City of Phoenix

Waste Characterization Study

2015 Final Report

CASCADIA CONSULTING GROUP

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Acknowledgments

This project required assistance and dedication from staff at the City and our partners. The project team would like to thank the following:

Operations Staff at North Gateway Transfer Station

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Field Services Staff

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Introduction and Objective

Since 2008, eight of the ten largest cities in the country (including Phoenix) have begun comprehensive waste characterization studies. These world class cities have used the results to:

- Increase recycling revenue by diverting more commodities into the recycling stream.
- Save money on tip fees by reducing the quantity of materials heading to the landfill.
- Reduce the contamination in recycling loads through targeted education campaigns.
- Save money by optimizing their collections, processing, and transfer operations.
- Develop local recycling markets and create new jobs in the recycling industry.
- Provide data to support development and implementation of future diversion technology and practices.

Increasing waste diversion is a high priority for the City of Phoenix: in early 2013, Mayor Stanton announced his goal to achieve a 40 percent landfill diversion rate by 2020. An important first step on the path to meeting this goal and increasing waste diversion is a well-informed analysis of the composition of Phoenix's residential waste stream.

The 2014 City of Phoenix Residential Waste Characterization Study collected composition and quantity data that may help guide policy formation and program implementation as the city moves toward its goal of 40 percent diversion by 2020. This study is an update to the previous Phoenix waste characterization study completed in 2003.

Project Overview

This study characterized samples from the following two substreams:

- **City Collected Residential Garbage –** Garbage generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials at the curb or in the alley.
- **City Collected Residential Recycling –** Recycling generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials at the curb or in the alley.

Prior to beginning fieldwork, Cascadia staff met with City staff, transfer station staff, and hauler representatives to plan and coordinate study logistics such as space at the transfer stations, vehicle selection strategies, and assistance from facility staff. Cascadia also worked with City staff to identify material types and definitions for this study. The field crew sorted the disposed and recycled samples into 84 unique material types which are divided among nine material classes

Cascadia pre-selected random residential garbage and recycling routes for sampling using route data provided by the City. Field crew staff photographed each sample, hand sorted the material into 84 different material types, and recorded the weight for each sorted material type. The average garbage

sample weight was 217 pounds and the average recycling sample weight was 136 pounds. In 2003 the average garbage sample weighed 228 pounds. The 2003 study did not include any recycling samples. The samples goals and actual samples sorted are summarized in Table 1. As shown, the Citywide garbage and recycling targets were exceeded.

Table 1. Sampling Goals and Actual Sample Counts

		Season 1		Season 2		Total	
Substream	**Bid Area**	**Goal**	**Actual**	**Goal**	**Actual**	**Goal**	**Actual**
Garbage	A	13	12	13	14	26	26
Garbage	B	13	12	13	14	26	26
Garbage	C	13	12	13	14	26	26
Garbage	D	13	15	13	12	26	27
Garbage	E	13	14	13	14	26	28
Garbage	F	13	13	13	13	26	26
Garbage	G	13	13	13	14	26	27
Garbage	H	13	13	13	12	26	25
Garbage	I	13	13	13	12	26	25
Garbage	J	13	13	13	13	26	26
Garbage Subtotal		***130***	***130***	***130***	***132***	***260***	***262***
Recycle	A	10	11	10	10	20	21
Recycle	B	10	8	10	12	20	20
Recycle	C	10	10	10	10	20	20
Recycle	D	10	12	10	12	20	24
Recycle	E	10	11	10	10	20	21
Recycle	F	10	11	10	11	20	22
Recycle	G	10	10	10	11	20	21
Recycle	H	10	11	10	10	20	21
Recycle	I	10	9	10	11	20	20
Recycle	J	10	8	10	12	20	20
Recycling Subtotal		***100***	***101***	***100***	***109***	***200***	***210***
Total		**230**	**231**	**230**	**241**	**460**	**472**

Summary of Findings

Cascadia analyzed the data from both seasons of field work to estimate the composition of residential garbage and recycling for each bid area and Citywide. To quantify diversion opportunities, the project team grouped material types according to their recoverability, using four recoverability groups:

- **Curbside Recycle –** Materials for which recycling technologies, programs, and markets are well developed and readily available. These materials are accepted in the current curbside program.
- **All Compostables –** Organic materials typically accepted for use in commercial compost systems.
- **Other Recoverable –** Materials for which recycling technologies, programs, and markets exist, but are not well developed **and area not part of the curbside recycle program.** Third parties frequently recycle these materials through drop-off recycling programs. **Examples include *grocery/merchandise bags*, and *batteries*.**

- **Non-recoverable – The trash and garbage m**aterials that are not readily recyclable or face other market-related barriers **to diversion**. Examples include *garbage bags*, *disposable diapers*, and *treated wood*.

Each material type was assigned to one of the recoverability groups based on the definitions listed above. Appendix A: Material Type Definitions shows how material types were categorized into each recoverability group. Detailed composition tables for each substream, bid area, and Citywide are presented in Appendix D: Detailed Composition Results by Bid Area.

When interpreting the results presented in the tables and figures in this report, it is important to consider the effect of rounding. Estimated tonnages are rounded to the nearest tenth of ton, and estimated percentages are rounded to the nearest hundredth of a percent. Tonnage subtotals and totals are rounded to the nearest ton. Percentage subtotals are rounded to the nearest tenth of a percent and totals to the nearest percent. Due to this rounding, the tonnages presented in the report, when added together, may not exactly match the subtotals and totals shown. Similarly, the percentages, when added together, may not exactly match the subtotals or totals shown.

Citywide Garbage Findings

The composition of residential garbage at the Citywide level is summarized in Figure 1 and Table 2. This composition data is based on 262 hand sorted samples. Tables in this section aggregate the 84 material types included in field sorting into 25 condensed material categories designed to showcase the curbside recyclables and compostable materials remaining in the garbage and to make the tables more readable when comparing the results between bid areas. Many, but not all, materials in the construction and demolition (C&D) category are included in the Other Recoverable group (the purple slice of the pie in Figure 1). However, the Other Recoverable slice of the pie is greater than the sum of the purple rows in Table 2 because the C&D materials are not listed individually. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Key findings for the Citywide garbage substream include:

- Nearly two-thirds (63.7%) of the residential garbage consists of material that can be diverted through standard recycling and composting programs.
- Compostable yard waste (29.9%) and food waste (14.7%) are the two most prevalent disposed materials. Combined they account for more than 40% of disposed residential garbage.
- More than 53,400 tons of material that could be recycled through the existing curbside collection program is being disposed annually. This is approximately 14% of disposed residential garbage.
- More than 55% of residential disposed garbage can be diverted through standard recycling and composting programs in every bid area and Citywide (see Figure 2).

Table 2. Citywide Garbage Summary Composition

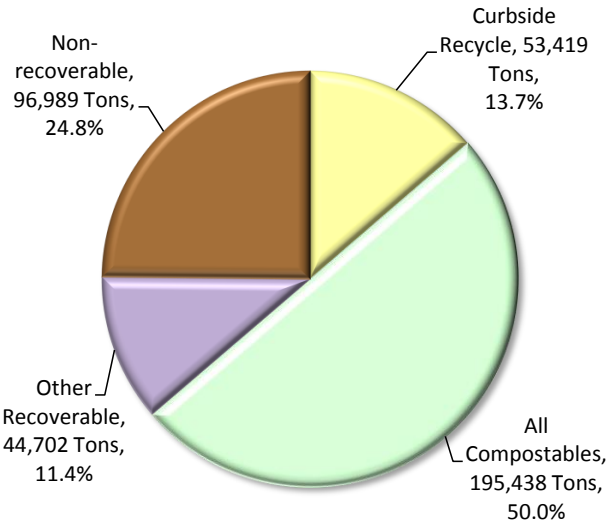
Material	Citywide %	Citywide Est. Tons
Paper	**12.6%**	**49,132**
Newspaper	0.95%	3,698.6
Unwaxed OCC / Kraft paper	1.38%	5,380.3
Other recyclable paper	4.36%	17,036.9
Compostable paper	5.43%	21,200.1
Other paper	0.47%	1,816.3
Plastic	**9.8%**	**38,127**
PET (#1) plastic	1.09%	4,245.0
HDPE (#2) plastic	0.53%	2,068.5
Other recyclable plastic (#3-#7 containers)	2.46%	9,598.6
Compostable plastic	0.02%	65.9
Clean plastic film (grocery sacks)	1.40%	5,468.9
Other plastic film (trash bags and food wrappers)	2.61%	10,181.4
Expanded Polystyrene	0.72%	2,814.2
Other plastic	0.94%	3,684.9
Glass	**1.9%**	**7,250**
Recyclable glass	1.18%	4,591.4
Other glass	0.68%	2,658.5
Metal	**2.7%**	**10,352**
Aluminum cans	0.26%	1,026.7
Tin/steel food cans	0.60%	2,328.5
Other recyclable metals	0.88%	3,444.1
Other metals	0.91%	3,552.4
Organic	**48.1%**	**187,991**
Compostable yard waste	29.91%	116,821.3
Food waste	14.68%	57,350.5
Non-compostable organic	3.54%	13,819.5
Construction and demolition waste*	**5.9%**	**23,227**
Household hazardous waste	**0.7%**	**2,566**
Other materials	**18.4%**	**71,903**
Subtotal Curbside Recycle	***13.7%***	***53,419***
Subtotal All Compostable	***50.0%***	***195,438***
Total	**100%**	**390,548**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

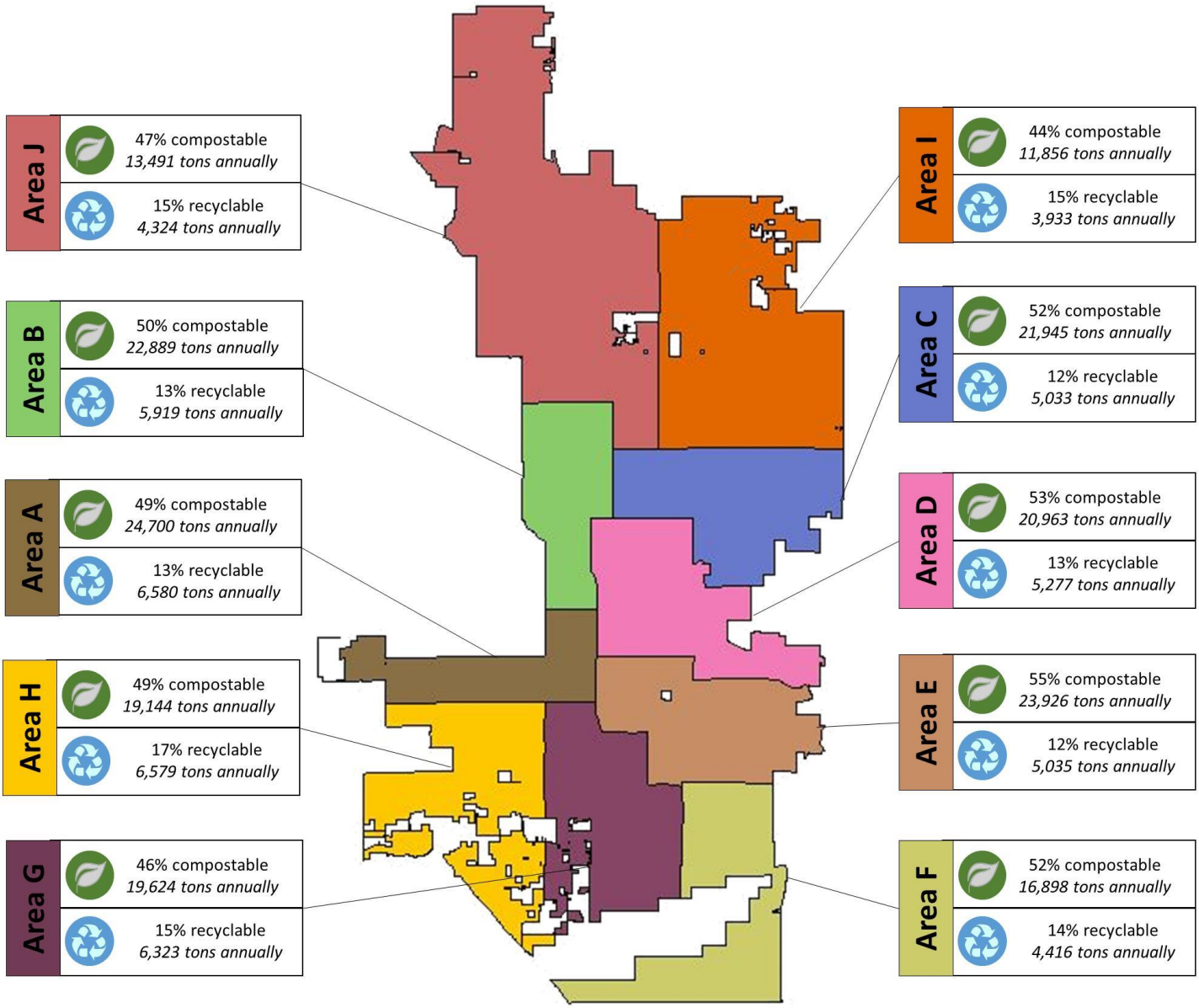
* Many, but not all, materials in the C&D category are included in the Other Recoverable group.

Figure 1. Citywide Garbage Recoverability



Due to rounding in this figure, sums may not exactly match subtotals and totals shown

Figure 2. Summary of Recoverability by Bid Area, Citywide Garbage



Citywide Recycling Findings

The recycling composition data is based on 210 hand sorted samples. Tables in this section aggregate the 84 material types using during field sorting into 21 condensed material categories designed to showcase the acceptable and contaminant materials in the recycling substream and to make the tables more readable when comparing the results between bid areas. Many, but not all, materials in the construction and demolition (C&D) category are included in the Other Recoverable group (the purple slice of the pie in Figure 3). However, the Other Recoverable slice of the pie is greater than the sum of the purple rows in Table 3 because the C&D materials are not listed individually. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

The composition of residential recycling at the Citywide level is summarized by recoverability group in Figure 3. More than three quarters of the recycling substream is Curbside Recycle, mostly recyclable paper (52.5%). Approximately 23% of the recycling substream is contaminants. Citywide, the five most prevalent contaminant material types are:

- *Non-distinct fines*, (2.9%, 2,950 tons). This is material smaller than 2" in diameter including dirt, broken glass, bottle caps, loose shredded paper, and small pieces of food.
- *Textiles*, (2.6%, 2,649 tons). This includes items mostly made of natural or synthetic fabrics such as pants, shirts, bed sheets, curtains, and towels. This does not include leather items.
- *Purchased food*, (2.2%, 2,266 tons). This includes most home food waste such as peels, bones, and unconsumed edible food.
- *Other plastic film*, (1.8%, 1,857 tons). This does not include grocery bags or trash bags. It includes most other plastic film such as chip bags, candy wrappers, frozen food bags, shower curtains, and inflatable mattresses.
- *Plastic/other materials*, (1.2%, 1,241 tons). This includes disposable razors, ballpoint pens, empty cigarette lighters, and toys made from a combination of plastic and metals parts.

The Citywide recycling composition is summarized in Table 3. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 3. Citywide Recycling Summary Composition

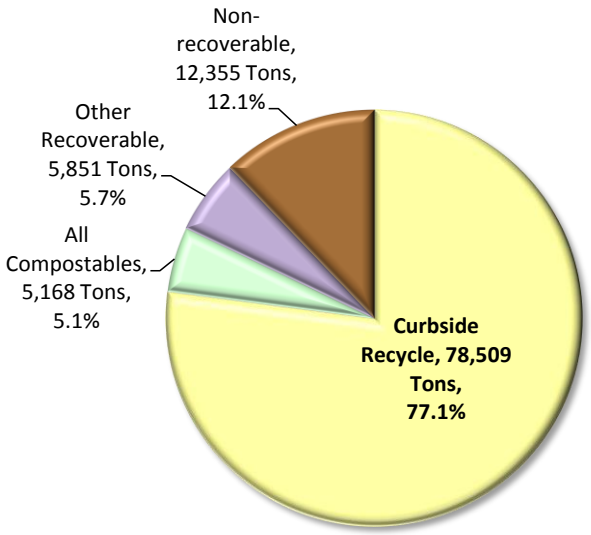
Material	Citywide %	Citywide Est. Tons
Paper	**54.8%**	**55,802**
Newspaper	8.92%	9,083.2
Unwaxed OCC / Kraft paper	16.84%	17,161.4
Other recyclable paper	26.70%	27,203.1
Other paper	2.31%	2,354.5
Plastic	**16.1%**	**16,379**
PET (#1) plastic	4.77%	4,859.8
HDPE (#2) plastic	3.20%	3,258.7
Other recyclable plastic	3.38%	3,439.8
Clean plastic film (grocery sacks)	0.75%	764.4
Other plastic film	2.15%	2,189.3
Expanded Polystyrene	0.61%	626.3
Other plastic	1.22%	1,241.2
Glass	**9.6%**	**9,820**
Recyclable glass	9.35%	9,527.1
Other glass	0.29%	292.6
Metal	**4.6%**	**4,695**
Aluminum cans	1.02%	1,043.3
Tin/steel food cans	1.49%	1,516.5
Other recyclable metals	1.39%	1,416.0
Other metals	0.71%	718.9
Organic	**4.0%**	**4,027**
Construction and demolition waste*	**1.4%**	**1,437**
Household hazardous waste	**0.2%**	**238**
Other materials	**9.3%**	**9,484**
Subtotal Curbside Recycle	***77.1%***	***78,509***
Subtotal Contaminants	***22.9%***	***23,374***
Total	**100%**	**101,882**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

* Many, but not all, materials in the C&D category are included in the Other Recoverable group.

Figure 3. Citywide Recycling Recoverability



Due to rounding in this figure, sums may not exactly match subtotals and totals shown

Contaminants in the Recycling

Citywide, the recycling contamination rate is approximately 23%. As shown in Table 4, the contamination rate ranges from nearly 15% in area F to nearly one third (32.7%) in area A. Table 4 also notes the five most prevalent contaminant material types in each bid area and Citywide. *Non-distinct fines*, *textiles, purchased food*, and *other plastic film* are in the top five in every bid area; Citywide, they are the four most prevalent contaminants. *Plastic/other materials* is in the top five in two of the ten bid areas and Citywide. *Leaves and grass* and *paper/other materials* are each in the top five in two bid areas. *Other electronics*, *furniture*, *miscellaneous organics*, and *disposable diapers* were each in the top five in one bid area (areas F, B, J, and G respectively). The top five contaminants comprise between 45% and 60% of the total contamination in each bid area and Citywide. The contamination rate in each bid area is further summarized in Figure 4. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

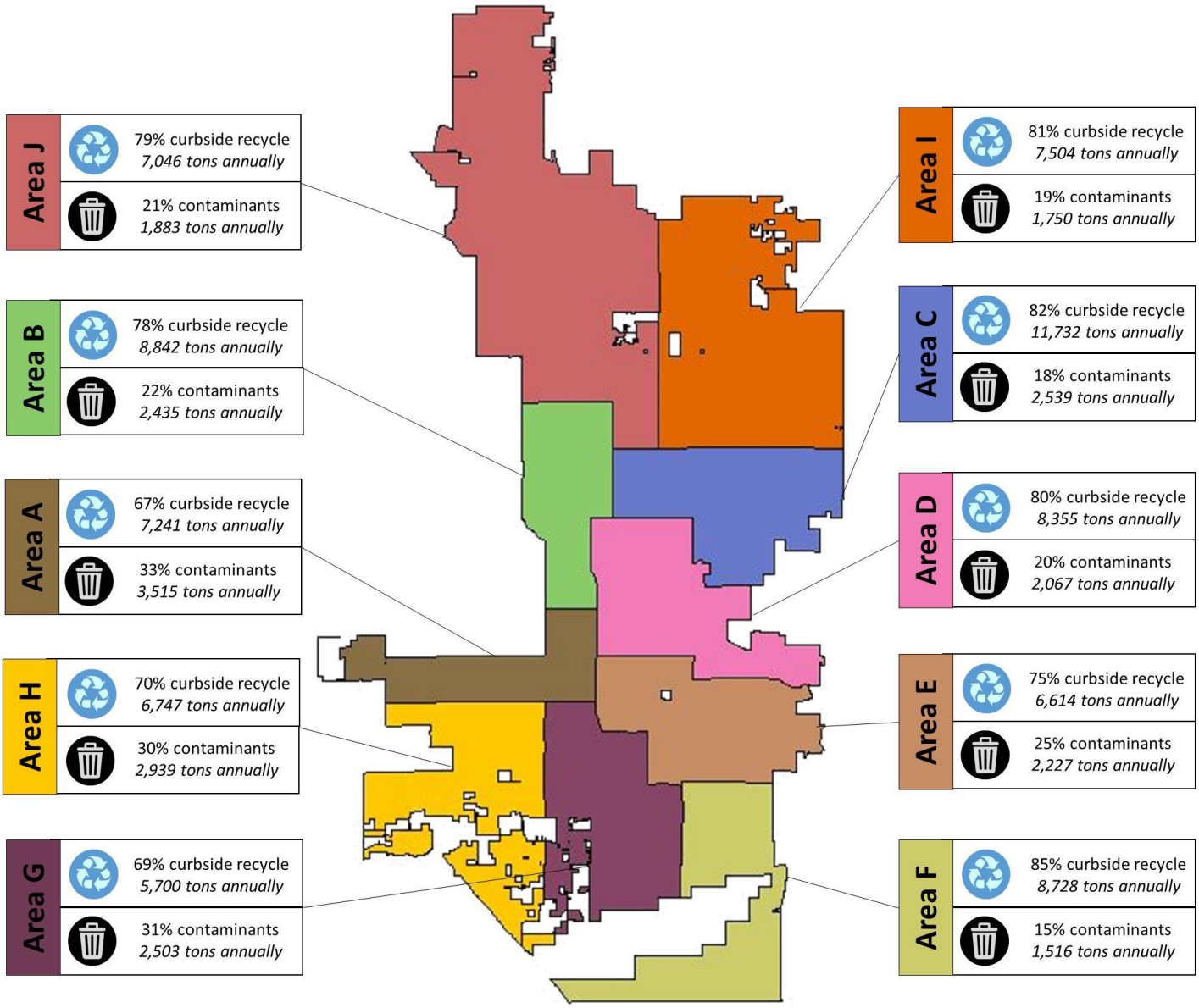
Table 4. Acceptable and Contaminant Materials by Bid Area, Citywide Recycling

	Bid Area Composition										Citywide
	A	B	C	D	E	F	G	H	I	J	Composition
Recyclable	**67.3%**	**78.4%**	**82.2%**	**80.2%**	**74.8%**	**85.2%**	**69.5%**	**69.7%**	**81.1%**	**78.9%**	**77.1%**
Recyclable papers	45.40%	54.07%	58.59%	57.10%	49.28%	57.50%	40.73%	46.19%	54.91%	56.12%	52.46%
Recyclable plastics	11.57%	11.40%	11.33%	9.88%	10.88%	10.77%	13.08%	12.76%	11.55%	10.51%	11.34%
Recyclable glass	6.56%	8.99%	8.39%	10.30%	11.42%	12.87%	12.20%	6.92%	9.55%	7.32%	9.35%
Recyclable metals	3.79%	3.94%	3.90%	2.89%	3.23%	4.06%	3.48%	3.78%	5.08%	4.95%	3.90%
Common Contaminants											
Non-distinct fines	4.51%	2.14%	1.48%	2.95%	2.94%	2.52%	5.09%	3.73%	2.18%	2.32%	2.90%
Textiles	3.67%	2.19%	2.80%	2.55%	2.34%	1.92%	3.06%	2.86%	2.06%	2.45%	2.60%
Purchased food	2.62%	2.20%	1.52%	1.86%	1.73%	1.07%	4.47%	3.69%	1.72%	1.98%	2.22%
Other plastic film	2.10%	1.43%	2.12%	1.58%	1.67%	1.41%	1.93%	2.25%	1.85%	1.83%	1.82%
Plastic/other materials								2.16%	1.36%		1.22%
Leaves & grass	3.58%				5.35%						
Paper/other materials			1.85%	1.64%							
Other electronics						1.16%					
Miscellaneous Organics										2.31%	
Disposable diapers							2.37%				
Furniture		3.10%									
Sum of Top Five Contaminants	**16.5%**	**11.1%**	**9.8%**	**10.6%**	**14.0%**	**8.1%**	**16.9%**	**14.7%**	**9.2%**	**10.9%**	**10.8%**
All Other Contaminants	**16.2%**	**10.5%**	**8.0%**	**9.3%**	**11.2%**	**6.7%**	**13.6%**	**15.6%**	**9.8%**	**10.2%**	**12.2%**
Total Contaminants	**32.7%**	**21.6%**	**17.8%**	**19.8%**	**25.2%**	**14.8%**	**30.5%**	**30.3%**	**18.9%**	**21.1%**	**22.9%**
Total Composition	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 4. Summary of Contamination Rate by Bid Area, Citywide Recycling



2. Project Overview

Introduction and Background

The City of Phoenix (City) provides solid waste collection and disposal service to approximately 397,000 residential units and institutions. For collection purposes, the City is divided into four service regions; each containing two or three bid areas for a total of ten bid areas. The City began its residential recycling program in 1989 and by February 2000 had expanded the program Citywide. Approximately 90% of households participate in the voluntary recycling program. In addition to solid waste collection, the City also operates two disposed waste transfer stations. Each is co-located with a Material Recovery Facility (MRF) for processing single stream recycling loads.

Since 2008, eight of the ten largest cities in the country (including Phoenix) have begun comprehensive waste characterization studies. These world class cities have used the results to:

- Increase recycling revenue by diverting more commodities into the recycling stream.
- Save money on tip fees by reducing the quantity of materials heading to the landfill.
- Reduce the contamination in recycling loads through targeted education campaigns.
- Save money by optimizing their collections, processing, and transfer operations.
- Develop local recycling markets and create new jobs in the recycling industry.
- Provide data to support development and implementation of future diversion technology and practices.

Increasing waste diversion is a high priority for the City of Phoenix: in early 2013, Mayor Stanton announced his goal to achieve a 40 percent landfill diversion rate by 2020. An important first step on the path to meeting this goal and increasing waste diversion is a well-informed analysis of the composition of Phoenix's residential waste stream.

The 2014 City of Phoenix Residential Waste Characterization Study collected composition and quantity data that may help guide policy formation and program implementation as the city moves toward its goal of 40 percent diversion by 2020. This study is an update to the previous Phoenix waste characterization study completed in 2003.

Summary of Methodology

The following sections summarize the three main tasks of the study methodology: Develop Plan, Collect Data, and Analyze Data.

Develop Plan

Step 1. Coordinate with City, Facility, and Hauler Staff

Prior to beginning fieldwork, Cascadia staff met with City staff, transfer station staff, and hauler representatives to plan and coordinate study logistics such as space at the transfer stations, vehicle selection strategies, and assistance from facility staff. The field services staff at the City's Public Works

Department (PWD) helped to coordinate route selection and the delivery of selected loads to the appropriate facilities. Facility staff helped to coordinate sample collection, sample disposal, and other details involved with the field data collection effort.

Step 2. Define Waste Streams

During the kickoff meeting, the project team defined the sampling universe. In this study, the universe included substreams waste streams that our field team quantified and characterized. A "substream" is determined by the particular generation, collection, or composition characteristics that make it a unique portion of the total waste stream.

In this study, the universe included the following two substreams for characterization and quantification:

- **City-Collected Residential Garbage –** Garbage generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials curbside or in the alley.
- **City-Collected Residential Recycling –** Recycling generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials curbside or in the alley.

The City is divided into four service regions and each region contains two to three bid areas for a total of ten bid areas. We allocated samples to and documented the quantities and composition of garbage and recycling from each bid area and for the City overall.

The tonnage associated with each substream and bid area can be found in Appendix H: Detailed Tonnage Data.

Step 3. Define Materials

Cascadia worked with City staff to identify material types and definitions for this study. The field crew sorted the disposed and recycled samples into 84 unique material types which are divided among eight material classes: **Paper, Plastic, Glass, Metal, Organic, Other Materials, Hazardous Waste,** and **Construction & Demolition.** Please refer to Appendix A: Material Type Definitions for the division of material types into material classes, and for material type definitions.

Step 4. Schedule Field Work and Allocate Samples

Sampling and sorting was completed over two field seasons approximately six months apart. Each field season covered two weeks each. The summer field season began on Monday August 18, 2014 and wrapped up Friday 8/29/2014. The second (winter) field season began Monday February 23, 2015 and wrapped up Friday 3/6/2015. Sampling dates were scheduled to avoid sampling on or near major holidays including the 2015 Super Bowl. The 260 garbage samples and 200 recycling samples were allocated approximately equally among the ten bid areas, two field seasons, and ten field days in each season.

The target sample allocations are summarized in Table 5.

Table 5. Sampling Allocation by Substream and Bid Area

Bid Area	Garbage		Recycle		Total	
	Season 1	Season 2	Season 1	Season 2	Garbage	Recycle
A	13	13	10	10	26	20
B	13	13	10	10	26	20
C	13	13	10	10	26	20
D	13	13	10	10	26	20
E	13	13	10	10	26	20
F	13	13	10	10	26	20
G	13	13	10	10	26	20
H	13	13	10	10	26	20
I	13	13	10	10	26	20
J	13	13	10	10	26	20
Total	**130**	**130**	**100**	**100**	**260**	**200**

Collect Data

Step 1. Route Selection

The first step in obtaining samples is to select random routes for sampling. Cascadia pre-selected regularly scheduled residential garbage and recycling routes using route data provided by the City. This route data included the collection day, the bid area, the route ID, and the substream (garbage or recycling).

Cascadia pre-selected routes for sampling data using the following three steps:

1. Compile a complete list of all routes using route data.
2. Assign each route a random number.
3. Select routes from this randomized list until the sample selection goals by substream and bid area are fulfilled.

We summarized selected routes for each sampling day on a *Vehicle Selection Sheet* and created an identifying *Sample Placard* for each route. A complete list of selected routes is included in Appendix G: Complete List of Selected Routes. Example field forms are included in Appendix F: Example Field Forms.

Most selected routes were directed to tip at their normal transfer station. To balance the daily workload and increase the efficiency of the field crew, several routes were redirected by the City from the transfer station where they normally tip to the other transfer station. The redirected routes are noted on the complete list of selected routes.

Cascadia distributed copies of the *Vehicle Selection Sheets* and *Sample Placards* to the City field services staff prior to sampling. The field services staff then distributed *Sample Placards* to the drivers of the routes selected for sampling, reminded them to participate in the study, and (as necessary) redirected routes. Prior to sampling, the field services staff noted the anticipated truck numbers for selected routes

on the *Vehicle Selection Sheets* and transmitted this information back to Cascadia. The field crew used the *Vehicle Selection Sheets* to facilitate vehicle identification at the sampling locations.

Step 2. Collect and Sort Samples

The field crew hand-sorted all recycling and garbage samples. When a selected vehicle arrived at the transfer station, the field supervisor collected the *Sample Placard*, verified with the driver the information noted on the *Sample Placard*, and directed the selected vehicle to the proper tipping location. After the vehicle dumped its load, the field supervisor superimposed an imaginary clock face grid over the dumped material. The field supervisor selected a sample from one cell on the clock using a randomly generated cell number (noted on the *Sample Placard*), and received assistance from the transfer station's loader and operator to extract this sample from the load. Field crew staff photographed each sample, sorted the material into 84 different material types, and recorded the weight for each sorted material type into the *Material Weight Tally Sheet*. The average garbage sample weight was 217 pounds and the average recycling sample weight was 136 pounds. In 2003 the average garbage sample weighed 228 pounds. The 2003 study did not include any recycling samples. For a full description of the sort method, refer to Appendix B: Detailed Study Design. For full list of material components and definitions used in the characterization field work, refer to Appendix A: Material Type Definitions.

Figure 5. Overview of Hand Sort Process

The samples goals and actual samples sorted are summarized in Table 6. As shown, the Citywide garbage and recycling targets were exceeded.

Table 6. Sampling Goals and Actual Sample Counts

		Season 1		Season 2		Total	
Substream	**Bid Area**	**Goal**	**Actual**	**Goal**	**Actual**	**Goal**	**Actual**
Garbage	A	13	12	13	14	26	26
Garbage	B	13	12	13	14	26	26
Garbage	C	13	12	13	14	26	26
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Garbage	H	13	13	13	12	26	25
Garbage	I	13	13	13	12	26	25
Garbage	J	13	13	13	13	26	26
Garbage Subtotal		***130***	***130***	***130***	***132***	***260***	***262***
Recycle	A	10	11	10	10	20	21
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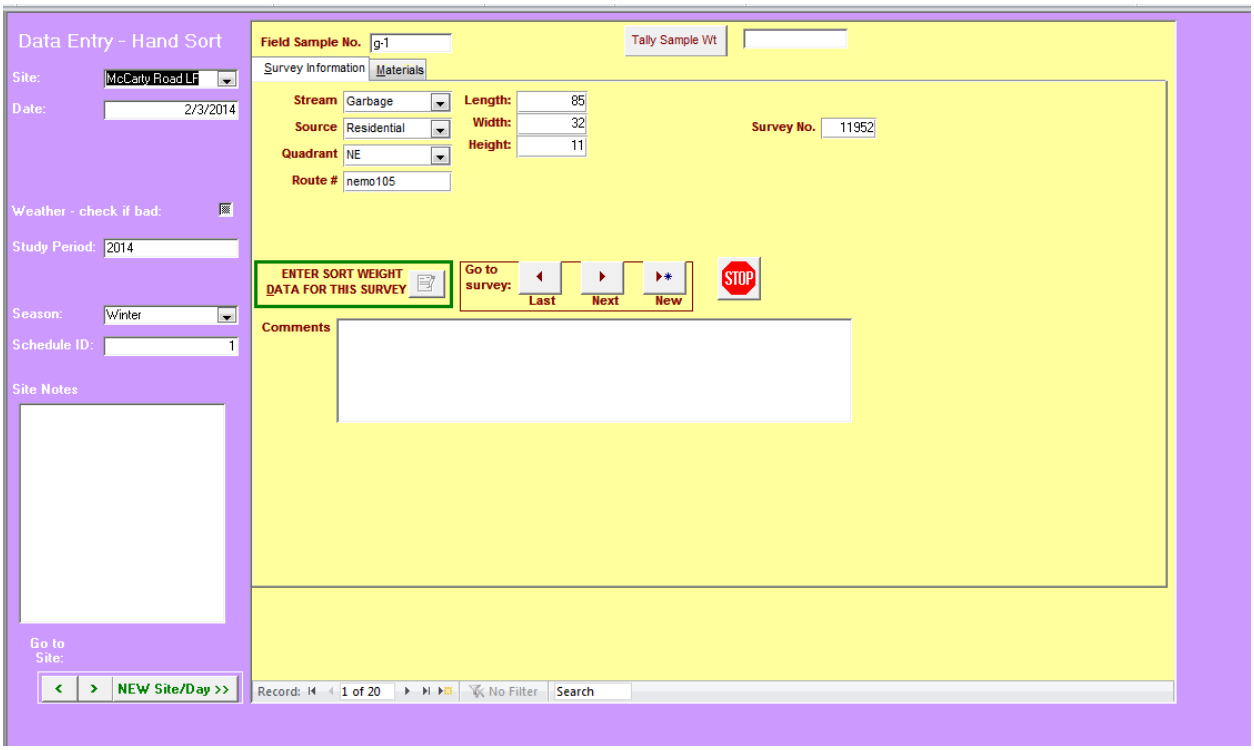
Recycle	D	10	12	10	12	20	24
Recycle	E	10	11	10	10	20	21
Recycle	F	10	11	10	11	20	22
Recycle	G	10	10	10	11	20	21
Recycle	H	10	11	10	10	20	21
Recycle	I	10	9	10	11	20	20
Recycle	J	10	8	10	12	20	20
Recycling Subtotal		***100***	***101***	***100***	***109***	***200***	***210***
Total		**230**	**231**	**230**	**241**	**460**	**472**

Analyze Data

Cascadia field staff reviewed all field forms daily to identify any unusual or missing entries and resolve them immediately. After field work, Cascadia staff entered all collected data into a customized database with built in data validation protocols (see Figure 6 for a screenshot of the data entry database).

The project team developed detailed estimates of waste composition and quantities for each substream using the tonnage data the City provided and the methods described in Appendix C: Waste Characterization Calculations.

Figure 6. Screenshot of Data Entry Database



Method to Obtain Tonnage Data

Cascadia required annual tonnage information to complete the analysis. The City of Phoenix provided Cascadia with the garbage and recycling tonnage by bid area from June 2013 to May 2014, the most recent fiscal year available, to support the analysis. The tonnage information for all substreams and bid area is summarized in Appendix H: Detailed Tonnage Data.

Changes from the Study Design

Over the course of a study unforeseen circumstances can arise that require the project team to deviate from the study design. The only significant deviation from the study design occurred on Tuesday 8/19/2014, when sampling activities were cancelled around 9:00am due to torrential rains and regional flooding which delayed or postponed collections due to roadway closures leading to the transfer station. This weather resulted in consistently low Tuesday sample counts across all bid areas. The field crew collected additional samples each day over the remainder of the summer study period to get caught up and meet the overall sampling targets.

3. Waste Characterization Results

Interpreting the Results

This report presents characterization results in three ways:

- First, two pie charts present an overview of composition by **Material Class** and Recoverability group. The *material types* included in each Recoverability Groups are illustrated in Appendix A: Material Type Definitions
- Next, the 10 most prevalent individual *material types*, by weight, are shown in a table.
- Finally, a detailed table lists the full composition and quantity results for the 84 *material types* used in the study. Please refer to Appendix A: Material Type Definitions for a list of definitions for *material types*.

To quantify diversion opportunities, the project team grouped material types according to their recoverability, using four recoverability groups:

- **Curbside Recycle –** Materials for which recycling technologies, programs, and markets are well developed and readily available. These materials are accepted in the current curbside program.
- **All Compostables –** Organic materials typically accepted for use in commercial compost systems.
- **Other Recoverable –** Materials for which recycling technologies, programs, and markets exist, but are not well developed **and area not part of the curbside recycle program.** Third parties frequently recycle these materials through drop-off recycling programs. **Examples include *grocery/merchandise bags*, and *batteries*.**
- **Non-recoverable – The trash and garbage m**aterials that are not readily recyclable or face other market-related barriers **to diversion**. Examples include *garbage bags*, *disposable diapers*, and *treated wood*.

Additional tables summarizing the composition and quantity data for each bid area are also included for each of the substreams.

Error Range (+/-)

The error range is a measure of the spread of values (variability) in a collection of data. For instance, if the quantities of *newspaper* were found to be nearly the same in each of the 262 garbage samples collected for this study, the result would be a very narrow error range. By contrast, if some samples were comprised of 75% *newspaper* and others were 0% *newspaper,* the results would show a much broader error range. In some cases the error range is larger than the estimated mean which leads to a negative number when the error range is subtracted from the mean. In these cases the true amount can be considered to be between 0.0% and the mean plus the error range.

Means and Error Ranges

The data from the characterization process were treated with a statistical procedure that provided two kinds of information for each of the *material types*:

- The percent-by-weight estimated composition of waste and
- The degree of precision of the composition estimates (expressed as the error range).

All estimates of precision were calculated at the 90% confidence level. An explanation of these calculations appears in Appendix C: Waste Characterization Calculations.

The example below illustrates how the results can be interpreted. In this example, the best estimate of the amount of *purchased food* present in Phoenix's waste is 12.3%. The plus or minus figure 0.9% reflects the precision of the estimate. When calculations are performed at the 90% confidence level, we are 90% certain that the true amount of *purchased food* is between 12.3% plus 0.9% and 12.3% minus 0.9%. In other words, we are 90% certain that the true amount of *purchased food* lies between 11.4% and 13.2%.

Material Type	Estimated Percent	+ / -
Purchased Food	12.3%	0.9%

Rounding

When interpreting the results presented in the tables and figures in this report, it is important to consider the **effect of rounding**.

To keep the composition tables and figures readable, estimated tonnages are rounded to the nearest tenth of ton, and estimated percentages are rounded to the nearest hundredth of a percent. Tonnage subtotals and totals are rounded to the nearest ton. Percentage subtotals are rounded to the nearest tenth of a percent and totals to the nearest percent. Due to this rounding, the **tonnages** presented in the report, when added together, may not exactly match the subtotals and totals shown. Similarly, the **percentages**, when added together, may not exactly match the subtotals or totals shown. Percentages less than 0.005% are shown as 0.00%.

It is important to recognize that the tons throughout the report were calculated using the non-rounded percentages. Therefore, using the rounded percentages from the tables to calculate tonnages may yield tonnages that are slightly different than those shown in the report.

For example, the rounded percentage for *purchased food* in Table 8 is shown as 12.27%, while the more precise number, 12.2666477417999%, was used in calculations. Similarly the total tonnage is shown as 390,548, slightly more than the more precise value of 390,547.55 used in the calculations. Using the more precise numbers, *purchased food* is calculated to be 47,907.1 tons (as shown in Table 8) which is slightly less than the 47,920.2 tons we would get if we calculated using the rounded numbers (12.27%, 390,548 tons).

Infrequent Material Types

Composition estimates for certain materials have a higher degree of uncertainty for two main reasons:

- The materials are infrequently disposed, and, consequently, appear infrequently in samples. Examples of such materials include *explosives*, *tires*, and *ash*. Because the composition results are based on few instances of these materials, the results are less certain, as shown by the relatively large error range.
- The quantity of material is highly variable between samples. *Mattresses*, for example, usually aren't found in any sample. When they are found, there is usually a large quantity of them (because the mattress weighs a lot it ends up being a large portion of the sample). This variability also increases the error range.

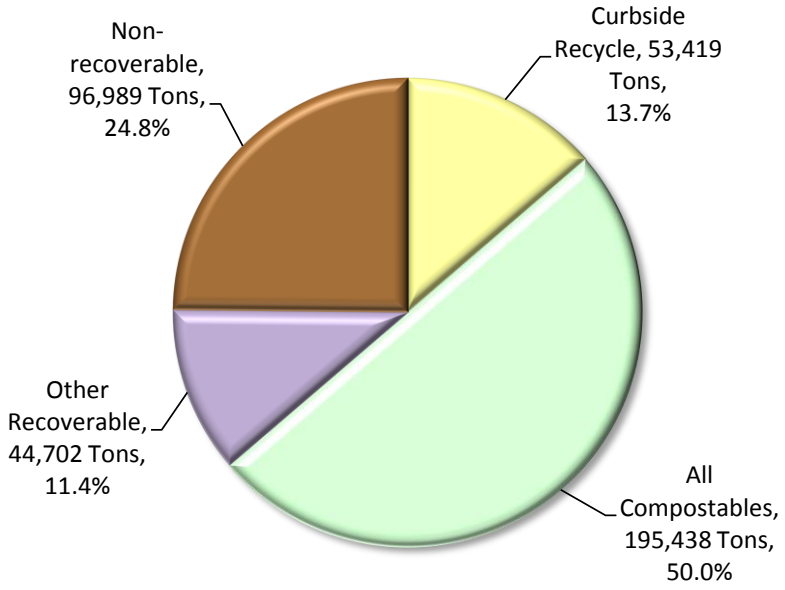
As an example, *tires* are estimated to comprise 0.1% of the Citywide garbage substream with a 0.1% error range. In other words, *tires* may be as much as 0.2% or as little as 0.0% of the waste stream, 100% more or less than the best estimate (0.1%). Small, lightweight materials that appear frequently in samples also make up a small percentage of the overall composition. These frequently-found materials, in contrast, have smaller relative confidence intervals. An example is *#1 PET bottles*, which comprise a small percentage of the overall waste stream (0.8%) and have a relatively small confidence interval (0.0%).

Citywide Garbage Findings

The results in this section are based on the weighted average of all 262 garbage samples collected from the ten bid areas. Annual garbage tonnages in each bid area are used to weight the results.

As shown in Figure 7, approximately 50% of the garbage is compostable and approximately 14% is recyclable in the current curbside program. The All Compostables recoverability group includes materials like *purchased food*, *leaves and grass*, and *compostable plastic bags.* The Curbside Recycle recoverability group includes materials like *newspaper*, *aluminum cans*, and *#1 PET bottles.* When combined these two readily recoverable groups of materials account for nearly two thirds (64%) of the City's garbage. Due to rounding in the figure, sums may not exactly match subtotals and totals shown.

Figure 7. Composition by Recoverability Group, Citywide Garbage



Due to rounding in this figure, sums may not exactly match subtotals and totals shown

The ten most prevalent material types in the Citywide garbage can be found in Table 7. The four most prevalent materials: *leaves and grass* (22.90%), *purchased food* (12.27%), *prunings less than 2"* (5.68%), and *compostable/food soiled paper* (5.36%) are compostable and combined account for more than 46% of the Citywide garbage. In all, the ten most prevalent materials account for nearly 66% of garbage. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

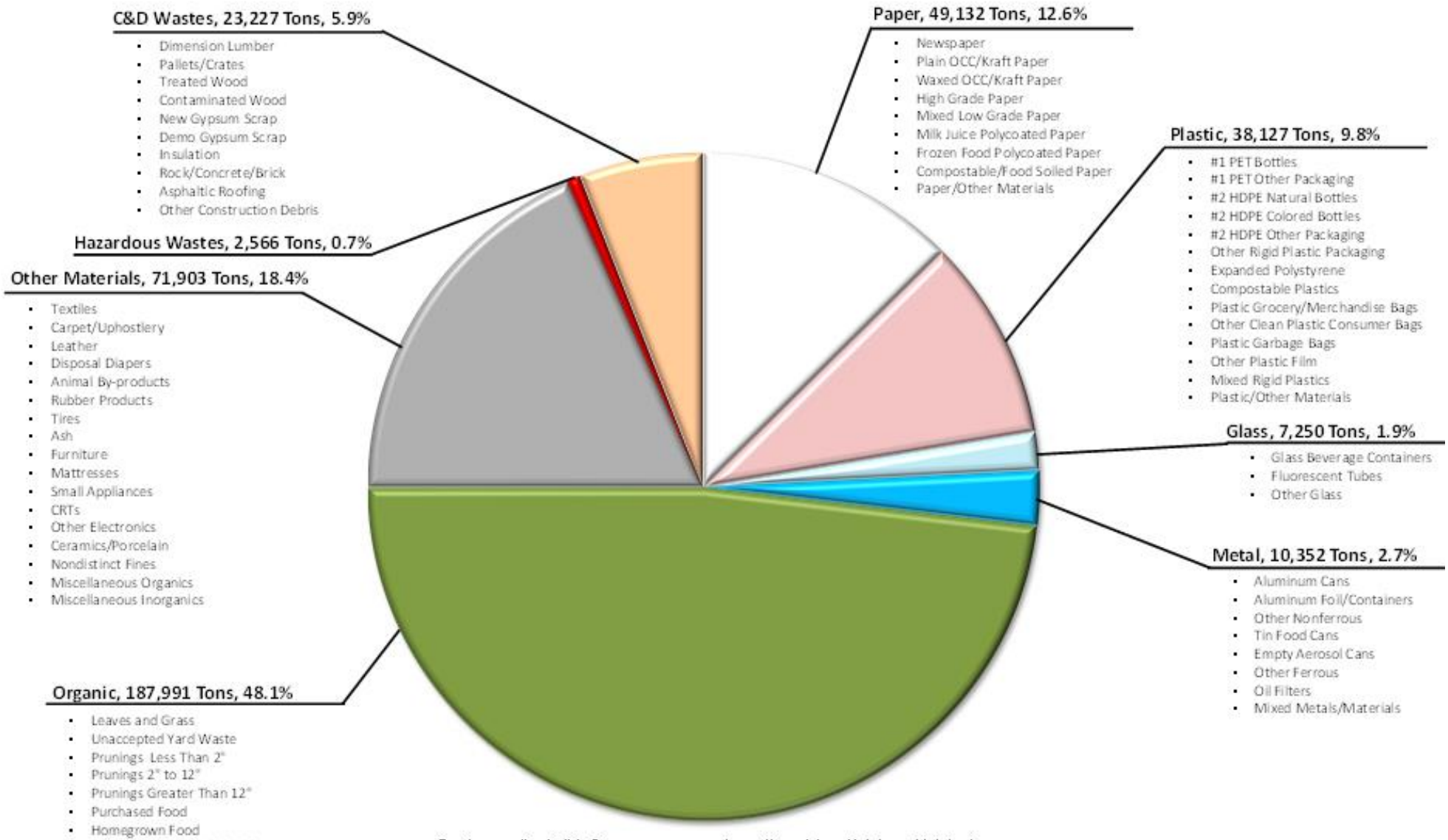
Table 7. Ten Most Prevalent Material Types, Citywide Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	22.90%	22.90%	89,453.9
Purchased Food	12.27%	35.17%	47,907.1
Prunings Less than 2"	5.68%	40.85%	22,171.4
Compostable/Food Soiled Paper	5.36%	46.21%	20,943.0
Textiles	4.16%	50.37%	16,228.6
Mixed Low-grade Paper	3.78%	54.15%	14,776.9
Unaccepted Yard Waste	3.10%	57.25%	12,121.3
Disposable Diapers	3.10%	60.36%	12,120.0
Animal By-products	2.65%	63.00%	10,336.3
Carpet/Upholstery	2.55%	65.55%	9,944.7
Subtotal	***65.5%***		***256,003***
All other material types	34.5%		134,544.3
Total	**100%**		**390,548**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

The composition data by material class are presented in Figure 8. **Organic** (48.1%) is the most prevalent material class. **Other Materials** and **Paper**, 18.4% and 12.6% respectively are the next largest classes. The **Other Materials** class includes many durable consumer goods and materials whose nature could not be determined by the field crew. Due to rounding in the figure, sums may not exactly match subtotals and totals shown.

Figure 8. Composition by Material Class, Citywide Garbage



Due to rounding in this figure, sums may not exactly match subtotals and totals shown

The detailed composition of the Citywide garbage is shown in Table 8. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 8. Detailed Composition, Citywide Garbage

Material	Estimated Percent	+ / -	Estimated Tons	Material	Estimated Percent	+ / -	Estimated Tons
Paper	**12.6%**		**49,132**	**Other Materials**	**18.4%**		**71,903**
Newspaper	0.95%	0.1%	3,698.6	Textiles	4.16%	0.5%	16,228.6
Plain OCC/Kraft Paper	1.38%	0.2%	5,380.3	Carpet/Upholstery	2.55%	0.6%	9,944.7
Waxed OCC/Kraft Paper	0.07%	0.0%	257.1	Leather	0.21%	0.1%	806.5
High Grade Paper	0.31%	0.1%	1,225.9	Disposable Diapers	3.10%	0.3%	12,120.0
Mixed Low-grade Paper	3.78%	0.3%	14,776.9	Animal By-products	2.65%	0.5%	10,336.3
Milk/Juice Polycoated Paper	0.14%	0.0%	550.8	Rubber Products	0.60%	0.2%	2,352.8
Frozen Food Polycoated Paper	0.12%	0.0%	483.4	Tires	0.10%	0.1%	381.0
Compostable/Food Soiled Paper	5.36%	0.3%	20,943.0	Ash	0.03%	0.0%	135.7
Paper/Other Materials	0.47%	0.1%	1,816.3	Furniture	0.08%	0.1%	306.8
				Mattresses	0.02%	0.0%	90.5
Plastic	**9.8%**		**38,127**	Small Appliances	0.65%	0.2%	2,533.3
#1 PET Bottles	0.83%	0.0%	3,251.9	CRTs	0.25%	0.2%	969.9
#1 PET Other Packaging	0.25%	0.0%	993.1	Other Electronics	0.68%	0.2%	2,644.0
#2 HDPE Natural Bottles	0.22%	0.0%	877.5	Ceramics/Porcelain	0.42%	0.1%	1,631.1
#2 HDPE Colored Bottles	0.28%	0.0%	1,092.6	Non-distinct Fines	1.81%	0.3%	7,087.0
#2 HDPE Other Packaging	0.03%	0.0%	98.4	Miscellaneous Organics	0.93%	0.1%	3,643.2
Other Rigid Plastic Packaging	0.83%	0.0%	3,254.3	Miscellaneous Inorganics	0.18%	0.1%	691.2
Expanded Polystyrene	0.72%	0.1%	2,814.2				
Compostable Plastics	0.02%	0.0%	65.9	**Hazardous Wastes**	**0.7%**		**2,566**
Plastic Grocery/Merchandise Bags	1.02%	0.1%	3,979.7	Latex Paint	0.12%	0.1%	485.7
Other Clean Plastic Consumer Product Bags	0.38%	0.0%	1,489.2	Hazardous Adhesives/Glues	0.01%	0.0%	29.3
Plastic Garbage Bags	0.99%	0.1%	3,850.9	Non-hazardous Adhesives/Glues	0.00%	0.0%	16.4
Other Plastic Film	1.62%	0.2%	6,330.5	Oil-based Paint/Solvent	0.02%	0.0%	69.4
Mixed Rigid Plastics	1.62%	0.2%	6,344.3	Hazardous Cleaners	0.01%	0.0%	28.6
Plastic/Other Materials	0.94%	0.2%	3,684.9	Pesticides/Herbicides	0.01%	0.0%	53.2
				Non-rechargeable Dry-cell Batteries	0.06%	0.0%	215.0
Glass	**1.9%**		**7,250**	Rechargeable Dry-cell Batteries	0.01%	0.0%	32.8
Glass Beverage Containers	1.18%	0.0%	4,591.4	Wet-cell (car) Batteries	0.00%	0.0%	15.8
Fluorescent Tubes	0.00%	0.0%	18.7	Asbestos	0.00%	0.0%	0.0
Other Glass	0.68%	0.0%	2,639.8	Explosives	0.01%	0.0%	25.8
				Vehicle and Equipment Fluids	0.01%	0.0%	46.1
Metal	**2.7%**		**10,352**	Pool Chemicals	0.00%	0.0%	1.0
Aluminum Cans	0.26%	0.0%	1,026.7	Other Hazardous Chemicals	0.13%	0.1%	524.9
Aluminum Foil/Containers	0.17%	0.0%	669.7	Other Non-hazardous Chemicals	0.26%	0.0%	1,021.5
Other Nonferrous	0.09%	0.0%	348.4				
Tin Food Cans	0.60%	0.0%	2,328.5	**C&D Wastes**	**5.9%**		**23,227**
Empty Aerosol Cans	0.10%	0.0%	390.9	Dimension Lumber	0.57%	0.2%	2,218.0
Other Ferrous	0.52%	0.1%	2,035.1	Pallets/Crates	0.09%	0.1%	342.3
Oil Filters	0.02%	0.0%	94.7	Treated Wood	0.81%	0.3%	3,177.9
Mixed Metals/Material	0.89%	0.3%	3,457.7	Contaminated Wood	1.23%	0.3%	4,789.1
				New Gypsum Scrap	0.25%	0.2%	965.6
Organic	**48.1%**		**187,991**	Demo Gypsum Scrap	0.27%	0.2%	1,040.0
Leaves & Grass	22.90%	1.5%	89,453.9	Insulation	0.02%	0.0%	80.8
Unaccepted Yard Waste	3.10%	0.7%	12,121.3	Rock/Concrete/Bricks	1.25%	0.3%	4,892.7
Prunings Less than 2"	5.68%	0.6%	22,171.4	Asphaltic Roofing	0.38%	0.2%	1,490.4
Prunings 2" to 12"	1.33%	0.4%	5,196.0	Other Construction Debris	1.08%	0.4%	4,230.0
Prunings Greater than 12"	0.43%	0.3%	1,698.1				
Purchased Food	12.27%	0.7%	47,907.1	**Totals**	**100%**		**390,548**
Homegrown Food	1.98%	0.6%	7,733.8				
Beverages and Liquids	0.44%	0.1%	1,709.6	**Sample Count**			**262**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Comparisons Between Bid Areas

As shown in Table 9 more than 55% of residential disposed garbage can be diverted through standard recycling and composting programs in every bid area and Citywide. Between 10% and 20% of the residential garbage is recyclable in every bid area and more than 40% is compostable in every bid area. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 9. Recoverable Material Composition by Bid Area, Citywide Garbage

	Bid Area Composition										Citywide
Category	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Composition**
Recyclable	**13%**	**13%**	**12%**	**13%**	**12%**	**14%**	**15%**	**17%**	**15%**	**15%**	**14%**
Recyclable papers	5.9%	6.4%	6.4%	7.0%	5.3%	6.5%	7.0%	8.9%	6.8%	7.1%	6.7%
Recyclable plastics	4.2%	4.1%	3.1%	3.7%	3.6%	4.3%	5.1%	4.1%	4.8%	4.1%	4.1%
Recyclable glass	1.4%	1.0%	0.9%	1.1%	1.0%	1.1%	1.2%	1.7%	1.0%	1.3%	1.2%
Recyclable metals	1.6%	1.5%	1.6%	1.5%	1.6%	1.8%	1.5%	2.1%	2.1%	2.5%	1.7%
Compostable	**49%**	**50%**	**52%**	**53%**	**55%**	**52%**	**46%**	**49%**	**44%**	**47%**	**50%**
Compostable paper	5.4%	5.2%	5.5%	5.4%	4.0%	5.6%	5.2%	5.9%	6.8%	6.1%	5.4%
Compostable plastic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Compostable yard waste	30.3%	31.6%	28.8%	32.2%	39.3%	30.6%	27.2%	27.1%	21.5%	25.8%	29.9%
Food waste	13.5%	13.5%	17.9%	15.1%	11.5%	16.3%	13.5%	16.0%	16.1%	15.0%	14.7%
Other	**38%**	**37%**	**36%**	**34%**	**34%**	**34%**	**39%**	**34%**	**41%**	**38%**	**36%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle Compostable Other Recoverable Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

A t-test was used to test the null hypothesis "There is no statistically significant difference between the percentage of **Paper** in the bid area A garbage and the garbage in the other bid areas combined." The same null hypothesis was also tested for each of the other material classes and the other bid areas. The calculations and a discussion of the t-test are included in Appendix C: Waste Characterization Calculations, detailed t-test tables are included in Appendix E: Bid Area Comparisons. As shown in Table 10, four bid areas had at least one statistically significant finding, including:

- **Other Materials** is lower in bid area A than in the other bid areas combined.
- **C&D** is higher in bid area A than in the other bid areas combined.
- **Plastic** is lower in bid area C than in the other bid areas combined.
- **Paper** is lower in bid area E than in the other bid areas combined.
- **Paper** is higher in bid area H than in the other bid areas combined.

Table 10. Summary of Statistically Significant Differences in the Garbage Composition

District	Material Type	Material Class	Notes
A	Garbage	Other Materials	The proportion of **Other Materials** in the garbage is 5.7 percentage points lower in A than in the other bid areas combined
A	Garbage	C&D	The proportion of **C&D** in the garbage is 5.0 percentage points higher in A than in the other bid areas combined
C	Garbage	Plastic	The proportion of **Plastic** in the garbage is 2.3 percentage points lower in C than in the other bid areas combined
E	Garbage	Paper	The proportion of **Paper** in the garbage is 3.3 percentage points lower in E than in the other bid areas combined
H	Garbage	Paper	The proportion of **Paper** in the garbage is 3.1 percentage points higher in H than in the other bid areas combined

Table 11 aggregates the 84 material types included in field sorting into 25 condensed material categories designed to showcase the curbside recyclables and compostable materials remaining in the garbage and to make the tables more readable when comparing the results between bid areas. Many, but not all, materials in the construction and demolition (C&D) category are included in the Other Recoverable group (the purple slice of the pie in Figure 7). However, the Other Recoverable slice of the pie is greater than the sum of the purple rows in Table 11 because the C&D materials are not listed individually. Compostable yard waste and food waste are the two most prevalent disposed materials in every bid area (and Citywide). Among the bid areas, these materials combined range from nearly 38% of residential garbage in area I to approximately 47% of residential garbage in area D. Compostable paper and other recyclable paper are also among the most prevalent materials in every bid area. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 11. Summary Composition by Bid Area, Citywide Garbage

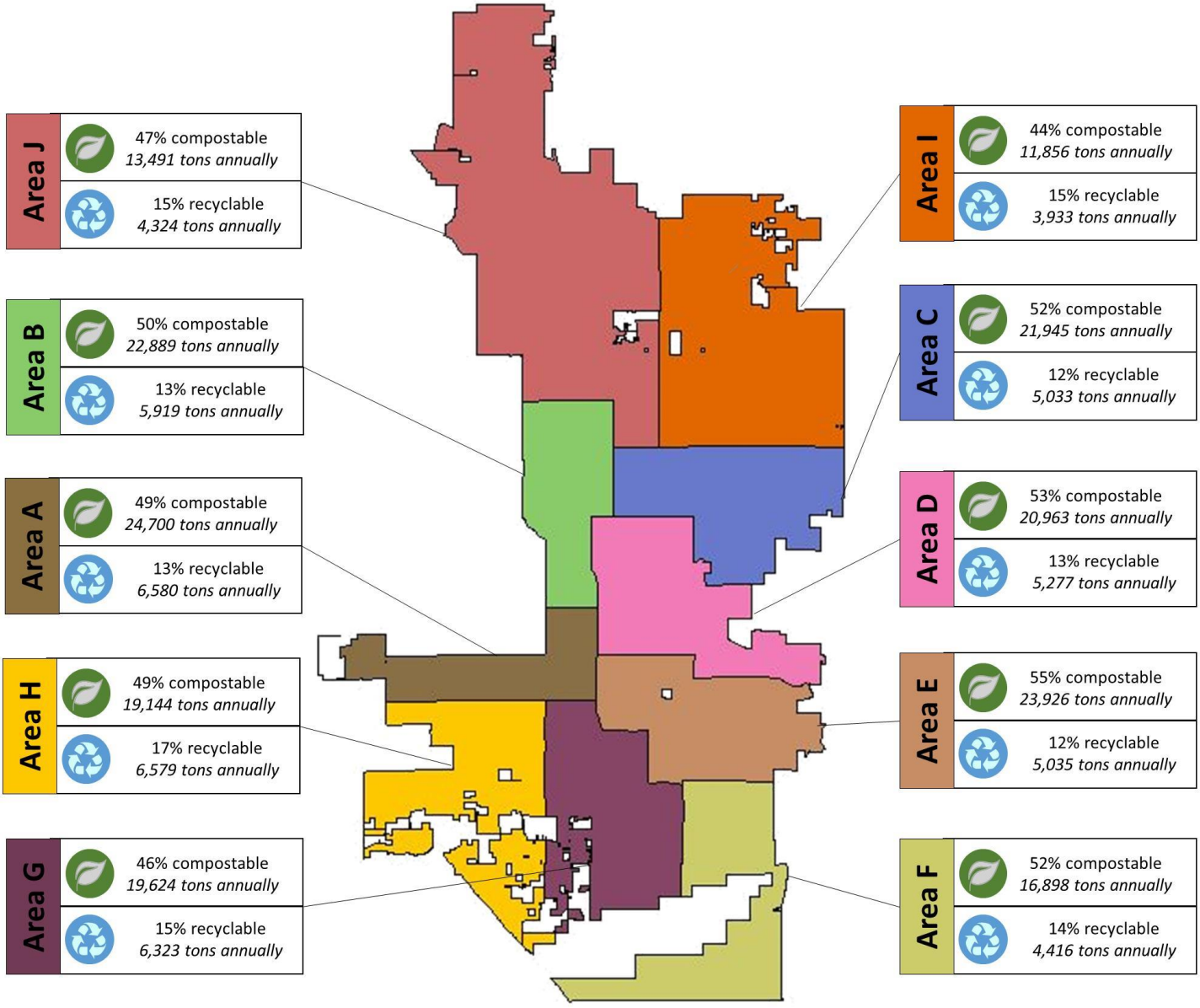
	Bid Area Composition										Citywide
Material	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Composition**
Paper	**11.8%**	**12.0%**	**12.3%**	**12.9%**	**9.7%**	**12.8%**	**12.5%**	**15.5%**	**14.2%**	**13.7%**	**12.6%**
Newspaper	0.62%	0.62%	1.04%	1.31%	0.82%	0.81%	1.23%	1.04%	1.02%	1.13%	0.95%
Unwaxed OCC / Kraft paper	1.55%	1.81%	1.43%	1.38%	0.97%	0.89%	1.20%	1.70%	1.16%	1.52%	1.38%
Other recyclable paper	3.73%	3.96%	3.92%	4.29%	3.54%	4.83%	4.59%	6.19%	4.66%	4.46%	4.36%
Compostable paper	5.44%	5.21%	5.51%	5.41%	4.03%	5.61%	5.15%	5.88%	6.78%	6.12%	5.43%
Other paper	0.45%	0.38%	0.36%	0.47%	0.35%	0.63%	0.38%	0.68%	0.57%	0.50%	0.47%
Plastic	**11.3%**	**8.9%**	**7.7%**	**8.5%**	**9.4%**	**11.3%**	**10.5%**	**11.1%**	**10.3%**	**8.8%**	**9.8%**
PET (#1) plastic	1.15%	1.08%	0.93%	1.00%	0.95%	1.18%	1.11%	1.36%	1.09%	1.03%	1.09%
HDPE (#2) plastic	0.64%	0.47%	0.37%	0.57%	0.49%	0.43%	0.61%	0.62%	0.55%	0.52%	0.53%
Other recyclable plastic	2.39%	2.56%	1.76%	2.16%	2.18%	2.69%	3.35%	2.07%	3.18%	2.53%	2.46%
Compostable plastic	0.00%	0.03%	0.02%	0.00%	0.02%	0.00%	0.05%	0.00%	0.03%	0.01%	0.02%
Clean plastic film (grocery sacks)	1.65%	1.25%	1.27%	1.19%	1.19%	1.30%	1.67%	1.86%	1.33%	1.14%	1.40%
Other plastic film	3.60%	2.38%	2.28%	2.21%	2.02%	3.42%	2.17%	2.73%	2.81%	2.54%	2.61%
Expanded Polystyrene	1.06%	0.57%	0.53%	0.56%	0.72%	0.65%	0.86%	1.04%	0.50%	0.52%	0.72%
Other plastic	0.83%	0.51%	0.50%	0.84%	1.79%	1.60%	0.71%	1.41%	0.77%	0.47%	0.94%
Glass	**2.1%**	**1.4%**	**1.6%**	**1.7%**	**1.7%**	**1.9%**	**2.0%**	**2.3%**	**1.7%**	**2.4%**	**1.9%**
Recyclable glass	1.40%	1.00%	0.89%	1.09%	0.99%	1.13%	1.18%	1.74%	0.98%	1.34%	1.18%
Other glass	0.71%	0.37%	0.70%	0.59%	0.71%	0.75%	0.80%	0.60%	0.68%	1.02%	0.68%
Metal	**2.0%**	**2.7%**	**4.0%**	**2.3%**	**1.8%**	**2.9%**	**1.8%**	**2.8%**	**3.2%**	**3.8%**	**2.7%**
Aluminum cans	0.23%	0.33%	0.22%	0.22%	0.25%	0.25%	0.22%	0.34%	0.31%	0.30%	0.26%
Tin/steel food cans	0.73%	0.58%	0.45%	0.48%	0.51%	0.61%	0.60%	0.92%	0.50%	0.52%	0.60%
Other recyclable metals	0.69%	0.60%	0.96%	0.76%	0.84%	0.90%	0.70%	0.84%	1.30%	1.69%	0.88%
Other metals	0.35%	1.17%	2.38%	0.83%	0.20%	1.12%	0.31%	0.67%	1.13%	1.29%	0.91%
Organic	**48.2%**	**48.1%**	**50.4%**	**50.3%**	**52.5%**	**49.6%**	**45.8%**	**44.7%**	**44.0%**	**45.5%**	**48.1%**
Compostable yard waste	30.33%	31.59%	28.76%	32.16%	39.27%	30.60%	27.23%	27.06%	21.53%	25.76%	29.91%
Food waste	13.52%	13.50%	17.91%	15.10%	11.51%	16.25%	13.47%	15.99%	16.15%	15.04%	14.68%
Non-compostable organic	4.39%	3.00%	3.72%	3.07%	1.73%	2.70%	5.10%	1.62%	6.36%	4.65%	3.54%
Construction and demolition waste	**10.2%**	**5.4%**	**5.4%**	**3.6%**	**6.8%**	**5.0%**	**6.8%**	**4.9%**	**4.1%**	**4.8%**	**5.9%**
Household hazardous waste	**0.8%**	**0.7%**	**0.8%**	**0.7%**	**0.4%**	**0.6%**	**0.4%**	**0.9%**	**0.8%**	**0.5%**	**0.7%**
Other materials	**13.5%**	**20.9%**	**17.9%**	**20.0%**	**17.7%**	**16.0%**	**20.1%**	**17.9%**	**21.7%**	**20.6%**	**18.4%**
Subtotal Curbside Recycle	***13.1%***	***13.0%***	***12.0%***	***13.3%***	***11.5%***	***13.7%***	***14.8%***	***16.8%***	***14.8%***	***15.0%***	***13.7%***
Subtotal Compostable	***49.3%***	***50.3%***	***52.2%***	***52.7%***	***54.8%***	***52.5%***	***45.9%***	***48.9%***	***44.5%***	***46.9%***	***50.0%***
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle | Compostable | Other Recoverable | Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

The recoverable fraction of the garbage in each bid area is summarized in Figure 9.

Figure 9. Summary of Recoverability by Bid Area, Citywide Garbage



Comparisons to Previous Studies

Working with PWD staff, Cascadia designed the material list used in the current study to be comparable to the material list used in the 2003 study. Results in this section aggregate the 84 material types used in the 2014 study into a condensed list of 22 materials that nearly match the 2003 study and showcase the curbside recyclables and compostable materials in the garbage. The aggregations are shown in Appendix A: Material Type Definitions. The totals and subtotals shown in this section are slightly different than those in other sections because of the aggregations necessary to accommodate the differences between the 2003 and 2014 material lists.[1] Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Based on PWD provided tonnage information, the total quantity of garbage has decreased by approximately 10% since 2003 from nearly 435,000 tons to nearly 391,000 tons. The 2003 and 2014 composition data is summarized in Table 12. The proportion of most recyclable or compostable materials in the garbage also decreased between the 2003 and 2014 studies; the exceptions are compostable paper, PET (#1) plastic, and compostable yard waste.

Compared to 2003, both the quantity of recyclable materials in the garbage and the proportion of garbage that is recyclable have decreased. In 2003, recyclables were nearly 19% of the garbage; in 2014, recyclables (as defined for this comparison) are approximately 11% of the garbage.

[1] The 2014 material list is designed to reflect the range of recyclable and compostable items currently of interest to PWD. Some of the material types in the 2014 list didn't exist in 2003 (*compostable plastic*) and some 2014 material types were a subset of another material type in 2003 (*mixed rigid plastics*). In this section, the 2014 material types *compostable plastic* and *mixed rigid plastics* are included in the material category other plastic to make the 2003 and 2014 compositions more directly comparable.

Table 12. Citywide Garbage Summary Composition, 2003 vs. 2014

Material	Citywide 2014 Composition	2014 Est. Tons	2003 Composition	2003 Est. Tons
Paper	**12.6%**	**49,132**	**18.3%**	**79,412**
Newspaper	0.95%	3,698.6	2.70%	11,729.5
Unwaxed OCC / Kraft paper	1.38%	5,380.3	2.90%	12,596.7
Other recyclable paper	4.36%	17,036.9	6.70%	29,151.5
Compostable paper	5.43%	21,200.1	4.53%	19,681.8
Other paper	0.47%	1,816.3	1.44%	6,252.9
Plastic	**9.8%**	**38,127**	**8.3%**	**36,176**
PET (#1) plastic	1.09%	4,245.0	0.70%	3,040.6
HDPE (#2) plastic	0.53%	2,068.5	0.67%	2,930.7
Clean plastic film (grocery sacks)	1.40%	5,468.9	0.90%	3,909.4
Other plastic film	2.61%	10,181.4	2.47%	10,742.3
Expanded polystyrene	0.72%	2,814.2	0.47%	2,061.3
Other plastic	3.42%	13,349.5	3.10%	13,491.1
Glass	**1.9%**	**7,250**	**2.5%**	**10,693**
Recyclable glass	1.18%	4,591.4	2.21%	9,616.3
Other glass	0.68%	2,658.5	0.25%	1,076.4
Metal	**2.7%**	**10,352**	**4.4%**	**18,994**
Aluminum cans	0.26%	1,026.7	0.47%	2,052.2
Tin/steel food cans	0.60%	2,328.5	1.02%	4,414.2
Other recyclable metals	0.88%	3,444.1	1.24%	5,382.0
Other metals	0.91%	3,552.4	1.64%	7,145.5
Organic	**44.6%**	**174,172**	**44.9%**	**195,176**
Compostable yard waste	29.91%	116,821.3	28.12%	122,257.9
Food waste	14.68%	57,350.5	16.77%	72,918.5
Construction and demolition waste	**5.9%**	**23,227**	**7.3%**	**31,614**
Household hazardous waste	**0.7%**	**2,566**	**0.4%**	**1,683**
Other materials	**21.9%**	**85,722**	**14.0%**	**61,035**
Subtotal Curbside Recycle	**11.2%**	**43,820**	**18.6%**	**80,914**
Subtotal All Compostable	**50.0%**	**195,372**	**49.4%**	**214,858**
Total	**100%**	**390,548**	**100%**	**434,783**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

See Table 13 for a comparison of the Citywide garbage recoverability between study years. The quantity of compostables in the residential garbage decreased from nearly 215,000 tons in 2003 to approximately 195,000 tons in 2014. This is due primarily to the overall reduction in garbage tonnage between the two studies, as the proportion of compostables in the garbage increased slightly from 2003 to 2014 (from 49% to 50%). Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 13. Citywide Garbage Recoverability, 2003 vs. 2014

	Citywide			
Category	2014 Composition	2014 Est. Tons	2003 Composition	2003 Est. Tons
Recyclable	**11%**	**43,820**	**19%**	**80,914**
Recyclable papers	6.7%	26,115.8	12.3%	53,477.7
Recyclable plastics	1.6%	6,313.5	1.4%	5,971.4
Recyclable glass	1.2%	4,591.4	2.2%	9,616.3
Recyclable metals	1.7%	6,799.3	2.7%	11,848.4
Compostable	**50%**	**195,372**	**49%**	**214,858**
Compostable paper	5.4%	21,200.1	4.5%	19,681.8
Compostable yard waste	29.9%	116,821.3	28.1%	122,257.9
Food waste	14.7%	57,350.5	16.8%	72,918.5
Other	**39%**	**151,356**	**32%**	**139,011**
Total	**100%**	**390,548**	**100%**	**434,783**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Because of the similarity in methods between the 2003 and 2014 studies, a t-test was used to check for statistically significant changes in composition data since 2003. This statistical calculation was used to test the null hypothesis "There is no statistically significant difference, between the 2003 and 2014 study periods, in the percentage of **Paper** in the Citywide garbage." The same null hypothesis was also tested for each of the other material classes. When comparing the 2003 Citywide garbage composition against the 2014 Citywide garbage composition every material class except **Organic** and **C&D** exhibited a statistically significant change. **Paper**, **Glass**, and **Metal** decreased while **Plastic**, **Other Materials**, and **HHW** increased. Though the t-test can't determine the cause for the change it is reasonable to assume that the proportion of the primarily recyclable material classes in the Citywide garbage decreased due to increased utilization of the curbside recycling program. The calculations and a discussion of the t-test are included in Appendix C: Waste Characterization Calculations. The t-test results are summarized in Table 14 on the next page.

Table 14. Test for Statistically Significant Changes in the Citywide Garbage, 2003 vs. 2014[2]

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-5.6% ⬇	11.0207	**0.0000 ***	**Yes**
Plastic	1.5% ⬆	4.4520	**0.0000 ***	**Yes**
Glass	-0.5% ⬇	3.2695	**0.0011 ***	**Yes**
Metal	-1.6% ⬇	5.1753	**0.0000 ***	**Yes**
Organics	2.6% ⬆	2.0806	0.0379	No
Other Materials	4.8% ⬆	5.6831	**0.0000 ***	**Yes**
HHW	0.3% ⬆	2.7044	**0.0071 ***	**Yes**
C&D	-1.4% ⬇	1.8263	0.0684	No

**(Cut-off for statistically significant difference = 0.0125)*

Bulky Materials in the Garbage

While in the field, the garbage sort crew noted loads that contained items too large or bulky for a Material Recovery Facility (MRF) to handle (appliances, furniture, tires, large stumps, concrete, etc.). The type of material and the number of items spotted were noted for all sampled loads. Of the 262 loads sampled, eight loads contained bulky items (3% of loads), see Figure 10 for a few example bulky items. There were three loads from area A, one from area C, two from area H, and two from area J. Two loads from area A contained a CRT television and one contained a tire. The load from area C contained a large microwave. The loads from area H contained several large truck tires and one passenger car tire. One load from area J contained a dishwasher and the other load contained a microwave.

Figure 10. Example Bulky Items

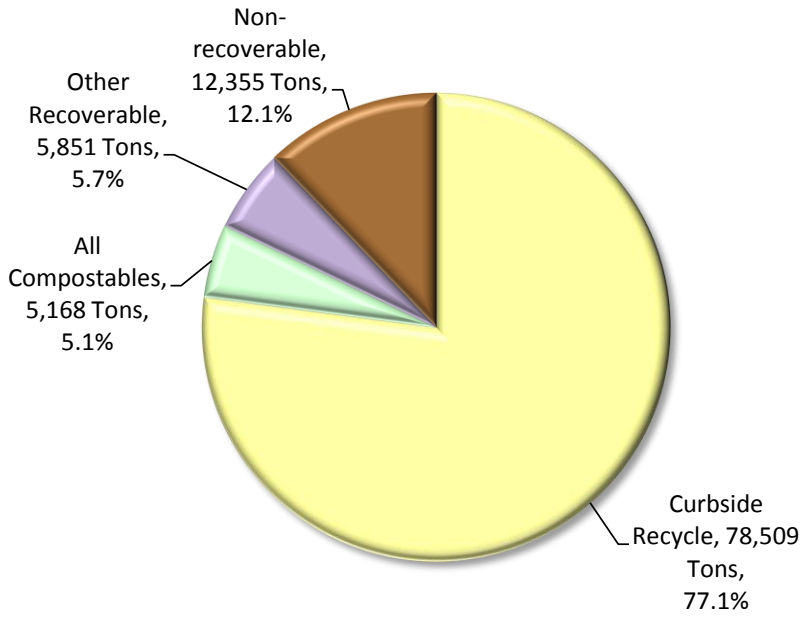
[2] The comparisons are made between unweighted composition findings.

Citywide Recycling Findings

The results in this section are based on the weighted average of all 210 recycling samples collected from the ten bid areas. Annual recycling tonnages in each bid area are used to weight the results.

As shown in Figure 11, approximately 77% of the recycling is recyclable in the current curbside program. The remaining approximately 23% is contaminant materials. Other large cities with published contamination rates (Seattle, King County, Houston, and others) have curbside recycling contamination rates between 10% and 30%. Due to rounding in the figure, sums may not exactly match subtotals and totals shown.

Figure 11. Composition by Recoverability Group, Citywide Recycling



The ten most prevalent material types can be found in Table 15. Four of the ten most prevalent materials are contaminants: *non-distinct fines* (2.90%), *textiles* (2.60%), *purchased food* (2.22%), and *other plastic film* (1.82%). Combined, the ten most prevalent materials account for approximately 76% of the Citywide recycling. Six of the top ten materials are accepted in the current curbside recycling program. They make up approximately two-thirds of the Citywide recycling. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

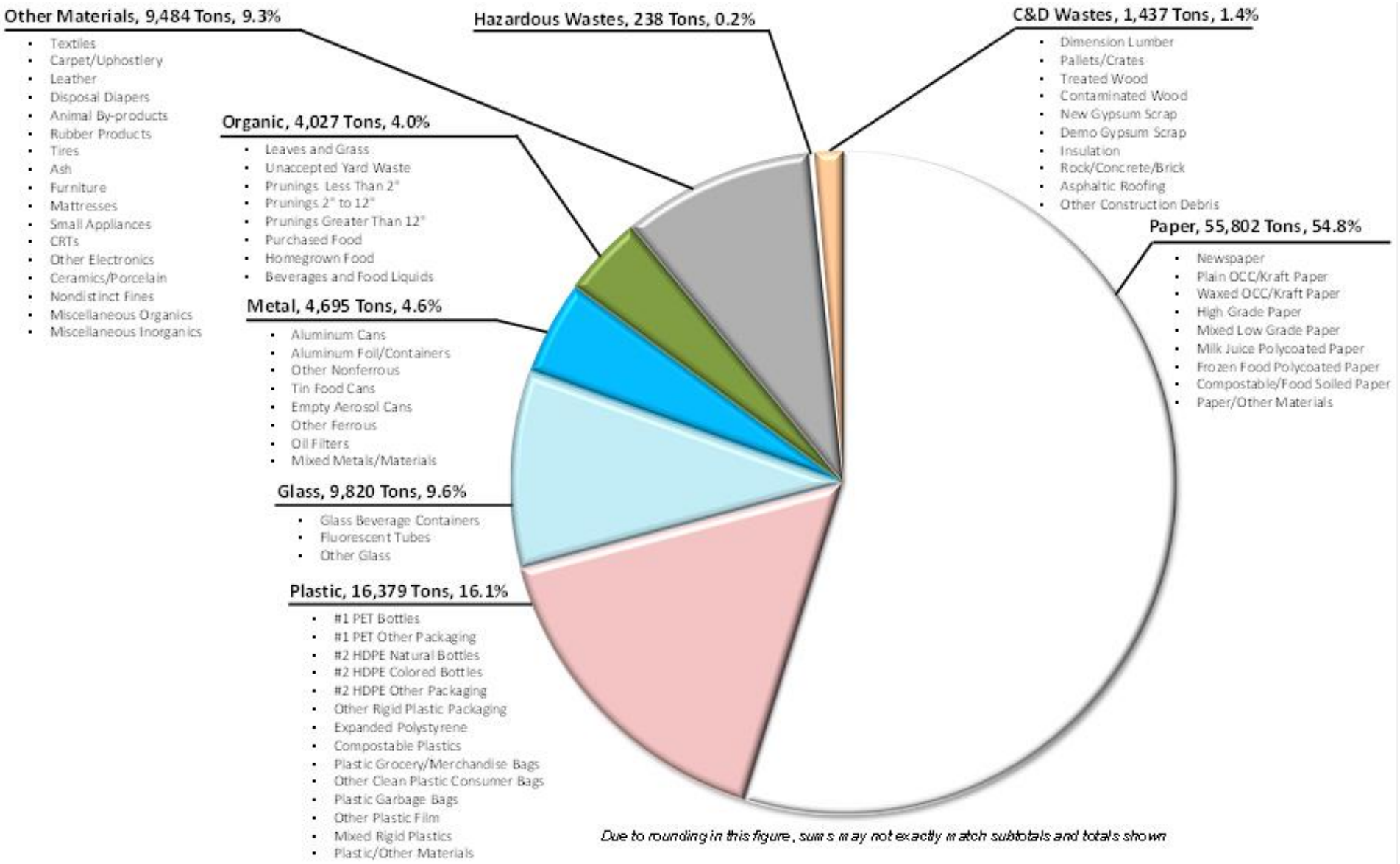
Table 15. Ten Most Prevalent Material Types, Citywide Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	24.91%	24.91%	25,382.9
Plain OCC/Kraft Paper	16.84%	41.76%	17,161.4
Glass Beverage Containers	9.35%	51.11%	9,527.1
Newspaper	8.92%	60.02%	9,083.2
#1 PET Bottles	3.92%	63.95%	3,995.7
Non-distinct Fines	2.90%	66.84%	2,950.3
Textiles	2.60%	69.44%	2,648.6
Purchased Food	2.22%	71.67%	2,265.9
Mixed Rigid Plastics	2.03%	73.70%	2,067.7
Other Plastic Film	1.82%	75.52%	1,856.5
Subtotal	***75.5%***		***76,939***
All other material types	24.5%		24,943.3
Total	**100%**		**101,882**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

The composition data by material class are presented in Figure 12. As shown, **Paper** and **Plastics** are the only two material classes to account for more than 10% of the Citywide recycling. They are approximately 55% and 16% of the curbside recycling, respectively. Due to rounding in the figure, sums may not exactly match subtotals and totals shown.

Figure 12. Composition by Material Class, Citywide Recycling



The detailed composition of the Citywide recycling is shown in Table 16. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 16. Detailed Composition, Citywide Recycling

Material	Estimated Percent	+ / -	Estimated Tons	Material	Estimated Percent	+ / -	Estimated Tons
Paper	**54.8%**		**55,802**	**Other Materials**	**9.3%**		**9,484**
Newspaper	8.92%	0.6%	9,083.2	Textiles	2.60%	0.3%	2,648.6
Plain OCC/Kraft Paper	16.84%	0.9%	17,161.4	Carpet/Upholstery	0.30%	0.2%	308.3
Waxed OCC/Kraft Paper	0.04%	0.0%	43.0	Leather	0.04%	0.0%	35.8
High Grade Paper	1.27%	0.3%	1,295.9	Disposable Diapers	0.75%	0.2%	761.6
Mixed Low-grade Paper	24.91%	0.8%	25,382.9	Animal By-products	0.04%	0.0%	40.8
Milk/Juice Polycoated Paper	0.47%	0.0%	482.1	Rubber Products	0.43%	0.1%	433.2
Frozen Food Polycoated Paper	0.04%	0.0%	42.1	Tires	0.06%	0.1%	59.8
Compostable/Food Soiled Paper	1.16%	0.1%	1,185.3	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.11%	0.2%	1,126.2	Furniture	0.41%	0.6%	417.5
				Mattresses	0.00%	0.0%	0.0
Plastic	**16.1%**		**16,379**	Small Appliances	0.10%	0.1%	101.3
#1 PET Bottles	3.92%	0.2%	3,995.7	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.85%	0.1%	864.1	Other Electronics	0.99%	0.2%	1,011.1
#2 HDPE Natural Bottles	1.57%	0.1%	1,597.0	Ceramics/Porcelain	0.15%	0.1%	148.3
#2 HDPE Colored Bottles	1.30%	0.1%	1,325.7	Non-distinct Fines	2.90%	0.3%	2,950.3
#2 HDPE Other Packaging	0.33%	0.1%	336.0	Miscellaneous Organics	0.43%	0.3%	437.3
Other Rigid Plastic Packaging	1.35%	0.1%	1,372.1	Miscellaneous Inorganics	0.13%	0.0%	130.0
Expanded Polystyrene	0.61%	0.1%	626.3				
Compostable Plastics	0.00%	0.0%	0.5	**Hazardous Wastes**	**0.2%**		**238**
Plastic Grocery/Merchandise Bags	0.67%	0.0%	687.2	Latex Paint	0.02%	0.0%	24.5
Other Clean Plastic Consumer Product Bags	0.08%	0.0%	77.2	Hazardous Adhesives/Glues	0.00%	0.0%	0.9
Plastic Garbage Bags	0.33%	0.0%	332.8	Non-hazardous Adhesives/Glues	0.01%	0.0%	12.9
Other Plastic Film	1.82%	0.1%	1,856.5	Oil-based Paint/Solvent	0.00%	0.0%	0.7
Mixed Rigid Plastics	2.03%	0.4%	2,067.7	Hazardous Cleaners	0.02%	0.0%	19.3
Plastic/Other Materials	1.22%	0.2%	1,240.7	Pesticides/Herbicides	0.00%	0.0%	2.7
				Non-rechargeable Dry-cell Batteries	0.04%	0.0%	40.8
Glass	**9.6%**		**9,820**	Rechargeable Dry-cell Batteries	0.00%	0.0%	1.6
Glass Beverage Containers	9.35%	0.1%	9,527.1	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.02%	0.1%	16.9	Asbestos	0.00%	0.0%	0.0
Other Glass	0.27%	0.1%	275.7	Explosives	0.00%	0.0%	0.2
				Vehicle and Equipment Fluids	0.01%	0.0%	8.0
Metal	**4.6%**		**4,695**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.02%	0.1%	1,043.3	Other Hazardous Chemicals	0.05%	0.0%	50.3
Aluminum Foil/Containers	0.16%	0.0%	166.5	Other Non-hazardous Chemicals	0.07%	0.0%	76.1
Other Nonferrous	0.19%	0.1%	190.6				
Tin Food Cans	1.49%	0.1%	1,516.5	**C&D Wastes**	**1.4%**		**1,437**
Empty Aerosol Cans	0.16%	0.0%	167.0	Dimension Lumber	0.07%	0.0%	71.7
Other Ferrous	0.88%	0.2%	891.9	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.03%	0.0%	32.8	Treated Wood	0.17%	0.1%	175.3
Mixed Metals/Material	0.67%	0.2%	686.1	Contaminated Wood	0.71%	0.2%	721.7
				New Gypsum Scrap	0.00%	0.0%	0.3
Organic	**4.0%**		**4,027**	Demo Gypsum Scrap	0.02%	0.0%	25.5
Leaves & Grass	1.15%	0.6%	1,173.1	Insulation	0.01%	0.0%	5.4
Unaccepted Yard Waste	0.06%	0.0%	58.3	Rock/Concrete/Bricks	0.15%	0.1%	155.6
Prunings Less than 2"	0.11%	0.1%	110.4	Asphaltic Roofing	0.12%	0.2%	121.4
Prunings 2" to 12"	0.04%	0.0%	40.5	Other Construction Debris	0.16%	0.1%	160.2
Prunings Greater than 12"	0.03%	0.0%	29.9				
Purchased Food	2.22%	0.3%	2,265.9	**Totals**	**100%**		**101,882**
Homegrown Food	0.04%	0.0%	37.9				
Beverages and Liquids	0.31%	0.1%	311.4	**Sample Count**			**210**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Comparisons Between Bid Areas

A t-test was used to check for statistically significant differences in composition data between bid areas. This statistical calculation was used to test the null hypothesis "There is no statistically significant difference between the percentage of **Paper** in the bid area A recycling and the recycling in the other bid areas." The same null hypothesis was also tested for each of the other material classes and the other bid areas. The calculations and a discussion of the t-test are included in Appendix C: Waste Characterization Calculations, detailed t-test tables are included in Appendix E: Bid Area Comparisons. As shown in Table 17, five bid areas had at least one statistically significant finding, including:

- **Paper** is lower in bid area A than in the other bid areas combined.
- **HHW** is higher in bid area A than in the other bid areas combined.
- **C&D** is higher in bid area A than in the other bid areas combined.
- **Paper** is higher in bid area C than in the other bid areas combined.
- **Organics** is higher in bid area E than in the other bid areas combined.
- **Paper** is lower in bid area G than in the other bid areas combined.
- **Plastic** is higher in bid area H than in the other bid areas combined.

Table 17. Summary of Statistically Significant Differences in the Recycling Composition

District	Material Type	Material Class	Notes
A	Recycle	Paper	The proportion of **Paper** in the recycle is 7.6 percentage points lower in A than in the other bid areas combined
A	Recycle	HHW	The proportion of **HHW** in the recycle is 0.4 percentage points higher in A than in the other bid areas combined
A	Recycle	C&D	The proportion of **C&D** in the recycle is 1.6 percentage points higher in A than in the other bid areas combined
C	Recycle	Paper	The proportion of Paper in the recycle is 7.9 percentage points higher in C than in the other bid areas combined
E	Recycle	Organics	The proportion of **Organics** in the recycle is 4.0 percentage points higher in E than in the other bid areas combined
G	Recycle	Paper	The proportion of **Paper** in the recycle is 12.3 percentage points lower in G than in the other bid areas combined
H	Recycle	Plastic	The proportion of **Plastic** in the recycle is 3.4% higher in H than in the other bid areas combined

Table 18 aggregates the 84 material types using during field sorting into 21 condensed material categories designed to showcase the acceptable and contaminant materials in the recycling substream and to make the tables more readable when comparing the results between bid areas. Many, but not all, materials in the construction and demolition (C&D) category are included in the Other Recoverable group (the purple slice of the pie in Figure 11). However, the Other Recoverable slice of the pie is greater than the sum of the purple rows in Table 18 because the C&D materials are not listed individually. Other recyclable paper and unwaxed OCC/kraft paper are the two most prevalent materials in each bid area and Citywide. Those two materials account for between 35% and 50% of the material collected in each bid area and Citywide. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 18. Summary Composition by Bid Area, Citywide Recycling

	Bid Area Composition										Citywide
Material	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Composition**
Paper	**47.5%**	**56.7%**	**61.4%**	**60.0%**	**51.0%**	**58.9%**	**43.3%**	**48.7%**	**56.6%**	**58.5%**	**54.8%**
Newspaper	6.22%	8.67%	10.39%	14.84%	8.71%	12.50%	4.31%	4.27%	9.03%	8.45%	8.92%
Unwaxed OCC / Kraft paper	15.49%	16.31%	17.73%	13.72%	14.09%	15.79%	15.00%	19.59%	19.17%	21.62%	16.84%
Other recyclable paper	23.70%	29.09%	30.46%	28.54%	26.48%	29.21%	21.42%	22.33%	26.71%	26.05%	26.70%
Other paper	2.08%	2.68%	2.86%	2.92%	1.71%	1.39%	2.54%	2.49%	1.67%	2.43%	2.31%
Plastic	**17.5%**	**15.3%**	**16.1%**	**13.7%**	**15.2%**	**14.5%**	**18.3%**	**19.2%**	**16.3%**	**15.2%**	**16.1%**
PET (#1) plastic	5.00%	5.01%	4.51%	4.12%	4.57%	4.97%	5.13%	5.42%	4.43%	4.65%	4.77%
HDPE (#2) plastic	3.92%	3.23%	2.71%	2.41%	2.99%	2.80%	3.79%	4.22%	3.43%	2.76%	3.20%
Other recyclable plastic	2.65%	3.16%	4.11%	3.34%	3.32%	3.00%	4.17%	3.13%	3.68%	3.10%	3.38%
Clean plastic film (grocery sacks)	0.99%	0.71%	0.56%	0.53%	0.70%	0.78%	1.08%	0.92%	0.75%	0.60%	0.75%
Other plastic film	2.49%	1.76%	2.31%	1.94%	2.02%	1.79%	2.30%	2.61%	2.15%	2.10%	2.15%
Expanded Polystyrene	0.81%	0.41%	0.47%	0.59%	0.66%	0.46%	0.64%	0.70%	0.45%	1.09%	0.61%
Other plastic	1.64%	1.02%	1.46%	0.73%	0.94%	0.71%	1.22%	2.16%	1.36%	0.84%	1.22%
Glass	**6.9%**	**9.2%**	**8.5%**	**10.6%**	**12.2%**	**13.1%**	**12.6%**	**7.3%**	**9.8%**	**7.4%**	**9.6%**
Recyclable glass	6.56%	8.99%	8.39%	10.30%	11.42%	12.87%	12.20%	6.92%	9.55%	7.32%	9.35%
Other glass	0.33%	0.18%	0.09%	0.29%	0.77%	0.22%	0.43%	0.36%	0.27%	0.10%	0.29%
Metal	**4.6%**	**5.1%**	**4.9%**	**3.5%**	**3.9%**	**4.3%**	**4.4%**	**4.4%**	**5.6%**	**5.2%**	**4.6%**
Aluminum cans	0.70%	1.16%	1.18%	0.94%	0.74%	1.29%	0.58%	0.80%	1.32%	1.42%	1.02%
Tin/steel food cans	1.60%	1.54%	1.32%	1.35%	1.64%	1.41%	1.40%	1.54%	1.35%	1.83%	1.49%
Other recyclable metals	1.49%	1.25%	1.40%	0.60%	0.85%	1.36%	1.51%	1.44%	2.41%	1.70%	1.39%
Other metals	0.84%	1.19%	0.97%	0.64%	0.68%	0.26%	0.91%	0.64%	0.49%	0.22%	0.71%
Organic	**7.3%**	**2.8%**	**2.0%**	**2.6%**	**7.7%**	**1.5%**	**5.8%**	**6.0%**	**2.3%**	**3.0%**	**4.0%**
Construction and demolition waste	**2.8%**	**0.6%**	**1.4%**	**1.5%**	**1.4%**	**0.5%**	**1.6%**	**0.9%**	**2.0%**	**1.5%**	**1.4%**
Household hazardous waste	**0.6%**	**0.1%**	**0.1%**	**0.2%**	**0.2%**	**0.0%**	**0.3%**	**0.2%**	**0.3%**	**0.3%**	**0.2%**
Other materials	**12.8%**	**10.1%**	**5.6%**	**7.9%**	**8.4%**	**7.2%**	**13.7%**	**13.3%**	**7.2%**	**8.9%**	**9.3%**
Subtotal Curbside Recycle	***67.3%***	***78.4%***	***82.2%***	***80.2%***	***74.8%***	***85.2%***	***69.5%***	***69.7%***	***81.1%***	***78.9%***	***77.1%***
Subtotal Contaminants	***32.7%***	***21.6%***	***17.8%***	***19.8%***	***25.2%***	***14.8%***	***30.5%***	***30.3%***	***18.9%***	***21.1%***	***22.9%***
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Contaminants in the Recycling

Citywide, the recycling contamination rate is approximately 23%. As shown in Table 19, the contamination rate ranges from nearly 15% in area F to nearly one third (32.7%) in area A. Table 19 also notes the five most prevalent contaminant material types in each bid area and Citywide. *Non-distinct fines*, *textiles, purchased food*, and *other plastic film* are in the top five in every bid area; Citywide, they are the four most prevalent contaminants. *Plastic/other materials* is in the top five in two of the ten bid areas and Citywide. *Leaves and grass* and *paper/other materials* are each in the top five in two bid areas. *Other electronics*, *furniture*, *miscellaneous organics*, and *disposable diapers* were each in the top five in one bid area (areas F, B, J, and G respectively). The top five contaminants comprise between 45% and 60% of the total contamination in each bid area and Citywide. Due to rounding in the table, sums may not exactly match subtotals and totals shown.

Table 19. Acceptable and Contaminant Materials by Bid Area, Citywide Recycling

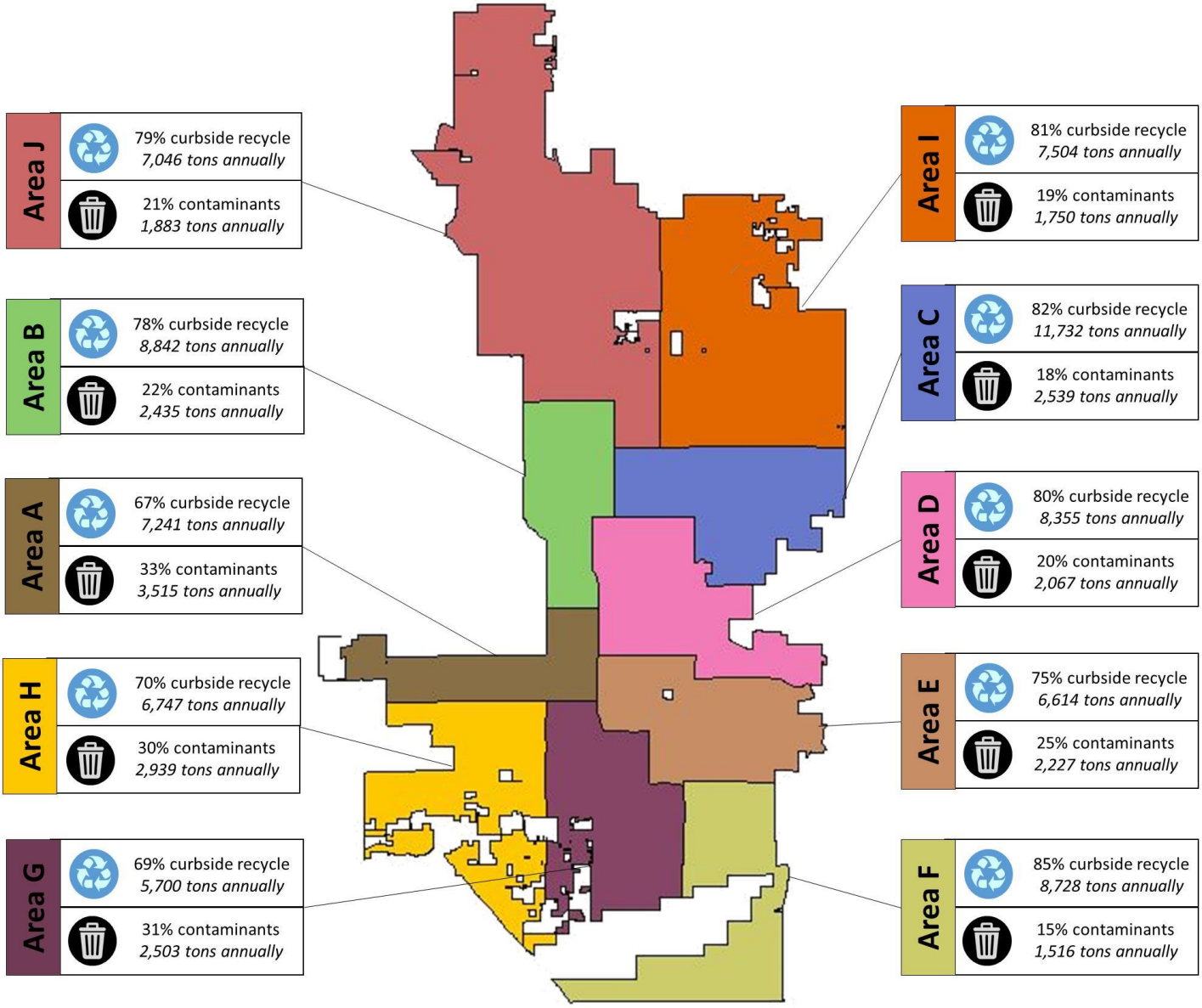
	Bid Area Composition										Citywide
	A	B	C	D	E	F	G	H	I	J	Composition
Recyclable	**67.3%**	**78.4%**	**82.2%**	**80.2%**	**74.8%**	**85.2%**	**69.5%**	**69.7%**	**81.1%**	**78.9%**	**77.1%**
Recyclable papers	45.40%	54.07%	58.59%	57.10%	49.28%	57.50%	40.73%	46.19%	54.91%	56.12%	52.46%
Recyclable plastics	11.57%	11.40%	11.33%	9.88%	10.88%	10.77%	13.08%	12.76%	11.55%	10.51%	11.34%
Recyclable glass	6.56%	8.99%	8.39%	10.30%	11.42%	12.87%	12.20%	6.92%	9.55%	7.32%	9.35%
Recyclable metals	3.79%	3.94%	3.90%	2.89%	3.23%	4.06%	3.48%	3.78%	5.08%	4.95%	3.90%
Common Contaminants											
Non-distinct fines	4.51%	2.14%	1.48%	2.95%	2.94%	2.52%	5.09%	3.73%	2.18%	2.32%	2.90%
Textiles	3.67%	2.19%	2.80%	2.55%	2.34%	1.92%	3.06%	2.86%	2.06%	2.45%	2.60%
Purchased food	2.62%	2.20%	1.52%	1.86%	1.73%	1.07%	4.47%	3.69%	1.72%	1.98%	2.22%
Other plastic film	2.10%	1.43%	2.12%	1.58%	1.67%	1.41%	1.93%	2.25%	1.85%	1.83%	1.82%
Plastic/other materials								2.16%	1.36%		1.22%
Leaves & grass	3.58%				5.35%						
Paper/other materials			1.85%	1.64%							
Other electronics						1.16%					
Miscellaneous Organics										2.31%	
Disposable diapers							2.37%				
Furniture		3.10%									
Sum of Top Five Contaminants	**16.5%**	**11.1%**	**9.8%**	**10.6%**	**14.0%**	**8.1%**	**16.9%**	**14.7%**	**9.2%**	**10.9%**	**10.8%**
All Other Contaminants	**16.2%**	**10.5%**	**8.0%**	**9.3%**	**11.2%**	**6.7%**	**13.6%**	**15.6%**	**9.8%**	**10.2%**	**12.2%**
Total Contaminants	**32.7%**	**21.6%**	**17.8%**	**19.8%**	**25.2%**	**14.8%**	**30.5%**	**30.3%**	**18.9%**	**21.1%**	**22.9%**
Total Composition	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

The contamination rate in each bid area is illustrated in Figure 13.

Figure 13. Summary of Contamination Rate by Bid Area, Citywide Recycling



The five most prevalent contaminants in each bid area and Citywide are summarized in Table 20.

Table 20. Top Five Contaminants by Bid Area, Citywide Recycling

Rank	Bid Area Top Five Contaminants and Composition			
	A	B	C	D
#1	Non-distinct Fines, 4.5%	Furniture, 3.1%	Textiles, 2.8%	Non-distinct Fines, 2.9%
#2	Textiles, 3.7%	Purchased Food, 2.2%	Other Film, 2.1%	Textiles, 2.5%
#3	Leaves & Grass, 3.6%	Textiles, 2.2%	Paper/Other Materials, 1.9%	Purchased Food, 1.9%
#4	Purchased Food, 2.6%	Non-distinct Fines, 2.1%	Purchased Food, 1.5%	Paper/Other Materials, 1.6%
#5	Other Film, 2.1%	Other Film, 1.4%	Non-distinct Fines, 1.5%	Other Film, 1.6%

Rank	Bid Area Top Five Contaminants and Composition			
	E	F	G	H
#1	Leaves & Grass, 5.3%	Non-distinct Fines, 2.5%	Non-distinct Fines, 5.1%	Non-distinct Fines, 3.7%
#2	Non-distinct Fines, 2.9%	Textiles, 1.9%	Purchased Food, 4.5%	Purchased Food, 3.7%
#3	Textiles, 2.3%	Other Film, 1.4%	Textiles, 3.1%	Textiles, 2.9%
#4	Purchased Food, 1.7%	Other Electronics, 1.2%	Disposable Diapers, 2.4%	Other Film, 2.3%
#5	Other Film, 1.7%	Purchased Food, 1.1%	Other Film, 1.9%	Plastic/Other Materials, 2.2%

Rank	Bid Area Top Five Contaminants and Composition		
	I	J	Citywide
#1	Non-distinct Fines, 2.2%	Textiles, 2.4%	Non-distinct Fines, 2.9%
#2	Textiles, 2.1%	Non-distinct Fines, 2.3%	Textiles, 2.6%
#3	Other Film, 1.8%	Miscellaneous Organics, 2.3%	Purchased Food, 2.2%
#4	Purchased Food, 1.7%	Purchased Food, 2%	Other Plastic Film, 1.8%
#5	Plastic/Other Materials, 1.4%	Other Film, 1.8%	Plastic/Other Materials, 1.2%

4. Comparisons Between Phoenix and Other Jurisdictions

Nine of the ten largest cities around the country have begun a waste characterization study since 2009. Most of those studies included only the garbage stream; recycling was not characterized. This section includes comparisons between the Phoenix characterization data and the characterization data from other jurisdictions around the country that have completed recent residential garbage and recycling characterization studies. The jurisdictions included and the dates of their studies are shown in Table 21. Since the methodology and material list used for each study varies, the comparisons should be considered anecdotal. Additional detail on the data sources used in these tables can be found in Appendix C: Waste Characterization Calculations.

Table 21. Cities Included in Comparisons

Jusridiction	Study year(s)	Study Notes
Seattle, Wa	2010/2014	Seattle completed a recycling characterization in 2010 and a garbage characterization in 2014. The recycling data presented here is the 2010 composition data applied to the 2014 tonnage data.
King County, WA	2011/2012	King County completed a garbage characterization in 2011 and a recycling characterization in 2012.
City X	2014	The haulers for a large west coast city completed a privately funded waste characterization study for the city. The haulers wish to keep the city anonymous.
New York City	2012	The recycling results reported here are the sum of New York City's two bin recycling system: paper in one and metal, glass, and plastic in the second.
Houston, Tx	2014	

For the purposes of the comparisons, the material lists used in each study were "rolled up" to a common basic material list that included paper, plastic, metal, glass, organics, and other materials. The total quantity of garbage and recycling, the estimated recycling rate, and the per capita garbage and recycling for each of the jurisdictions are illustrated in Table 22. The recycling tons shown are gross tons, uncorrected for the level of contamination. The recycling rate also does not take into account any organics diversion so the total diversion rate for many of these jurisdictions is higher than shown. Seattle, King County, and City X all have well developed residential curbside organics diversion programs that likely contribute to the relatively low per capita garbage rates in those jurisdictions.

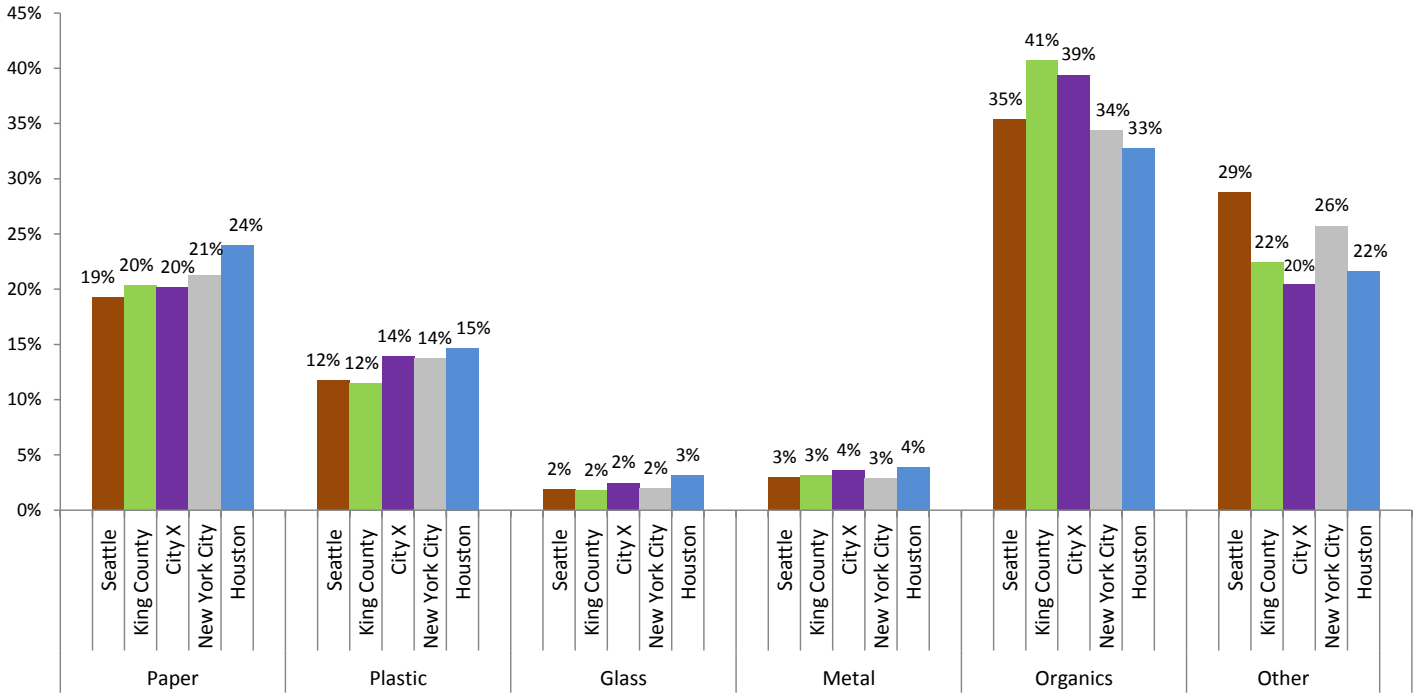
Table 22. Garbage and Recycling Baseline Data for Cities Included in Comparisons

Jursidiction	Year	Garbage Tons	Recycle Tons	Recycling Rate*	Study Year Population	Garbage lbs/person/year	Recycle lbs/person/year
Phoenix	2014	390,548	101,882	21%	1,537,058	508.2	132.6
Seattle	2014	60,106	59,353	50%	668,342	179.9	177.6
King County	2011/2012	187,206	90,697	33%	1,349,938	277.4	134.4
City X	2014	> 70,000	> 60,000	46%	> 800,000	174.1	146.3
New York City	2012	2,588,201	497,648	16%	8,365,903	618.7	119.0
Houston	2014	380,297	29,475	7%	2,239,558	339.6	26.3

**This is based on gross recycling tons and does not take into account contaminants in the recycling nor does it consider any organics diversion*

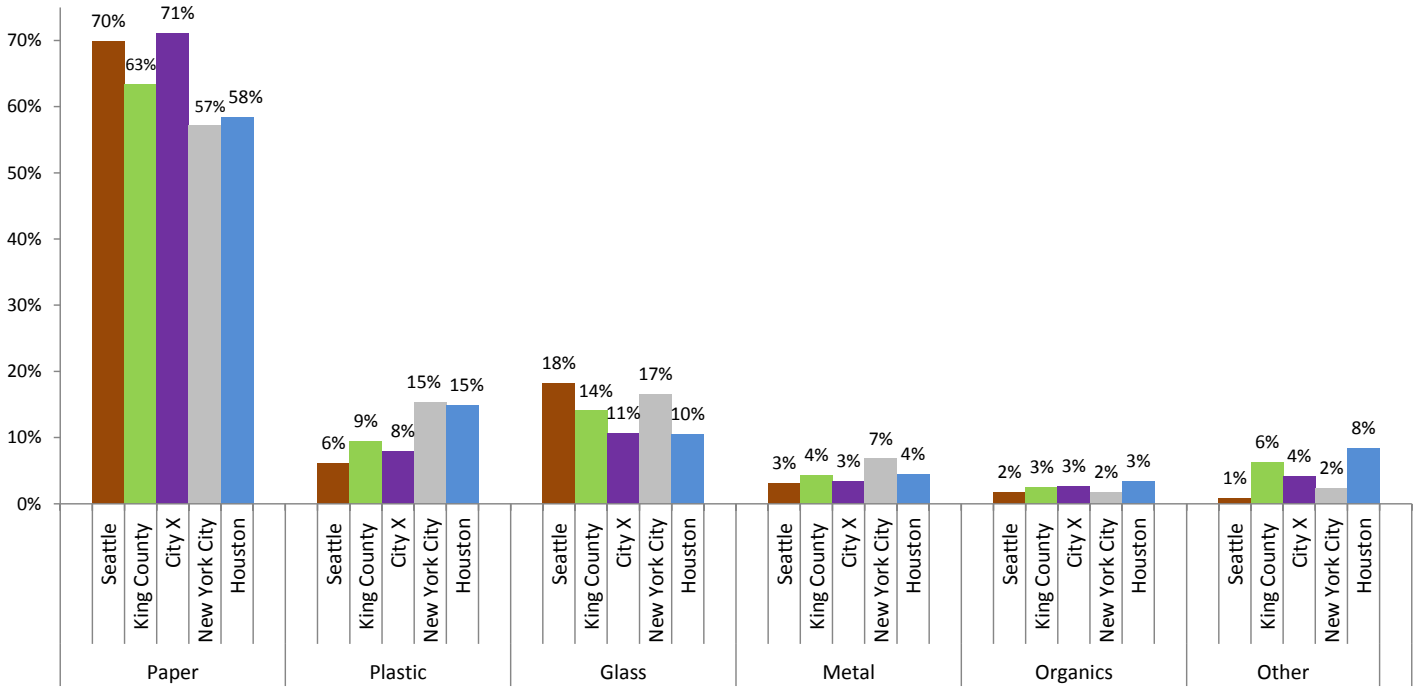
As shown in Figure 14, the garbage composition remains reasonably constant from jurisdiction to jurisdiction. Possible reasons for the variation include: robust recycling programs drawing high value materials out of the garbage stream, food waste collection programs, differences in the prevalence of eating meals out. Seattle instituted a plastic ban on July 1, 2012. In 2010 plastic bags accounted for 0.4% of Seattle's garbage and in 2014 they accounted for 0.2% of Seattle's garbage, a 50% reduction.

Figure 14. Garbage Composition in Comparison Cities



As shown in Figure 15, the composition of recycled materials remains reasonably constant from jurisdiction to jurisdiction. The largest variations are noted in the proportion of paper and plastic materials. Possible reasons for this variation in the plastics include differences in materials accepted in the recycling program or purchasing habits.

Figure 15. Recycling Composition in Comparison Cities



5. Diversion Potential Assessment

Background

The City of Phoenix (City) has established a goal to divert 40 percent of municipal solid waste generated through reduction, reuse, recycling, and recovery by the year 2020. In October 2013, SAIC completed a report "40 by 20: Evaluation of Alternatives to Achieve the City of Phoenix's Diversion Goal" (40 by 20 Report). The study evaluated six diversion alternatives and provided recommendations and strategies for the City to meet its diversion goals. The six diversion alternatives are listed below:

- **Alternative 1:** Expand Education, Outreach, and Compliance for Curbside Recycling.
- **Alternative 2:** Implement a Volume-Based Fee Structure for Residential Garbage Collection.
- **Alternative 3:** Offer Weekly Collection of Containerized Green Organics by Subscription.
- **Alternative 4:** Collect Brush Separately from Bulk Waste.
- **Alternative 5:** Increase Recovery of Materials at the Transfer Stations.
- **Alternative 6:** Develop a Mixed Waste Processing Facility.

For the 40 by 20 Report, fiscal year (FY) 2012/2013 data was used to determine the potential impact of each diversion alternative. With the conclusion of the 2014 Residential Characterization Study, the Project Team re-visited each diversion alternative to provide the City with a summary of how the alternative could be impacted based on the current composition of the waste stream. Specifically, the Project Team calculated/provided:

- Diversion projections (types and quantities of materials that could be recovered);
- Appropriate technologies for recovery;
- Estimated cost to recover the identified commodities; and
- Potential revenue by commodity.

The following sections summarize the updated findings for each alternative.

Alternative 1 – Expand Education, Outreach and Compliance for Curbside Recycling

Description

Alternative 1, as described in the 40 by 20 Report, is to increase public education, outreach, and compliance efforts with the intent of increasing diversion and improving the City's recycling program in two ways:

1. By increasing the amount of material collected in the curbside recycling program; and
2. By decreasing contamination in the material set out in the curbside recycling program.

For this alternative, it is assumed that the City would expand its curbside recycling public education efforts through its "Reimagine Phoenix" campaign. In June 2013, the City launched this recycling and sustainability campaign, focusing on public education and engagement aimed to reduce the amount of trash destined for disposal.

This section will focus on how the results of the 2014 Residential Characterization Study could impact the City's education and outreach programs by addressing:

- Diversion projections (types and quantities of materials that could be recovered);
- Appropriate technologies for recovery of these materials;
- Estimated cost to recover the identified commodities; and
- Potential revenue by commodity.

The analysis of this section focuses primarily on the effects of public education on the recycling stream. Education and outreach are also part of implementing new diversion programs (e.g., mixed waste processing) or expanding current programs (e.g., volume-based garbage fees and organics collection) and those effects on diversion are addressed in subsequent sections of this report.

Diversion Projections – Recycling

As reported by the City, an estimated 101,882 tons of recyclable materials were collected in the residential curbside single-stream program in FY 2014. The composition of the curbside recyclables was determined by the 2014 Residential Characterization Study and the materials set out in the curbside recycling stream were further categorized by their recoverability, as shown in Table 23.

Table 23. Composition by Recoverability Group, Citywide Recycling

Recoverability Group	Percent[(1)]	Annual Tons[(2)]
Curbside Recyclable	77.1%	78,509
Non-Recoverable	12.1%	12,355
Other Recoverable	5.7%	5,851
Compostable	5.1%	5,168
Total	**100%**	**101,882**

Note: Due to rounding, sums may not match totals and subtotals
(1) Based on the 2014 Residential Characterization Study.
(2) Based on FY 2014 recycling tons reported by the City of Phoenix.

Curbside Recyclable Material

Approximately 77% (or 78,509 tons) of the material collected curbside is comprised of items that are currently accepted in the City's residential curbside recycling program (i.e., certain paper, plastic, glass, and metal items). The remaining 23% (or 23,374 tons) of the material collected for recycling consist of contaminants or items that are not accepted in the City's curbside recycling collection program. Of the contaminants, an estimated 5.7% of the material collected may be recoverable, but not through the current curbside program, and 5.1% is compostable, though not all materials may be accepted in the City's organics program.

As outlined in the 40 by 20 Report, it is projected that with an increased investment in education, outreach, and compliance, the participation rate could increase from 45% to 50-55%. The education and outreach campaign would be geared both toward increasing the number of households that participate in the program, and encouraging current participants to recycle more material.

Using the same assumptions that were presented in the 40 by 20 Report, the quantity of recyclables set out for collection could increase by 8% in the "low diversion" scenario to 15% in the "high diversion" scenario, as a result of increased education. Those diversion percentages were applied to the tons of Curbside Recyclable materials that were estimated based on the 2014 Residential Characterization Study. An estimated 6,281 to 11,776 additional tons per year could potentially be collected in the residential curbside recycling program as shown in Table 24.

Table 24. Estimated Increase in Curbside Recycle Collected
Alternative 1 – Expand Education and Outreach

Curbside Recycle Materials	Estimated Percent[(1)]	Estimated Tons[(2)]	Low Diversion (8%) Increase in Tons	High Diversion (15%) Increase in Tons
Paper				
Newspaper	8.92%	9,083	727	1,362
Plain OCC/Kraft Paper	16.84%	17,161	1,373	2,574
High Grade Paper	1.27%	1,296	104	194
Mixed Low-grade Paper	24.91%	25,383	2,031	3,807
Milk/Juice Polycoated Paper	0.47%	482	39	72
Frozen Food Polycoated Paper	0.04%	42	3	6
Plastic				
#1 PET Bottles	3.92%	3,996	320	599
#1 PET Other Packaging	0.85%	864	69	130
#2 HDPE Natural Bottles	1.57%	1,597	128	240
#2 HDPE Colored Bottles	1.30%	1,326	106	199
#2 HDPE Other Packaging	0.33%	336	27	50
Other Rigid Plastic Packaging	1.35%	1,372	110	206
Mixed Rigid Plastics	2.03%	2,068	165	310
Glass				
Glass Beverage Containers	9.35%	9,527	762	1,429
Metal				
Aluminum Cans	1.02%	1,043	83	157
Aluminum Foil/Containers	0.16%	167	13	25
Other Nonferrous	0.19%	191	15	29
Tin Food Cans	1.49%	1,516	121	227
Empty Aerosol Cans	0.16%	167	13	25
Other Ferrous	0.88%	892	71	134
Total Curbside	**77.1%**	**78,509**	**6,281**	**11,776**

Note: Due to rounding, sums may not match totals and subtotals
(1) Based on the 2014 Residential Characterization Study.
(2) Based on FY 2014 recycling tons reported by the City of Phoenix.

The other materials found in the curbside recycling stream are considered contaminants. For this analysis, it was assumed that with increased education, outreach, and compliance, a portion of these

materials could be diverted from the recycling cart to either the garbage cart, the organics cart, or could be brought to specific drop-off collection sites.

Non-Recoverable Material

Non-recoverable materials make up approximately 12% of the recyclables collected at the curb, which equates to 12,355 tons per year. With increased education, it is estimated that between 8 and 15% of this material could be diverted to the garbage cart. A very small amount of household hazardous waste (HHW), such as latex paint and adhesives, was found in the recycling stream; residents should be instructed to take those materials to one of the City's HHW collection events. Table 25 shows the estimated tons, by material type, of items classified as "non-recoverable" that could potentially be diverted from the recycling stream with increased education.

Table 25. Estimated Reduction in Non-Recoverable Materials
Alternative 1 – Expand Education and Outreach

Non-Recoverable Materials	Estimated Percent[(1)]	Estimated Tons[(2)]	Low Diversion (8%) Decrease in Tons	High Diversion (15%) Decrease in Tons
Paper/Other Materials	1.11%	1,126	90	169
Expanded Polystyrene	0.61%	626	50	94
Plastic Garbage Bags	0.33%	333	27	50
Other Plastic Film	1.82%	1,857	149	278
Plastic/Other Materials	1.22%	1,241	99	186
Other Glass	0.27%	276	22	41
Unaccepted Yard Waste	0.06%	58	5	9
Carpet/Upholstery	0.30%	308	25	46
Disposable Diapers	0.75%	762	61	114
Animal By-Products	0.04%	41	3	6
Rubber Products	0.43%	433	35	65
Ash	0.00%	0	0	0
Furniture	0.41%	418	33	63
Small Appliances	0.10%	101	8	15
Non-Distinct Fines	2.90%	2,950	236	443
Miscellaneous Organics	0.43%	437	35	66
Miscellaneous Inorganics	0.13%	130	10	20
Latex Paint	0.02%	24	2	4
Hazardous Adhesives/Glues	0.00%	1	0	0
Non-Hazardous Adhesives/Glues	0.01%	13	1	2
Oil-based Paint/Solvent	0.00%	1	0	0
Hazardous Cleaners	0.02%	19	2	3
Pesticides/Herbicides	0.00%	3	0	0
Asbestos	0.00%	0	0	0
Explosives	0.00%	0	0	0
Vehicle and Equipment Fluids	0.01%	8	1	1
Pool Chemicals	0.00%	0	0	0
Other Hazardous Chemicals	0.05%	50	4	8
Other Non-hazardous Chemicals	0.07%	76	6	11
Treated Wood	0.17%	175	14	26
Contaminated Wood	0.71%	722	58	108
Insulation	0.01%	5	0	1
Other Construction Debris	0.16%	160	13	24
Total Non-Recoverable	**12.1%**	**12,355**	**988**	**1,853**

Note: Due to rounding, sums may not match totals and subtotals
[(1)] Based on the 2014 Residential Characterization Study.
[(2)] Based on FY 2014 recycling tons reported by the City of Phoenix.

The largest material category in the non-recoverable composition is *non-distinct fines*. This category consists of dirt and other small materials that are smaller than two inches in diameter. Fines are a product of the collection process and while they may not be targeted for diversion, the quantity will decrease as the overall tons of non-recoverable materials decreases.

Other Recoverable Material

Other recoverable materials make up an estimated 5.7% of the curbside recycling stream or 5,851 tons annually. Currently there are some drop-off collection opportunities available for certain materials including:

- *Plastic grocery/merchandise bags* and *other clean plastic consumer bags* can be taken to "Bag Central" stations located at various Phoenix grocery stores.
- *Fluorescent tubes*, *oil filters*, *other electronics*, and *tires* are accepted at the City's HHW and electronics collection events (held at various times throughout the year).
- *Textiles* (clothing, shoes, purses, belts) are accepted throughout Phoenix at various consignment shops, thrift stores, and reuse centers.
- Certain materials such as lumber and other building materials may be accepted for reuse at locations such as Stardust Building Supplies and Habitat for Humanity's Re-Stores.

The City may implement additional diversion programs for some of these items (and other potentially recoverable materials) in the future, but until then, residents should be instructed to use available drop-off programs or dispose of these items in their garbage cart.

It is estimated that through expanded education, residents could divert between 8 and 15% of other recoverable materials from the recycling stream. The potential decrease in tons is shown by material type in Table 26.

Table 26. Estimated Reduction in Other Recoverable Materials
Alternative 1 – Expand Education and Outreach

Other Recoverable Materials	Estimated Percent[(1)]	Estimated Tons[(2)]	Low Diversion (8%) Decrease in Tons	High Diversion (15%) Decrease in Tons	Potential Diversion Method
Plastic Grocery/Merchandise Bags	0.67%	687	55	103	Bag Central/Grocery Stores
Other Clean Plastic Consumer Product Bags	0.08%	77	6	12	Bag Central/Grocery Stores
Fluorescent Tubes	0.02%	17	1	3	HHW Collection Events
Oil Filters	0.03%	33	3	5	HHW Collection Events
Mixed Metals/Material	0.67%	686	55	103	Scrap Metal Dealer or Garbage Cart
Prunings Greater than 12" (diameter)	0.03%	30	2	4	Bulk Trash Collection
Textiles	2.60%	2,649	212	397	Thrift Stores & Consignment Shops
Leather	0.04%	36	3	5	Thrift Stores & Consignment Shops
Tires	0.06%	60	5	9	HHW Collection Events
Mattresses	0.00%	0	0	0	Bulk Trash Collection
CRTs	0.00%	0	0	0	HHW Collection Events
Other Electronics	0.99%	1,011	81	152	HHW Collection Events
Ceramics/Porcelain	0.15%	148	12	22	Bulk Trash Collection or Garbage Cart
Non-rechargeable Dry-cell Batteries	0.04%	41	3	6	Battery Vendor or Garbage Cart
Rechargeable Dry-cell Batteries	0.00%	2	0	0	HHW Collection Events
Wet-cell (car) Batteries	0.00%	0	0	0	HHW Collection Events
Dimension Lumber	0.07%	72	6	11	Bulk Trash Collection
Pallets/Crates	0.00%	0	0	0	Bulk Trash Collection
New Gypsum Scrap	0.00%	0	0	0	Bulk Trash Collection
Demo Gypsum Scrap	0.02%	25	2	4	Bulk Trash Collection
Rock/Concrete/Bricks	0.15%	156	12	23	C&D Recycler or Transfer Station
Asphaltic Roofing	0.12%	121	10	18	Bulk Trash Collection
Total Other Recoverable	**5.7%**	**5,851**	**468**	**878**	

Note: Due to rounding, sums may not match totals and subtotals
[(1)] Based on the 2014 Residential Characterization Study.
[(2)] Based on FY 2014 recycling tons reported by the City of Phoenix.

Compostable Material

A small portion of the curbside recycling substream (approximately 5.1% or 5,168 tons) is compostable material. For this analysis, it was assumed that with increased education and outreach, the amount of compostables that could be diverted from the recycling cart to either the garbage or organics cart would be in the range of 8 to 15%. (The City implemented the Green Organics Curbside Collection program in July 2014 and is currently in Phase 1 of the roll-out. It is a voluntary program and currently less than three percent of eligible households subscribe.) A more detailed discussion of the diversion potential for compostables can be found in Alternative 3 – Weekly Collection of Containerized Green Organics.

It is estimated that through expanded education, residents could divert between 413 and 775 tons of compostable materials from the recycling stream. The potential decrease by material type is shown in Table 27.

Table 27. Estimated Reduction in All Compostables
Alternative 1 – Expand Education and Outreach

All Compostable Materials	Estimated Percent[(1)]	Estimated Tons[(2)]	Low Diversion (8%) Decrease in Tons	High Diversion (15%) Decrease in Tons	Diversion Method
Waxed OCC/Kraft Paper	0.04%	43	3	6	Garbage Cart
Compostable/Food Soiled Paper	1.16%	1,185	95	178	Garbage Cart
Compostable Plastics	0.00%	0	0	0	Garbage Cart
Leaves & Grass	1.15%	1,173	94	176	Organics or Garbage
Prunings Less than 2" (diameter)	0.11%	110	9	17	Organics or Garbage
Prunings 2" to 12" (diameter)	0.04%	41	3	6	Organics or Garbage
Purchased Food	2.22%	2,266	181	340	Garbage Cart
Homegrown Food	0.04%	38	3	6	Garbage Cart
Beverages and Liquids	0.31%	311	25	47	Garbage Cart/Drain
Total Compostable	**5.1%**	**5,168**	**413**	**775**	

Note: Totals may not equal sum due to rounding.
[(1)] Based on the 2014-2015 Residential Characterization Study.
[(2)] Based on FY 2014 recycling tons reported by the City of Phoenix.

Currently only yard waste, such as grass clippings, twigs, branches, and shrubs are allowed in the City's curbside organics program. In the future, the City could potentially expand its organics collection program to include food waste and/or compostable paper, in which case the diversion percentages would increase due to the added convenience for residents to place these additional materials in their organics cart.

Expanding education also provides the City with the opportunity to remind residents that they can reduce the quantity of yard waste generated by implementing xeriscaping techniques (landscaping with plants that require little or no water) and/or grasscycling (leaving grass clippings on the lawn).

Recyclable Material Summary

As a result of expanded education and outreach, it is projected that the quantity of residential recyclable materials collected at the curb will increase and the quantity of contaminants in the recycling stream will decrease due to proper disposal and use of appropriate drop-off collection sites. The Project Team estimates that the City could potentially expect an increase of 6,281 to 11,776 tons of recyclable material to be set out for curbside recycling collection, while an estimated 1,870 to 3,506 tons of contaminated materials could be directed from the recycling stream to either the garbage stream or to other recycling programs (based on the assumptions outlined in this section). The combined impacts of these efforts are summarized in Table 28.

Table 28. Projected Recycling Quantities after Implementation Alternative 1 – Expand Education and Outreach

Recoverability Group	Base Tons	Low Diversion	High Diversion
Curbside Recyclable	78,509	84,790	90,285
Non-Recoverable	12,355	11,367	10,502
Other Recoverable	5,851	5,383	4,973
Compostable	5,168	4,754	4,393
Total Tons	**101,882**	**106,293**	**110,153**

Education and outreach efforts, therefore, would be expected to not only increase the tons of material recovered, but also would result in a higher portion of the material collected to actually be recycled.

Diversion Projections – Garbage

An estimated 390,548 tons of residential garbage was collected by the City in FY 2014. From the 2014 Residential Characterization Study, the waste was grouped into the same recoverability categories as the recyclables. The results are shown in Table 29.

Table 29 Composition by Recoverability Group, Citywide Garbage

Recoverability Group	Percent	Tons
Curbside Recyclable	13.7%	53,419
Non-Recoverable	24.8%	96,989
Other Recoverable	11.5%	44,702
Compostable	50.0%	195,438
Total	**100%**	**390,548**

Approximately 53,419 tons (13.7%) of garbage contain materials that are currently accepted in the City's residential curbside recycling program (i.e., certain paper, plastic, glass, and metal items). The estimated

8 to 15% increase (6,281 to 11,776 tons) in the materials to be collected from the recycling carts, as described earlier in this section, was subtracted from the curbside recyclable tonnage in the garbage since those tons would be diverted to the recycling stream.

Of the remaining 337,129 tons of garbage, it is the Project Team's opinion that there would be a negligible change in the quantities of Non-Recoverable, Other Recoverable, and Compostable materials collected due to increased education. However it is estimated that a more significant quantity of Other Recoverables could be diverted under Alternative 2 – Implement a Volume-Based Fee Structure (due to economic incentives to minimize the quantity of waste disposed) and a significant quantity of Compostables could be diverted under Alternative 3 - Weekly Collection of Containerized Green Organics.

As a result of expanded education and outreach, it is estimated the City could expect a decrease in tons of recyclable material to be set out with the garbage, while the quantities of Non-Recoverable, Other Recoverable, and Compostable materials would increase slightly due to residents placing these materials in the garbage cart rather than the recycling cart, as shown in Table 30.

Table 30. Projected Garbage Quantities after Implementation
Alternative 1 – Expand Education and Outreach

Recoverability Group	Base Tons	Low Diversion	High Diversion
Curbside Recyclable	53,419	47,138	41,642
Non-Recoverable	96,989	97,977	98,842
Other Recoverable	44,702	45,170	45,580
Compostable	195,438	195,851	196,213
Total Tons	**390,548**	**386,137**	**382,277**

Appropriate Technologies for Recovery

For Alternative 1 – Expand Education, Outreach, and Compliance for Curbside Recycling, it is assumed the City would maintain its current collection and processing technologies.

Estimated Cost to Recover Identified Commodities

Table 31 shows the projected change in costs, savings, and revenue associated with implementing Alternative 1.

Per the 40 by 20 Report and for the purposes of this evaluation, it is assumed that the City increases its expenditures on public education, outreach, and compliance by $2.50 per household per year, or a total of $981,095 per year. In addition to the increased costs of public education, collecting 8 to 15% more recyclables at the curb would result in increased processing costs. At $33.22 per ton (the maximum processing fee under the current contract when adjusted for CPI), the cost to process the additional recyclables would be $146,500 in the low diversion scenario and $274,729 in the high diversion scenario. Using the methodology developed for the 40 by 20 Report to determine collection costs, the Project Team projects that the City would require three additional recycling routes in the low diversion

scenario and seven additional routes in the high diversion scenario. In both scenarios, the anticipated tons diverted would only eliminate one trash collection route. The net additional collection costs are projected to be $486,975 per year in the low diversion scenario and $1,298,599 per year in the high diversion scenario.

Table 31. Annual Financial Projections
Alternative 1 – Expand Education and Outreach

	Low Diversion Estimate	High Diversion Estimate
Additional Costs		
Education[(1)]	$981,095	$981,095
Processing Recyclables[(2)]	146,500	274,729
Changes in Collection Routes[(3)]	486,975	1,298,599
Total Additional Costs	**$1,614,570**	**$2,554,423**
Additional Savings/Revenue		
Decrease Transfer/Haul Cost[(4)]	$77,332	$144,752
Decrease in ADEQ Disposal Fee [(5)]	1,578	2,954
Decrease in Buckeye Royalty Fee[(6)]	18,118	33,913
Increased Revenue from the Sale of Recyclables (City-share)[(7)]	883,415	1,656,404
Total Additional Savings/Revenue	**$980,443**	**$1,838,023**
Projected Annual Impact	**-$634,126**	**-$716,401**
Per Additional Ton Diverted	-$100.45	-$60.63

[(1)] $2.50 increase per household per year.
[(2)] $33.22 per additional ton collected.
[(3)] Assuming additional labor, fuel, and equipment, etc. to collect additional recyclables with a minor offset in collection costs of residential trash.
[(4)] Assumes saving of $12.25 per ton diverted.
[(5)] Assumes savings of $0.25 per ton diverted.
[(6)] Assumes savings of $2.87 per ton diverted.
[(7)] Based on average revenue the City received per ton, by commodity, in May 2015.

There will also be savings that result from transferring, hauling, and disposing of less trash,[3] an estimated $77,332 in the low diversion scenario and $144,752 in the high diversion scenario. Diverting more material away from disposal and into recycling is projected to result in an estimated $883,415 (low

[3] To ensure conservative estimates in disposal savings, the Project Team only included savings in hauling and disposal costs directly tied to tonnage. This includes the per-ton hauling cost from the transfer stations to the landfill and the tonnage-based fees charged at the landfill. With sufficient reduction, net costs of landfill operations are also likely to decrease, however, this decrease is not directly tied to tonnage.

diversion scenario) to $1,656,404 (high diversion scenario) in increased revenues annually from the sale of recyclable materials.

The net result is that increasing spending on education, outreach, and compliance by $2.50 per household per year is projected to result in a net increase in costs between $634,126 in the low diversion scenario and $716,401 in the high diversion scenario. This is equivalent to an estimated cost of $100.45 per additional ton diverted in the low diversion scenario and $60.63 per additional ton diverted in the high diversion scenario.

Potential Revenue by Commodity

The potential revenue from the sale of the additional recyclable materials collected due to increased education and outreach, is shown in Table 32. The estimated price per ton was based on average revenue the City received per commodity, per ton, in May 2015.

Table 32. Projected Revenue
Alternative 1 – Expand Education and Outreach

	Low Diversion 8% Increase	High Diversion 15% Increase	Estimated Revenue per Ton[(1)]	Potential Revenue (Low)	Potential Revenue (High)
Paper					
Newspaper	727	1,362	$100	$72,666	$136,248
Plain OCC/Kraft Paper	1,373	2,574	$110	$151,020	$283,162
High Grade Paper	104	194	$100	$10,367	$19,439
Mixed Low-grade Paper	2,031	3,807	$100	$203,063	$380,744
Milk/Juice Polycoated Paper	39	72	$100	$3,857	$7,231
Frozen Food Polycoated Paper	3	6	$100	$337	$632
Plastic					
#1 PET Bottles	320	599	$400	$127,861	$239,740
#1 PET Other Packaging	69	130	$0	$0	$0
#2 HDPE Natural Bottles	128	240	$680	$86,878	$162,896
#2 HDPE Colored Bottles	106	199	$500	$53,027	$99,426
#2 HDPE Other Packaging	27	50	$0	$0	$0
Other Rigid Plastic Packaging	110	206	$35	$3,842	$7,204
Mixed Rigid Plastics	165	310	$136	$22,496	$42,181
Glass					
Glass Beverage Containers	762	1,429	$17	$12,703	$23,818
Metal					
Aluminum Cans	83	157	$1,478	$123,364	$231,308
Aluminum Foil/Containers	13	25	$0	$0	$0
Other Nonferrous	15	29	$0	$0	$0
Tin Food Cans	121	227	$60	$7,279	$13,648
Empty Aerosol Cans	13	25	$60	$802	$1,503
Other Ferrous	71	134	$54	$3,853	$7,224
Total Curbside	**6,281**	**11,776**	**-**	**$883,415**	**$1,656,404**

Note: Due to rounding, sums may not match totals and subtotals
[(1)] Based on average revenue the City received per ton, by commodity, in May 2015.

Alternative 2 – Implement a Volume-Based Fee Structure for Residential Garbage Collection

Description

As described in the 40 by 20 Report, Pay-As-You-Throw (PAYT) or volume-based garbage collection, is a system in which generators, in this case residents, are typically charged a higher rate when they set out more trash for collection and disposal (or receive a discount for recycling). This provides a financial incentive to reduce waste and recycle more in order to dispose of (and pay) less. PAYT can be particularly effective at diverting waste when combined with convenient diversion programs such as curbside recycling (particularly with wheeled carts) or separate green organics collection.

In July 2014, the City began offering volume-based curbside trash collection service. Instead of calling it PAYT, the City titled it "Save as You Reduce and Recycle" (SAY R&R). The SAY R&R program offers residents the option to downsize their 90-gallon trash cart to a 60-gallon cart for a $3.00 discount on their monthly Solid Waste Service fee. The monthly fee of $26.80 is then reduced to $23.80. Residents must be enrolled in the City's curbside recycling program to receive the discount. The City implemented its voluntary Green Organics (GO) Curbside Collection program at the same time as SAY R&R to offer residents another opportunity to reduce the quantity of waste set out for collection. (Alternative 3 of this report analyzes the impacts of curbside organics collection on waste diversion.)

As of April 15, 2015, approximately 6,259 households (less than two percent) had signed up for the SAY R&R collection service. Because the program is too new to determine participation rates, and the City does not have tonnage data available to determine the impact of the program, the Project Team used the assumptions from the 40 by 20 Report to analyze the volume-based fee structure alternative.

This section will focus on how the results of the 2014 Residential Characterization Study might impact the City's SAY R&R collection program by addressing:

- Diversion projections (types and quantities of materials that could be recovered);
- Appropriate technologies for recovery;
- Estimated cost to recover the identified commodities; and
- Potential revenue by commodity.

Diversion Projections

Currently, the majority of City residents have a single 90-gallon container for trash collection for which they pay a $26.80 per month subscription fee. The new SAY R&R program offers residents the option to downsize their 90-gallon trash cart to a 60-gallon cart for a monthly subscription fee of $23.80.

In the 40 by 20 Report, SAIC evaluated the financial impact of multiple pricing options, each offering two container sizes (60-gallon and 90-gallon) plus alley collection. Depending on the rates selected for each service level, some fee structures resulted in a net positive financial outcome (additional revenue from fees were higher than added costs) while others resulted in a net negative financial outcome (additional costs were higher than additional revenue from fees). In an effort to keep the analyses comparable, the rate structure used in the 40 by 20 report was also used in this analysis, with the exception of the adjusted 60-gallon fee, which now reflects the City's current rate of $23.80 per month. (In the 40 by 20 report, the adjusted 60-gallon fee was $21.00, creating a larger economic incentive for residents to switch cart sizes.) Table 33 shows the volume-based fees used in this analysis, which includes an increase for an additional 90-gallon cart and an increase in alley collection.

Table 33. Monthly Garbage Service Rates Used in Analysis
Alternative 2 – Volume-Based Fee Structure

	Baseline[(1)]	Adjusted
60-Gallon	-	$23.80
90-Gallon	$26.80	$26.80
Additional 90-Gallon	$13.40	$21.00
Alley	$26.80	$32.00

[(1)] Prior to implementing the SAY R&R program.

Table 34 shows the key assumptions used to estimate the range of potential diversion when the SAY R&R program is fully implemented. In the low diversion scenario, it is assumed that 52,587 households switch to a 60-gallon cart while 271,960 keep a single 90-gallon cart. The number of households that keep multiple carts drops from 7,454 to 3,924 households. In the high diversion scenario, it is assumed that 89,476 households switch to a 60-gallon cart while 240,957 remain with a 90-gallon container; only 1,570 households are assumed to have multiple carts. In both scenarios, the number of households with alley collection drops due to the increase in the rate for alley collection.

Table 34. Participating Households and Other Assumptions
Alternative 2 – Volume-Based Fee Structure

	Current	Low Diversion	High Diversion
Number (Percent) of Households Selecting SAY R&R Service Level			
60-Gallon Cart	6,259 (1.6%)	52,587 (13.4%)	89,476 (22.8%)
90-Gallon Cart	292,445 (74.5%)	271,960 (69.3%)	240,957 (61.4%)
Second 90-Gallon Cart	7,454 (1.9%)	3,924 (1.0%)	1,570 (0.4%)
Alley Service	86,280 (22.0%)	63,967 (16.3%)	60,435 (15.4%)
	392,438 (100%)	**392,438 (100%)**	**392,438 (100%)**
Increase in Recyclables Collected		**15%**	**20%**
Source Reduction/Disposal Reduction		**5%**	**7%**
Percent Contamination	**22.9%**	**28%**	**18%**

From the 40 by 20 Report it is projected that the tons collected in the curbside recycling program would increase by 15% in the low diversion scenario and by 20% in the high diversion scenario with volume-based garbage collection. In addition to recycling more, the SAY R&R rate structure can lead to source reduction, disposal reduction, and reuse as residents take actions such as buying in bulk, using fewer disposable items, composting organics at home, and donating items for reuse rather than disposing of them to reduce the amount of trash they set out. Based on a study conducted for the U.S. EPA in 2006, in which programs from over 1,000 communities were considered, an average of 6% less trash and recyclable material is generated by residents in communities with PAYT programs.[4] Thus, for this analysis, it is assumed that source reduction, reuse, composting, and increasing the use of appropriate drop-off collection sites (e.g., for plastic bags, HHW, and textiles), would reduce the amount of trash set out for disposal by 5% in the low diversion scenario and 7% in the high diversion scenario in addition to the additional tons diverted to recycling. (For the purposes of this report, the term "source reduction" will be used to encompass all the disposal reduction activities mentioned here.)

A potential negative impact of the SAY R&R rate structure is that, in an effort to divert more material from their trash container, residents may put more non-recyclable material in their recycling cart. In the low diversion scenario, it is assumed that the contamination rate of material in recycling carts increases from the current 22.9% (23,374 tons) to 28% for a total of 32,806 tons. In the high diversion scenario, it

[4] U.S. Environmental Protection Agency, *Pay-As-You-Throw (PAYT) in the US: 2006 Update and Analyses,* December 2006.

is assumed that education, outreach, and monitoring reduces contamination in the recycling carts to 18% for a total of 22,007 tons.

Table 35 presents the resulting diversion projected under these assumptions. In the low diversion scenario, a total of 117,165 tons is projected to be diverted through recycling and 19,527 tons through source reduction/disposal reduction. At the high end of projected diversion, an estimated 122,260 tons are estimated to be recycled and another 27,338 diverted through source reduction/disposal reduction efforts. The total tons of garbage collected for disposal is estimated to decrease from the current 390,548 tons to 355,738 in the low diversion scenario to 342,833 tons in the high diversion scenario.

Table 35. Annual Tonnage Projections
Alternative 2 – Volume-Based Fee Structure

	Current Tons[1]	Low Diversion	High Diversion
Tons Source Reduced[2]	0	19,527	27,338
Tons Collected for Recycling[3]	101,882	117,165	122,260
Increase in Tons		*15,282*	*20,377*
Tons Collected for Disposal	390,548	355,738	342,833
Decrease in Tons[4]		*34,810*	*47,715*
Recycling Contamination Disposed[5]	23,374	32,806	22,007
Recyclables Marketed[6]	78,509	84,359	100,253
Increase in Tons		*5,850*	*21,744*

Note: Due to rounding, sums may not match totals and subtotals
[1] Based on FY 2014 tons reported by the City of Phoenix.
[2] Estimated at 5% in the low diversion scenario and 7% in the high diversion scenario.
[3] Increase from current tons estimated at 15% in the low diversion and 20% in the high diversion.
[4] Sum of Source Reduction and Tons Collected for Recycling.
[5] Estimated at 28% in the low diversion scenario and 18% in the high diversion scenario.
[6] Tons Collected for Recycling minus Recycling Contamination Disposed.

Curbside Recyclable Material

An estimated 101,882 tons of recyclable materials are currently collected in the residential curbside single-stream program. From the 2014 Residential Characterization Study, it was determined that 77.1% (or 78,509 tons) of the material collected curbside is comprised of items that are currently accepted in the City's residential curbside recycling program and are marketable to end-users.

As stated previously, it is estimated that the quantities of recyclable material collected at the curb would increase between 15 and 20% as a result of increased participation in volume-based garbage collection. At the same time, the percent of contamination in recycling carts is expected to increase to 28% in the low diversion scenario and decrease to 18% in the high diversion scenario. Using the recycling composition percentages from the 2014 Residential Characterization Study, the tons available for market were estimated by commodity, as shown in Table 36.

Table 36. Estimated Tons of Curbside Recyclables Marketed
Alternative 2 – Volume-Based Fee Structure

Curbside Recyclable Materials	Estimated Percent[1]	Current Estimated Tons[2]	Low Diversion Increase in Tons[3]	High Diversion Increase in Tons[4]
Paper				
Newspaper	11.6%	9,083	677	2,516
Plain OCC/Kraft Paper	21.9%	17,161	1,279	4,753
High Grade Paper	1.7%	1,296	97	359
Mixed Low-grade Paper	32.3%	25,383	1,891	7,030
Milk/Juice Polycoated Paper	0.6%	482	36	134
Frozen Food Polycoated Paper	0.1%	42	3	12
Plastic				
#1 PET Bottles	5.1%	3,996	298	1,107
#1 PET Other Packaging	1.1%	864	64	239
#2 HDPE Natural Bottles	2.0%	1,597	119	442
#2 HDPE Colored Bottles	1.7%	1,326	99	367
#2 HDPE Other Packaging	0.4%	336	25	93
Other Rigid Plastic Packaging	1.7%	1,372	102	380
Mixed Rigid Plastics	2.6%	2,068	154	573
Glass				
Glass Beverage Containers	12.1%	9,527	710	2,639
Metal				
Aluminum Cans	1.3%	1,043	78	289
Aluminum Foil/Containers	0.2%	167	12	46
Other Nonferrous	0.2%	191	14	53
Tin Food Cans	1.9%	1,516	113	420
Empty Aerosol Cans	0.2%	167	12	46
Other Ferrous	1.1%	892	66	247
Total Curbside	**100%**	**78,509**	**5,850**	**21,744**

Note: Due to rounding, sums may not match totals and subtotals
[1] Based on the percentage of the Curbside Recyclables from the 2014 Residential Characterization Study.
[2] Based on FY 2014 recycling tons reported by the City of Phoenix.
[3] Based on a 15% increase in tons of recyclables collected at the curb, minus contamination.
[4] Based on a 20% increase in tons of recyclables collected at the curb, minus contamination.

Garbage

An estimated 390,548 tons of residential garbage was collected by the City in FY 2014. Based on the assumptions presented in Table 34 (15 to 20% increase in recyclables collected and 5 to 7% source reduction), it is estimated the quantity of garbage set out for disposal could decrease by 34,810 to 47,715 tons per year as a result of implementing volume-based collection fees.

With the financial incentive to switch to a smaller container, it is expected that residents will not only recycle more at the curb, but will also be more inclined to divert other recoverable materials from the waste stream by using available drop-off programs for items such as plastic bags, HHW, and textiles.

In addition, residents may reduce waste by grasscycling, composting at home, or subscribing to the City's Green Organics (GO) Curbside Collection program. This voluntary program was implemented at the same time as SAY R&R to offer residents another opportunity to reduce the quantity of waste set out for collection. The City is phasing in the GO Curbside Collection program which is currently only available to 38% of the City's households. The program is voluntary and residents pay an additional $5.00 per month for each 90-gallon curbside organics container which is collected weekly. Currently there are approximately 4,000 households participating out of an eligible 150,000 households (about 2.7%).

The tons "source reduced" in Table 35 are assumed to be a combination of source reduction activities, increased use of drop-off collection sites, and organics diversion efforts.

Appropriate Technologies for Recovery

For Alternative 2 – Implement a Volume-Based Fee Structure for Residential Garbage Collection, it is assumed the City would maintain its current collection and processing technologies.

Estimated Cost to Recover Identified Commodities

Table 37 shows the projected change in costs, savings, and revenue associated with implementing Alternative 2. The table shows the annual cost of purchasing enough 60-gallon carts to supply the households that are projected to request them (as indicated in Table 34) plus 15% for spare inventory. The cart costs include purchasing and shipping costs as well as the estimated cost to deliver carts to households, after a portion of the current annual cart budget is applied. The resulting capital cost is allocated over a ten-year payback period. Education costs are expected to be an additional $2.50 per household per year (the same amount as in Alternative 1),[5] however for this alternative, an additional 50 cents per household per year is dedicated to ensuring compliance. As in Alternative 1, there are anticipated cost increases associated with processing additional tons of recyclables and increased collection costs. Seven additional recycling routes are anticipated in the low diversion scenario and 13 in the high diversion scenario, only offset by the elimination of a single refuse route in both scenarios. Additional budget is also allocated for labor associated with documenting changes to the level of service and monthly fees in the billing system.

[5] Although the education costs were included in the analysis of Alternative 1, they are also included here, so that each alternative can be analyzed as a separate option.

Table 37. Annual Financial Projections
Alternative 2 – Volume-Based Fee Structure

	Low Diversion Estimate	High Diversion Estimate
Additional Costs		
Carts (Annualized Capital Costs)[1]	$130,305	$221,711
Education[2]	981,095	981,095
Compliance[3]	196,219	196,219
Processing[4]	507,683	676,911
Programming (Billing/Scheduling)[5]	49,267	82,394
Collection Routes[6]	1,298,599	2,521,209
Total Additional Costs	**$3,163,167**	**$4,679,539**
Additional Savings/Revenue		
Transfer/Haul[7]	$310,875	$601,257
ADEQ Disposal Fee [8]	6,344	12,271
Buckeye Royalty Fee[9]	72,833	140,866
Change in Revenue from Customer Fees	2,114,109[10]	(27,661)[11]
Increased Revenue from the Sale of Recyclables (City-share)[12]	822,874	3,058,416
Total Additional Savings/Revenue	**$3,327,036**	**$3,785,149**
Projected Annual Impact	**$163,869**	**($894,390)**
Per Additional Ton Diverted	$6.46	($18.22)

[1] Capital cost for carts assumes each 60-gallon cart costs $39.08, plus 7.6% sales tax and 3% freight costs. An additional 15% are purchased over the number of households requesting 60-gallon carts. A delivery fee of $16 per cart is also added to cart costs, for the households receiving a new 60-gallon cart. These costs are spread over ten years. A portion of the current annual cart budget is deducted from cart costs (percentage based on percent of customers moving to 60-gallons) to include only estimated additional incremental cart costs.

[2] $2.50 increase per household per year.

[3] $0.50 per household per year.

[4] $33.22 per additional ton collected.

[5] 3 minutes per account for billing staff to set up system at average salary and benefits of $50.80 per hour. Cost spread over 3 years but likely to be higher in first year.

[6] Assuming additional labor, fuel, and equipment, etc. to collect additional recyclables with a minor offset in collection costs of residential trash.

[7] Assumes saving of $12.25 per ton diverted.

[8] Assumes savings of $0.25 per ton diverted.

[9] Assumes savings of $2.87 per ton diverted.

[10] Assumes 13.4% of households choose 60-gallon carts, 69.3% of households choose a single 90-gallon cart, 1.0% of households choose two or more 90-gallon carts, and 16.3% choose alley service.

[11] Assumes 22.8% of households choose 60-gallon carts, 61.4% of households choose a single 90-gallon car, 0.4% of households choose more than one 90-gallon cart, and 15.4% choose alley service.

[12] Based on average revenue the City received per ton, by commodity, in May 2015.

The City will recognize savings in transfer, hauling, and disposal costs estimated at $310,875 in the low diversion scenario and $601,257 in the high diversion scenario, as a result of less trash being collected. At the assumed fee structure, revenues from monthly customer fees are projected to increase in the low diversion scenario as residents keeping alley collection and more than one 90-gallon cart pay a higher monthly fee. On the other hand, revenues from customer fees are projected to decrease in the high diversion scenario as the increased revenue from the higher fees for alley and extra cart collection are offset by the larger number of customers assumed to select the 60-gallon containers at a lower rate than the current level of service. The revenue from the sale of additional recyclables will reduce the total net costs of this diversion alternative.

In sum, implementation of this alternative alone is projected to result in additional revenue per year of $163,869 in the low diversion scenario and net increased costs per year of $894,390 in the high diversion scenario. This is equivalent to revenue of $6.46 per additional ton diverted in the low diversion scenario and a cost of $18.22 per additional ton diverted in the high diversion scenario. However, it is important to note that the annual net cost is strongly influenced by the fee structure. If the cost for the current cart size increased as the City offered a smaller cart for a reduced fee, this alternative could be cost neutral or result in net revenue.

Potential Revenue by Commodity

The potential revenue from the sale of the additional recyclable materials collected due to implementation of a volume-based fee structure, is shown in Table 38. The estimated price per ton was based on average revenue the City received per commodity, per ton, in May 2015.

Table 38. Projected Revenue
Alternative 2 – Volume-Based Fee Structure

	Low Diversion Increase in Tons	High Diversion Increase in Tons	Estimated Revenue per Ton[(1)]	Potential Revenue (Low)	Potential Revenue (High)
Paper					
Newspaper	677	2,516	$100	$67,686	$251,571
Plain OCC/Kraft Paper	1,279	4,753	$110	$140,670	$522,836
High Grade Paper	97	359	$100	$9,657	$35,892
Mixed Low-grade Paper	1,891	7,030	$100	$189,147	$703,013
Milk/Juice Polycoated Paper	36	134	$100	$3,592	$13,352
Frozen Food Polycoated Paper	3	12	$100	$314	$1,167
Plastic					
#1 PET Bottles	298	1,107	$400	$119,099	$442,660
#1 PET Other Packaging	64	239	$0	$0	$0
#2 HDPE Natural Bottles	119	442	$680	$80,924	$300,773
#2 HDPE Colored Bottles	99	367	$500	$49,393	$183,583
#2 HDPE Other Packaging	25	93	$0	$0	$0
Other Rigid Plastic Packaging	102	380	$35	$3,579	$13,301
Mixed Rigid Plastics	154	573	$136	$20,955	$77,883
Glass					
Glass Beverage Containers	710	2,639	$17	$11,832	$43,978
Metal					
Aluminum Cans	78	289	$1,478	$114,910	$427,092
Aluminum Foil/Containers	12	46	$0	$0	$0
Other Nonferrous	14	53	$0	$0	$0
Tin Food Cans	113	420	$60	$6,780	$25,200
Empty Aerosol Cans	12	46	$60	$747	$2,775
Other Ferrous	66	247	$54	$3,589	$13,339
Total Curbside	**5,850**	**21,744**	**-**	**$822,874**	**$3,058,416**

Note: Due to rounding, sums may not match totals and subtotals
[(1)] Based on average revenue the City received per ton, by commodity, in May 2015.

Alternative 3 – Weekly Collection of Containerized Green Organics

Description

Alternative 3, as described in the 40 by 20 Report, is for the City to offer weekly collection of containerized green organics to all households, by subscription.

The City implemented the Green Organics (GO) Curbside Collection program in July 2014. The program is being phased in and is currently only available to 38% of the City's households. Under the current Phase 1 of the GO Curbside Collection program, approximately 4,000 households are participating, out of 150,000 eligible households (about 2.7% of eligible households are participating). Future phases of the program will expand GO collection to additional areas of the City. The program is voluntary and residents pay an additional $5.00 per month for each 90-gallon curbside organics container that is collected weekly.

This section will focus on how the results of the 2014 Residential Characterization Study might impact the City's curbside GO collection program by addressing:

- Diversion projections (types and quantities of materials that could be recovered);
- Appropriate technologies for recovery of these materials;
- Estimated cost to recover the identified commodities; and
- Potential revenue by commodity.

Diversion Projections

An estimated 390,548 tons of residential garbage was collected by the City in FY 2014. From the 2014 Residential Characterization Study, it was estimated that 195,438 tons (approximately 50%) of the waste stream contained was compostable materials. In addition to leaves, grass, and prunings, (which made up 29.9% of the waste stream), the compostables category included food waste, compostable paper/food soiled paper, and other compostable materials (which totaled 20.1% of the waste stream). Currently only yard waste, such as leaves, grass clippings, twigs, branches, and shrubs are allowed in the City's curbside GO program.

Table 39 shows the current estimated composition of the compostables in the garbage, by material type.

Table 39. Quantity of Compostable Material, Citywide Garbage

	Estimated Percent[(1)]	Current Estimated Tons[(2)]
Materials accepted in GO Program		
Leaves & Grass	22.9%	89,454
Prunings Less than 2"	5.7%	22,171
Prunings 2" to 12"	1.3%	5,196
Subtotal	***29.9%***	***116,821***
Materials NOT accepted in GO Program		
Waxed OCC/Kraft Paper	0.1%	257
Compostable/Food Soiled Paper	5.4%	20,943
Compostable Plastics	0.0%	66
Purchased Food	12.3%	47,907
Homegrown Food	2.0%	7,734
Beverages and Liquids	0.4%	1,710
Subtotal	***20.1%***	***78,617***
Total	**50%**	**195,438**

Note: Due to rounding, sums may not match totals and subtotals
(1) Based on the 2014 Residential Characterization Study.
(2) Based on FY 2014 garbage tons reported by the City of Phoenix.

Based on the 116,821 tons of GO materials disposed in the waste stream annually, it was determined that, on average, each household[6] generates approximately 595 pounds (or 0.2977 tons) of GO materials per year. To evaluate the diversion potential of the fully implemented (Citywide) curbside GO collection program, the Project Team used the same participation assumptions as outlined in the 40 by 20 Report – between 15 and 25% of households would subscribe to the program. It is assumed that those residents who subscribe to the GO collection program are going to divert (and set out for collection) essentially all (100%) of the green organics they generate. Using these assumptions, it is projected that an additional 17,523 to 29,205 tons per year of green organics would be diverted from the residential waste stream via a fully-implemented Citywide GO curbside collection program, as shown in Table 40.

Table 40. Participating Households and Other Assumptions
Alternative 3 – Weekly Collection of Containerized Green Organics

	Low Diversion	High Diversion
Percent of Households Participating	15%	25%
Number of Households Participating	58,866	98,110
Total GO Tons Diverted per Year	17,523	29,205

Using the projected tonnage diverted per year from the low and high diversion scenarios in Table 40, the composition of the compostable materials that could be expected to be diverted from the garbage to the GO curbside collection program are shown, by material type, in Table 41.

Table 41. Estimated Reduction of GO Program Materials in the Citywide Garbage
Alternative 3 – Weekly Collection of Containerized Green Organics

Materials accepted in GO Program	Current Estimated Tons(1)	Low Diversion Decrease in Tons(2)	High Diversion Decrease in Tons(3)
Leaves & Grass	89,454	13,418	22,363
Prunings Less than 2"	22,171	3,326	5,543
Prunings 2" to 12"	5,196	779	1,299
Total	**116,821**	**17,523**	**29,205**

Note: Due to rounding, sums may not match totals and subtotals
(1) Based on FY 2014 garbage tons reported by the City of Phoenix.
(2) Based on 15% of households participating in GO Curbside Collection program.
(3) Based on a 25% of households participating in GO Curbside Collection program.

[6] Number of active households: 392,438 per the City of Phoenix staff.

From the 2014 Residential Characterization Study, it was estimated that 20.1% of the waste stream contained other compostables that are not currently accepted in the GO program. In the future, the City could potentially expand its organics collection program to include food waste, compostable/food soiled paper (e.g., tissues, napkins, wrappers), and/or other compostable materials. Table 42 shows the diversion potential of these materials, based on the same assumption that 15 to 25% of households will participate, however it was assumed that only 50% of the material generated by residents would be placed in the GO curbside container. As the financial incentive to reduce the amount of waste set out for disposal becomes greater (because of pricing differences between garbage cart sizes), the more likely it is that residents will take action to divert more materials from the waste stream (e.g., placing more food waste and food soiled paper in the organics cart instead of the garbage cart).

Table 42. Estimated Reduction of Non-GO Program Materials in the Citywide Garbage Alternative 3 – Weekly Collection of Containerized Green Organics

Materials accepted in GO Program	Current Estimated Tons[(1)]	Low Diversion Decrease in Tons[(2)]	High Diversion Decrease in Tons[(3)]
Waxed OCC/Kraft Paper	257	19	32
Compostable/Food Soiled Paper	20,943	1,571	2,618
Compostable Plastics	66	5	8
Purchased Food	47,907	3,593	5,988
Homegrown Food	7,734	580	967
Beverages and Liquids	1,710	128	214
Total	**78,617**	**5,896**	**9,827**

Note: Due to rounding, sums may not match totals and subtotals
[(1)] Based on FY 2014 garbage tons reported by the City of Phoenix.
[(2)] Based on 15% of households participating in GO Curbside Collection program.
[(3)] Based on 25% of households participating in GO Curbside Collection program.

Appropriate Technologies for Recovery

For Alternative 3 – Weekly Collection of Containerized Green Organics, it is assumed the City would maintain its current collection and processing technologies.

Estimated Cost to Recover Identified Commodities

Per the 40 by 20 Report and for the purposes of this evaluation, it is assumed that the City increases its expenditures on public education, outreach, and compliance by $1.50 per household per year, or a total of $588,657 per year. Because palm fronds and oleander are excluded from the GO curbside collection program, education efforts and compliance are essential for a successful program.

The most significant additional cost is anticipated to be the increased collection costs resulting from additional routes – 10 new routes in the low diversion scenario and 16 in the high diversion scenario, with only one less refuse route resulting from the diversion of green organics. The cost for processing organics, currently $25 per ton, will also increase from between $438,080 per year in the low diversion scenario to $730,133 in the high diversion scenario. Other costs include the annualized capital cost of

purchasing organics carts; costs for public outreach, education, and compliance; and costs to set-up and maintain billing for subscribers.

Table 43 shows the projected change in costs, savings, and revenue associated with implementing Alternative 3 – Weekly Collection of Containerized Green Organics citywide.

Table 43. Annual Financial Projections
Alternative 3 – Weekly Collection of Containerized Green Organics

	Low Diversion	High Diversion
Additional Costs		
Carts (Annualized Capital Costs)[1]	$365,298	$608,574
Education[2]	588,657	588,657
Processing Organics[3]	438,080	730,133
Programming (Billing/Scheduling)[4]	49,840	83,066
Collection Routes[5]	1,912,778	3,162,058
Total Additional Costs	**$3,354,652**	**$5,172,489**
Additional Savings/Revenue		
Transfer/Haul[6]	$214,659	$357,765
ADEQ Disposal Fee [7]	4,381	7,301
Buckeye Royalty Fee[8]	50,292	83,819
Revenue from Subscription Fees	3,531,942 [9]	5,886,570 [10]
Total Additional Savings/Revenue	**$3,801,274**	**$6,335,456**
Projected Annual Impact	**$446,622**	**$1,162,967**
Per Additional Ton Diverted	$25.49	$39.82

[1] Based on $44.47 per cart plus 3% freight and 7.6% sales tax with no financing costs/interest, ten year amortization schedule, reduced for current cart replacement budget, 15% additional inventory. Includes delivery cost of $16.00 per cart for participating households (or $16 per delivery for households with more than one organics cart). Deducts a portion of current cart replacement budget (that which would be allocated to 25% of participating households) to deduct current estimated cart replacement costs that organics carts would replace.

[2] $1.50 increase per household per year for education, outreach, and compliance.

[3] $25 per additional ton processed.

[4] 3 minutes per account for billing staff to set up system at salary and benefits of $50.80 per hour. Cost every spread over 3 years but likely to be higher in first year.

[5] Assuming additional labor, fuel, and equipment, etc. for separate organics routes with a minor offset in collection costs of residential trash.

[6] Assumes saving of $12.25 per ton diverted.

[7] Assumes savings of $0.25 per ton diverted.

[8] Assumes savings of $2.87 per ton diverted.

[9] Assumes 15%, or 58,866 households, subscribe, and pay a monthly rate of $5.

[10] Assumes 25%, or 98,110 households, subscribe and pay a monthly rate of $5.

Savings associated with containerized organics collection and diversion include a reduction in transfer/haul costs to the landfill and tonnage-associated fees for disposal. A $5 monthly subscription fee is projected to provide nearly $3.5 million in revenues in the low diversion scenario and over $5.8 million in the high diversion scenario. The additional revenue plus the savings are projected to offset the additional costs of organics collection, with $446,622 remaining in the low diversion scenario and $1,162,967 remaining in the high diversion scenario to cover any unanticipated costs. This is equivalent to a net savings of $25.49 per additional ton diverted in the low diversion scenario and $39.82 per additional ton diverted in the high diversion scenario.

Potential Revenue by Commodity

For the analysis of Alternative 3 - Weekly Collection of Containerized Green Organics, it was assumed there would not be any revenue from the sale of finished compost. Often a municipality will use the finished compost for City projects or give it away to residents. As curbside organics collection programs mature and the quantity of green organics increases, some municipalities will sell their finished compost loose and/or bag it for retail sales. This usually requires that the compost be tested to meet the U.S. Composting Council's Seal of Testing Assurance guidelines.

Alternative 4 – Collect Brush Separately from Bulk for Diversion

Description

Alternative 4, as described in the 40 by 20 Report, is for the City to replace its quarterly collection of brush and bulky items with an on-call service whereby each household can request brush and bulky collection twice annually as part of the base level of service.

The 2014 Residential Characterization Study analyzed the garbage and recyclable materials set out in wheeled carts by residents. Alternative 4 is not directly impacted by the results of the characterization study.

Alternative 5 – Increase Recovery at Transfer Stations

Description

Alternative 5, as described in the 40 by 20 Report, is for the City to dedicate additional resources to divert more recoverable material from direct haul loads coming into the transfer stations, primarily from commercial contractors and landscapers.

The 2014 Residential Characterization Study analyzed the garbage and recyclable materials set out in wheeled carts by residents. Alternative 5 is not directly impacted by the results of the characterization study.

Alternative 6 – Develop a Mixed Waste Processing Facility

Description

The final diversion alternative presented in the 40 by 20 Report, assumes that the City directs municipal solid waste (MSW) to a mixed waste processing facility at which recyclable materials would be diverted. This is in contrast to a materials recovery facility (MRF) where recyclables (that have already been separated from solid waste at the point of generation) are delivered for processing. Materials diverted at a mixed waste processing facility are sold to markets or sent to another facility for further processing, while the remaining material is sent to landfills for disposal. In some cases, a mixed waste processing line can be added at a transfer station and arriving loads that are "rich" in recyclable commodities are put through this processing line prior to being disposed. Mixed waste processing is often incorporated on the front-end of a waste conversion facility, so that valuable recyclables are removed and only select waste is introduced into a conversion unit.

Mixed waste processing can operate in concert with recycling programs, such as curbside recycling and green organics collection and processing. Residents and businesses would still be encouraged and incentivized to separate recoverable materials with high value but the remaining "trash" would be sent to a mixed waste processing facility where any remaining recyclables and/or organics would be extracted. A mixed waste processing facility could be owned and operated by the City, owned and operated by a private company, or owned by the City and operated by a private contractor.

For this analysis, as in the 40 by 20 Report, it is assumed that residential MSW collected by the City and currently delivered to the 27th Avenue transfer station would be processed at a mixed waste processing facility located at the same site. Recyclable materials would be extracted for recovery but no other processing, such as thermal conversion of the MSW, would be performed. Remaining material would be hauled in tractor trailers to the landfill.

Two types of facilities are considered in this analysis in order to project diversion and financial impacts. In Alternative 6A, the following materials would be recovered:

- Cardboard;
- Mixed paper;
- Five grades of plastic (#1, #2-Natural, #2-Colored, Mixed Plastics #3-#7, and Mixed Rigid Plastics);
- Ferrous metals;
- Aluminum cans;
- Green organics; and
- Wood.

In Alternative 6B, all of the materials listed above are recovered with the exception of green organics and wood.

Diversion Projections

Table 44 shows the tons of recyclables and organics that are projected to be recovered from a mixed waste processing facility in a low and high diversion scenario assuming 367,000 tons[7] of residential MSW enters the facility. To develop these estimates, the Project Team used the percentages of certain recoverable materials in the City's residential waste stream (determined by the 2014 Residential Characterization Study) that would be most feasible to recover, and applied a material-specific recovery rate based on experience with the diversion potential of a mixed waste processing facility. Based on these assumptions, it is projected that between 115,427 and 138,513 tons per year could be diverted at a mixed waste processing facility if organics and wood were recovered (diversion alternative 6A) and between 30,100 and 36,120 tons would be recovered if organics and wood were excluded from the recovery process (diversion alternative 6B).

[7] To be consistent with the 40 by 20 Report, 367,000 tons of residential MSW were modeled as incoming tonnage.

Table 44. Projected Annual Tons Processed at a Mixed Waste Processing Facility
Alternative 6 – Mixed Waste Processing

Material	Percent of Citywide Garbage[2]	Low Diversion[3]	High Diversion[3]
Old Corrugated Cardboard (OCC)	1.4%	3,495	4,193
Mixed Paper[4]	5.3%	12,974	15,569
Plastic #1 – PET Bottles	0.8%	2,611	3,133
Plastic #2 – Natural HDPE Bottles	0.2%	576	692
Plastic #2 – Colored HDPE Bottles	0.3%	734	880
Mixed Plastics #3-#7	0.8%	1,861	2,233
Mixed Rigid Plastics	1.6%	3,633	4,359
Ferrous Metals[5]	1.2%	3,358	4,030
Aluminum Cans	0.3%	859	1,031
Subtotal – Recyclables	**11.9%**	**30,100**	**36,120**
Organics/Green Waste[6]	30.3%	83,511	100,213
Organics/Wood[7]	0.7%	1,817	2,180
TOTAL – Recyclables plus Organics	**42.9%**	**115,427**	**138,513**

Note: Due to rounding, sums may not match totals and subtotals

[1] Assuming 367,000 tons per year delivered and applying recovery rates specific to each material.

[2] Based on 2014 Residential Characterization Study.

[3] Based on material-specific recovery rates developed for the 40 by 20 Report.

[4] Includes newspaper, high grade, mixed low-grade, milk/juice polycoated paper, and frozen food packaging.

[5] Includes tin food cans, empty aerosol cans, and other ferrous metals.

[6] Includes leaves and grass and all prunings (less than 2 inches, 2 inches to 12 inches, and greater than 12 inches).

[7] Includes dimension lumber and pallets/crates.

Appropriate Technologies for Recovery

For this alternative, it was assumed a processing line would be added to the 27th Avenue transfer station. Much of the technology used to recover recyclable materials in a mixed waste processing facility is similar to the equipment used in a single-stream MRF. Often additional equipment such as a bag breaker and additional screens to sort out organics are necessary for processing mixed waste. The primary equipment used in a mixed waste processing facility could include:

- Conveyor pit and incline conveyor;
- Bag breaker;
- Conveyors;
- Metering drum;
- V-screen or polishing screen (to separate fiber from containers);
- Disc screens or star screens (to separate paper);
- Optical sorters (to separate plastics by resin and color);
- Conveyor to sort line;
- Sorting platform;
- Cross belt magnet;
- Eddy current separator;
- Transfer and exit conveyors;
- Hoppers; and
- Baler.

There are many ways to configure the flow of materials through a mixed waste processing facility. The typical movement of materials, through mechanical and manual sorting processes, will vary depending on the equipment actually assembled to process the waste.

Estimated Cost to Recover Identified Commodities

Table 45 shows the projected capital cost for a mixed waste processing facility with (diversion alternative 6A) and without (diversion alternative 6B) recovery of organics and wood. In both cases, the facility is assumed to be sited at the 27th Avenue transfer station and to be capable of processing 367,000 tons per year of residential MSW delivered to that transfer station. The estimated capital costs for a mixed waste processing facility that recovers organics and wood is $46,494,500; the annual debt service is estimated to be $5,223,396 given the financing assumptions indicated. Excluding the organics recovery equipment, the projected cost for the mixed waste processing facility (diversion alternative 6B) is equal to $44,769,500, or $5,002,088 in estimated annual debt payment. The costs listed in Table 45 reflect the estimated capital costs in the 40 by 20 Report.[8] It should be noted that these are planning-level costs and should be revisited if and when the City begins to identify the specifics of this alternative.

[8] The initial cost estimates for the 40 by 20 Report were prepared in 2013. A review of the United States Bureau of Labor Statistics' Producer Price Index for the "Material Recyclers" industry indicates a slight reduction in the price index from 2013 to 2015.

Table 45. Estimated Capital Investment
Alternative 6 – Mixed Waste Processing

	Alternative 6A	Alternative 6B
Fixed Equipment		
Fixed Equipment	$24,000,000	$24,000,000
Organics Recovery Equipment	1,500,000	0
Contingency (15%)	3,825,000	3,600,000
Subtotal – Fixed Equipment	**$29,325,000**	**$27,600,000**
Annual Debt Service – Fixed Equipment[(1)]	**$3,762,229**	**$3,540,922**
Rolling Stock		
Rolling Stock	$930,000	$930,000
Contingency (15%)	139,500	139,500
Subtotal – Rolling Stock	**$1,069,500**	**$1,069,500**
Annual Debt Service – Rolling Stock[(2)]	**$152,786**	**$152,786**
Buildings [(3)]		
Operations	$11,000,000	$11,000,000
Support	3,000,000	3,000,000
Contingency (15%)	2,100,000	2,100,000
Subtotal – Buildings[(4)]	**$16,100,000**	**$16,100,000**
Annual Debt Service - Buildings	**$1,308,381**	**$1,308,381**
Total Capital Investment	**$46,494,500**	**$44,769,500**
Total Annual Debt Service	**$5,223,396**	**$5,002,088**

[(1)] 10-year term, 5% interest rate, and no issuance fee assumed for all fixed equipment.
[(2)] 7-year term and no financing assumed for rolling stock.
[(3)] Buildings include supporting infrastructure cost, scale facilities, and basic road and utility infrastructure.
[(4)] 20-year term, 5% interest rate, and 2% issuance fee assumed for buildings.

Table 46 shows the projected costs, savings, and revenues associated with a mixed waste processing facility at the 27th Avenue transfer station that recovers recyclable materials and organic and wood waste from the residential waste stream. Operation and maintenance (O&M) costs are estimated at $30.73 per incoming ton plus a profit of 20% (assuming a private contractor operates the facility) for a total of $36.88 per ton, totaling $13,535,254 per year. The cost to send recovered organics to a processor is assumed to be $25 per ton, as in the other options, for a total of $2,133,188 in the low diversion scenario and $2,559,825 in the high diversion scenario. The net increase in annual costs resulting from a mixed waste processing facility that diverts organics as well as other recoverable materials is $20,891,837 in the low diversion scenario and $21,318,475 in the high diversion scenario. The mixed waste processing facility is projected to result in savings of $1,774,116 per year in the low

diversion scenario and $2,128,940 in the high diversion scenario as a result of transferring, hauling, and disposing of less material in the landfill. In addition, the projected additional revenue from diverted material ranges from nearly $4.5 million to nearly $5.4 million per year, using the average prices the City is currently receiving, and a ten percent reduction in value due to reduced cleanliness of the material (compared to curbside material), as well as a ten percent share to the processor. No revenue is assumed from the marketing of organics. When projected savings and revenues are subtracted from the annual cost increases associated with a mixed waste processing facility, the net increase in cost is projected to be $14,650,741 in the low diversion scenario and $13,829,159 per year in the high diversion scenario. This is equivalent to $126.93 per additional ton diverted for the low diversion scenario and $99.84 in the high diversion scenario.

Table 46. Annual Financial Projections
Alternative 6A – Mixed Waste Processing with Organics Recovery

	Low Diversion	High Diversion
Additional Costs		
Annual Debt Service[(1)]	$5,223,396	$5,223,396
O&M[(2)]	13,535,254	13,535,254
Organics Processing[(3)]	2,133,188	2,559,825
Total Additional Costs	**$20,891,837**	**$21,318,475**
Savings		
Decrease Transfer/Haul Cost[(4)]	$1,413,984	$1,696,780
Decrease in ADEQ Disposal Fee [(5)]	28,857	34,628
Decrease in Buckeye Royalty Fee[(6)]	331,276	397,531
Total Savings	**$1,774,116**	**$2,128,940**
Additional Revenue[(7)]	$4,466,980	$5,360,376
Projected Annual Impact	**-$14,650,741**	**-$13,829,159**
Per Additional Ton Diverted	**-$126.93**	**-$99.84**

(1) See **Table 45** for calculations and assumptions.
(2) Assumed to be $36.88 per ton, which includes a 20% profit on $30.73 per ton.
(3) $25 per ton for organics diverted at facility and sent to processing contractor.
(4) Assumes savings of $12.25 per ton diverted.
(5) Assumes savings of $0.25 per ton diverted.
(6) Assumes savings of $2.87 per ton diverted.
(7) Based on various prices per commodity using the City's current revenue figures, minus a 10% reduction in value due to reduced cleanliness of the material, as well as a 10% reduction for the revenue share to the processor.

Table 47 shows the projected financial impact of processing residential MSW at a mixed waste processing facility that recovers high value recyclables but not organics and wood. O&M costs are estimated to be $30.48 per incoming ton plus a profit of 20% (assuming a private contractor operates the facility) for a total of $36.58 per ton and $13,423,392 per year. Capital and O&M costs are offset by savings in transfer, haul, and disposal costs for the tonnage that is diverted from the landfill, an estimated savings of $368,722 per year in the low diversion scenario and $442,466 in the high diversion scenario. The projected additional revenue from diverted material ranges from nearly $4.5 million to nearly $5.4 million per year, using the average prices the City is currently receiving, and a ten percent reduction in value due to reduced cleanliness of the material (compared to curbside material), as well as a ten percent share to the processor. When savings and revenues are deducted from the increased costs of implementing this alternative, the net increase in cost is projected to be between $13,495,868 (in the low diversion scenario) and $12,509,946 (in high diversion scenario), or between $448.37 (in low diversion scenario) and $346.35 (in high diversion scenario) per additional ton diverted.

Table 47. Annual Financial Projections
Alternative 6B – Mixed Waste Processing without Organics Recovery

	Low Diversion	High Diversion
Additional Costs		
Annual Debt Service[(1)]	$5,002,088	$5,002,088
O&M[(2)]	13,423,392	13,423,392
Organics Processing[(3)]	**$18,425,480**	**$18,425,480**
Total Additional Costs		
Savings	$368,722	$442,466
Decrease Transfer/Haul Cost[(4)]	7,525	9,030
Decrease in ADEQ Disposal Fee [(5)]	86,386	103,663
Decrease in Buckeye Royalty Fee[(6)]	**$462,633**	**$555,159**
Total Savings	**$4,466,980**	**$5,360,376**
Additional Revenue[(7)]	**-$13,495,868**	**-$12,509,946**
Projected Annual Impact	-$448.37	-$346.35
Per Additional Ton Diverted	$5,002,088	$5,002,088

[(1)] See Table 45 for calculations and assumptions.

[(2)] Assumed to be $36.58 per ton, which includes a 20% profit on $30.48 per ton.

[(3)] Assumes saving of $12.25 per ton diverted.

[(4)] Assumes savings of $0.25 per ton diverted.

[(5)] Assumes savings of $2.87 per ton diverted.

[(6)] Based on various prices per commodity using the City's current revenue figures, minus a 10% reduction in value due to reduced cleanliness of the material, as well as a 10% reduction for the revenue share to the processor.

Potential Revenue by Commodity

The potential revenue from the sale of the recyclable materials recovered from the mixed waste processing alternative is shown in Table 48, by commodity. The estimated price per ton was based on average revenue the City received per ton in May 2015. (For this alternative, it was assumed glass would not be recovered from a mixed waste processing facility.) As mentioned previously, the revenue was reduced by ten percent to account for dirtier material (compared to curbside collected material) and ten percent of the revenue would go to the processor.

Table 48. Projected Revenue
Alternative 6 – Mixed Waste Processing

	Low Diversion Increase in Tons	High Diversion Increase in Tons	Estimated Revenue per Ton[(1)]	Potential Revenue (Low)[(2)]	Potential Revenue (High)[(2)]
Paper					
OCC	3,495	4,193	$99	$311,367	$373,640
Mixed Paper	12,974	15,569	$90	$1,050,879	$1,261,055
Plastic					
#1 PET Bottles	2,611	3,133	$360	$845,804	$1,014,965
#2 HDPE Natural Bottles	576	692	$612	$317,527	$381,033
#2 HDPE Colored Bottles	734	880	$450	$297,151	$356,581
Other Rigid Plastic Packaging (#3-#7)	1,861	2,233	$32	$52,764	$63,317
Mixed Rigid Plastics	3,633	4,359	$122	$400,172	$480,206
Metal					
Ferrous Metals	3,358	4,030	$54	$163,201	$195,841
Aluminum Cans	859	1,031	$1,330	$1,028,114	$1,233,737
Total	**30,100**	**36,120**	**-**	**$4,466,980**	**$5,360,376**

Note: Due to rounding, sums may not match totals and subtotals
(1) Based on average revenue the City received per ton, by commodity, in May 2015 minus 10% for reduced cleanliness coming from a mixed waste process.
(2) Tons multiplied by estimated revenue per ton minus 10% revenue share to the processor.

Appendix A: Material Type Definitions

Paper

1. **NEWSPAPER:** Printed newsprint. Advertising "slicks" (glossy paper) are included in this category if found mixed with newspaper; otherwise, ad slicks are included with mixed low grade paper.
2. **PLAIN OCC/KRAFT PAPER:** Old unwaxed/uncoated corrugated container boxes and Kraft paper, and brown paper bags.
3. **WAXED OCC/KRAFT PAPER:** Old waxed/coated corrugated container boxes and Kraft paper, and brown paper bags.
4. **HIGH GRADE PAPER:** White or lightly colored sulfite/sulfate bond, copy papers, envelopes, and continuous-feed sulfite/sulfate/ground wood computer printouts and forms of all types. This is a combination of the 2003 types *office paper* and *computer paper*.
5. **MIXED LOW GRADE PAPER:** Low-grade, potentially recyclable papers, including junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, carbonless copy paper, paperback books, paper egg creates, and telephone directories. This is a combination of the 2003 types *mixed low grade* and *phone books*.
6. **MILK/JUICE POLYCOATED PAPER:** Bleached polycoated milk, ice cream, and aseptic juice containers.
7. **FROZEN FOOD POLYCOATED PAPER:** Bleached and unbleached polycoated frozen/refrigerator packaging, excluding polycoated milk/ice cream/aseptic containers.
8. **COMPOSTABLE/FOOD SOILED PAPER:** Paper towels, paper plates, waxed paper, tissues, shredded paper, and other paper products without a plastic coating. The items may be food soiled.
9. **PAPER/OTHER MATERIALS:** Predominantly paper with other materials attached (e.g. orange juice cans and spiral notebooks) and other hard to recycle paper items such as carbon copy paper, hardcover books, plastic coated paper cups, and photographs. This is a combination of the 2003 types *paper/other materials* and *other papers*.

Plastic

10. **#1 PET BOTTLES:** Polyethylene terephthalate bottles. A bottle has a neck and a mouth narrower than the base. Items may bear a #1 when labeled for recycling. This is approximately the same as the 2003 type *PET pop and liquor bottles*.
11. **#1 PET OTHER PACKAGING:** All non-bottle PET plastic packaging including tubs, jars, tray, and clamshells. This includes single use PET plastic cups. Items may bear a #1 when labeled for recycling. This is a combination of the 2003 types *other PET bottles* and the PET items in *other rigid packaging*.
12. **#2 HDPE NATURAL BOTTLES:** High-density polyethylene translucent bottles, often containing milk, juice, and beverage containers. A bottle has a neck and a mouth narrower than the base. Items may bear a #2 when labeled for recycling. This is approximately the same as the 2003 type *HDPE milk and juice bottles.*

13. **#2 HDPE COLORED BOTTLES:** High-density polyethylene colored or pigmented bottles. A bottle has a neck and a mouth narrower than the base. Examples include laundry detergent bottles and some gallon juice jugs. Items may bear a #2 when labeled for recycling. This is approximately the same as the 2003 type *other HDPE bottles.*
14. **#2 HDPE OTHER PACKAGING:** All non-bottle HDPE plastic packaging including tubs, jars, tray, and clamshells. An example is a ground coffee tub. Items may bear a #2 when labeled for recycling. This is a combination of the 2003 types *HDPE jars and tubs* and the HDPE items in *other rigid packaging*.
15. **OTHER RIGID PLASTIC PACKAGING:** Plastic bottles, jars, tubs, trays, clamshells, and other packaging not classified in the above-defined PET or HDPE categories; includes plastic packaging labeled #3-#7, unknown or unlabeled plastic packaging, and dual labeled plastic packaging but excludes all expanded polystyrene items and items labeled compostable. Examples include some shampoo bottles, dairy tubs, and single use plastic cups. This is a combination of the 2003 types *other plastic bottles, jars, and tubs* and *other rigid packaging*.
16. **EXPANDED POLYSTYRENE:** Includes packaging and finished products made of expanded polystyrene. Examples include packing peanuts, clamshells, trays, and packing blocks. Does not include rigid Styrofoam insulation.
17. **COMPOSTABLE PLASTICS:** Packaging made from compostable materials such as corn or potatoes, with the words “compostable” on the product. This is a new type.
18. **PLASTIC GROCERY/MERCHANDISE BAGS:** Plastic shopping bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Does not include dry cleaner bags. This does include grocery and merchandise bags reused for other purposes such as small trash bags. This is a new type.
19. **OTHER CLEAN PLASTIC CONSUMER PRODUCT BAGS:** Bread, produce, and dry cleaner plastic film bags. These are usually transparent and made of a single layer of film. Also includes Zip-Loc bags.
20. **PLASTIC GARBAGE BAGS:** Plastic garbage bags. This does not include single use shopping bags reused as garbage bags.
21. **OTHER PLASTIC FILM:** All other film items, including film packaging not defined elsewhere, plastic sheeting, photographic negatives, dirty zip-loc bags, and shower curtains. This includes multi-layer and opaque food packaging such as chip bags, candy bar wrappers, frozen food bags, etc.
22. **MIXED RIGID PLASTICS:** Plastic products intended for long term use or for to be reused multiple times. Examples include toys, milk crates, plastic pallets, plastic pipes, and buckets. Includes fiberglass resin products and materials.
23. **PLASTIC/OTHER MATERIALS:** Predominately plastic with other materials attached such as disposable razors, pens, lighters, toothbrushes, hoses, credit cards, drinking straws, and 3-ring binders.

Glass

24. **GLASS BEVERAGE CONTAINERS:** Includes any color pop, liquor, wine, juice, beer, and food bottles, jars, and containers. This is a combination of the 2003 *clear, green, and brown beverage container types* and the 2003 *container glass* type.
25. **FLUORESCENT TUBES:** Fluorescent light tubes and compact fluorescent bulbs.
26. **OTHER GLASS:** Window glass, light bulbs (except fluorescent tubes), mirrors, glassware, and any other glass item that does not fit into a category above.

Metal

27. **ALUMINUM CANS:** Aluminum beverage cans (UBC) and bi-metal cans made mostly of aluminum. This does not include aluminum food containers or cat food containers.
28. **ALUMINUM FOIL/CONTAINERS:** All other aluminum food containers, trays, and foil. This type includes cat food containers.
29. **OTHER NONFERROUS:** Metals not derived from iron, to which a magnet will not adhere, and which are not significantly contaminated with other metals or materials, including metal products and scrap such as window frames and cookware. This is a combination of the 2003 types *other nonferrous* and *other aluminum*.
30. **TIN FOOD CANS:** Tinned steel food containers, including bi-metal cans mostly of steel. Does not include paint cans or other types of steel cans.
31. **EMPTY AEROSOL CANS:** Empty, mixed material/metal aerosol cans. (Aerosols that still contain product are sorted according to that material—for instance, solvent-based paint.)
32. **OTHER FERROUS:** Ferrous and alloyed ferrous scrap metals to which a magnet adheres and which are not significantly contaminated with other metals or materials. Stainless steel is included in this material type. This includes empty and punctured tanks for liquid and gaseous fuels.
33. **OIL FILTERS:** Metal oil filters used in cars and other automobiles.
34. **MIXED METALS/MATERIALS:** Motors, insulated wire, and finished products containing a mixture of metals, or metals and other materials, whose weight is derived significantly from the metal portion of its construction.

Organic

35. **LEAVES AND GRASS:** Grass clippings, leaves, and weeds.
36. **UNACCEPTED YARD WASTE:** Oleander, palm fronds, pyracantha, and creosote. This is a new type.
37. **PRUNINGS LESS THAN 2”:** Cut prunings, 2" or less in diameter, from bushes, shrubs, and trees. This may include some prunings with fruit attached if the weight of the pruning exceeds the weight of the fruit. This is a new type.
38. **PRUNINGS 2” TO 12”:** Cut prunings, between 2" and 12” in diameter, from bushes, shrubs, and trees. This may include some prunings with fruit attached if the weight of the pruning exceeds the weight of the fruit. This is a new type.

39. **PRUNINGS GREATER THAN 12":** Cut prunings, 12" or more in diameter, from bushes, shrubs, and trees. This may include some prunings with fruit attached if the weight of the pruning exceeds the weight of the fruit. This is a new type.
40. **PURCHASED FOOD:** Food wastes and scraps, including bone, rinds, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside.
41. **HOMEGROWN FOOD:** Fruits and vegetables grown at home. Large quantities of the same fruit or vegetable lacking PLU stickers or other grocery store marking are considered homegrown fruits and vegetables. This may include some prunings with fruit attached if the weight of the fruit exceeds the weight of the prunings. This is a new type.
42. **BEVERAGES AND FOOD LIQUIDS:** Bottled water, soda, and other edible liquids such as pickle juice. This does not include the moisture content of solid foods. This is a new type.

Other Materials

43. **TEXTILES:** 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, non-leather shoes, and towels.
44. **CARPET/UPHOLSTERY:** Floor coverings and other furnishings made entirely of natural or synthetic fibers. Carpet is a general category of flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Other examples include carpet padding, area rugs, curtains, pillows, and cushions.
45. **LEATHER:** Finished products or scraps of leather. Examples include leather purses, leather shoes, and baseball gloves.
46. **DISPOSABLE DIAPERS:** Disposable baby diapers and adult protective undergarments.
47. **ANIMAL BY-PRODUCTS:** Animal carcasses and wastes. This includes animal feces and kitty litter.
48. **RUBBER PRODUCTS:** Finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hoses, rubber and latex gloves, and foam rubber (except carpet padding).
49. **TIRES:** Vehicle tires of all types.
50. **ASH:** Fireplace, burn barrel, or fire pit ash.
51. **FURNITURE:** Mixed-material furniture such as upholstered chairs. Items made wholly of a single material will be sorted based on the material type (wood furniture is sorted as treated wood, a metal desk is sorted as other ferrous).
52. **MATTRESSES:** Mattresses and box springs of any kind. Include memory foam, coil, stuffed, and futon mattresses.
53. **SMALL APPLIANCES:** Small electric appliances such as toasters, microwave ovens, power tools, curling irons, and light fixtures.
54. **CRT'S:** Computer monitors and television sets containing a cathode ray tube (CRT). This is a combination of the 2003 types *computer monitors* and *televisions*.
55. **OTHER ELECTRONICS:** Item with some circuitry not categorized elsewhere including cell phones, answering machines, electronic toys, stereos, radios, tape decks, other audio/visual equipment, VCRs, DVD players, computer processors, mice, keyboards, disk drives, monitors and TV's that

do not contain cathode ray tubes, printers, scanners, gaming systems, tablet computers, e-readers, and laptops. This is a combination of the 2003 types *audio/visual equipment* and *other computer equipment*.

56. **CERAMICS/PORCELAIN:** Finished ceramic or porcelain products such as dishware, toilets, etc.
57. **NONDISTINCT FINES:** Contains mixed fines smaller than 2" in diameter including dirt and other small materials. This is a combination of the 2003 types *nondistinct fines* and *sand/soil/dirt*.
58. **MISCELLANEOUS ORGANICS:** Wax, modeling clay, bar soap, cigarette butts, and other organic materials not classified elsewhere.
59. **MISCELLANEOUS INORGANICS:** Other non-combustible, inorganic materials not classified elsewhere.

Construction and Demolition Wastes

60. **DIMENSION LUMBER:** Clean milled lumber.
61. **PALLETS/CRATES:** Untreated wood pallets, crates, and other packaging lumber/panel board. This is a combination of the 2003 types *pallets* and *crates*.
62. **TREATED WOOD:** Lumber and wood products that have been painted or treated so as to render them difficult to compost. This includes plywood, other engineered woods, furniture made wholly of wood, and painted pallets and crates.
63. **CONTAMINATED WOOD:** Lumber and wood products contaminated with other wastes in such a way that they cannot easily be separated, but consisting primarily (over 50%) of wood. Often adhered to concrete or other contaminants that would not compost easily. This includes plywood and other engineered woods.
64. **NEW GYPSUM SCRAP:** New gypsum wallboard scrap.
65. **DEMO GYPSUM SCRAP:** Used or demolition gypsum wallboard scrap.
66. **INSULATION:** Fiberglass building and mechanical insulation, batt or rigid. Includes rigid Styrofoam insulation panels.
67. **ROCK/CONCRETE/BRICKS:** Includes rock gravel larger than 2" diameter, Portland cement mixtures (set or unset), and fired-clay bricks.
68. **ASPHALTIC ROOFING:** Asphalt shingles, tarpaper of built-up roofing.
69. **OTHER CONSTRUCTION DEBRIS:** Construction debris (other than wood), which cannot be classified into other component categories, and mixed fine building material scraps.

Household Hazardous

70. **LATEX PAINTS:** Water-based paints and similar products.
71. **HAZARDOUS ADHESIVES/GLUES:** Oil/resin/volatile solvent-based glues and adhesives, including epoxy, rubber cement, two-part glues and sealers, and auto body fillers.
72. **NON-HAZARDOUS ADHESIVES/GLUES:** Water-based glues, caulking compounds, grouts, and spackle.

73. **OIL-BASED PAINT/SOLVENT:** Solvent-based paints, varnishes, and similar products. Various solvents, including chlorinated and flammable solvents, paint strippers, solvents contaminated with other products such as paints, degreasers and some other cleaners if the primary ingredient is (or was) a solvent, or alcohol such as methanol and isopropanol.
74. **HAZARDOUS CLEANERS:** Various acids and bases whose primary purpose is to clean surfaces, unclog drains, or perform other actions.
75. **PESTICIDES/HERBICIDES:** Variety of poisons whose purpose is to discourage or kill pests, weeds, or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, are also included.
76. **NON-RECHARGABLE DRY-CELL BATTERIES:** Dry-cell batteries of various sizes and types as commonly used in households that are not intended to be re-charged and re-used. This is a new type created by splitting the 2003 type *dry cell batteries*.
77. **RECHARGABLE DRY-CELL BATTERIES:** Dry-cell batteries of various sizes and types as commonly used in households that are intended to be re-charged and re-used. This is a new type created by splitting the 2003 type *dry cell batteries*.
78. **WET-CELL BATTERIES:** Wet-cell batteries of various sizes and types as commonly used in automobiles.
79. **ASBESTOS:** Asbestos and asbestos-containing wastes (if this is the primary hazard associated with these wastes).
80. **EXPLOSIVES:** Gunpowder, unspent ammunition, picric acid, and other potentially explosive chemicals. This includes full or partly full tanks for liquid and gaseous fuels.
81. **VEHICLE AND EQUIPMENT FLUIDS:** Containers with fluids used in vehicles or engines, including antifreeze, brake fluid, motor oil, gasoline, and diesel fuel. This is a combination of the 2003 types *gasoline/kerosene* and *motor oil/diesel oil*.
82. **POOL CHEMICALS:** Chemicals in liquid or powder form used to maintain swimming pools. This is a new type, probably included in the *hazardous cleaners* type in 2003.
83. **OTHER HAZARDOUS CHEMICALS:** Other hazardous wastes that do not fit into the above categories, including unidentifiable materials and medical wastes such as I.V. tubing and patient drapes (Medical wastes that could be considered a bio-hazard were excluded from the sorts.).
84. **OTHER NON-HAZARDOUS CHEMICALS:** Non-hazardous soaps, cleaners, medicines, cosmetics, fire extinguishers, and other household chemicals.

Table 49. Material Types by Recoverability Group

Curbside Recycle	Other Recoverable	Non-recoverable
Newspaper	Plastic Grocery/Merchandise Bags	Paper/Other Materials
Plain OCC/Kraft Paper	Other Clean Plastic Consumer Product Bags	Expanded Polystyrene
High Grade Paper	Fluorescent Tubes	Plastic Garbage Bags
Mixed Low-grade Paper	Oil Filters	Other Plastic Film
Milk/Juice Polycoated Paper	Mixed Metals/Material	Plastic/Other Materials
Frozen Food Polycoated Paper	Prunings Greater than 12"	Other Glass
#1 PET Bottles	Textiles	Unaccepted Yard Waste
#1 PET Other Packaging	Leather	Carpet/Upholstery
#2 HDPE Natural Bottles	Tires	Disposable Diapers
#2 HDPE Colored Bottles	Mattresses	Animal By-products
#2 HDPE Other Packaging	CRTs	Rubber Products
Other Rigid Plastic Packaging	Other Electronics	Ash
Mixed Rigid Plastics	Ceramics/Porcelain	Furniture
Glass Beverage Containers	Dimension Lumber	Small Appliances
Aluminum Cans	Pallets/Crates	Non-distinct Fines
Aluminum Foil/Containers	New Gypsum Scrap	Miscellaneous Organics
Other Nonferrous	Demo Gypsum Scrap	Miscellaneous Inorganics
Tin Food Cans	Rock/Concrete/Bricks	Treated Wood
Empty Aerosol Cans	Asphaltic Roofing	Contaminated Wood
Other Ferrous	Non-rechargeable Dry-cell Batteries	Insulation
	Rechargeable Dry-cell Batteries	Other Construction Debris
Compostable	Wet-cell (car) Batteries	Latex Paint
Waxed OCC/Kraft Paper		Hazardous Adhesives/Glues
Compostable/Food Soiled Paper		Non-hazardous Adhesives/Glues
Compostable Plastics		Oil-based Paint/Solvent
Leaves & Grass		Hazardous Cleaners
Prunings Less than 2"		Pesticides/Herbicides
Prunings 2" to 12"		Asbestos
Purchased Food		Explosives
Homegrown Food		Vehicle and Equipment Fluids
Beverages and Liquids		Pool Chemicals
		Other Hazardous Chemicals
		Other Non-hazardous Chemicals

Table 50. Detailed Material List Mapped onto the Summary Material List, Citywide Garbage

2014 Material Types	Garbage Summary Material List
Newspaper	Newspaper
Plain OCC/Kraft Paper	Unwaxed OCC / Kraft paper
High Grade Paper Mixed Low-grade Paper Milk/Juice Polycoated Paper Frozen Food Polycoated Paper	Other recyclable paper
Waxed OCC/Kraft Paper Compostable/Food Soiled Paper	Compostable paper
Paper/Other Materials	Other paper
#1 PET Bottles #1 PET Other Packaging	PET (#1) plastic
#2 HDPE Natural Bottles #2 HDPE Colored Bottles #2 HDPE Other Packaging	HDPE (#2) plastic
Other Rigid Plastic Packaging Mixed Rigid Plastics	Other recyclable plastic
Compostable Plastics	Compostable plastic
Plastic Grocery/Merchandise Bags Other Clean Plastic Consumer Product Bags	Clean plastic film (grocery sacks)
Plastic Garbage Bags Other Plastic Film	Other plastic film
Expanded Polystyrene	Expanded polystyrene
Plastic/Other Materials	Other Plastic
Glass Beverage Containers	Recyclable glass
Fluorescent Tubes Other Glass	Other glass
Aluminum Cans	Aluminum cans
Tin Food Cans	Tin/steel food cans
Aluminum Foil/Containers Other Nonferrous Empty Aerosol Cans Other Ferrous	Other recyclable metals
Oil Filters Mixed Metals/Material	Other metals
Leaves & Grass Prunings Less than 2" Prunings 2" to 12"	Compostable yard waste
Purchased Food Homegrown Food Beverages and Liquids	Food waste

Table 50. Detailed Material List Mapped onto the Summary Material List, ctnd.
Citywide Garbage

2014 Material Types	Garbage Summary Material List
Unaccepted Yard Waste Prunings Greater than 12"	**Non-compostable organic**
Dimension Lumber Pallets/Crates Treated Wood Contaminated Wood New Gypsum Scrap Demo Gypsum Scrap Insulation Rock/Concrete/Bricks Asphaltic Roofing Other Construction Debris	**Construction and demolition waste**
Latex Paint Hazardous Adhesives/Glues Non-hazardous Adhesives/Glues Oil-based Paint/Solvent Hazardous Cleaners Pesticides/Herbicides Non-rechargeable Dry-cell Batteries Rechargeable Dry-cell Batteries Wet-cell (car) Batteries Asbestos Explosives Vehicle and Equipment Fluids Pool Chemicals Other Hazardous Chemicals Other Non-hazardous Chemicals	**Household hazardous waste**
Textiles Carpet/Upholstery Leather Disposable Diapers Animal By-products Rubber Products Tires Ash Furniture Mattresses Small Appliances CRTs Other Electronics Ceramics/Porcelain Non-distinct Fines Miscellaneous Organics Miscellaneous Inorganics	**Other materials**

Table 51. Detailed Material List Mapped onto the Summary Material List, Citywide Recycling

2014 Material Types	Recycling Summary Material List
Newspaper	**Newspaper**
Plain OCC/Kraft Paper	**Unwaxed OCC / Kraft paper**
High Grade Paper Mixed Low-grade Paper Milk/Juice Polycoated Paper Frozen Food Polycoated Paper	**Other recyclable paper**
Waxed OCC/Kraft Paper Compostable/Food Soiled Paper Paper/Other Materials	**Other paper**
#1 PET Bottles #1 PET Other Packaging	**PET (#1) plastic**
#2 HDPE Natural Bottles #2 HDPE Colored Bottles #2 HDPE Other Packaging	**HDPE (#2) plastic**
Other Rigid Plastic Packaging Mixed Rigid Plastics	**Other recyclable plastic**
Plastic Grocery/Merchandise Bags Other Clean Plastic Consumer Product Bags	**Clean plastic film (grocery sacks)**
Plastic Garbage Bags Other Plastic Film	**Other plastic film**
Expanded Polystyrene	**Expanded polystyrene**
Compostable Plastics Plastic/Other Materials	**Other Plastic**
Glass Beverage Containers	**Recyclable glass**
Fluorescent Tubes Other Glass	**Other glass**
Aluminum Cans	**Aluminum cans**
Tin Food Cans	**Tin/steel food cans**
Aluminum Foil/Containers Other Nonferrous Empty Aerosol Cans Other Ferrous	**Other recyclable metals**
Oil Filters Mixed Metals/Material	**Other metals**
Leaves & Grass Prunings Less than 2" Prunings 2" to 12" Purchased Food Homegrown Food Beverages and Liquids Unaccepted Yard Waste Prunings Greater than 12"	**Organic**

Table 51. Detailed Material List Mapped onto the Summary Material List, ctnd.
Citywide Recycling

2014 Material Types	Recycling Summary Material List
Dimension Lumber	Construction and demolition waste
Pallets/Crates	
Treated Wood	
Contaminated Wood	
New Gypsum Scrap	
Demo Gypsum Scrap	
Insulation	
Rock/Concrete/Bricks	
Asphaltic Roofing	
Other Construction Debris	
Latex Paint	Household hazardous waste
Hazardous Adhesives/Glues	
Non-hazardous Adhesives/Glues	
Oil-based Paint/Solvent	
Hazardous Cleaners	
Pesticides/Herbicides	
Non-rechargeable Dry-cell Batteries	
Rechargeable Dry-cell Batteries	
Wet-cell (car) Batteries	
Asbestos	
Explosives	
Vehicle and Equipment Fluids	
Pool Chemicals	
Other Hazardous Chemicals	
Other Non-hazardous Chemicals	
Textiles	Other materials
Carpet/Upholstery	
Leather	
Disposable Diapers	
Animal By-products	
Rubber Products	
Tires	
Ash	
Furniture	
Mattresses	
Small Appliances	
CRTs	
Other Electronics	
Ceramics/Porcelain	
Non-distinct Fines	
Miscellaneous Organics	
Miscellaneous Inorganics	

Table 52. 2014 vs 2003 Comparison of Material Types

2014 Material Types	Comparison Category	2003 Material Types
Newspaper	**Newspaper**	Newspaper
Plain OCC/Kraft Paper	**Unwaxed OCC / Kraft paper**	Plain OCC/Kraft
High Grade Paper Mixed Low-grade Paper Milk/Juice Polycoated Paper Frozen Food Polycoated Paper	**Other recyclable paper**	Office Paper Computer Paper Mixed Low Grade Phone Books Milk/Juice/Polycoat
Waxed OCC/Kraft Paper Compostable/Food Soiled Paper	**Compostable paper**	Compostable Soiled
Paper/Other Materials	**Other paper**	Waxed OCC/Kraft Frozen Food Polycoats Paper/Other Materials Other Paper
#1 PET Bottles #1 PET Other Packaging	**PET (#1) plastic**	#1 Pop & Liquor #1 Other Bottles
#2 HDPE Natural Bottles #2 HDPE Colored Bottles #2 HDPE Other Packaging	**HDPE (#2) plastic**	#2 Milk & Juice #2 Other Bottles #2 Jars & Tubs
Expanded Polystyrene	**Expanded polystyrene**	Expanded Polystyrene
Plastic Grocery/Merchandise Bags Other Clean Plastic Consumer Product Bags	**Clean plastic film (grocery sacks)**	Grocery/Store/Bread Bags
Plastic Garbage Bags Other Plastic Film	**Other plastic film**	Garbage Bags Other Plastic Film
Other Rigid Plastic Packaging Compostable Plastics Mixed Rigid Plastics Plastic/Other Materials	**Other plastic**	Other Rigid Packaging Other Bottles, Jars & Tubs Plastic Products
Glass Beverage Containers	**Recyclable glass**	Clear Beverage/Liquid Green Beverage/Liquid Brown Beverage/Liquid Container Glass
Fluorescent Tubes Other Glass	**Other glass**	Fluorescent Tubes Other Glass
Aluminum Cans	**Aluminum cans**	Aluminum Beverage Cans
Tin Food Cans	**Tin/steel food cans**	Tinned Food Cans
Aluminum Foil/Containers Other Nonferrous Empty Aerosol Cans Other Ferrous	**Other recyclable metals**	Alum. Foil/Containers Other Aluminum Empty Aerosol Cans Other Ferrous
Oil Filters Mixed Metals/Material	**Other metals**	Other Nonferrous Motor Oil filters Mixed Metals/Material
Leaves & Grass Prunings Less than 2" Prunings 2" to 12"	**Compostable yard waste**	Leaves & Grass Prunings
Purchased Food Homegrown Food Beverages and Liquids	**Food waste**	Food Wastes

Table 52. 2014 vs 2003 Comparison of Material Types, ctnd.

2014 Material Types	Comparison Category	2003 Material Types
Dimension Lumber	Construction and demolition waste	Pallets
Pallets/Crates		Crates/Boxes
Treated Wood		Dimension Lumber
Contaminated Wood		Other Untreated Wood
New Gypsum Scrap		Treated Wood
Demo Gypsum Scrap		Contaminated Wood
Insulation		New Gypsum Scrap
Rock/Concrete/Bricks		Demo Gypsum Scrap
Asphaltic Roofing		Fiberglass Insulation
Other Construction Debris		Rock/Concrete/Bricks
		Asphaltic Roofing
		Other Construction Debris
		Sand/Soil/Dirt
Latex Paint	Household hazardous waste	Latex Paint
Hazardous Adhesives/Glues		Hazardous Glue/Adhesives
Non-hazardous Adhesives/Glues		Non-hazardous Glues
Oil-based Paint/Solvent		Oil-based Paint/Thinners
Hazardous Cleaners		Hazardous Cleaners
Pesticides/Herbicides		Pesticides/Herbicides
Non-rechargeable Dry-cell Batteries		Dry-cell Batteries
Rechargeable Dry-cell Batteries		Wet-cell Batteries
Wet-cell (car) Batteries		Gasoline/Kerosene
Asbestos		Motor Oil/Diesel Oil
Explosives		Asbestos
Vehicle and Equipment Fluids		Explosives
Pool Chemicals		Other Hazardous
Other Hazardous Chemicals		Other Non-hazardous
Other Non-hazardous Chemicals		
Unaccepted Yard Waste	Other materials	Textiles/Clothing
Prunings Greater than 12"		Carpet/Upholstery
Textiles		Leather
Carpet/Upholstery		Disposable Diapers
Leather		Animal By-products
Disposable Diapers		Rubber Products
Animal By-products		Tires
Rubber Products		Ash
Tires		Furniture
Ash		Mattresses
Furniture		Small Appliances
Mattresses		Audio/Visual Equipment
Small Appliances		Computer Monitors
CRTs		Television Sets
Other Electronics		Other Computer Equipment
Ceramics/Porcelain		Ceramics/China
Non-distinct Fines		Non-distinct Fines
Miscellaneous Organics		Misc. Organics
Miscellaneous Inorganics		Misc. Inorganics

Appendix B: Detailed Study Design

This appendix includes the study design **as it was written prior to beginning field work**.

Study Objectives

Increasing waste diversion is a high priority for the City of Phoenix: in early 2013, Mayor Stanton announced his goal to achieve a 40 percent landfill diversion rate by 2020. An important first step on the path to meeting this goal and increasing waste diversion is a well-informed analysis and interpretation of the composition of Phoenix's residential waste stream. The City of Phoenix is conducting the 2014 Residential Waste Characterization Study to estimate the quantity and composition of City collected residential garbage and recycling. The study design is crafted so that the final composition and quantity data will help guide policy formation and program implementation as the city moves toward its goal of 40 percent diversion by 2020.

Sampling Universe and Substreams

The first step in planning a waste characterization study is to identify and carefully define the waste streams that will be studied, or the "universe" of waste. In this study, the universe includes two substreams that our field team will quantify and characterize. A "substream" is determined by the particular generation, collection, or composition characteristics that make it a unique portion of the total waste stream.

In this study, the universe will include the following two substreams for characterization and quantification:

- **Residential Garbage –** Garbage generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials at the curb or in the alley.
- **Residential Recycling –** Recycling generated by single family residences located within the City of Phoenix. City collection vehicles collect these materials at the curb or in the alley.

The City is divided into ten bid areas lettered A through J. We will allocate samples to and document the quantities and composition of garbage and recycling from each bid area independently and for the ten bid areas combined (Citywide).

Sampling Calendar and Substream Allocations

Residential Garbage and Recycling

Our field team will complete two sampling seasons, with two weeks of sampling each season. All season one sampling and sorting is scheduled to begin on 8/18/14. Season two sampling and sorting is scheduled to begin in February 2015, with the exact dates to be decided closer to the start date. The field crews will collect and sort samples Monday through Friday, with the possibility of sorting on Saturday if additional days are necessary to meet sampling goals. We will not collect samples on

Saturdays. Sampling dates are scheduled to avoid sampling on or near major holidays. Garbage and recycling samples will be allocated approximately equally between the two seasons, between the two weeks each season, and among the ten bid areas.

Each season, we will sort 13 garbage samples from each bid area and ten recycling samples from each bid area. Table 1 summarizes the sample allocations.

Table 53. Sampling Allocation by Substream and Bid Area

Bid Area	Garbage		Recycle		Total	
	Season 1	Season 2	Season 1	Season 2	Garbage	Recycle
A	13	13	10	10	26	20
B	13	13	10	10	26	20
C	13	13	10	10	26	20
D	13	13	10	10	26	20
E	13	13	10	10	26	20
F	13	13	10	10	26	20
G	13	13	10	10	26	20
H	13	13	10	10	26	20
I	13	13	10	10	26	20
J	13	13	10	10	26	20
Total	**130**	**130**	**100**	**100**	**260**	**200**

Obtaining and Sorting Samples

Route Selection

The first step in obtaining samples is to select random routes for sampling.

Cascadia pre-selected routes for sampling using residential garbage and recycling route data provided by the City of Phoenix. This route data included the collection day, the bid area, the route ID, the regular tip location, and the substream (garbage or recycling).

Cascadia pre-selected routes from this route data using the following three steps:

1. Compile a complete list of all routes.
2. Assign each route a random number. Organize routes in numerical order according to their randomly assigned numbers.
3. Select routes from this randomized list until the sample selection goals by substream and bid area are fulfilled. The selection includes two contingency routes each day in the event that a sample from a primary route is unavailable.

We will summarize selected routes for each sampling day on a *Vehicle Selection Sheet* and will create an identifying *Sample Placard* for each route (see Appendix F: Example Field Forms for examples of the field forms). A detailed list of selected routes is included in Appendix G: Complete List of Selected Routes. The number of garbage and recycling routes selected from each bid area and day of the week is summarized in Table 54 and Table 55, respectively.

Table 54. Number of Selected Garbage Routes by Bid Area and Day

Bid Area	Mon.	Tue.	Wed.	Thu.	Fri.	Total
A	3	3	3	3	3	**15**
B	3	3	3	3	3	**15**
C	3	3	3	3	3	**15**
D	3	3	3	3	3	**15**
E	3	3	3	3	3	**15**
F	3	3	3	3	3	**15**
G	3	3	3	3	3	**15**
H	3	3	3	3	3	**15**
I	3	3	3	3	3	**15**
J	3	3	3	3	3	**15**
Total	**30**	**30**	**30**	**30**	**30**	**150**

Table 55. Number of Selected Recycling Routes by Bid Area and Day

Bid Area	Mon.	Tue.	Wed.	Thu.	Fri.	Total
A	2	2	3	2	3	**12**
B	3	3	2	2	2	**12**
C	2	2	2	3	3	**12**
D	2	3	2	3	2	**12**
E	2	2	3	2	3	**12**
F	2	3	2	3	2	**12**
G	2	3	2	2	3	**12**
H	3	2	2	3	2	**12**
I	3	2	2	2	3	**12**
J	2	3	2	2	3	**12**
Total	**23**	**25**	**22**	**24**	**26**	**120**

Each season, Cascadia's field team will collect and sort samples for one week at North Gateway Transfer Station and one week at 27th St. Transfer station. Most routes will collected and sorted at the facility where they normally tip, but the City will need to redirect a small number of routes to maintain equal sample numbers for each bid area and balance the weekly workload for the field crew.

Cascadia will distribute copies of the *Vehicle Selection Sheets* and *Sample Placards* to the City collection route supervisors prior to sampling. The route supervisors will then distribute *Sample Placards* to the drivers of the routes selected for sampling, remind them to participate in the study, and (as necessary) redirect routes. Prior to sampling, the route supervisors will note the anticipated truck numbers for selected routes on the *Vehicle Selection Sheets* and transmit this information back to Cascadia. The field crew will use the *Vehicle Selection Sheets* to facilitate vehicle identification at the sampling locations.

Example Vehicle Selection Sheets and Sample Placards appear in Appendix F: Example Field Forms.

Sample Collection and Sorting Procedures

Cascadia's field team will hand-sort all samples using the method outlined below.

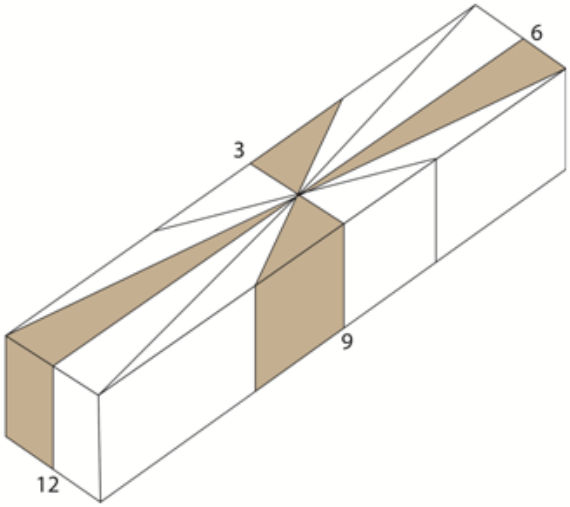
Garbage and Recycling Sample Collection Procedure

When a selected vehicle arrives at the sampling facility, the facility staff and field crew will direct the vehicle to the designated sample load tipping area. At 27th Ave. transfer station (27th Ave.) and North Gateway transfer station (NGTS) selected garbage loads will tip near the sort crew in a self-haul bay set aside for the purpose of the study. At 27th Ave. selected recycling loads will tip on the regular receiving floor near the sort crew in an area cordoned off exclusively for the use vehicles selected for the study. At NGTS selected recycling loads will tip on the regular tip floor and samples will be transported outdoors for sorting. Once loads are tipped the field crew will collect samples from pre-selected garbage and recycling routes using the following procedure:

- The field supervisor will first collect the *Sample Placard* from the driver of the selected load and verify the load's description with the information on the *Vehicle Selection Sheet*.

The driver will dump the selected load in an elongated pile. For garbage loads that can be safely inspected, the field crew supervisor will photograph and examine the load for materials that appear to be too bulky, too heavy, or too dense for a material processing facility to handle. If those items are present, the field team will count and record items on the Material Weight Tally Sheet (see Appendix F: Example Field Forms for examples of all field forms).

Figure 16. Clock Face Grid for Sampling



- The field supervisor will select a sample from this pile using an imaginary clock face grid (as shown in Figure 16) superimposed over the dumped material. The field supervisory will select a sample from one cell on the clock using a randomly generated cell number that is printed on the *Sample Placard*.

Figure 17. Tarped Sampled with Sample Placard

- With the assistance of the sampling facility's loader and operator, the field crew will extract a sample from the selected portion of the load, place the sample on a tarp, and take a photograph of the sample using a digital camera. The *Sample Placard* that identifies each sample will be positioned so that it is visible in each photograph. Figure 17 shows a sample on a tarp with the *Sample Placard* visible. Garbage samples will weigh approximately 200 lbs. each and recycling samples will weigh approximately 125 lbs. each.

Garbage and Recycling Hand-sort Procedure

The field crew will hand-sort all garbage and recycling samples using the following procedure:

- The sorting crew will sort the sample by material type into separate baskets. The individual members of the sorting crew typically specialize in groups of materials, such as papers or plastics. The field supervisor will monitor the homogeneity of material in the baskets as they accumulate, rejecting any materials that are improperly classified. The material list and definitions that will guide this sorting are presented in Appendix A: Material Type Definitions

The field supervisor will verify the purity of each material as it is weighed in its basket using a pre-calibrated scale, and will record each material weight on a *Material Weight Tally Sheet.* An example *Material Weight Tally Sheet* is presented in Appendix F: Example Field Forms.

The field crew will complete a thorough clean-up effort after each day of work to ensure the site is left in good condition. The cleanup will include:

- Organizing and stowing sorting supplies in a designated location.
- Preparing all materials sorted throughout the day for disposal or recycling.
- Sweeping and cleaning the sort area to prevent windblown litter.
- Removing and properly disposing of any single-use personal protective equipment.
- Checking out with the facility manager each day.

At the conclusion of each sorting day, the crew manager will complete a quality control review of the data recorded on each *Material Weight Tally Sheet*. The completed sheets will be transported to the Cascadia office for data entry.

Analysis

Method to Obtain Tonnage Data

Cascadia requires annual tonnage information to complete the analysis. The City of Phoenix will provide Cascadia with the following tonnage information for the 12 month period from June 2013 to May 2014:

- City collected residential garbage tonnage by bid area
- City collected residential recycling tonnage by bid area

Appendix C: Waste Characterization Calculations

Estimating Waste Composition

Waste composition estimates were calculated using a method that gave equal weighting or "importance" to each sample within a given stratum. Confidence intervals (error ranges) were calculated based on assumptions of normality in the composition estimates.

In the descriptions of calculation methods, the following variables are used frequently:

- *i* denotes an individual sample;
- *j* denotes the material type;
- c_j is the weight of the material type *j* in a sample;
- *w* is the weight of an entire sample;
- r_j is the composition estimate for material *j* (*r* stands for *ratio*);
- *s* denotes a particular sector or subsector of the waste stream; and
- *n* denotes the number of samples in the particular group that is being analyzed at that step.

Estimating the Composition

The following method was used to estimate the composition of a single stratum.

For a given stratum (that is, for the samples belonging to the same waste sector within the same jurisdiction), the composition estimate denoted by r_j represents the ratio of the component's weight to the total weight of all the samples in the stratum. This estimate was derived by summing each component's weight across all of the selected samples belonging to a given stratum and dividing by the sum of the total weight of waste for all of the samples in that stratum, as shown in the following equation:

$$r_j = \frac{\sum_i c_{ij}}{\sum_i w_i}$$

where:

- *c* = weight of particular component;
- *w* = sum of all component weights;
- for *i* = 1 to *n*, where *n* = number of selected samples; and
- for *j* = 1 to *m*, where *m* = number of components.

For example, the following simplified scenario involves three samples. For the purposes of this example, only the weights of the component *carpet* are shown.

	Sample 1	**Sample 2**	**Sample 3**
Weight (*c*) of carpet (in lbs)	5	3	4
Total Sample Weight (*w*) (in lbs)	80	70	90

$$r_{Carpet} = \sum \frac{5+3+4}{80+70+90} = 0.05$$

To find the composition estimate for the component *carpet*, the weights for that material are added for all selected samples and divided by the total sample weights of those samples. The resulting composition is 0.05, or 5%. In other words, 5% of the sampled material, by weight, is *carpet*. This finding is then projected onto the stratum being examined in this step of the analysis.

The confidence interval for this estimate was derived in two steps. First, the variance around the estimate was calculated, accounting for the fact that the ratio included two random variables (the component and total sample weights). The variance of the ratio estimator equation follows:

$$\mathrm{Var}(r_j) \approx \left(\frac{1}{n}\right)\left(\frac{1}{\overline{w}^2}\right)\left(\frac{\sum_i \left(c_{ij} - r_j w_i\right)^2}{n-1}\right)$$

where:

$$\overline{w} = \frac{\sum_i w_i}{n}$$

(For more information regarding Equation 2, refer to *Sampling Techniques, 3rd Edition* by William G. Cochran [John Wiley & Sons, Inc., 1977].)

Second, error range at the 90% confidence level were calculated for a component's mean as follows:

$$r_j \pm \left(z\sqrt{\mathrm{Var}(r_j)}\right)$$

where *z* = the value of the *z*-statistic (1.645) corresponding to a 90% confidence level.

Composition results for strata were then combined, using a weighted averaging method, to estimate the composition of larger portions of the waste stream (for example the garbage composition for each bid area was combined to calculate the Citywide garbage composition). The relative tonnages associated with each stratum served as the weighting factors. The calculation was performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) + \ldots$$

where:

- *p* = the proportion of tonnage contributed by the noted waste stratum (the weighting factor);
- *r* = ratio of component weight to total waste weight in the noted waste stratum (the composition percent for the given material component); and
- for *j* = 1 to *m*, where *m* = number of material components.

For example, the above equation is illustrated here using three waste strata.

	Stratum 1	**Stratum 2**	**Stratum 3**
Ratio (r) of carpet	5%	10%	10%
Tonnage	25,000	100,000	50,000
Proportion of tonnage (*p*)	14.3%	57.1%	28.6%

To estimate the portion of larger portions of the waste stream, the composition results for the three strata are combined as follows.

$$O_{Carpet} = (0.143 * 0.05) + (0.571 * 0.10) + (0.286 * 0.10) = 0.093 = 9.3\%$$

Therefore, 9.3% of this examined portion of the waste stream is *carpet*.

The variance of the weighted average was calculated as follows:

$$\mathrm{Var}(O_j) = \left(p_1^2 \ \mathrm{Var}(r_{j1})\right) + \left(p_2^2 \ \mathrm{Var}(r_{j2})\right) + \left(p_3^2 \ \mathrm{Var}(r_{j3})\right) + \ldots$$

Weighted Composition Results

Composition results for all substreams were combined, using a weighted averaging method, to estimate the composition of the entire generation. The relative tonnages associated with each substream served as the weighting factors. The calculation was performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) + \ldots$$

where:

- p = the proportion of tonnage contributed by the noted waste substream (the weighting factor);
- r = ratio of component weight to total waste weight in the noted waste substream (the composition percent for the given material component); and
- for j = 1 to m, where m = number of material components.

The following scenario illustrates the above equation. This example involves the component *carpet* in three substreams.

	Waste Sector 1	Waste Sector 2	Waste Sector 3
Ratio of carpet (r)	0.05	0.10	0.15
Proportion of Tonnage (p)	50%	25%	25%

$$O_{Carpet} = (0.50 * 0.05) + (0.25 * 0.10) + (0.25 * 0.15) = 0.0875$$

So, it is estimated that 0.0875 or 8.75% of the entire waste stream is composed of *carpet*.

The variance of the weighted average was calculated as follows:

$$\mathrm{Var}(O_j) = \left(p_1^2 \ \mathrm{Var}(r_{j1})\right) + \left(p_2^2 \ \mathrm{Var}(r_{j2})\right) + \left(p_3^2 \ \mathrm{Var}(r_{j3})\right) + \ldots$$

Evaluating Changes in the Composition Between Studies

Comparisons examined the changes in the in composition percentages for each of the nine material classes. In order to control for population changes and other factors that may influence the total amount of material composted from year to year, the tests described in this appendix measure material proportions, not actual tonnage. For example, say that **Paper** accounts for 10% of Citywide garbage each year, and that a total of 1,000 tons of material was disposed in one year and 2,000 tons disposed in the next. While the amount of **Paper** increased from 100 to 200 tons, the percentage remained the same. Therefore, the tests would indicate that there had been no change.

The purpose of conducting these comparisons is to identify trends within the Citywide garbage substream in the percentage of selected types of waste disposed over time. One specific example is stated as follows:

Hypothesis: "There is no statistically significant difference, between the 2003 and 2014 study periods, in the percentage of **Paper** in the Citywide garbage."

Statistics are then employed to look for evidence disproving the hypothesis. A "significant" result means that there is enough evidence to disprove the hypothesis and it can be concluded that there is a true difference across years. "Insignificant" results indicate that either a) there is no true difference, or b) even though there may be a difference, there is not enough evidence to prove it.[9]

The purpose of these tests is to identify changes across years; however, the study did not attempt to investigate *why* or *how* these changes occurred. The changes may be due to a variety of factors. Future studies could be designed to test the influence of various potential sources of the increase/decrease of specific materials in the disposed waste stream.

Statistical Considerations

The analyses were based on the component percentages, by weight. As described in this appendix, these percentages are calculated by dividing the sum of the selected component weights by the sum of the corresponding sample weights. The comparisons are made between unweighted composition findings instead of weighted findings, thus the composition shown in the t-test tables may differ slightly from the composition data shown in the rest of the report. T-tests (modified for ratio estimation) were used to examine the variations from year to year.

Normality

The distributions of some of the material types may be skewed and may not follow a normal distribution. Although t-tests assume a normal distribution, they are very robust to departures from this assumption, particularly with large sample sizes. In addition, the material classes are sums of the material types, which improve our ability to meet the assumptions of normality.

Dependence

There may be dependence between material types (i.e., if a person disposes of material A, they always dispose of material B at the same time).

There is certainly a degree of dependence between the calculated percentages. Because the percentages sum to 100 (in the case of year-to-year comparisons), if the percentage of material A increases, the percentage of some other material must decrease.

Multiple T-Tests

In all statistical tests, there is a chance of incorrectly concluding that a result is significant. The year-to-year comparison required conducting several t-tests (one for each material class), **each** of which carries that risk. However, we were willing to accept only a 10% chance, **overall**, of making an incorrect conclusion. Therefore, each test was adjusted by setting the significance threshold to $\frac{0.10}{w}$ (w = the number of t-tests).

The adjustment can be explained as follows:

[9] Please see the "Power Analysis" discussion on page 93.

For each test, we set a $1-\frac{0.10}{w}$ chance of not making a mistake, which results in a $\left(1-\frac{0.10}{w}\right)^{w}$ chance of not making a mistake during all *w* tests.

Since one minus the chance of not making a mistake equals the chance of making a mistake, by making this adjustment, we have set the overall risk of making a wrong conclusion during any one of the tests at $\left(1-\left(1-\frac{0.10}{w}\right)^{w}\right)=0.10$.

The chance of a "false positive" for the year-to-year comparisons made in this study is restricted to 10% overall, or 1.25% for each test (10% divided by the eight tests equals 1.25%).

For more detail regarding this issue, please refer to Section 11.2 "The Multiplicity Problem and the Bonferroni Inequality" of *An Introduction to Contemporary Statistics* by L.H. Koopmans (Duxbury Press, 1981).

Power Analysis

As the number of samples is increased, so is the ability to detect differences. In the future, an a *priori* power analysis might benefit this research by determining how many samples would be required to detect a particular minimum difference of interest.

Interpreting the Calculation Results

For the purposes of this study, only those calculation results with a p-value of less than 1.25% are considered to be statistically significant. As described above, the threshold for determining statistically significant results (the "alpha-level") is conservative, accounting for the fact that so many individual tests were calculated. An asterisk notes the statistically significant differences.

The t-statistic is calculated from the data. According to statistical theory, the larger the absolute value of the t-statistic, the less likely the two populations are to have the same mean. The p-value describes the probability of observing the calculated t-statistic if there were no true difference between the population means.

Data Sources for Comparisons to Other Jurisdictions

Phoenix

- **Disposed and Recycled Composition and Quantity:** This study
- **Population:** http://quickfacts.census.gov/qfd/states/04/0455000.html

Seattle

- **Disposed Waste Composition and Quantity:** http://www.seattle.gov/Util/cs/groups/public/@spu/@garbage/documents/webcontent/1_043661.pdf
- **Recycling Composition:** http://www.seattle.gov/Util/cs/groups/public/@spu/@garbage/documents/webcontent/01_014339.pdf
- **Recycling Quantities:** Selected 2014 single family recycling quantities from this report http://www.seattle.gov/Util/cs/groups/public/@spu/@garbage/documents/webcontent/1_039050.pdf
- **Population:** http://quickfacts.census.gov/qfd/states/53/5363000.html

King County

- **Disposed Waste Composition and Quantity:** http://your.kingcounty.gov/solidwaste/about/documents/waste-characterization-study-2011.pdf
- **Recycling Composition and Quantity:** private communication with King County Solid Waste Division; February 2013
- **Population:** http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk and http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk Population number excludes Seattle since the composition data excludes Seattle.

City X

- **Disposed and Recycled Composition and Quantity:** Private communication with the City's haulers; March 2015
- **Population:** US Census Bureau 2014 estimate

New York City

- **Disposed and Recycled Composition and Quantity:** This study
- **Population:** http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

Houston

- **Disposed and Recycled Composition and Quantity:** private communication with Chris Butler, One Bin For All program manager, City of Houston Mayor's Office; December 2014
- **Population:** http://quickfacts.census.gov/qfd/states/48/4835000.html

Appendix D: Detailed Composition Results by Bid Area

Table 56. Summary Quantities by Bid Area, Citywide Garbage

	Bid Area Estimated Tons										Citywide
Material	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Est. Tons**
Paper	**5,910**	**5,451**	**5,152**	**5,118**	**4,236**	**4,112**	**5,365**	**6,061**	**3,782**	**3,946**	**49,132**
Newspaper	309.9	283.5	436.4	521.7	359.7	259.9	524.4	406.6	271.9	324.7	3,698.6
Unwaxed OCC / Kraft paper	779.0	821.3	600.2	548.9	421.5	285.8	512.0	665.3	309.1	437.2	5,380.3
Other recyclable paper	1,869.7	1,802.3	1,649.1	1,707.9	1,545.1	1,555.2	1,964.3	2,420.2	1,241.6	1,281.6	17,036.9
Compostable paper	2,727.3	2,370.3	2,315.9	2,151.4	1,756.9	1,807.7	2,203.2	2,302.3	1,806.0	1,758.9	21,200.1
Other paper	224.6	173.9	150.3	188.4	152.3	203.1	160.6	266.1	153.0	144.0	1,816.3
Plastic	**5,674**	**4,025**	**3,221**	**3,398**	**4,082**	**3,630**	**4,503**	**4,339**	**2,736**	**2,520**	**38,127**
PET (#1) plastic	575.4	493.2	390.5	398.3	415.3	380.7	473.6	531.4	290.5	296.2	4,245.0
HDPE (#2) plastic	319.3	212.6	157.2	226.4	212.7	137.7	262.6	244.5	145.9	149.6	2,068.5
Other recyclable plastic	1,199.6	1,162.9	740.8	861.5	949.5	866.8	1,432.0	809.7	848.0	727.7	9,598.6
Compostable plastic	0.0	14.0	10.5	0.0	10.7	0.0	20.1	0.0	8.0	2.6	65.9
Clean plastic film (grocery sacks)	826.7	570.4	531.9	475.4	518.4	417.9	715.2	728.9	355.5	328.7	5,468.9
Other plastic film	1,805.6	1,082.4	957.2	880.7	882.2	1,101.3	926.5	1,067.3	749.3	728.7	10,181.4
Expanded Polystyrene	530.4	257.7	222.3	221.7	313.7	209.5	369.0	405.6	133.8	150.5	2,814.2
Other plastic	416.8	231.9	210.9	333.5	779.0	516.4	304.0	551.9	204.7	135.8	3,684.9
Glass	**1,059**	**624**	**669**	**670**	**740**	**605**	**848**	**914**	**444**	**677**	**7,250**
Recyclable glass	702.8	454.3	373.2	434.1	430.6	363.4	505.4	680.9	262.5	384.1	4,591.4
Other glass	356.0	169.5	295.9	235.6	309.7	241.3	343.0	233.3	181.5	292.8	2,658.5
Metal	**1,001**	**1,219**	**1,684**	**908**	**790**	**927**	**781**	**1,083**	**864**	**1,095**	**10,352**
Aluminum cans	112.9	148.0	91.4	85.6	109.5	81.1	94.9	132.2	83.6	87.5	1,026.7
Tin/steel food cans	365.8	265.8	189.4	189.1	224.4	195.8	254.5	360.1	132.8	150.8	2,328.5
Other recyclable metals	345.7	275.1	404.4	303.1	366.4	290.0	299.2	328.3	347.0	484.9	3,444.1
Other metals	176.8	530.0	999.4	329.6	89.4	360.4	132.0	262.8	300.5	371.7	3,552.4
Organic	**24,173**	**21,868**	**21,182**	**20,031**	**22,914**	**15,960**	**19,583**	**17,475**	**11,737**	**13,068**	**187,991**
Compostable yard waste	15,199.4	14,367.2	12,091.0	12,801.1	17,135.5	9,854.9	11,642.7	10,586.3	5,737.8	7,405.5	116,821.3
Food waste	6,773.4	6,137.8	7,528.0	6,010.2	5,023.0	5,235.5	5,758.4	6,255.6	4,304.3	4,324.4	57,350.5
Non-compostable organic	2,200.3	1,362.6	1,563.1	1,220.0	755.9	869.9	2,181.8	633.3	1,694.8	1,337.7	13,819.5
Construction and demolition waste	**5,136**	**2,470**	**2,274**	**1,434**	**2,981**	**1,620**	**2,911**	**1,920**	**1,091**	**1,391**	**23,227**
Household hazardous waste	**409**	**305**	**344**	**287**	**163**	**194**	**178**	**336**	**206**	**142**	**2,566**
Other materials	**6,749**	**9,512**	**7,507**	**7,957**	**7,727**	**5,161**	**8,587**	**7,000**	**5,794**	**5,908**	**71,903**
Subtotal Curbside Recycle	***6,580***	***5,919***	***5,033***	***5,277***	***5,035***	***4,416***	***6,323***	***6,579***	***3,933***	***4,324***	***53,419***
Subtotal Compostable	***24,700***	***22,889***	***21,945***	***20,963***	***23,926***	***16,898***	***19,624***	***19,144***	***11,856***	***13,491***	***195,438***
Total	**50,112**	**45,474**	**42,034**	**39,803**	**43,632**	**32,210**	**42,755**	**39,129**	**26,654**	**28,746**	**390,548**

Key: Curbside Recycle Compostable Other Recoverable Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 57. Recoverable Material Quantities by Bid Area, Citywide Garbage

Category	Bid Area Estimated Tons										Citywide
	A	B	C	D	E	F	G	H	I	J	Est. Tons
Recyclable	**6,580**	**5,919**	**5,033**	**5,277**	**5,035**	**4,416**	**6,323**	**6,579**	**3,933**	**4,324**	**53,419**
Recyclable papers	2,958.5	2,907.0	2,685.7	2,778.5	2,326.3	2,100.9	3,000.7	3,492.0	1,822.6	2,043.5	26,115.8
Recyclable plastics	2,094.3	1,868.8	1,288.5	1,486.2	1,577.5	1,385.2	2,168.2	1,585.5	1,284.4	1,173.5	15,912.1
Recyclable glass	702.8	454.3	373.2	434.1	430.6	363.4	505.4	680.9	262.5	384.1	4,591.4
Recyclable metals	824.5	688.9	685.1	577.9	700.3	566.9	648.6	820.6	563.4	723.1	6,799.3
Compostable	**24,700**	**22,889**	**21,945**	**20,963**	**23,926**	**16,898**	**19,624**	**19,144**	**11,856**	**13,491**	**195,438**
Compostable paper	2,727.3	2,370.3	2,315.9	2,151.4	1,756.9	1,807.7	2,203.2	2,302.3	1,806.0	1,758.9	21,200.1
Compostable plastic	0.0	14.0	10.5	0.0	10.7	0.0	20.1	0.0	8.0	2.6	65.9
Compostable yard waste	15,199.4	14,367.2	12,091.0	12,801.1	17,135.5	9,854.9	11,642.7	10,586.3	5,737.8	7,405.5	116,821.3
Food waste	6,773.4	6,137.8	7,528.0	6,010.2	5,023.0	5,235.5	5,758.4	6,255.6	4,304.3	4,324.4	57,350.5
Other	**18,831**	**16,666**	**15,056**	**13,563**	**14,672**	**10,895**	**16,808**	**13,405**	**10,865**	**10,930**	**141,691**
Total	**50,112**	**45,474**	**42,034**	**39,803**	**43,632**	**32,210**	**42,755**	**39,129**	**26,654**	**28,746**	**390,548**

Key: Curbside Recycle Compostable Other Recoverable Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 18. Composition by Material Class, Area A Garbage

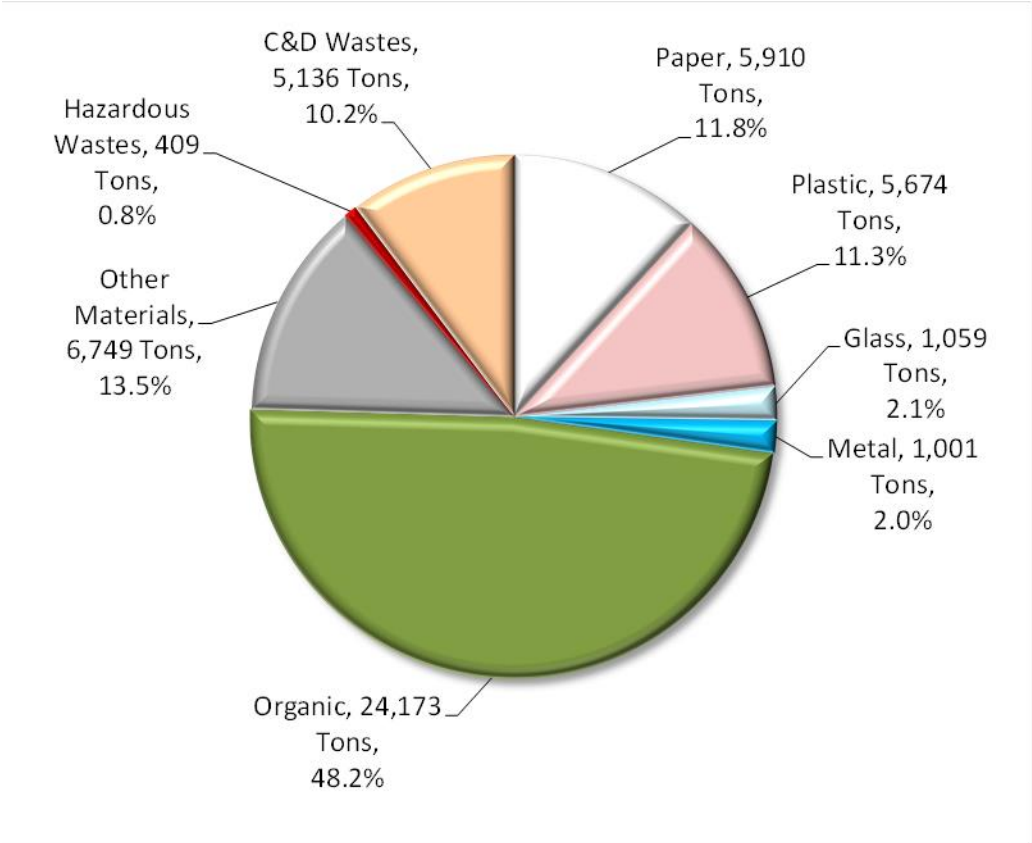


Figure 19. Composition by Recoverability Group, Area A Garbage

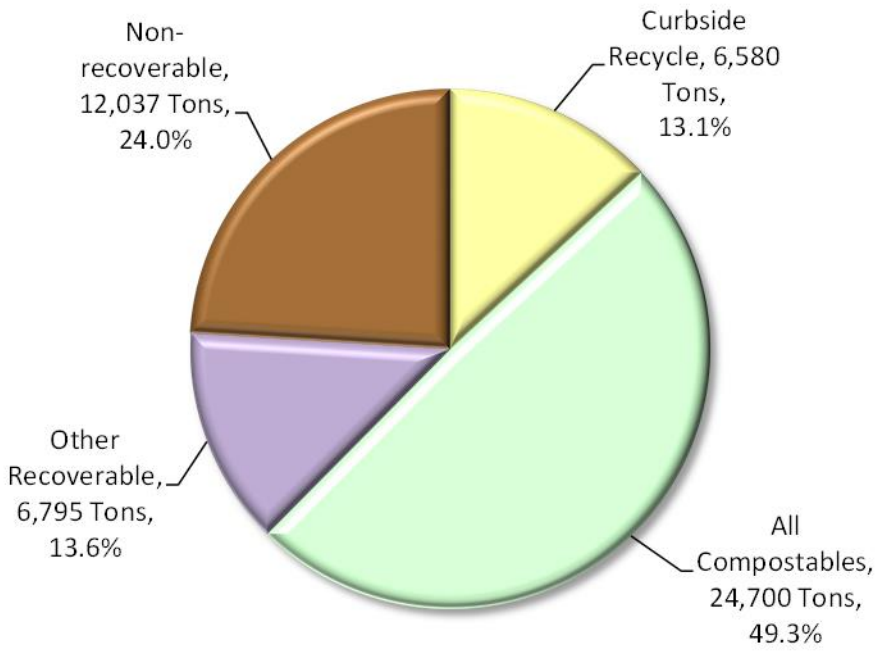


Table 58. Ten Most Prevalent Material Types, Area A Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	26.38%	26.38%	13,221.3
Purchased Food	11.93%	38.31%	5,978.7
Compostable/Food Soiled Paper	5.42%	43.74%	2,718.0
Textiles	3.90%	47.64%	1,955.6
Disposable Diapers	3.39%	51.04%	1,701.0
Prunings Less than 2"	3.30%	54.34%	1,654.0
Unaccepted Yard Waste	3.30%	57.64%	1,653.6
Mixed Low-grade Paper	3.23%	60.87%	1,618.7
Other Construction Debris	2.86%	63.72%	1,431.8
Other Plastic Film	2.47%	66.19%	1,237.5
Subtotal	***66.2%***		***33,170***
All other material types	33.8%		16,941.3
Total	**100%**		**50,112**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 59. Detailed Composition, Area A Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**11.8%**		**5,910**	**Other Materials**	**13.5%**		**6,749**
Newspaper	0.62%	0.3%	309.9	Textiles	3.90%	1.5%	1,955.6
Plain OCC/Kraft Paper	1.55%	0.4%	779.0	Carpet/Upholstery	0.70%	0.4%	352.2
Waxed OCC/Kraft Paper	0.02%	0.0%	9.3	Leather	0.36%	0.2%	178.8
High Grade Paper	0.28%	0.2%	142.0	Disposable Diapers	3.39%	0.7%	1,701.0
Mixed Low-grade Paper	3.23%	0.4%	1,618.7	Animal By-products	0.26%	0.1%	128.5
Milk/Juice Polycoated Paper	0.13%	0.1%	65.6	Rubber Products	0.53%	0.3%	265.4
Frozen Food Polycoated Paper	0.09%	0.1%	43.4	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	5.42%	0.9%	2,718.0	Ash	0.05%	0.1%	23.9
Paper/Other Materials	0.45%	0.1%	224.6	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**11.3%**		**5,674**	Small Appliances	0.22%	0.2%	108.6
#1 PET Bottles	0.97%	0.2%	485.0	CRTs	1.10%	1.2%	549.3
#1 PET Other Packaging	0.18%	0.1%	90.4	Other Electronics	0.44%	0.5%	221.3
#2 HDPE Natural Bottles	0.28%	0.1%	142.5	Ceramics/Porcelain	0.57%	0.5%	284.8
#2 HDPE Colored Bottles	0.31%	0.1%	153.9	Non-distinct Fines	1.03%	0.6%	516.5
#2 HDPE Other Packaging	0.05%	0.0%	22.9	Miscellaneous Organics	0.83%	0.3%	415.3
Other Rigid Plastic Packaging	0.83%	0.1%	415.3	Miscellaneous Inorganics	0.10%	0.0%	47.8
Expanded Polystyrene	1.06%	0.2%	530.4				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.8%**		**409**
Plastic Grocery/Merchandise Bags	1.36%	0.2%	680.6	Latex Paint	0.28%	0.4%	140.2
Other Clean Plastic Consumer Product Bags	0.29%	0.1%	146.1	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	1.13%	0.2%	568.1	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	2.47%	1.6%	1,237.5	Oil-based Paint/Solvent	0.02%	0.0%	9.7
Mixed Rigid Plastics	1.57%	0.5%	784.3	Hazardous Cleaners	0.01%	0.0%	3.1
Plastic/Other Materials	0.83%	0.4%	416.8	Pesticides/Herbicides	0.01%	0.0%	3.3
				Non-rechargeable Dry-cell Batteries	0.02%	0.0%	8.9
Glass	**2.1%**		**1,059**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.4
Glass Beverage Containers	1.40%	0.1%	702.8	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.1%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.71%	0.0%	356.0	Explosives	0.03%	0.0%	13.3
				Vehicle and Equipment Fluids	0.03%	0.1%	17.3
Metal	**2.0%**		**1,001**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.23%	0.0%	112.9	Other Hazardous Chemicals	0.21%	0.2%	105.2
Aluminum Foil/Containers	0.19%	0.0%	93.0	Other Non-hazardous Chemicals	0.22%	0.1%	107.8
Other Nonferrous	0.08%	0.1%	37.7				
Tin Food Cans	0.73%	0.2%	365.8	**C&D Wastes**	**10.2%**		**5,136**
Empty Aerosol Cans	0.07%	0.0%	35.7	Dimension Lumber	0.52%	0.5%	263.0
Other Ferrous	0.36%	0.1%	179.2	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	1.80%	1.5%	901.1
Mixed Metals/Material	0.35%	0.2%	176.8	Contaminated Wood	1.51%	1.0%	757.5
				New Gypsum Scrap	1.01%	1.2%	507.2
Organic	**48.2%**		**24,173**	Demo Gypsum Scrap	0.44%	0.5%	219.9
Leaves & Grass	26.38%	5.0%	13,221.3	Insulation	0.00%	0.0%	0.2
Unaccepted Yard Waste	3.30%	1.5%	1,653.6	Rock/Concrete/Bricks	0.62%	0.5%	309.7
Prunings Less than 2"	3.30%	1.8%	1,654.0	Asphaltic Roofing	1.49%	1.2%	745.6
Prunings 2" to 12"	0.65%	0.8%	324.1	Other Construction Debris	2.86%	2.5%	1,431.8
Prunings Greater than 12"	1.09%	1.8%	546.7				
Purchased Food	11.93%	1.9%	5,978.7	**Totals**	**100%**		**50,112**
Homegrown Food	1.13%	0.9%	566.4				
Beverages and Liquids	0.46%	0.2%	228.4	**Sample Count**			**26**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 20. Composition by Material Class, Area B Garbage

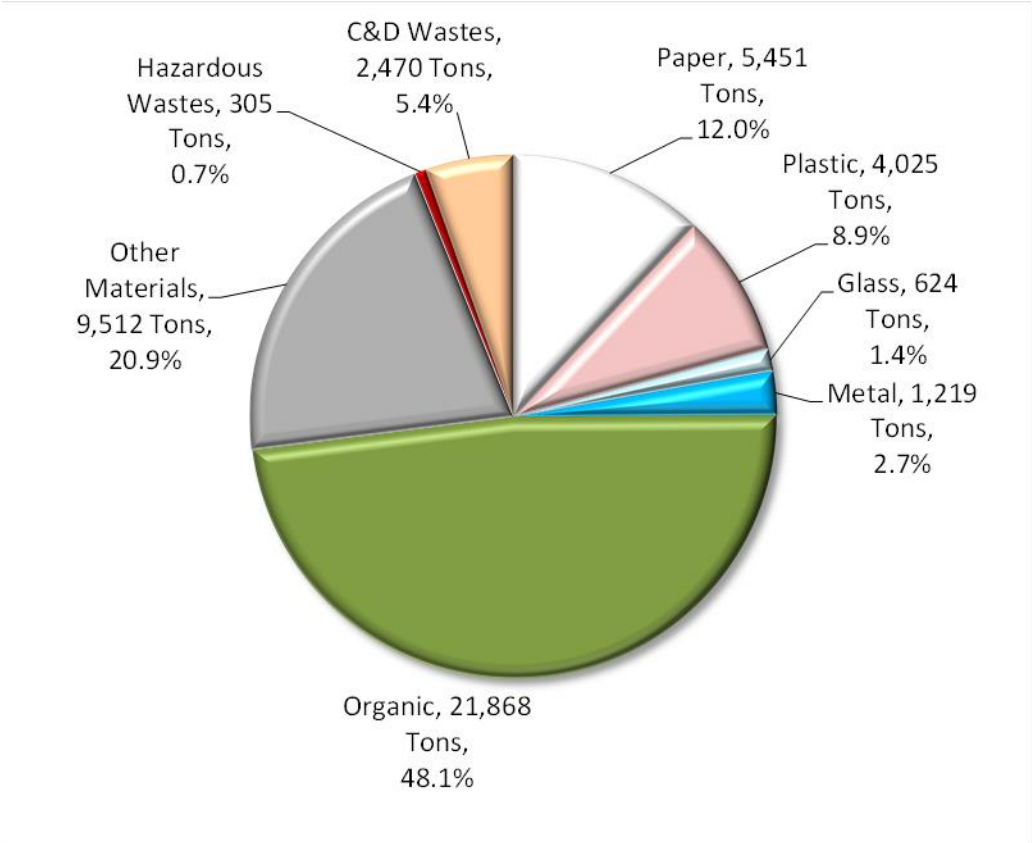


Figure 21. Composition by Recoverability Group, Area B Garbage

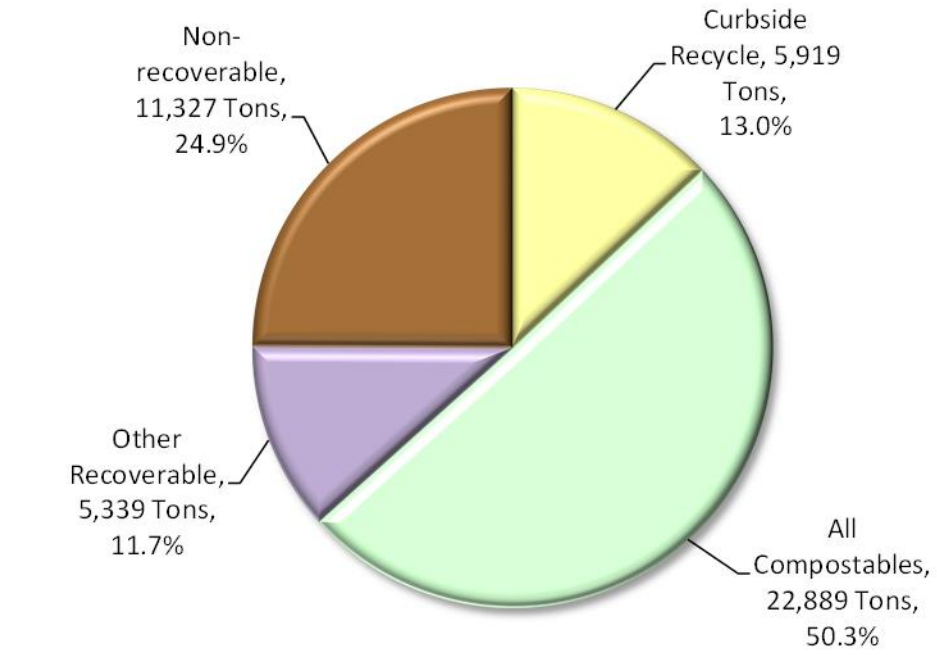


Table 60. Ten Most Prevalent Material Types, Area B Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	22.14%	22.14%	10,067.2
Purchased Food	10.31%	32.45%	4,690.7
Prunings Less than 2"	5.66%	38.12%	2,575.6
Compostable/Food Soiled Paper	5.17%	43.29%	2,350.8
Textiles	4.27%	47.56%	1,943.7
Disposable Diapers	3.98%	51.54%	1,808.8
Carpet/Upholstery	3.92%	55.46%	1,781.9
Prunings 2" to 12"	3.79%	59.25%	1,724.4
Animal By-products	3.48%	62.73%	1,584.3
Mixed Low-grade Paper	3.48%	66.22%	1,583.8
Subtotal	***66.2%***		***30,111***
All other material types	33.8%		15,363.1
Total	**100%**		**45,474**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 61. Detailed Composition, Area B Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**12.0%**		**5,451**	**Other Materials**	**20.9%**		**9,512**
Newspaper	0.62%	0.4%	283.5	Textiles	4.27%	1.8%	1,943.7
Plain OCC/Kraft Paper	1.81%	1.0%	821.3	Carpet/Upholstery	3.92%	2.1%	1,781.9
Waxed OCC/Kraft Paper	0.04%	0.0%	19.5	Leather	0.68%	1.0%	308.9
High Grade Paper	0.25%	0.2%	115.6	Disposable Diapers	3.98%	1.3%	1,808.8
Mixed Low-grade Paper	3.48%	0.5%	1,583.8	Animal By-products	3.48%	2.9%	1,584.3
Milk/Juice Polycoated Paper	0.19%	0.2%	86.3	Rubber Products	0.95%	0.6%	430.9
Frozen Food Polycoated Paper	0.04%	0.0%	16.5	Tires	0.03%	0.1%	14.9
Compostable/Food Soiled Paper	5.17%	0.9%	2,350.8	Ash	0.11%	0.2%	48.4
Paper/Other Materials	0.38%	0.1%	173.9	Furniture	0.21%	0.3%	94.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**8.9%**		**4,025**	Small Appliances	0.46%	0.6%	209.7
#1 PET Bottles	0.79%	0.1%	358.4	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.30%	0.1%	134.9	Other Electronics	0.41%	0.3%	185.0
#2 HDPE Natural Bottles	0.17%	0.0%	76.3	Ceramics/Porcelain	0.58%	0.3%	263.1
#2 HDPE Colored Bottles	0.30%	0.1%	134.4	Non-distinct Fines	0.95%	0.4%	434.2
#2 HDPE Other Packaging	0.00%	0.0%	2.0	Miscellaneous Organics	0.76%	0.3%	345.4
Other Rigid Plastic Packaging	0.78%	0.1%	356.3	Miscellaneous Inorganics	0.13%	0.1%	58.9
Expanded Polystyrene	0.57%	0.1%	257.7				
Compostable Plastics	0.03%	0.0%	14.0	**Hazardous Wastes**	**0.7%**		**305**
Plastic Grocery/Merchandise Bags	0.89%	0.1%	405.0	Latex Paint	0.23%	0.3%	106.0
Other Clean Plastic Consumer Product Bags	0.36%	0.1%	165.4	Hazardous Adhesives/Glues	0.04%	0.1%	16.1
Plastic Garbage Bags	0.91%	0.1%	413.1	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.47%	0.2%	669.3	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.77%	0.6%	806.6	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	0.51%	0.2%	231.9	Pesticides/Herbicides	0.05%	0.1%	21.5
				Non-rechargeable Dry-cell Batteries	0.06%	0.1%	29.5
Glass	**1.4%**		**624**	Rechargeable Dry-cell Batteries	0.00%	0.0%	1.2
Glass Beverage Containers	1.00%	0.0%	454.3	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.02%	0.1%	11.1	Asbestos	0.00%	0.0%	0.0
Other Glass	0.35%	0.0%	158.3	Explosives	0.00%	0.0%	0.4
				Vehicle and Equipment Fluids	0.02%	0.0%	11.3
Metal	**2.7%**		**1,219**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.33%	0.1%	148.0	Other Hazardous Chemicals	0.07%	0.0%	30.7
Aluminum Foil/Containers	0.15%	0.0%	66.2	Other Non-hazardous Chemicals	0.19%	0.1%	88.0
Other Nonferrous	0.01%	0.0%	6.7				
Tin Food Cans	0.58%	0.1%	265.8	**C&D Wastes**	**5.4%**		**2,470**
Empty Aerosol Cans	0.12%	0.0%	56.6	Dimension Lumber	0.78%	0.7%	354.7
Other Ferrous	0.32%	0.1%	145.7	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.03%	0.1%	14.3	Treated Wood	0.46%	0.4%	211.4
Mixed Metals/Material	1.13%	0.8%	515.7	Contaminated Wood	0.67%	0.4%	303.0
				New Gypsum Scrap	0.01%	0.0%	5.2
Organic	**48.1%**		**21,868**	Demo Gypsum Scrap	0.46%	0.7%	207.4
Leaves & Grass	22.14%	3.7%	10,067.2	Insulation	0.14%	0.1%	64.8
Unaccepted Yard Waste	2.94%	2.1%	1,336.8	Rock/Concrete/Bricks	1.02%	0.6%	462.4
Prunings Less than 2"	5.66%	1.7%	2,575.6	Asphaltic Roofing	0.94%	1.5%	425.7
Prunings 2" to 12"	3.79%	2.8%	1,724.4	Other Construction Debris	0.96%	0.9%	435.8
Prunings Greater than 12"	0.06%	0.1%	25.8				
Purchased Food	10.31%	1.5%	4,690.7	**Totals**	**100%**		**45,474**
Homegrown Food	2.50%	2.1%	1,136.4				
Beverages and Liquids	0.68%	0.4%	310.7	**Sample Count**			**26**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 22. Composition by Material Class, Area C Garbage

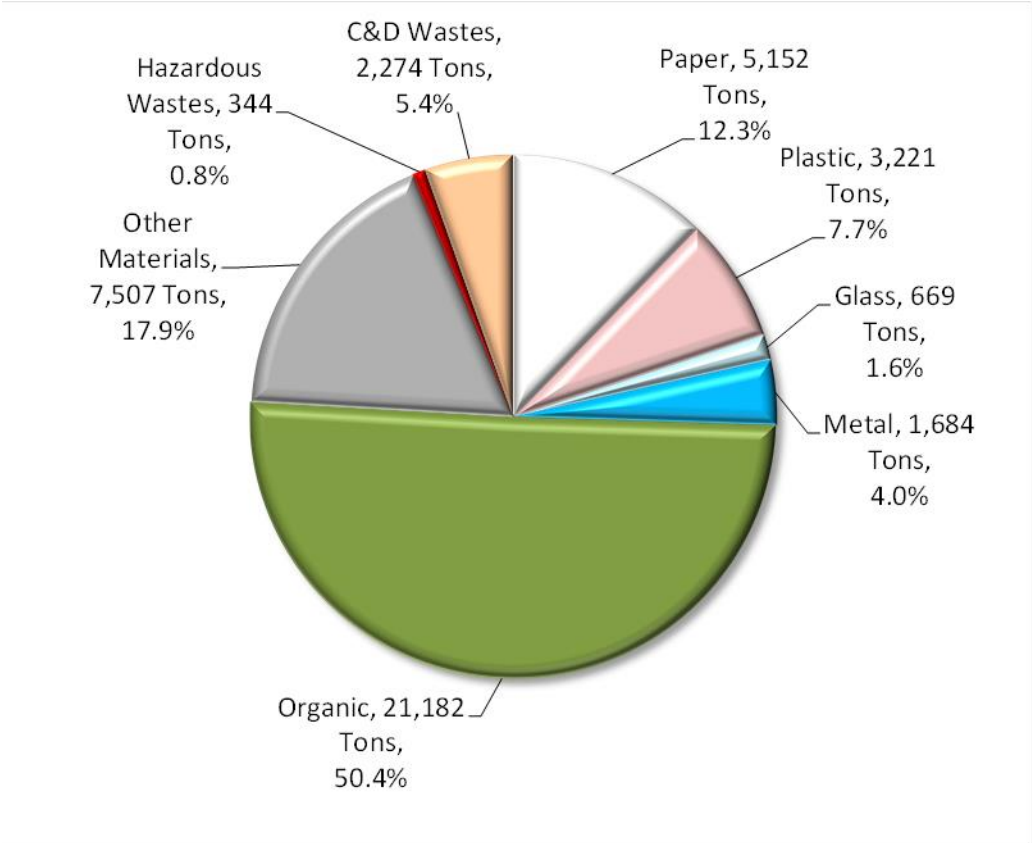


Figure 23. Composition by Recoverability Group, Area C Garbage

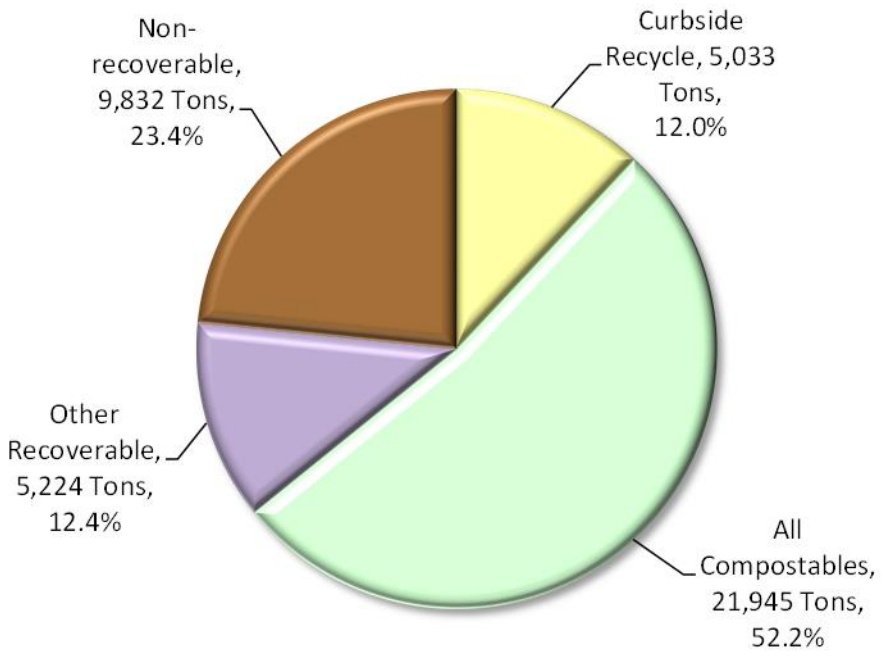


Table 62. Ten Most Prevalent Material Types, Area C Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	18.25%	18.25%	7,669.9
Purchased Food	12.84%	31.09%	5,399.1
Prunings Less than 2"	9.12%	40.21%	3,833.3
Compostable/Food Soiled Paper	5.41%	45.62%	2,272.6
Homegrown Food	4.76%	50.37%	1,998.9
Unaccepted Yard Waste	3.72%	54.09%	1,563.1
Textiles	3.46%	57.55%	1,453.9
Animal By-products	3.42%	60.98%	1,439.6
Mixed Low-grade Paper	3.14%	64.12%	1,320.5
Non-distinct Fines	2.84%	66.95%	1,192.3
Subtotal	***67.0%***		***28,143***
All other material types	33.0%		13,890.3
Total	**100%**		**42,034**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 63. Detailed Composition, Area C Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**12.3%**		**5,152**	**Other Materials**	**17.9%**		**7,507**
Newspaper	1.04%	0.4%	436.4	Textiles	3.46%	1.5%	1,453.9
Plain OCC/Kraft Paper	1.43%	0.5%	600.2	Carpet/Upholstery	1.16%	0.9%	487.1
Waxed OCC/Kraft Paper	0.10%	0.1%	43.3	Leather	0.18%	0.1%	75.5
High Grade Paper	0.52%	0.3%	218.5	Disposable Diapers	1.89%	0.6%	795.3
Mixed Low-grade Paper	3.14%	0.7%	1,320.5	Animal By-products	3.42%	1.7%	1,439.6
Milk/Juice Polycoated Paper	0.10%	0.0%	43.8	Rubber Products	0.64%	0.4%	270.2
Frozen Food Polycoated Paper	0.16%	0.1%	66.3	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	5.41%	0.7%	2,272.6	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.36%	0.1%	150.3	Furniture	0.05%	0.1%	20.6
				Mattresses	0.00%	0.0%	0.0
Plastic	**7.7%**		**3,221**	Small Appliances	1.13%	0.9%	473.0
#1 PET Bottles	0.62%	0.1%	260.9	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.31%	0.1%	129.7	Other Electronics	1.51%	1.5%	633.3
#2 HDPE Natural Bottles	0.13%	0.0%	55.5	Ceramics/Porcelain	0.17%	0.1%	72.3
#2 HDPE Colored Bottles	0.24%	0.1%	99.3	Non-distinct Fines	2.84%	1.2%	1,192.3
#2 HDPE Other Packaging	0.01%	0.0%	2.4	Miscellaneous Organics	1.19%	0.5%	499.1
Other Rigid Plastic Packaging	0.86%	0.1%	362.7	Miscellaneous Inorganics	0.22%	0.2%	94.4
Expanded Polystyrene	0.53%	0.2%	222.3				
Compostable Plastics	0.02%	0.0%	10.5	**Hazardous Wastes**	**0.8%**		**344**
Plastic Grocery/Merchandise Bags	0.90%	0.2%	377.6	Latex Paint	0.13%	0.1%	54.2
Other Clean Plastic Consumer Product Bags	0.37%	0.1%	154.3	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.84%	0.2%	355.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.43%	0.2%	602.1	Oil-based Paint/Solvent	0.00%	0.0%	0.7
Mixed Rigid Plastics	0.90%	0.4%	378.1	Hazardous Cleaners	0.02%	0.0%	7.9
Plastic/Other Materials	0.50%	0.2%	210.9	Pesticides/Herbicides	0.02%	0.0%	9.0
				Non-rechargeable Dry-cell Batteries	0.14%	0.1%	58.8
Glass	**1.6%**		**669**	Rechargeable Dry-cell Batteries	0.01%	0.0%	2.6
Glass Beverage Containers	0.89%	0.0%	373.2	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.1%	1.7	Asbestos	0.00%	0.0%	0.0
Other Glass	0.70%	0.0%	294.2	Explosives	0.00%	0.0%	0.7
				Vehicle and Equipment Fluids	0.01%	0.0%	5.6
Metal	**4.0%**		**1,684**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.22%	0.1%	91.4	Other Hazardous Chemicals	0.03%	0.0%	14.0
Aluminum Foil/Containers	0.15%	0.0%	64.5	Other Non-hazardous Chemicals	0.45%	0.2%	190.3
Other Nonferrous	0.10%	0.1%	42.6				
Tin Food Cans	0.45%	0.1%	189.4	**C&D Wastes**	**5.4%**		**2,274**
Empty Aerosol Cans	0.08%	0.0%	32.5	Dimension Lumber	0.59%	0.6%	246.0
Other Ferrous	0.63%	0.4%	264.8	Pallets/Crates	0.40%	0.6%	168.6
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.13%	0.1%	56.2
Mixed Metals/Material	2.38%	2.0%	999.4	Contaminated Wood	1.60%	1.6%	674.1
				New Gypsum Scrap	0.48%	0.5%	200.1
Organic	**50.4%**		**21,182**	Demo Gypsum Scrap	0.41%	0.7%	170.5
Leaves & Grass	18.25%	4.6%	7,669.9	Insulation	0.03%	0.0%	11.1
Unaccepted Yard Waste	3.72%	1.8%	1,563.1	Rock/Concrete/Bricks	1.20%	1.0%	503.2
Prunings Less than 2"	9.12%	2.5%	3,833.3	Asphaltic Roofing	0.25%	0.3%	106.0
Prunings 2" to 12"	1.40%	1.0%	587.8	Other Construction Debris	0.33%	0.4%	138.3
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	12.84%	2.1%	5,399.1	**Totals**	**100%**		**42,034**
Homegrown Food	4.76%	3.4%	1,998.9				
Beverages and Liquids	0.31%	0.2%	130.0	**Sample Count**			**26**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 24. Composition by Material Class, Area D Garbage

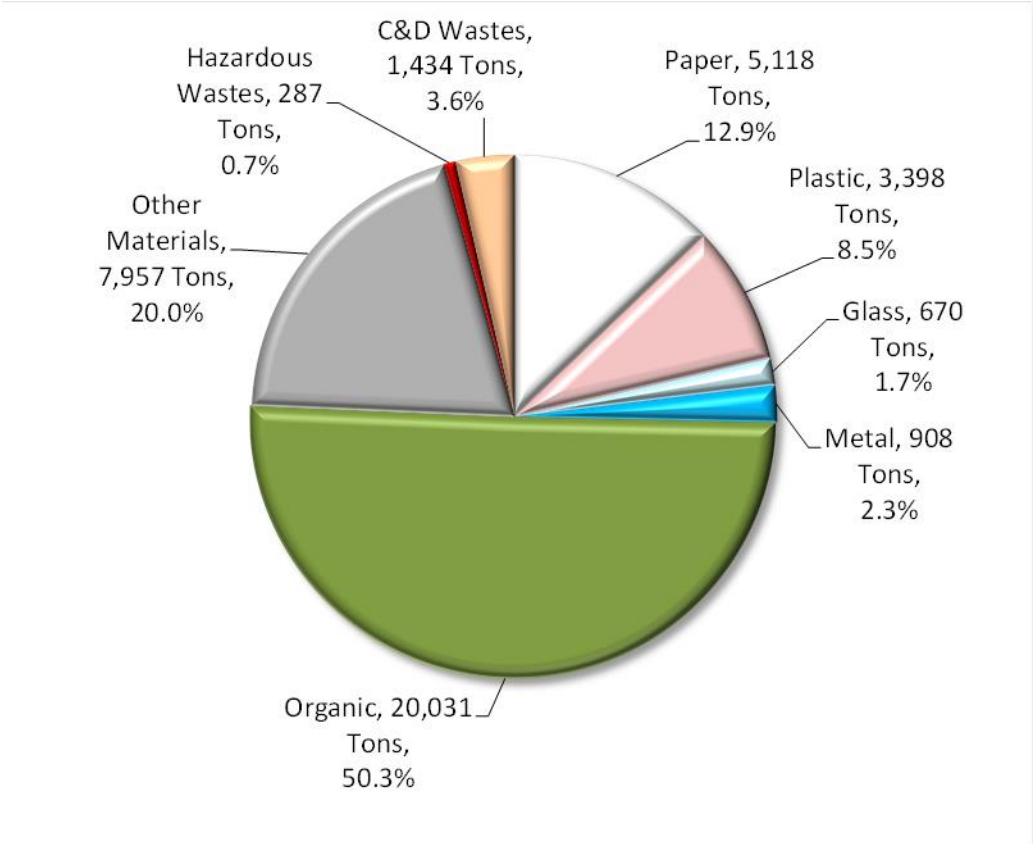


Figure 25. Composition by Recoverability Group, Area D Garbage

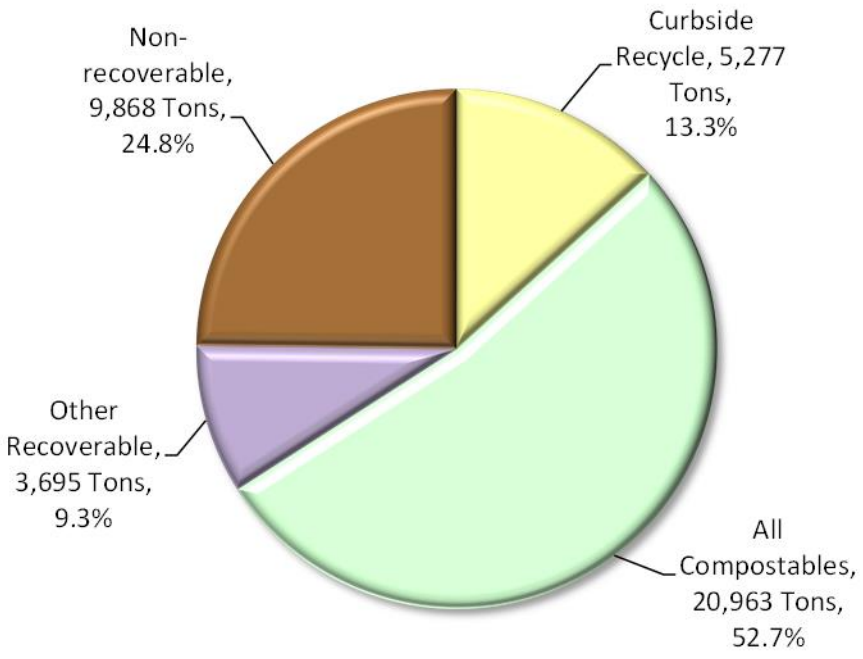


Table 64. Ten Most Prevalent Material Types, Area D Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	26.94%	26.94%	10,723.8
Purchased Food	11.29%	38.23%	4,493.1
Carpet/Upholstery	5.56%	43.79%	2,214.6
Compostable/Food Soiled Paper	5.37%	49.16%	2,137.5
Prunings Less than 2"	4.27%	53.44%	1,700.0
Textiles	3.95%	57.39%	1,572.2
Mixed Low-grade Paper	3.65%	61.04%	1,453.3
Homegrown Food	3.34%	64.38%	1,329.2
Disposable Diapers	3.02%	67.40%	1,203.4
Animal By-products	2.98%	70.38%	1,186.9
Subtotal	***70.4%***		***28,014***
All other material types	29.6%		11,788.8
Total	**100%**		**39,803**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 65. Detailed Composition, Area D Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**12.9%**		**5,118**	**Other Materials**	**20.0%**		**7,957**
Newspaper	1.31%	0.6%	521.7	Textiles	3.95%	1.4%	1,572.2
Plain OCC/Kraft Paper	1.38%	0.5%	548.9	Carpet/Upholstery	5.56%	3.3%	2,214.6
Waxed OCC/Kraft Paper	0.04%	0.0%	13.9	Leather	0.06%	0.0%	23.7
High Grade Paper	0.39%	0.3%	155.8	Disposable Diapers	3.02%	1.0%	1,203.4
Mixed Low-grade Paper	3.65%	0.7%	1,453.3	Animal By-products	2.98%	1.8%	1,186.9
Milk/Juice Polycoated Paper	0.11%	0.0%	43.9	Rubber Products	0.32%	0.1%	129.1
Frozen Food Polycoated Paper	0.14%	0.1%	54.8	Tires	0.06%	0.1%	25.4
Compostable/Food Soiled Paper	5.37%	1.1%	2,137.5	Ash	0.09%	0.1%	34.3
Paper/Other Materials	0.47%	0.1%	188.4	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**8.5%**		**3,398**	Small Appliances	0.43%	0.5%	171.1
#1 PET Bottles	0.75%	0.2%	298.4	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.25%	0.1%	99.8	Other Electronics	0.41%	0.3%	162.7
#2 HDPE Natural Bottles	0.23%	0.1%	91.0	Ceramics/Porcelain	0.15%	0.1%	58.0
#2 HDPE Colored Bottles	0.31%	0.1%	123.4	Non-distinct Fines	1.42%	0.6%	563.9
#2 HDPE Other Packaging	0.03%	0.0%	12.0	Miscellaneous Organics	0.97%	0.4%	385.1
Other Rigid Plastic Packaging	0.81%	0.1%	322.8	Miscellaneous Inorganics	0.57%	0.7%	226.9
Expanded Polystyrene	0.56%	0.1%	221.7				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.7%**		**287**
Plastic Grocery/Merchandise Bags	0.82%	0.2%	325.2	Latex Paint	0.17%	0.2%	69.3
Other Clean Plastic Consumer Product Bags	0.38%	0.1%	150.2	Hazardous Adhesives/Glues	0.01%	0.0%	5.8
Plastic Garbage Bags	1.04%	0.2%	415.5	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.17%	0.2%	465.3	Oil-based Paint/Solvent	0.01%	0.0%	5.5
Mixed Rigid Plastics	1.35%	0.5%	538.7	Hazardous Cleaners	0.00%	0.0%	0.1
Plastic/Other Materials	0.84%	0.7%	333.5	Pesticides/Herbicides	0.01%	0.0%	5.1
				Non-rechargeable Dry-cell Batteries	0.05%	0.0%	18.4
Glass	**1.7%**		**670**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	1.09%	0.1%	434.1	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.1%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.59%	0.0%	235.6	Explosives	0.00%	0.0%	0.3
				Vehicle and Equipment Fluids	0.01%	0.0%	2.7
Metal	**2.3%**		**908**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.22%	0.1%	85.6	Other Hazardous Chemicals	0.15%	0.2%	58.1
Aluminum Foil/Containers	0.18%	0.0%	70.0	Other Non-hazardous Chemicals	0.31%	0.2%	122.1
Other Nonferrous	0.12%	0.1%	48.9				
Tin Food Cans	0.48%	0.1%	189.1	**C&D Wastes**	**3.6%**		**1,434**
Empty Aerosol Cans	0.06%	0.0%	22.1	Dimension Lumber	0.14%	0.1%	54.3
Other Ferrous	0.41%	0.2%	162.1	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.03%	0.0%	13.2	Treated Wood	0.80%	0.6%	319.2
Mixed Metals/Material	0.80%	0.4%	316.5	Contaminated Wood	0.70%	0.3%	278.4
				New Gypsum Scrap	0.01%	0.0%	3.1
Organic	**50.3%**		**20,031**	Demo Gypsum Scrap	0.08%	0.1%	31.7
Leaves & Grass	26.94%	5.5%	10,723.8	Insulation	0.00%	0.0%	1.0
Unaccepted Yard Waste	2.23%	1.2%	889.5	Rock/Concrete/Bricks	1.44%	0.8%	572.5
Prunings Less than 2"	4.27%	1.5%	1,700.0	Asphaltic Roofing	0.09%	0.1%	37.8
Prunings 2" to 12"	0.95%	1.2%	377.2	Other Construction Debris	0.34%	0.3%	135.6
Prunings Greater than 12"	0.83%	1.4%	330.5				
Purchased Food	11.29%	2.4%	4,493.1	**Totals**	**100%**		**39,803**
Homegrown Food	3.34%	2.2%	1,329.2				
Beverages and Liquids	0.47%	0.3%	187.9	**Sample Count**			**27**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 26. Composition by Material Class, Area E Garbage

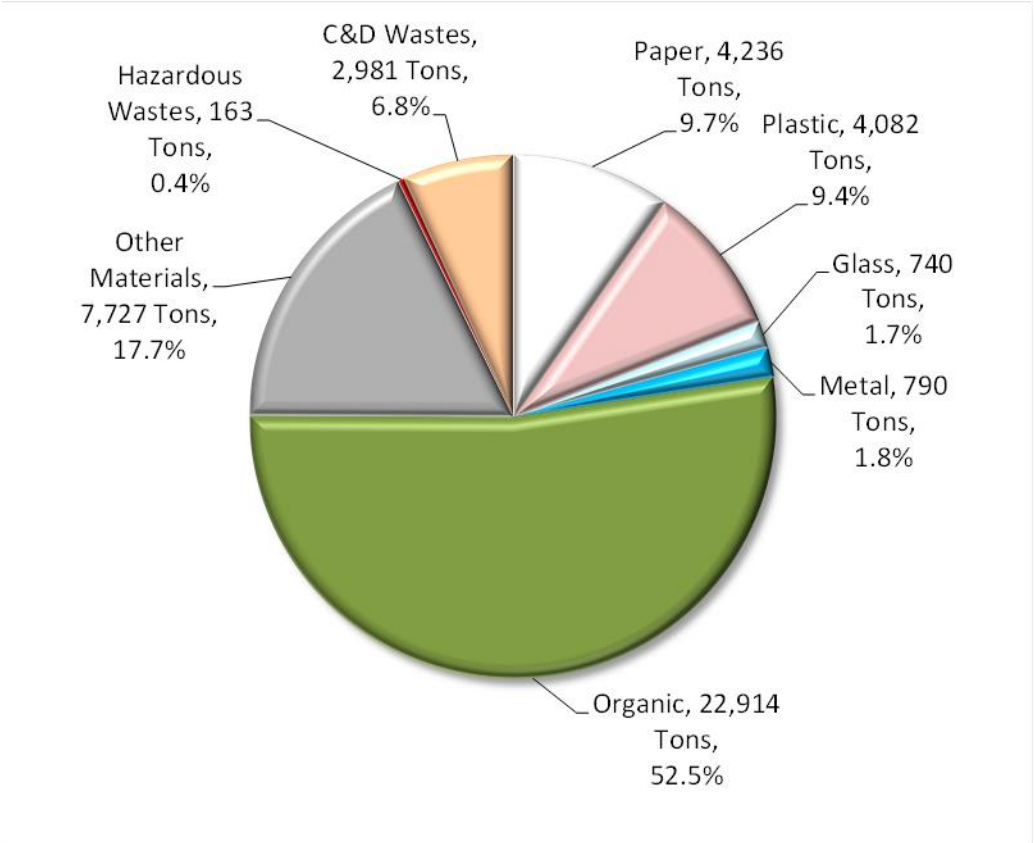


Figure 27. Composition by Recoverability Group, Area E Garbage

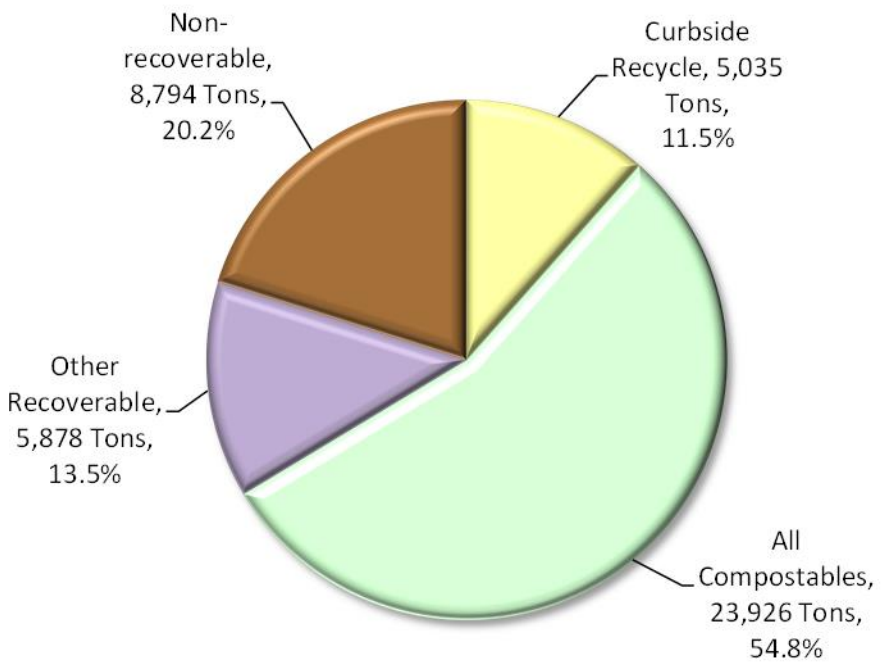


Table 66. Ten Most Prevalent Material Types, Area E Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	31.90%	31.90%	13,917.0
Purchased Food	9.59%	41.48%	4,183.2
Prunings Less than 2"	6.26%	47.74%	2,729.8
Textiles	5.69%	53.43%	2,481.9
Compostable/Food Soiled Paper	4.02%	57.45%	1,752.8
Mixed Low-grade Paper	3.06%	60.51%	1,335.2
Carpet/Upholstery	3.00%	63.50%	1,307.3
Disposable Diapers	2.64%	66.15%	1,154.0
Rock/Concrete/Bricks	2.06%	68.21%	900.0
Plastic/Other Materials	1.79%	69.99%	779.0
Subtotal	***70.0%***		***30,540***
All other material types	30.0%		13,092.0
Total	**100%**		**43,632**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 67. Detailed Composition, Area E Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**9.7%**		**4,236**	**Other Materials**	**17.7%**		**7,727**
Newspaper	0.82%	0.3%	359.7	Textiles	5.69%	1.7%	2,481.9
Plain OCC/Kraft Paper	0.97%	0.3%	421.5	Carpet/Upholstery	3.00%	1.9%	1,307.3
Waxed OCC/Kraft Paper	0.01%	0.0%	4.0	Leather	0.15%	0.1%	66.3
High Grade Paper	0.30%	0.2%	132.8	Disposable Diapers	2.64%	0.7%	1,154.0
Mixed Low-grade Paper	3.06%	0.5%	1,335.2	Animal By-products	1.42%	0.9%	619.1
Milk/Juice Polycoated Paper	0.09%	0.0%	38.8	Rubber Products	0.27%	0.2%	118.7
Frozen Food Polycoated Paper	0.09%	0.0%	38.3	Tires	0.29%	0.5%	124.8
Compostable/Food Soiled Paper	4.02%	0.5%	1,752.8	Ash	0.03%	0.0%	12.9
Paper/Other Materials	0.35%	0.1%	152.3	Furniture	0.00%	0.0%	0.0
				Mattresses	0.21%	0.3%	90.5
Plastic	**9.4%**		**4,082**	Small Appliances	0.62%	0.5%	272.2
#1 PET Bottles	0.78%	0.1%	340.6	CRTs	0.53%	0.8%	231.4
#1 PET Other Packaging	0.17%	0.0%	74.7	Other Electronics	0.56%	0.7%	246.0
#2 HDPE Natural Bottles	0.19%	0.1%	85.0	Ceramics/Porcelain	0.36%	0.3%	156.6
#2 HDPE Colored Bottles	0.27%	0.1%	116.7	Non-distinct Fines	1.06%	0.4%	463.4
#2 HDPE Other Packaging	0.03%	0.0%	11.0	Miscellaneous Organics	0.76%	0.3%	330.0
Other Rigid Plastic Packaging	0.68%	0.2%	296.8	Miscellaneous Inorganics	0.12%	0.1%	52.2
Expanded Polystyrene	0.72%	0.2%	313.7				
Compostable Plastics	0.02%	0.0%	10.7	**Hazardous Wastes**	**0.4%**		**163**
Plastic Grocery/Merchandise Bags	0.89%	0.2%	388.9	Latex Paint	0.01%	0.0%	4.2
Other Clean Plastic Consumer Product Bags	0.30%	0.1%	129.5	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.75%	0.1%	329.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	1.6
Other Plastic Film	1.27%	0.3%	553.0	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.50%	0.9%	652.8	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	1.79%	0.9%	779.0	Pesticides/Herbicides	0.02%	0.0%	9.1
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	12.7
Glass	**1.7%**		**740**	Rechargeable Dry-cell Batteries	0.03%	0.0%	12.5
Glass Beverage Containers	0.99%	0.1%	430.6	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.1%	0.6	Asbestos	0.00%	0.0%	0.0
Other Glass	0.71%	0.0%	309.1	Explosives	0.02%	0.0%	7.9
				Vehicle and Equipment Fluids	0.01%	0.0%	2.5
Metal	**1.8%**		**790**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.25%	0.1%	109.5	Other Hazardous Chemicals	0.09%	0.1%	38.8
Aluminum Foil/Containers	0.17%	0.0%	73.3	Other Non-hazardous Chemicals	0.17%	0.1%	73.6
Other Nonferrous	0.02%	0.0%	8.0				
Tin Food Cans	0.51%	0.1%	224.4	**C&D Wastes**	**6.8%**		**2,981**
Empty Aerosol Cans	0.10%	0.0%	42.6	Dimension Lumber	0.84%	0.8%	365.8
Other Ferrous	0.56%	0.3%	242.5	Pallets/Crates	0.11%	0.2%	49.0
Oil Filters	0.01%	0.0%	5.0	Treated Wood	0.69%	0.6%	300.0
Mixed Metals/Material	0.19%	0.1%	84.4	Contaminated Wood	1.48%	0.7%	645.4
				New Gypsum Scrap	0.03%	0.0%	14.7
Organic	**52.5%**		**22,914**	Demo Gypsum Scrap	0.56%	0.7%	242.6
Leaves & Grass	31.90%	5.4%	13,917.0	Insulation	0.00%	0.0%	0.2
Unaccepted Yard Waste	1.12%	0.9%	488.1	Rock/Concrete/Bricks	2.06%	1.4%	900.0
Prunings Less than 2"	6.26%	1.8%	2,729.8	Asphaltic Roofing	0.02%	0.0%	6.8
Prunings 2" to 12"	1.12%	1.0%	488.7	Other Construction Debris	1.05%	0.7%	456.3
Prunings Greater than 12"	0.61%	1.0%	267.8				
Purchased Food	9.59%	1.4%	4,183.2	**Totals**	**100%**		**43,632**
Homegrown Food	1.48%	1.4%	646.1				
Beverages and Liquids	0.44%	0.2%	193.6	**Sample Count**			**28**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 28. Composition by Material Class, Area F Garbage

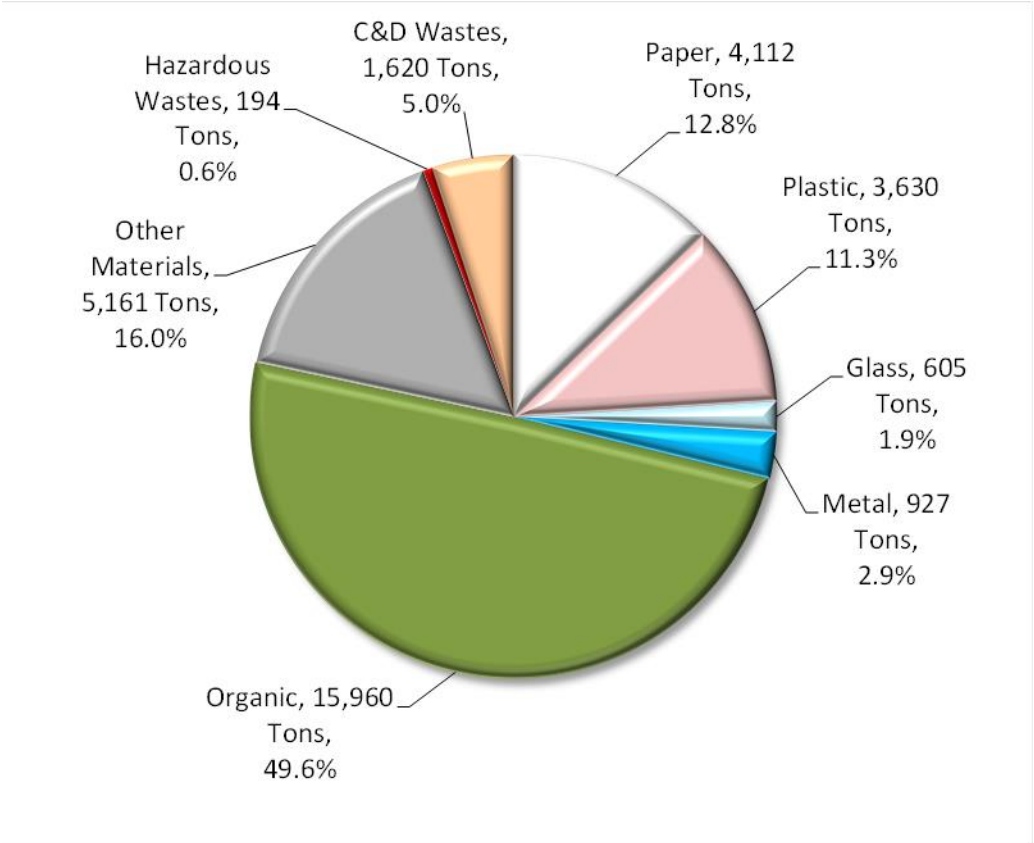


Figure 29. Composition by Recoverability Group, Area F Garbage

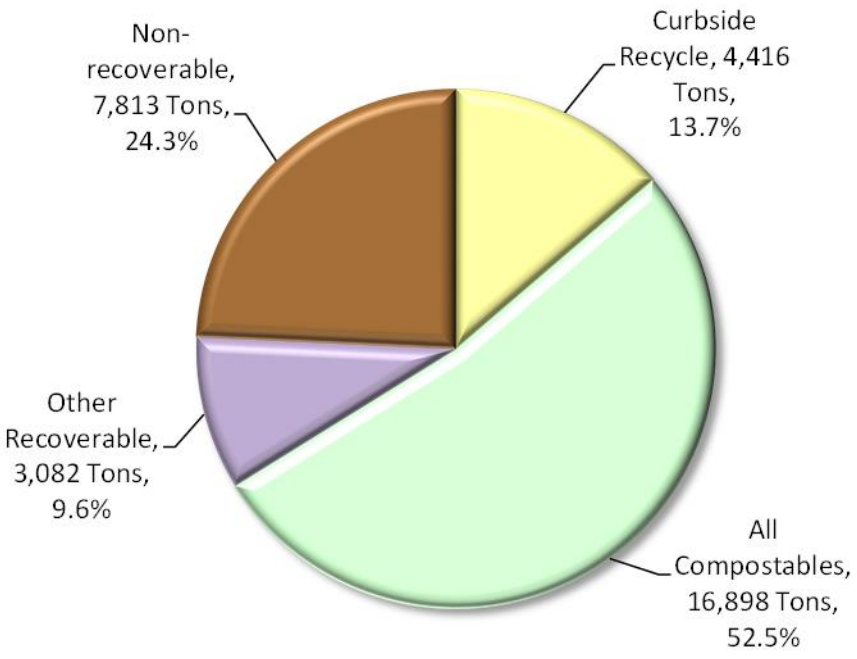


Table 68. Ten Most Prevalent Material Types, Area F Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	21.70%	21.70%	6,989.7
Purchased Food	13.85%	35.55%	4,461.1
Prunings Less than 2"	7.40%	42.95%	2,384.2
Compostable/Food Soiled Paper	5.50%	48.45%	1,771.9
Mixed Low-grade Paper	4.09%	52.54%	1,317.5
Textiles	4.05%	56.59%	1,304.1
Animal By-products	3.30%	59.89%	1,062.5
Unaccepted Yard Waste	2.70%	62.59%	869.9
Other Plastic Film	2.30%	64.90%	742.2
Disposable Diapers	2.05%	66.94%	659.1
Subtotal	***66.9%***		***21,562***
All other material types	33.1%		10,647.5
Total	**100%**		**32,210**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 69. Detailed Composition, Area F Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**12.8%**		**4,112**	**Other Materials**	**16.0%**		**5,161**
Newspaper	0.81%	0.3%	259.9	Textiles	4.05%	1.6%	1,304.1
Plain OCC/Kraft Paper	0.89%	0.3%	285.8	Carpet/Upholstery	1.88%	1.1%	606.7
Waxed OCC/Kraft Paper	0.11%	0.1%	35.8	Leather	0.23%	0.2%	74.1
High Grade Paper	0.31%	0.2%	99.7	Disposable Diapers	2.05%	0.8%	659.1
Mixed Low-grade Paper	4.09%	0.8%	1,317.5	Animal By-products	3.30%	1.1%	1,062.5
Milk/Juice Polycoated Paper	0.24%	0.1%	78.0	Rubber Products	0.39%	0.3%	127.2
Frozen Food Polycoated Paper	0.19%	0.1%	60.0	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	5.50%	0.8%	1,771.9	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.63%	0.2%	203.1	Furniture	0.01%	0.0%	2.5
				Mattresses	0.00%	0.0%	0.0
Plastic	**11.3%**		**3,630**	Small Appliances	1.02%	0.8%	327.3
#1 PET Bottles	0.86%	0.2%	278.5	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.32%	0.1%	102.2	Other Electronics	0.61%	0.6%	197.6
#2 HDPE Natural Bottles	0.18%	0.1%	58.8	Ceramics/Porcelain	0.31%	0.3%	98.8
#2 HDPE Colored Bottles	0.21%	0.0%	68.8	Non-distinct Fines	1.35%	0.4%	434.8
#2 HDPE Other Packaging	0.03%	0.0%	10.0	Miscellaneous Organics	0.66%	0.2%	211.7
Other Rigid Plastic Packaging	0.96%	0.1%	310.4	Miscellaneous Inorganics	0.17%	0.1%	54.9
Expanded Polystyrene	0.65%	0.1%	209.5				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.6%**		**194**
Plastic Grocery/Merchandise Bags	0.87%	0.1%	278.9	Latex Paint	0.16%	0.2%	50.6
Other Clean Plastic Consumer Product Bags	0.43%	0.1%	139.0	Hazardous Adhesives/Glues	0.02%	0.0%	6.3
Plastic Garbage Bags	1.11%	0.4%	359.1	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	2.30%	0.9%	742.2	Oil-based Paint/Solvent	0.02%	0.0%	6.2
Mixed Rigid Plastics	1.73%	0.6%	556.4	Hazardous Cleaners	0.00%	0.0%	0.6
Plastic/Other Materials	1.60%	1.1%	516.4	Pesticides/Herbicides	0.00%	0.0%	0.1
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	9.5
Glass	**1.9%**		**605**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	1.13%	0.1%	363.4	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.0%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.75%	0.0%	241.3	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**2.9%**		**927**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.25%	0.1%	81.1	Other Hazardous Chemicals	0.12%	0.1%	38.3
Aluminum Foil/Containers	0.16%	0.0%	53.0	Other Non-hazardous Chemicals	0.26%	0.1%	82.8
Other Nonferrous	0.02%	0.0%	6.1				
Tin Food Cans	0.61%	0.2%	195.8	**C&D Wastes**	**5.0%**		**1,620**
Empty Aerosol Cans	0.11%	0.0%	34.7	Dimension Lumber	0.66%	0.6%	211.1
Other Ferrous	0.61%	0.4%	196.3	Pallets/Crates	0.00%	0.0%	0.6
Oil Filters	0.02%	0.0%	6.6	Treated Wood	0.42%	0.5%	134.5
Mixed Metals/Material	1.10%	0.8%	353.8	Contaminated Wood	1.37%	0.8%	442.7
				New Gypsum Scrap	0.04%	0.0%	13.0
Organic	**49.6%**		**15,960**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	21.70%	4.8%	6,989.7	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	2.70%	1.7%	869.9	Rock/Concrete/Bricks	1.23%	1.0%	395.1
Prunings Less than 2"	7.40%	2.2%	2,384.2	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	1.49%	1.0%	481.0	Other Construction Debris	1.31%	1.4%	422.6
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	13.85%	2.6%	4,461.1	**Totals**	**100%**		**32,210**
Homegrown Food	1.90%	1.4%	610.5				
Beverages and Liquids	0.51%	0.2%	163.9	**Sample Count**			**26**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 30. Composition by Material Class, Area G Garbage

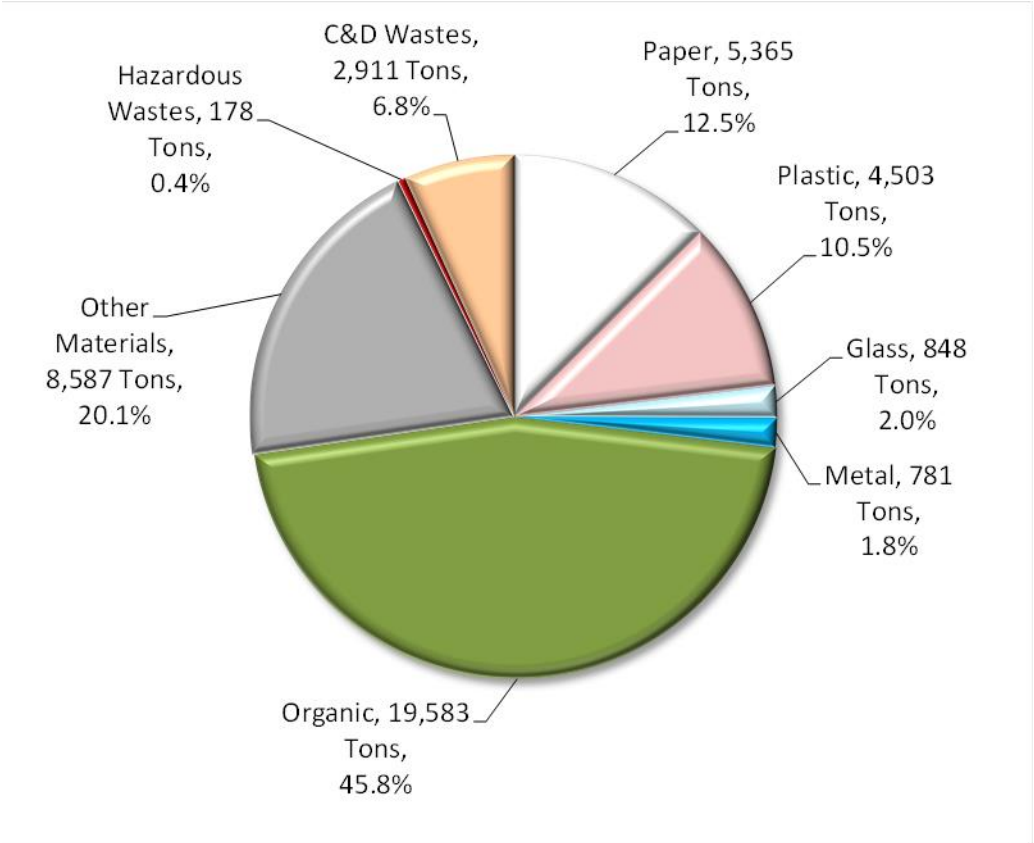


Figure 31. Composition by Recoverability Group, Area G Garbage

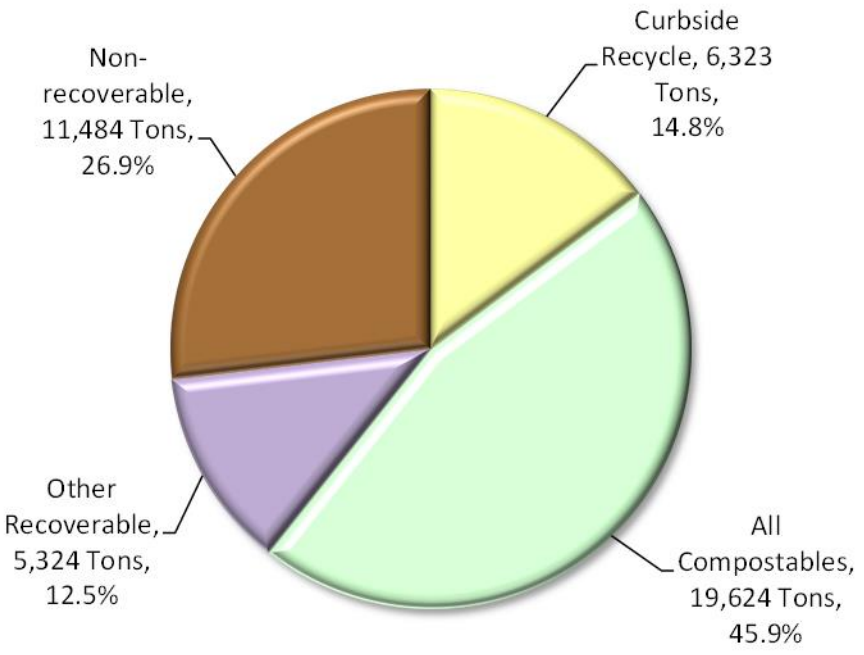


Table 70. Ten Most Prevalent Material Types, Area G Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	21.64%	21.64%	9,252.7
Purchased Food	12.41%	34.05%	5,304.4
Textiles	6.03%	40.07%	2,576.1
Compostable/Food Soiled Paper	5.08%	45.15%	2,169.9
Prunings Less than 2"	5.02%	50.17%	2,146.5
Unaccepted Yard Waste	4.78%	54.94%	2,041.6
Mixed Low-grade Paper	4.25%	59.19%	1,817.7
Disposable Diapers	3.30%	62.49%	1,409.0
Carpet/Upholstery	2.80%	65.29%	1,195.1
Non-distinct Fines	2.66%	67.94%	1,136.8
Subtotal	***67.9%***		***29,050***
All other material types	32.1%		13,705.4
Total	**100%**		**42,755**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 71. Detailed Composition, Area G Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**12.5%**		**5,365**	**Other Materials**	**20.1%**		**8,587**
Newspaper	1.23%	0.7%	524.4	Textiles	6.03%	2.5%	2,576.1
Plain OCC/Kraft Paper	1.20%	0.3%	512.0	Carpet/Upholstery	2.80%	1.8%	1,195.1
Waxed OCC/Kraft Paper	0.08%	0.1%	33.3	Leather	0.06%	0.0%	27.5
High Grade Paper	0.13%	0.1%	54.9	Disposable Diapers	3.30%	0.9%	1,409.0
Mixed Low-grade Paper	4.25%	0.8%	1,817.7	Animal By-products	2.25%	1.2%	962.0
Milk/Juice Polycoated Paper	0.09%	0.0%	39.2	Rubber Products	0.45%	0.2%	191.0
Frozen Food Polycoated Paper	0.12%	0.1%	52.6	Tires	0.08%	0.1%	32.5
Compostable/Food Soiled Paper	5.08%	0.8%	2,169.9	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.38%	0.1%	160.6	Furniture	0.02%	0.0%	10.4
				Mattresses	0.00%	0.0%	0.0
Plastic	**10.5%**		**4,503**	Small Appliances	0.72%	0.7%	306.4
#1 PET Bottles	0.87%	0.2%	372.5	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.24%	0.1%	101.1	Other Electronics	0.36%	0.3%	153.4
#2 HDPE Natural Bottles	0.32%	0.1%	137.4	Ceramics/Porcelain	0.44%	0.3%	189.2
#2 HDPE Colored Bottles	0.28%	0.1%	118.9	Non-distinct Fines	2.66%	1.7%	1,136.8
#2 HDPE Other Packaging	0.01%	0.0%	6.3	Miscellaneous Organics	0.85%	0.4%	362.4
Other Rigid Plastic Packaging	0.77%	0.2%	330.2	Miscellaneous Inorganics	0.08%	0.0%	35.0
Expanded Polystyrene	0.86%	0.2%	369.0				
Compostable Plastics	0.05%	0.1%	20.1	**Hazardous Wastes**	**0.4%**		**178**
Plastic Grocery/Merchandise Bags	1.13%	0.3%	484.3	Latex Paint	0.11%	0.1%	45.2
Other Clean Plastic Consumer Product Bags	0.54%	0.2%	230.9	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.96%	0.2%	410.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.21%	0.2%	516.3	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	2.58%	1.3%	1,101.7	Hazardous Cleaners	0.01%	0.0%	4.1
Plastic/Other Materials	0.71%	0.3%	304.0	Pesticides/Herbicides	0.01%	0.0%	2.5
				Non-rechargeable Dry-cell Batteries	0.04%	0.0%	19.0
Glass	**2.0%**		**848**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	1.18%	0.1%	505.4	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.1%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.80%	0.0%	343.0	Explosives	0.00%	0.0%	0.4
				Vehicle and Equipment Fluids	0.01%	0.0%	5.4
Metal	**1.8%**		**781**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.22%	0.1%	94.9	Other Hazardous Chemicals	0.06%	0.0%	26.4
Aluminum Foil/Containers	0.12%	0.0%	51.1	Other Non-hazardous Chemicals	0.18%	0.1%	75.5
Other Nonferrous	0.07%	0.1%	29.0				
Tin Food Cans	0.60%	0.1%	254.5	**C&D Wastes**	**6.8%**		**2,911**
Empty Aerosol Cans	0.10%	0.0%	41.4	Dimension Lumber	0.55%	0.5%	234.2
Other Ferrous	0.42%	0.2%	177.7	Pallets/Crates	0.29%	0.3%	123.7
Oil Filters	0.07%	0.1%	29.7	Treated Wood	0.94%	0.6%	403.0
Mixed Metals/Material	0.24%	0.1%	102.3	Contaminated Wood	1.75%	1.1%	748.5
				New Gypsum Scrap	0.12%	0.1%	52.2
Organic	**45.8%**		**19,583**	Demo Gypsum Scrap	0.31%	0.5%	132.5
Leaves & Grass	21.64%	4.8%	9,252.7	Insulation	0.00%	0.0%	1.4
Unaccepted Yard Waste	4.78%	4.4%	2,041.6	Rock/Concrete/Bricks	1.84%	1.5%	787.4
Prunings Less than 2"	5.02%	2.1%	2,146.5	Asphaltic Roofing	0.02%	0.0%	8.6
Prunings 2" to 12"	0.57%	0.7%	243.5	Other Construction Debris	0.98%	0.9%	419.1
Prunings Greater than 12"	0.33%	0.5%	140.2				
Purchased Food	12.41%	2.2%	5,304.4	**Totals**	**100%**		**42,755**
Homegrown Food	0.79%	0.6%	339.5				
Beverages and Liquids	0.27%	0.1%	114.4	**Sample Count**			**27**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

**Figure 32. Composition by Material Class,
Area H Garbage**

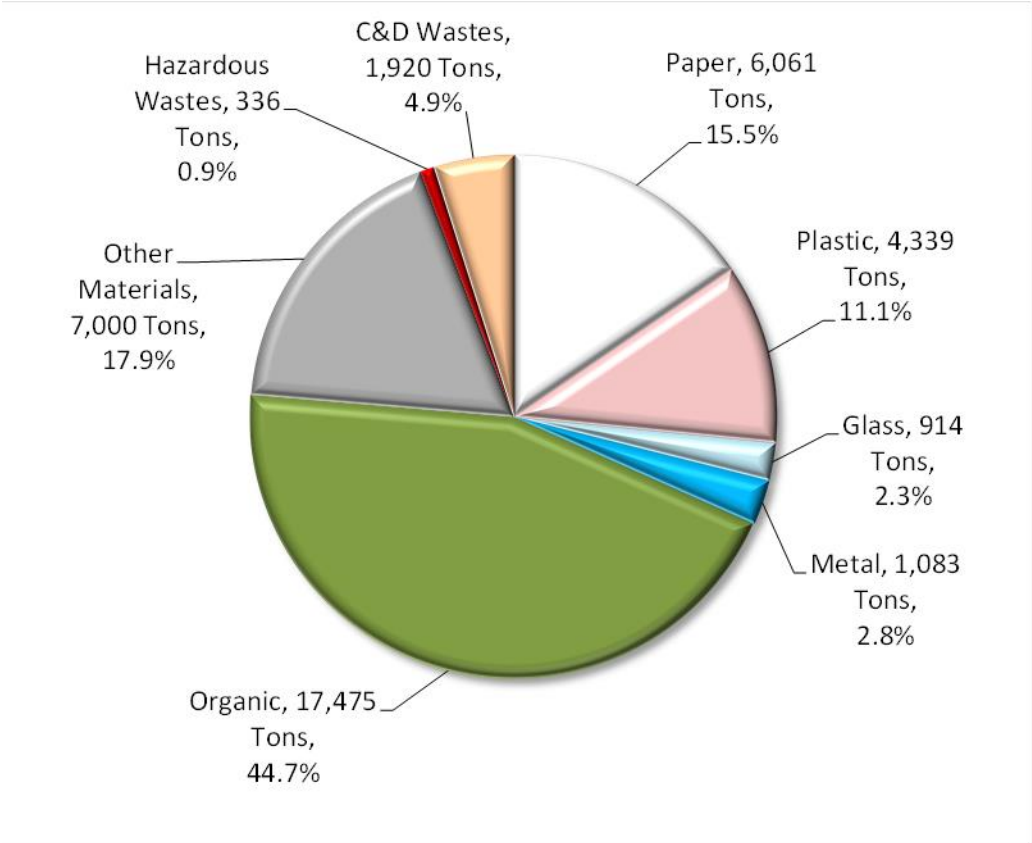


Figure 33. Composition by Recoverability Group, Area H Garbage

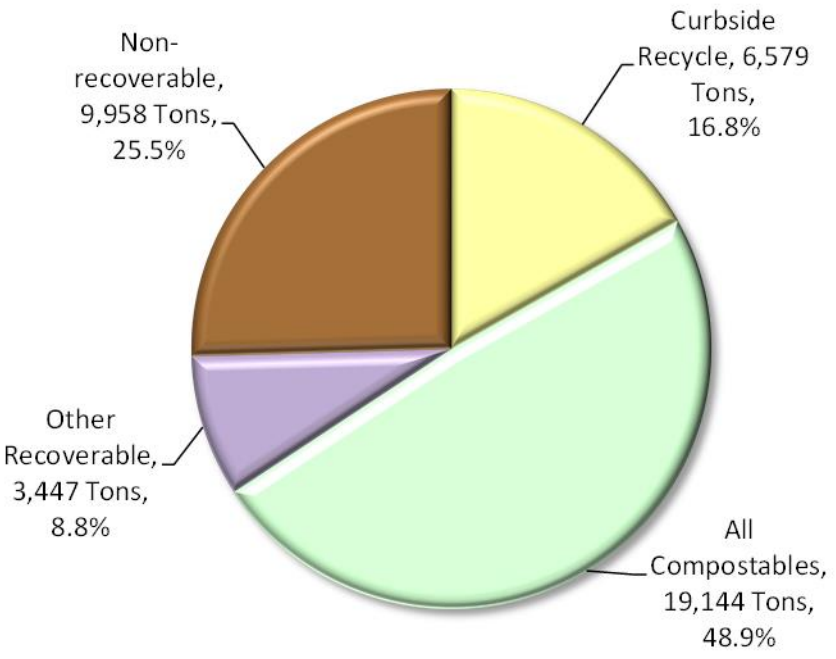


Table 72. Ten Most Prevalent Material Types, Area H Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	22.00%	22.00%	8,608.0
Purchased Food	15.05%	37.05%	5,888.6
Compostable/Food Soiled Paper	5.74%	42.79%	2,245.5
Mixed Low-grade Paper	5.64%	48.43%	2,208.3
Disposable Diapers	4.47%	52.90%	1,749.6
Prunings Less than 2"	4.04%	56.95%	1,581.9
Animal By-products	3.00%	59.94%	1,172.1
Textiles	2.83%	62.77%	1,108.8
Non-distinct Fines	2.39%	65.16%	935.0
Contaminated Wood	1.83%	66.99%	714.9
Subtotal	***67.0%***		***26,213***
All other material types	33.0%		12,915.9
Total	**100%**		**39,129**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 73. Detailed Composition, Area H Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**15.5%**		**6,061**	**Other Materials**	**17.9%**		**7,000**
Newspaper	1.04%	0.5%	406.6	Textiles	2.83%	1.1%	1,108.8
Plain OCC/Kraft Paper	1.70%	0.5%	665.3	Carpet/Upholstery	0.24%	0.1%	92.8
Waxed OCC/Kraft Paper	0.15%	0.2%	56.8	Leather	0.04%	0.0%	14.7
High Grade Paper	0.24%	0.1%	93.7	Disposable Diapers	4.47%	1.2%	1,749.6
Mixed Low-grade Paper	5.64%	1.6%	2,208.3	Animal By-products	3.00%	1.4%	1,172.1
Milk/Juice Polycoated Paper	0.15%	0.1%	57.1	Rubber Products	1.24%	1.2%	485.9
Frozen Food Polycoated Paper	0.16%	0.1%	61.1	Tires	0.47%	0.8%	183.3
Compostable/Food Soiled Paper	5.74%	0.8%	2,245.5	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.68%	0.3%	266.1	Furniture	0.46%	0.8%	179.3
				Mattresses	0.00%	0.0%	0.0
Plastic	**11.1%**		**4,339**	Small Appliances	0.21%	0.3%	83.6
#1 PET Bottles	1.12%	0.1%	436.5	CRTs	0.43%	0.7%	168.2
#1 PET Other Packaging	0.24%	0.1%	94.9	Other Electronics	0.38%	0.4%	149.8
#2 HDPE Natural Bottles	0.32%	0.1%	127.1	Ceramics/Porcelain	0.52%	0.4%	205.4
#2 HDPE Colored Bottles	0.25%	0.1%	97.6	Non-distinct Fines	2.39%	1.3%	935.0
#2 HDPE Other Packaging	0.05%	0.0%	19.8	Miscellaneous Organics	1.07%	0.3%	419.3
Other Rigid Plastic Packaging	0.92%	0.1%	360.4	Miscellaneous Inorganics	0.13%	0.1%	51.9
Expanded Polystyrene	1.04%	0.2%	405.6				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.9%**		**336**
Plastic Grocery/Merchandise Bags	1.48%	0.2%	579.5	Latex Paint	0.00%	0.0%	0.1
Other Clean Plastic Consumer Product Bags	0.38%	0.1%	149.4	Hazardous Adhesives/Glues	0.00%	0.0%	0.7
Plastic Garbage Bags	1.03%	0.2%	403.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.70%	0.2%	664.2	Oil-based Paint/Solvent	0.10%	0.2%	38.7
Mixed Rigid Plastics	1.15%	0.4%	449.3	Hazardous Cleaners	0.00%	0.0%	0.4
Plastic/Other Materials	1.41%	0.9%	551.9	Pesticides/Herbicides	0.01%	0.0%	2.6
				Non-rechargeable Dry-cell Batteries	0.04%	0.0%	14.1
Glass	**2.3%**		**914**	Rechargeable Dry-cell Batteries	0.02%	0.0%	5.9
Glass Beverage Containers	1.74%	0.1%	680.9	Wet-cell (car) Batteries	0.04%	0.1%	15.8
Fluorescent Tubes	0.00%	0.1%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.60%	0.0%	233.3	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**2.8%**		**1,083**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.34%	0.1%	132.2	Other Hazardous Chemicals	0.43%	0.5%	168.9
Aluminum Foil/Containers	0.21%	0.1%	83.6	Other Non-hazardous Chemicals	0.23%	0.1%	89.2
Other Nonferrous	0.13%	0.1%	50.8				
Tin Food Cans	0.92%	0.2%	360.1	**C&D Wastes**	**4.9%**		**1,920**
Empty Aerosol Cans	0.17%	0.1%	65.5	Dimension Lumber	0.54%	0.5%	209.9
Other Ferrous	0.33%	0.2%	128.4	Pallets/Crates	0.00%	0.0%	0.4
Oil Filters	0.05%	0.0%	18.7	Treated Wood	0.98%	0.8%	384.7
Mixed Metals/Material	0.62%	0.5%	244.1	Contaminated Wood	1.83%	1.1%	714.9
				New Gypsum Scrap	0.14%	0.1%	54.8
Organic	**44.7%**		**17,475**	Demo Gypsum Scrap	0.05%	0.1%	18.6
Leaves & Grass	22.00%	4.4%	8,608.0	Insulation	0.00%	0.0%	0.7
Unaccepted Yard Waste	1.62%	1.1%	633.3	Rock/Concrete/Bricks	0.43%	0.3%	168.6
Prunings Less than 2"	4.04%	1.3%	1,581.9	Asphaltic Roofing	0.35%	0.5%	136.9
Prunings 2" to 12"	1.01%	1.5%	396.4	Other Construction Debris	0.59%	0.7%	230.4
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	15.05%	2.2%	5,888.6	**Totals**	**100%**		**39,129**
Homegrown Food	0.65%	0.5%	255.3				
Beverages and Liquids	0.29%	0.1%	111.7	**Sample Count**			**25**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 34. Composition by Material Class, Area I Garbage

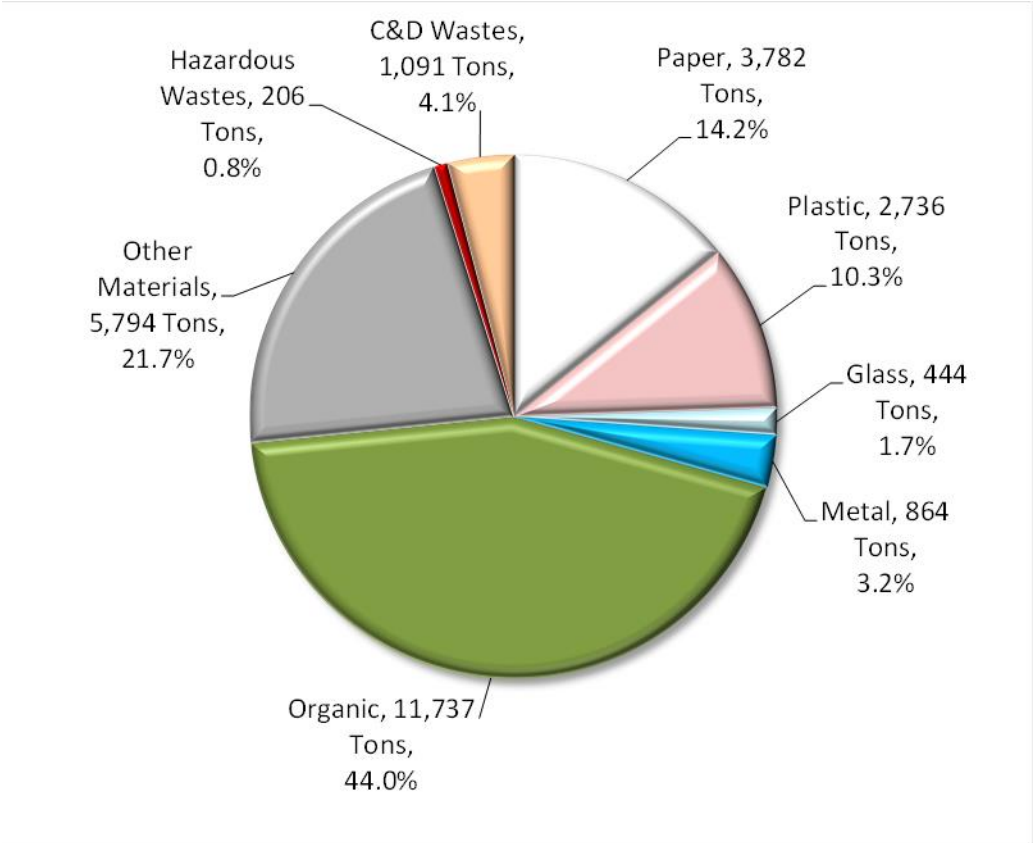


Figure 35. Composition by Recoverability Group, Area I Garbage

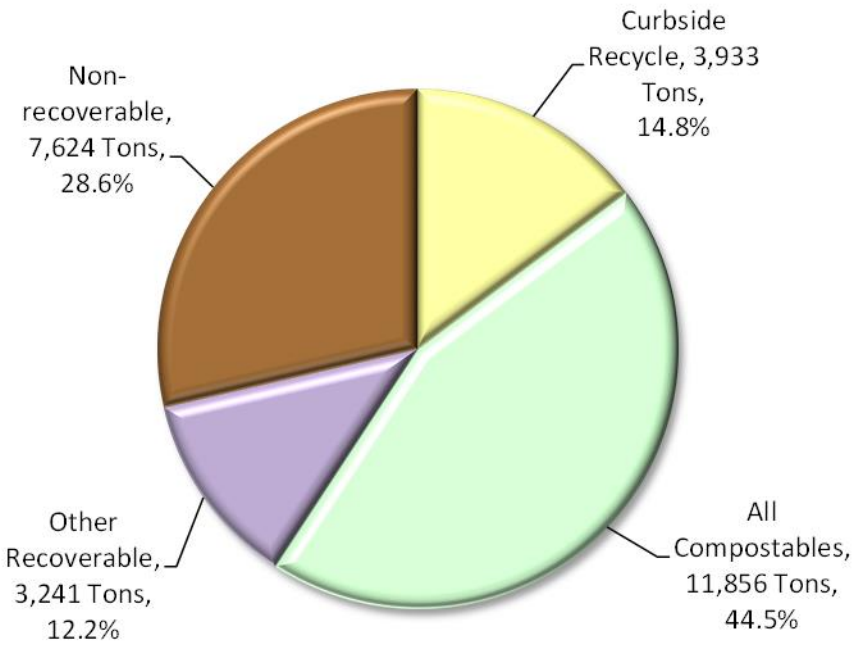


Table 74. Ten Most Prevalent Material Types, Area I Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	16.18%	16.18%	4,311.6
Purchased Food	14.93%	31.11%	3,980.0
Compostable/Food Soiled Paper	6.73%	37.83%	1,792.5
Unaccepted Yard Waste	5.51%	43.34%	1,468.3
Prunings Less than 2"	4.68%	48.02%	1,246.9
Animal By-products	4.16%	52.18%	1,107.6
Mixed Low-grade Paper	3.80%	55.97%	1,011.6
Non-distinct Fines	3.02%	58.99%	805.5
Textiles	2.97%	61.97%	792.5
Carpet/Upholstery	2.71%	64.68%	722.6
Subtotal	***64.7%***		***17,239***
All other material types	35.3%		9,414.5
Total	**100%**		**26,654**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 75. Detailed Composition, Area I Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**14.2%**		**3,782**	**Other Materials**	**21.7%**		**5,794**
Newspaper	1.02%	0.4%	271.9	Textiles	2.97%	1.1%	792.5
Plain OCC/Kraft Paper	1.16%	0.5%	309.1	Carpet/Upholstery	2.71%	2.0%	722.6
Waxed OCC/Kraft Paper	0.05%	0.0%	13.5	Leather	0.05%	0.0%	14.4
High Grade Paper	0.42%	0.2%	111.7	Disposable Diapers	2.61%	0.8%	696.2
Mixed Low-grade Paper	3.80%	0.7%	1,011.6	Animal By-products	4.16%	1.1%	1,107.6
Milk/Juice Polycoated Paper	0.26%	0.2%	69.1	Rubber Products	0.79%	0.5%	209.7
Frozen Food Polycoated Paper	0.18%	0.1%	49.1	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	6.73%	1.1%	1,792.5	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.57%	0.3%	153.0	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**10.3%**		**2,736**	Small Appliances	1.48%	1.6%	394.8
#1 PET Bottles	0.78%	0.1%	208.9	CRTs	0.08%	0.1%	21.0
#1 PET Other Packaging	0.31%	0.1%	81.6	Other Electronics	1.97%	1.5%	526.1
#2 HDPE Natural Bottles	0.18%	0.1%	48.9	Ceramics/Porcelain	0.36%	0.2%	96.0
#2 HDPE Colored Bottles	0.33%	0.1%	86.9	Non-distinct Fines	3.02%	1.6%	805.5
#2 HDPE Other Packaging	0.04%	0.0%	10.1	Miscellaneous Organics	1.47%	0.6%	391.8
Other Rigid Plastic Packaging	0.91%	0.2%	241.4	Miscellaneous Inorganics	0.06%	0.0%	16.0
Expanded Polystyrene	0.50%	0.1%	133.8				
Compostable Plastics	0.03%	0.0%	8.0	**Hazardous Wastes**	**0.8%**		**206**
Plastic Grocery/Merchandise Bags	0.85%	0.1%	225.5	Latex Paint	0.04%	0.1%	11.7
Other Clean Plastic Consumer Product Bags	0.49%	0.2%	130.0	Hazardous Adhesives/Glues	0.00%	0.0%	0.3
Plastic Garbage Bags	1.15%	0.2%	305.3	Non-hazardous Adhesives/Glues	0.02%	0.0%	5.3
Other Plastic Film	1.67%	0.2%	444.1	Oil-based Paint/Solvent	0.01%	0.0%	3.8
Mixed Rigid Plastics	2.28%	0.9%	606.6	Hazardous Cleaners	0.02%	0.0%	4.3
Plastic/Other Materials	0.77%	0.3%	204.7	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.13%	0.1%	34.0
Glass	**1.7%**		**444**	Rechargeable Dry-cell Batteries	0.03%	0.1%	8.1
Glass Beverage Containers	0.98%	0.1%	262.5	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.01%	0.1%	3.7	Asbestos	0.00%	0.0%	0.0
Other Glass	0.67%	0.0%	177.8	Explosives	0.01%	0.0%	2.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**3.2%**		**864**	Pool Chemicals	0.00%	0.0%	1.0
Aluminum Cans	0.31%	0.1%	83.6	Other Hazardous Chemicals	0.09%	0.1%	22.8
Aluminum Foil/Containers	0.21%	0.1%	57.0	Other Non-hazardous Chemicals	0.42%	0.2%	112.9
Other Nonferrous	0.10%	0.1%	26.5				
Tin Food Cans	0.50%	0.1%	132.8	**C&D Wastes**	**4.1%**		**1,091**
Empty Aerosol Cans	0.10%	0.0%	26.6	Dimension Lumber	0.77%	1.1%	205.8
Other Ferrous	0.89%	0.7%	236.9	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.02%	0.0%	6.2	Treated Wood	0.05%	0.0%	13.4
Mixed Metals/Material	1.10%	0.6%	294.3	Contaminated Wood	0.25%	0.2%	67.6
				New Gypsum Scrap	0.43%	0.6%	114.5
Organic	**44.0%**		**11,737**	Demo Gypsum Scrap	0.06%	0.1%	16.7
Leaves & Grass	16.18%	4.6%	4,311.6	Insulation	0.00%	0.0%	0.5
Unaccepted Yard Waste	5.51%	2.2%	1,468.3	Rock/Concrete/Bricks	1.95%	0.9%	519.7
Prunings Less than 2"	4.68%	1.8%	1,246.9	Asphaltic Roofing	0.02%	0.0%	5.6
Prunings 2" to 12"	0.67%	0.7%	179.3	Other Construction Debris	0.55%	0.6%	147.2
Prunings Greater than 12"	0.85%	1.4%	226.4				
Purchased Food	14.93%	2.4%	3,980.0	**Totals**	**100%**		**26,654**
Homegrown Food	0.71%	0.6%	188.1				
Beverages and Liquids	0.51%	0.2%	136.3	**Sample Count**			**25**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 36. Composition by Material Class, Area J Garbage

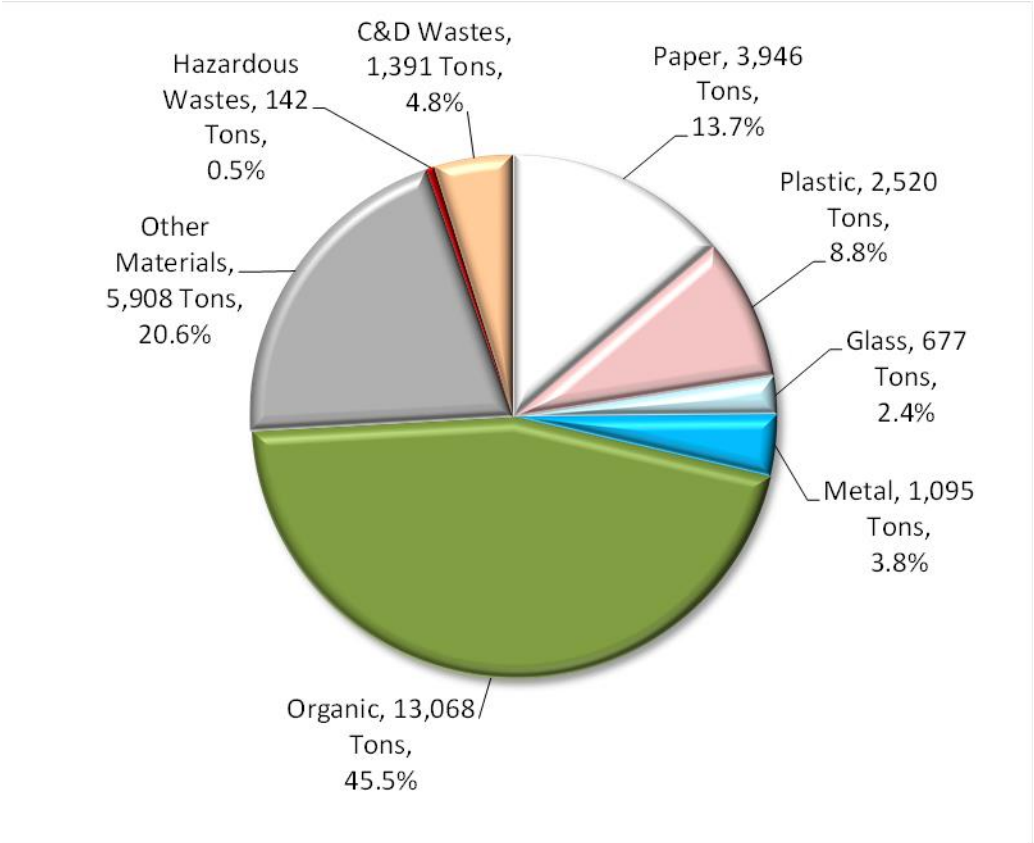


Figure 37. Composition by Recoverability Group, Area J Garbage

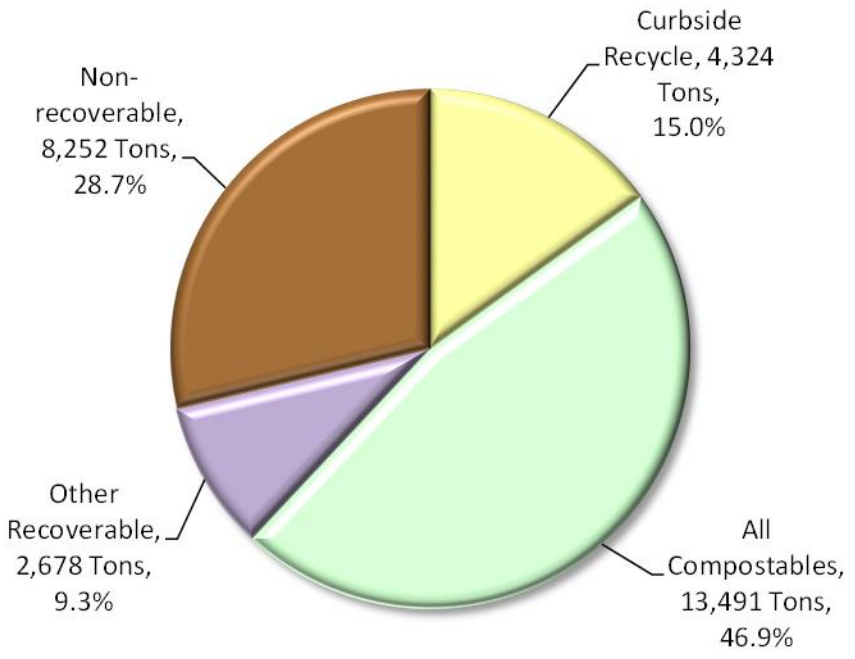


Table 76. Ten Most Prevalent Material Types, Area J Garbage

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Leaves & Grass	16.32%	16.32%	4,692.7
Purchased Food	12.27%	28.60%	3,528.3
Prunings Less than 2"	8.07%	36.67%	2,319.2
Compostable/Food Soiled Paper	6.02%	42.69%	1,731.4
Carpet/Upholstery	4.12%	46.81%	1,184.5
Unaccepted Yard Waste	4.09%	50.91%	1,177.1
Mixed Low-grade Paper	3.86%	54.77%	1,110.4
Animal By-products	3.74%	58.50%	1,073.7
Textiles	3.62%	62.12%	1,039.7
Disposable Diapers	3.28%	65.40%	943.5
Subtotal	***65.4%***		***18,800***
All other material types	34.6%		9,945.4
Total	**100%**		**28,746**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 77. Detailed Composition, Area J Garbage

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**13.7%**		**3,946**	**Other Materials**	**20.6%**		**5,908**
Newspaper	1.13%	0.5%	324.7	Textiles	3.62%	1.4%	1,039.7
Plain OCC/Kraft Paper	1.52%	0.6%	437.2	Carpet/Upholstery	4.12%	2.5%	1,184.5
Waxed OCC/Kraft Paper	0.10%	0.1%	27.5	Leather	0.08%	0.1%	22.5
High Grade Paper	0.35%	0.2%	101.3	Disposable Diapers	3.28%	1.2%	943.5
Mixed Low-grade Paper	3.86%	0.8%	1,110.4	Animal By-products	3.74%	1.5%	1,073.7
Milk/Juice Polycoated Paper	0.10%	0.0%	28.9	Rubber Products	0.43%	0.3%	124.8
Frozen Food Polycoated Paper	0.14%	0.1%	41.1	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	6.02%	0.9%	1,731.4	Ash	0.06%	0.1%	16.2
Paper/Other Materials	0.50%	0.2%	144.0	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**8.8%**		**2,520**	Small Appliances	0.65%	0.9%	186.6
#1 PET Bottles	0.74%	0.1%	212.2	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.29%	0.1%	84.0	Other Electronics	0.59%	0.4%	168.9
#2 HDPE Natural Bottles	0.19%	0.1%	55.1	Ceramics/Porcelain	0.72%	0.6%	206.8
#2 HDPE Colored Bottles	0.32%	0.1%	92.7	Non-distinct Fines	2.10%	0.8%	604.6
#2 HDPE Other Packaging	0.01%	0.0%	1.8	Miscellaneous Organics	0.98%	0.6%	283.0
Other Rigid Plastic Packaging	0.90%	0.2%	257.9	Miscellaneous Inorganics	0.18%	0.1%	53.1
Expanded Polystyrene	0.52%	0.1%	150.5				
Compostable Plastics	0.01%	0.0%	2.6	**Hazardous Wastes**	**0.5%**		**142**
Plastic Grocery/Merchandise Bags	0.81%	0.1%	234.2	Latex Paint	0.01%	0.0%	4.1
Other Clean Plastic Consumer Product Bags	0.33%	0.1%	94.5	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	1.02%	0.1%	292.2	Non-hazardous Adhesives/Glues	0.03%	0.1%	9.5
Other Plastic Film	1.52%	0.3%	436.5	Oil-based Paint/Solvent	0.02%	0.0%	4.7
Mixed Rigid Plastics	1.63%	0.7%	469.8	Hazardous Cleaners	0.03%	0.0%	8.2
Plastic/Other Materials	0.47%	0.2%	135.8	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	10.0
Glass	**2.4%**		**677**	Rechargeable Dry-cell Batteries	0.01%	0.0%	2.0
Glass Beverage Containers	1.34%	0.1%	384.1	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.01%	0.1%	1.5	Asbestos	0.00%	0.0%	0.0
Other Glass	1.01%	0.0%	291.2	Explosives	0.00%	0.0%	0.7
				Vehicle and Equipment Fluids	0.00%	0.0%	1.2
Metal	**3.8%**		**1,095**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.30%	0.1%	87.5	Other Hazardous Chemicals	0.08%	0.0%	21.6
Aluminum Foil/Containers	0.20%	0.1%	58.0	Other Non-hazardous Chemicals	0.28%	0.1%	79.5
Other Nonferrous	0.32%	0.4%	92.1				
Tin Food Cans	0.52%	0.1%	150.8	**C&D Wastes**	**4.8%**		**1,391**
Empty Aerosol Cans	0.12%	0.0%	33.3	Dimension Lumber	0.26%	0.3%	73.3
Other Ferrous	1.05%	0.9%	301.5	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	1.0	Treated Wood	1.58%	1.1%	454.4
Mixed Metals/Material	1.29%	0.8%	370.7	Contaminated Wood	0.55%	0.4%	156.9
				New Gypsum Scrap	0.00%	0.0%	0.7
Organic	**45.5%**		**13,068**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	16.32%	4.1%	4,692.7	Insulation	0.00%	0.0%	0.9
Unaccepted Yard Waste	4.09%	1.7%	1,177.1	Rock/Concrete/Bricks	0.95%	0.8%	274.0
Prunings Less than 2"	8.07%	2.2%	2,319.2	Asphaltic Roofing	0.06%	0.1%	17.4
Prunings 2" to 12"	1.37%	1.1%	393.7	Other Construction Debris	1.44%	1.1%	413.0
Prunings Greater than 12"	0.56%	0.9%	160.7				
Purchased Food	12.27%	2.3%	3,528.3	**Totals**	**100%**		**28,746**
Homegrown Food	2.31%	1.5%	663.4				
Beverages and Liquids	0.46%	0.2%	132.6	**Sample Count**			**26**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 78. Recoverable Material Composition Bid Area, Citywide Recycling

	Bid Area Composition										Citywide
Category	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Composition**
Recyclable	**67%**	**78%**	**82%**	**80%**	**75%**	**85%**	**69%**	**70%**	**81%**	**79%**	**77%**
Recyclable papers	45.4%	54.1%	58.6%	57.1%	49.3%	57.5%	40.7%	46.2%	54.9%	56.1%	52.5%
Recyclable plastics	11.6%	11.4%	11.3%	9.9%	10.9%	10.8%	13.1%	12.8%	11.5%	10.5%	11.3%
Recyclable glass	6.6%	9.0%	8.4%	10.3%	11.4%	12.9%	12.2%	6.9%	9.6%	7.3%	9.4%
Recyclable metals	3.8%	3.9%	3.9%	2.9%	3.2%	4.1%	3.5%	3.8%	5.1%	5.0%	3.9%
Contaminants	**33%**	**22%**	**18%**	**20%**	**25%**	**15%**	**31%**	**30%**	**19%**	**21%**	**23%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Key: Curbside Recycle | Compostable | Other Recoverable | Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 79. Summary Quantities by Bid Area, Citywide Recycling

	Bid Area Estimated Tons										Citywide
Material	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**Est. Tons**
Paper	**5,107**	**6,399**	**8,769**	**6,256**	**4,509**	**6,033**	**3,549**	**4,715**	**5,237**	**5,228**	**55,802**
Newspaper	668.5	978.1	1,482.5	1,546.7	769.9	1,280.3	353.4	414.0	835.4	754.3	9,083.2
Unwaxed OCC / Kraft paper	1,665.8	1,839.1	2,530.5	1,429.8	1,245.9	1,618.1	1,230.3	1,897.4	1,774.1	1,930.4	17,161.4
Other recyclable paper	2,549.2	3,280.4	4,347.4	2,974.6	2,341.4	2,991.9	1,757.4	2,162.4	2,472.2	2,326.2	27,203.1
Other paper	223.6	301.8	408.8	304.8	151.5	142.5	208.1	241.3	154.9	217.3	2,354.5
Plastic	**1,882**	**1,725**	**2,302**	**1,424**	**1,345**	**1,486**	**1,503**	**1,855**	**1,504**	**1,353**	**16,379**
PET (#1) plastic	537.9	564.7	643.4	429.8	404.5	509.4	420.7	524.5	410.1	414.9	4,859.8
HDPE (#2) plastic	421.9	364.4	386.8	251.2	264.0	286.4	310.7	408.9	317.6	246.9	3,258.7
Other recyclable plastic	284.8	356.7	586.9	348.5	293.3	307.3	341.8	302.8	340.7	277.0	3,439.8
Clean plastic film (grocery sacks)	106.2	80.1	79.5	55.5	62.2	80.2	88.6	89.2	69.1	53.8	764.4
Other plastic film	267.3	198.5	329.9	202.6	179.0	183.8	188.7	252.4	199.1	187.9	2,189.3
Expanded Polystyrene	87.0	45.9	67.3	61.2	58.6	46.8	52.4	68.1	41.4	97.5	626.3
Other plastic	176.6	114.6	208.3	75.6	83.5	72.4	100.0	209.4	125.8	74.9	1,241.2
Glass	**740**	**1,034**	**1,210**	**1,103**	**1,078**	**1,342**	**1,036**	**705**	**909**	**663**	**9,820**
Recyclable glass	705.1	1,013.8	1,197.0	1,073.0	1,010.0	1,318.9	1,000.8	670.5	883.9	654.1	9,527.1
Other glass	35.3	19.9	13.2	30.2	67.7	23.0	35.2	34.9	24.7	8.6	292.6
Metal	**498**	**579**	**696**	**368**	**345**	**442**	**360**	**428**	**516**	**462**	**4,695**
Aluminum cans	75.5	131.1	168.1	97.7	65.1	131.6	47.4	77.7	121.9	127.2	1,043.3
Tin/steel food cans	172.4	173.2	188.7	140.9	145.0	144.7	114.5	148.7	125.0	163.3	1,516.5
Other recyclable metals	159.9	140.6	200.4	62.4	75.3	139.2	123.6	139.6	223.3	151.8	1,416.0
Other metals	90.6	134.5	139.0	67.1	59.7	26.2	74.5	61.9	45.7	19.7	718.9
Organic	**783**	**317**	**280**	**274**	**684**	**149**	**478**	**582**	**215**	**265**	**4,027**
Construction and demolition waste	**305**	**73**	**196**	**155**	**121**	**47**	**129**	**91**	**184**	**135**	**1,437**
Household hazardous waste	**66**	**14**	**18**	**18**	**18**	**2**	**28**	**20**	**25**	**27**	**238**
Other materials	**1,375**	**1,135**	**799**	**824**	**741**	**742**	**1,120**	**1,288**	**664**	**796**	**9,484**
Subtotal Curbside Recycle	***7,241***	***8,842***	***11,732***	***8,355***	***6,614***	***8,728***	***5,700***	***6,747***	***7,504***	***7,046***	***78,509***
Subtotal Contaminants	***3,515***	***2,435***	***2,539***	***2,067***	***2,227***	***1,516***	***2,503***	***2,939***	***1,750***	***1,883***	***23,374***
Total	**10,756**	**11,277**	**14,270**	**10,421**	**8,841**	**10,244**	**8,203**	**9,685**	**9,254**	**8,929**	**101,882**

Key: Curbside Recycle | Compostable | Other Recoverable | Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 80. Recoverable Material Quantities by Bid Area, Citywide Recycling

Category	Bid Area Estimated Tons										Citywide
	A	B	C	D	E	F	G	H	I	J	Est. Tons
Recyclable	**7,241**	**8,842**	**11,732**	**8,355**	**6,614**	**8,728**	**5,700**	**6,747**	**7,504**	**7,046**	**78,509**
Recyclable papers	4,883.5	6,097.7	8,360.4	5,951.1	4,357.2	5,890.3	3,341.1	4,473.8	5,081.7	5,010.9	53,447.6
Recyclable plastics	1,244.5	1,285.7	1,617.1	1,029.4	961.7	1,103.2	1,073.1	1,236.2	1,068.5	938.8	11,558.3
Recyclable glass	705.1	1,013.8	1,197.0	1,073.0	1,010.0	1,318.9	1,000.8	670.5	883.9	654.1	9,527.1
Recyclable metals	407.8	444.8	557.2	301.1	285.3	415.5	285.5	366.0	470.2	442.3	3,975.8
Contaminants	**3,515**	**2,435**	**2,539**	**2,067**	**2,227**	**1,516**	**2,503**	**2,939**	**1,750**	**1,883**	**23,374**
Total	**10,756**	**11,277**	**14,270**	**10,421**	**8,841**	**10,244**	**8,203**	**9,685**	**9,254**	**8,929**	**101,882**

Key: Curbside Recycle; Compostable; Other Recoverable; Non-recoverable

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 38. Composition by Material Class, Area A Recycling

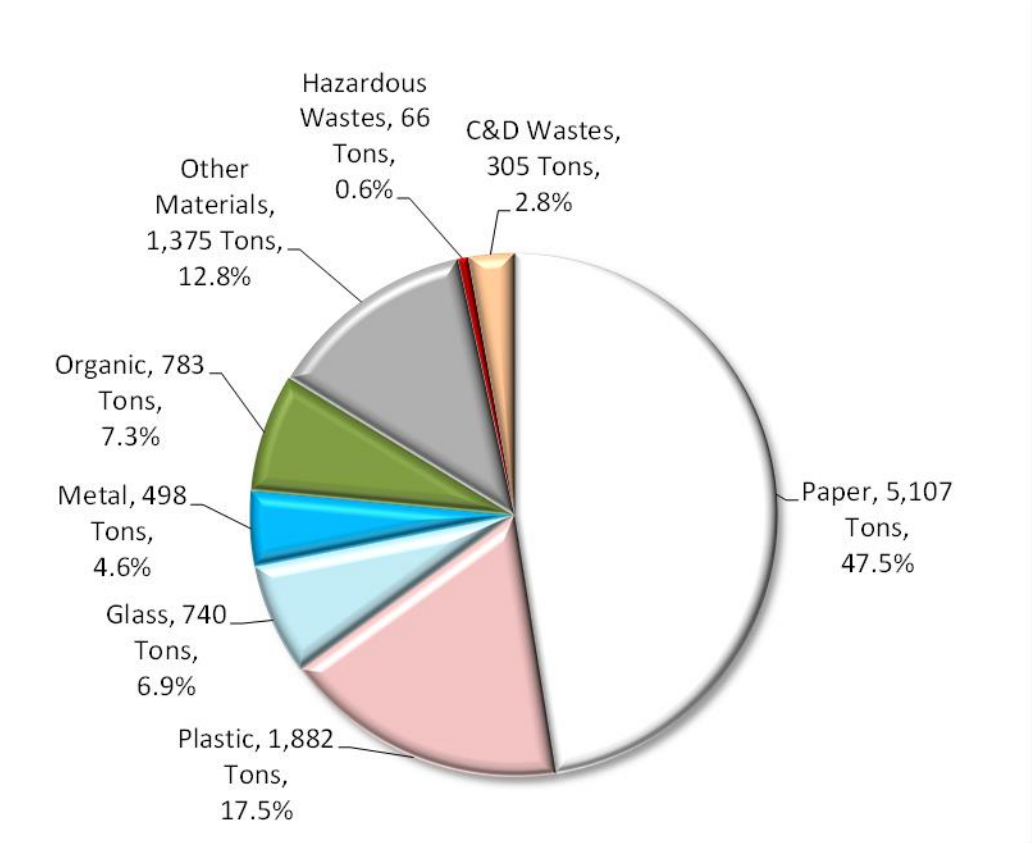


Figure 39. Composition by Recoverability Group, Area A Recycling

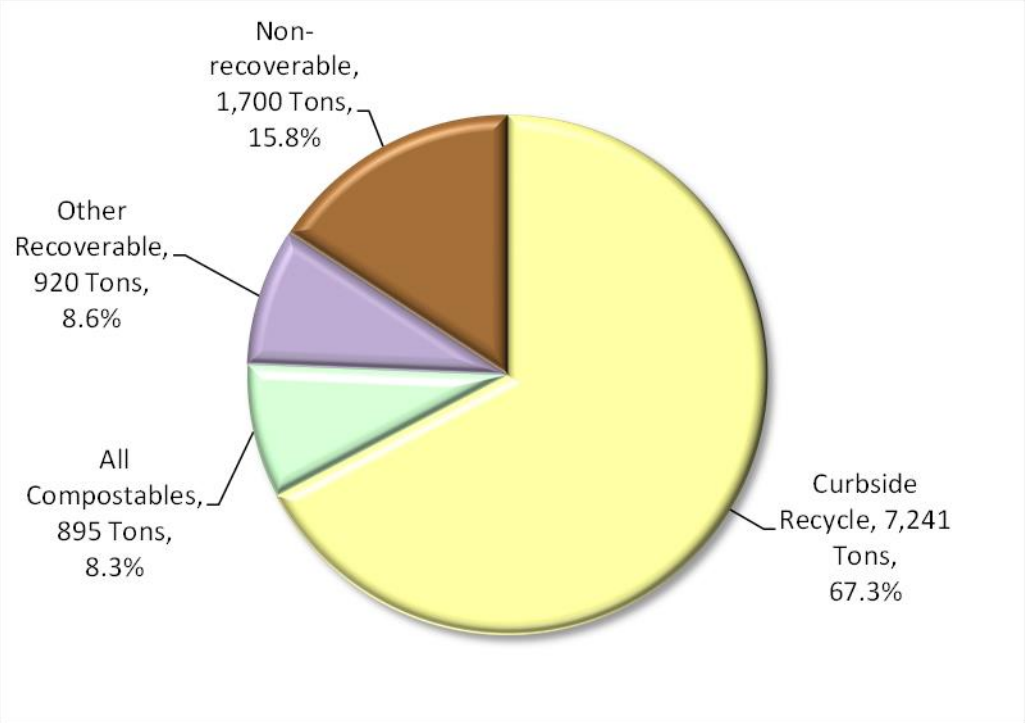


Table 81. Ten Most Prevalent Material Types, Area A Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	20.78%	20.78%	2,234.6
Plain OCC/Kraft Paper	15.49%	36.26%	1,665.8
Glass Beverage Containers	6.56%	42.82%	705.1
Newspaper	6.22%	49.03%	668.5
Non-distinct Fines	4.51%	53.55%	485.6
#1 PET Bottles	4.27%	57.82%	459.3
Textiles	3.67%	61.49%	395.1
Leaves & Grass	3.58%	65.08%	385.4
Purchased Food	2.62%	67.70%	282.2
High Grade Paper	2.35%	70.05%	252.8
Subtotal	***70.0%***		***7,535***
All other material types	30.0%		3,221.6
Total	**100%**		**10,756**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 82. Detailed Composition, Area A Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**47.5%**		**5,107**	**Other Materials**	**12.8%**		**1,375**
Newspaper	6.22%	2.3%	668.5	Textiles	3.67%	1.1%	395.1
Plain OCC/Kraft Paper	15.49%	2.3%	1,665.8	Carpet/Upholstery	0.17%	0.3%	17.8
Waxed OCC/Kraft Paper	0.02%	0.0%	2.3	Leather	0.00%	0.0%	0.0
High Grade Paper	2.35%	1.7%	252.8	Disposable Diapers	1.34%	0.5%	143.7
Mixed Low-grade Paper	20.78%	2.5%	2,234.6	Animal By-products	0.02%	0.0%	2.7
Milk/Juice Polycoated Paper	0.47%	0.2%	50.2	Rubber Products	0.82%	0.6%	88.1
Frozen Food Polycoated Paper	0.11%	0.1%	11.6	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	1.24%	0.2%	133.1	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.82%	0.3%	88.3	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**17.5%**		**1,882**	Small Appliances	0.10%	0.2%	10.9
#1 PET Bottles	4.27%	0.5%	459.3	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.73%	0.1%	78.5	Other Electronics	1.26%	0.8%	135.9
#2 HDPE Natural Bottles	2.16%	0.3%	232.5	Ceramics/Porcelain	0.23%	0.2%	25.1
#2 HDPE Colored Bottles	1.44%	0.3%	154.4	Non-distinct Fines	4.51%	1.3%	485.6
#2 HDPE Other Packaging	0.32%	0.1%	35.0	Miscellaneous Organics	0.51%	0.4%	54.3
Other Rigid Plastic Packaging	1.18%	0.3%	126.7	Miscellaneous Inorganics	0.14%	0.1%	15.5
Expanded Polystyrene	0.81%	0.2%	87.0				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.6%**		**66**
Plastic Grocery/Merchandise Bags	0.95%	0.1%	102.3	Latex Paint	0.14%	0.2%	15.0
Other Clean Plastic Consumer Product Bags	0.04%	0.0%	3.9	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.38%	0.1%	41.0	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	2.10%	0.5%	226.4	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.47%	0.5%	158.1	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	1.64%	0.5%	176.6	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.04%	0.0%	4.4
Glass	**6.9%**		**740**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.4
Glass Beverage Containers	6.56%	0.3%	705.1	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.3%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.33%	0.1%	35.3	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**4.6%**		**498**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.70%	0.2%	75.5	Other Hazardous Chemicals	0.14%	0.2%	15.1
Aluminum Foil/Containers	0.16%	0.1%	17.3	Other Non-hazardous Chemicals	0.29%	0.3%	31.3
Other Nonferrous	0.18%	0.1%	19.1				
Tin Food Cans	1.60%	0.4%	172.4	**C&D Wastes**	**2.8%**		**305**
Empty Aerosol Cans	0.21%	0.1%	22.7	Dimension Lumber	0.03%	0.0%	3.0
Other Ferrous	0.94%	0.5%	100.7	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.05%	0.1%	5.6	Treated Wood	0.45%	0.4%	48.9
Mixed Metals/Material	0.79%	0.7%	85.0	Contaminated Wood	0.88%	0.5%	94.9
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**7.3%**		**783**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	3.58%	3.0%	385.4	Insulation	0.02%	0.0%	1.7
Unaccepted Yard Waste	0.15%	0.2%	16.5	Rock/Concrete/Bricks	0.46%	0.5%	49.7
Prunings Less than 2"	0.00%	0.0%	0.4	Asphaltic Roofing	0.96%	1.5%	103.2
Prunings 2" to 12"	0.28%	0.4%	29.7	Other Construction Debris	0.03%	0.0%	3.4
Prunings Greater than 12"	0.06%	0.1%	6.0				
Purchased Food	2.62%	0.9%	282.2	**Totals**	**100%**		**10,756**
Homegrown Food	0.01%	0.0%	0.6				
Beverages and Liquids	0.57%	0.3%	61.8	**Sample Count**			**21**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 40. Composition by Material Class, Area B Recycling

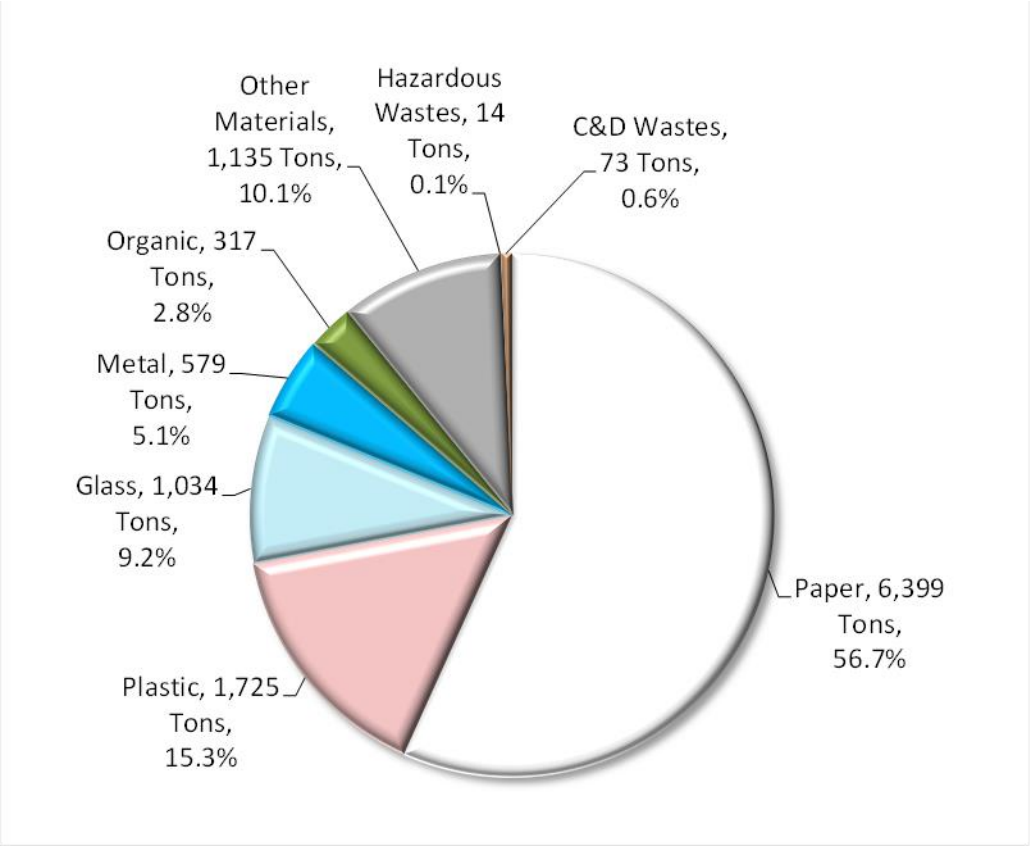


Figure 41. Composition by Recoverability Group, Area B Recycling

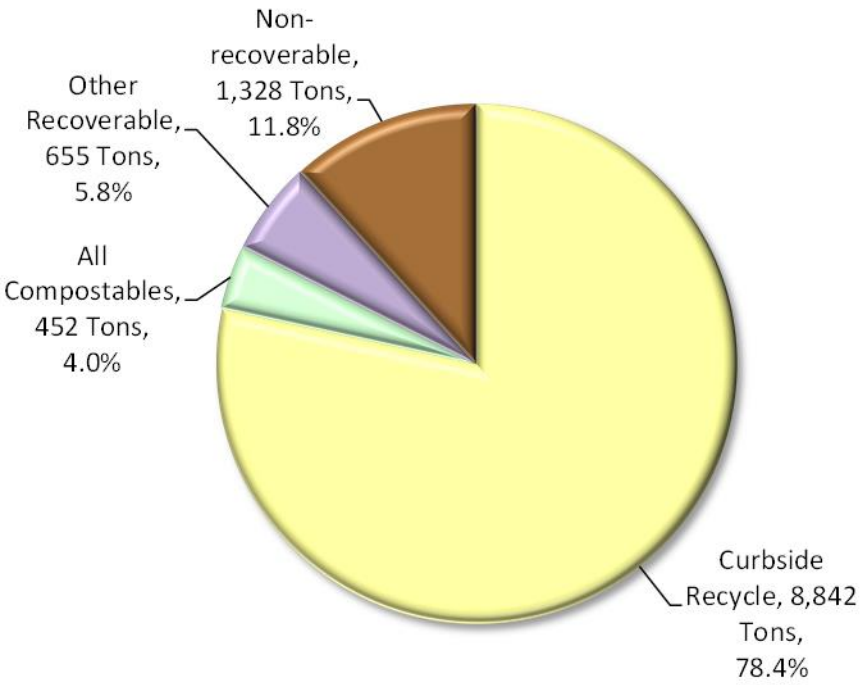


Table 83. Ten Most Prevalent Material Types, Area B Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	27.64%	27.64%	3,117.1
Plain OCC/Kraft Paper	16.31%	43.95%	1,839.1
Glass Beverage Containers	8.99%	52.94%	1,013.8
Newspaper	8.67%	61.61%	978.1
#1 PET Bottles	4.14%	65.76%	467.4
Furniture	3.10%	68.86%	349.8
Purchased Food	2.20%	71.06%	248.5
Textiles	2.19%	73.26%	247.3
Non-distinct Fines	2.14%	75.40%	241.5
#2 HDPE Natural Bottles	1.66%	77.06%	187.6
Subtotal	***77.1%***		***8,690***
All other material types	22.9%		2,586.6
Total	**100%**		**11,277**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 84. Detailed Composition, Area B Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**56.7%**		**6,399**	**Other Materials**	**10.1%**		**1,135**
Newspaper	8.67%	1.5%	978.1	Textiles	2.19%	0.7%	247.3
Plain OCC/Kraft Paper	16.31%	2.8%	1,839.1	Carpet/Upholstery	0.00%	0.0%	0.0
Waxed OCC/Kraft Paper	0.00%	0.0%	0.0	Leather	0.00%	0.0%	0.0
High Grade Paper	1.00%	0.6%	113.3	Disposable Diapers	0.45%	0.4%	50.4
Mixed Low-grade Paper	27.64%	2.6%	3,117.1	Animal By-products	0.00%	0.0%	0.2
Milk/Juice Polycoated Paper	0.39%	0.1%	44.2	Rubber Products	0.19%	0.1%	21.1
Frozen Food Polycoated Paper	0.05%	0.1%	5.9	Tires	0.06%	0.1%	7.3
Compostable/Food Soiled Paper	1.28%	0.5%	144.0	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.40%	1.3%	157.8	Furniture	3.10%	5.1%	349.8
				Mattresses	0.00%	0.0%	0.0
Plastic	**15.3%**		**1,725**	Small Appliances	0.31%	0.5%	34.9
#1 PET Bottles	4.14%	0.8%	467.4	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.86%	0.4%	97.3	Other Electronics	1.23%	0.7%	138.9
#2 HDPE Natural Bottles	1.66%	0.4%	187.6	Ceramics/Porcelain	0.22%	0.2%	25.3
#2 HDPE Colored Bottles	1.36%	0.3%	153.8	Non-distinct Fines	2.14%	0.7%	241.5
#2 HDPE Other Packaging	0.20%	0.1%	23.0	Miscellaneous Organics	0.12%	0.1%	13.2
Other Rigid Plastic Packaging	1.65%	0.3%	185.7	Miscellaneous Inorganics	0.05%	0.0%	5.1
Expanded Polystyrene	0.41%	0.1%	45.9				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.1%**		**14**
Plastic Grocery/Merchandise Bags	0.63%	0.1%	71.4	Latex Paint	0.02%	0.0%	2.3
Other Clean Plastic Consumer Product Bags	0.08%	0.1%	8.7	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.33%	0.1%	37.7	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.2
Other Plastic Film	1.43%	0.3%	160.8	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.52%	0.5%	171.0	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	1.02%	0.3%	114.6	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.09%	0.1%	10.4
Glass	**9.2%**		**1,034**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.2
Glass Beverage Containers	8.99%	0.4%	1,013.8	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.3%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.18%	0.1%	19.9	Explosives	0.00%	0.0%	0.2
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**5.1%**		**579**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.16%	0.2%	131.1	Other Hazardous Chemicals	0.00%	0.0%	0.4
Aluminum Foil/Containers	0.15%	0.0%	16.8	Other Non-hazardous Chemicals	0.00%	0.0%	0.2
Other Nonferrous	0.24%	0.2%	26.6				
Tin Food Cans	1.54%	0.2%	173.2	**C&D Wastes**	**0.6%**		**73**
Empty Aerosol Cans	0.10%	0.1%	11.3	Dimension Lumber	0.03%	0.1%	3.9
Other Ferrous	0.76%	0.4%	85.9	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.10%	0.1%	11.1
Mixed Metals/Material	1.19%	1.1%	134.5	Contaminated Wood	0.34%	0.2%	38.6
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**2.8%**		**317**	Demo Gypsum Scrap	0.01%	0.0%	1.5
Leaves & Grass	0.21%	0.3%	23.9	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.08%	0.1%	9.1	Rock/Concrete/Bricks	0.05%	0.1%	5.4
Prunings Less than 2"	0.05%	0.1%	5.9	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.02%	0.0%	1.9	Other Construction Debris	0.11%	0.1%	12.7
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	2.20%	1.3%	248.5	**Totals**	**100%**		**11,277**
Homegrown Food	0.00%	0.0%	0.0				
Beverages and Liquids	0.25%	0.1%	28.0	**Sample Count**			**20**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 42. Composition by Material Class, Area C Recycling

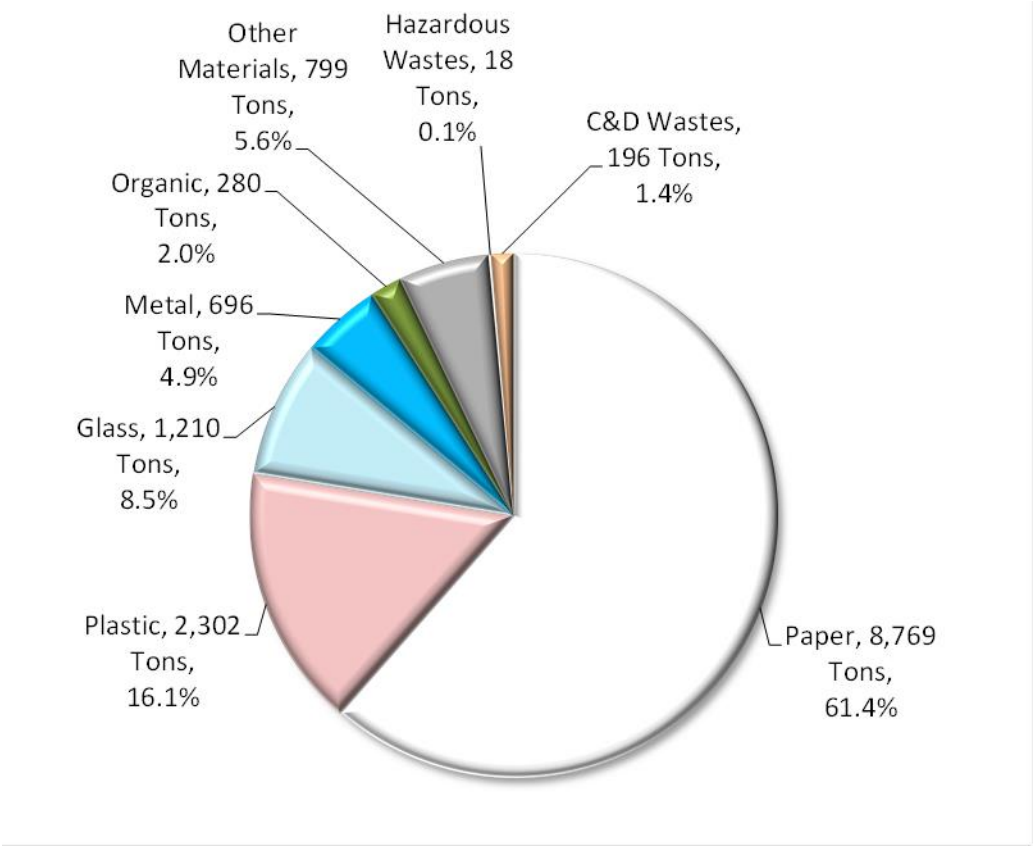


Figure 43. Composition by Recoverability Group, Area C Recycling

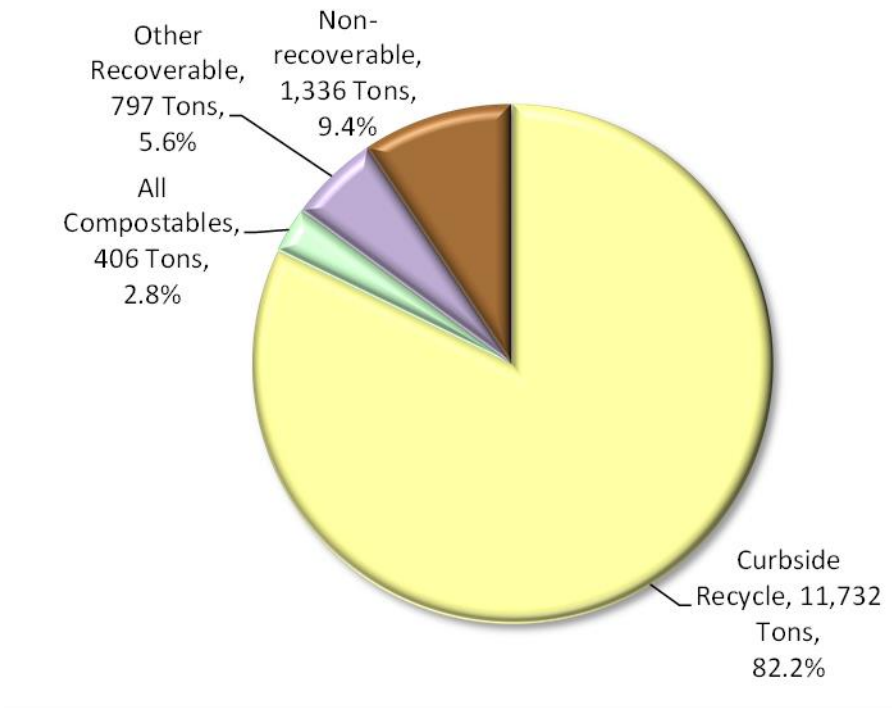


Table 85. Ten Most Prevalent Material Types, Area C Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	28.49%	28.49%	4,065.1
Plain OCC/Kraft Paper	17.73%	46.22%	2,530.5
Newspaper	10.39%	56.61%	1,482.5
Glass Beverage Containers	8.39%	64.99%	1,197.0
#1 PET Bottles	3.71%	68.71%	530.1
Textiles	2.80%	71.51%	399.3
Mixed Rigid Plastics	2.72%	74.23%	388.7
Other Plastic Film	2.12%	76.35%	302.7
Paper/Other Materials	1.85%	78.20%	264.2
Purchased Food	1.52%	79.73%	217.4
Subtotal	***79.7%***		***11,377***
All other material types	20.3%		2,893.1
Total	**100%**		**14,270**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 86. Detailed Composition, Area C Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**61.4%**		**8,769**	**Other Materials**	**5.6%**		**799**
Newspaper	10.39%	1.3%	1,482.5	Textiles	2.80%	1.0%	399.3
Plain OCC/Kraft Paper	17.73%	2.6%	2,530.5	Carpet/Upholstery	0.00%	0.0%	0.0
Waxed OCC/Kraft Paper	0.12%	0.2%	16.7	Leather	0.00%	0.0%	0.3
High Grade Paper	1.40%	0.7%	199.1	Disposable Diapers	0.12%	0.1%	17.5
Mixed Low-grade Paper	28.49%	3.0%	4,065.1	Animal By-products	0.00%	0.0%	0.3
Milk/Juice Polycoated Paper	0.56%	0.1%	80.1	Rubber Products	0.26%	0.2%	37.1
Frozen Food Polycoated Paper	0.02%	0.0%	3.1	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	0.90%	0.3%	127.9	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.85%	1.0%	264.2	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**16.1%**		**2,302**	Small Appliances	0.00%	0.0%	0.0
#1 PET Bottles	3.71%	0.5%	530.1	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.79%	0.2%	113.3	Other Electronics	0.77%	0.5%	109.2
#2 HDPE Natural Bottles	1.31%	0.3%	187.6	Ceramics/Porcelain	0.11%	0.1%	16.2
#2 HDPE Colored Bottles	1.09%	0.3%	155.8	Non-distinct Fines	1.48%	0.4%	210.7
#2 HDPE Other Packaging	0.30%	0.2%	43.4	Miscellaneous Organics	0.02%	0.0%	2.3
Other Rigid Plastic Packaging	1.39%	0.3%	198.2	Miscellaneous Inorganics	0.04%	0.0%	5.9
Expanded Polystyrene	0.47%	0.2%	67.3				
Compostable Plastics	0.00%	0.0%	0.3	**Hazardous Wastes**	**0.1%**		**18**
Plastic Grocery/Merchandise Bags	0.47%	0.1%	66.6	Latex Paint	0.05%	0.1%	7.2
Other Clean Plastic Consumer Product Bags	0.09%	0.1%	12.9	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.19%	0.1%	27.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	2.12%	0.4%	302.7	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	2.72%	2.4%	388.7	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	1.46%	0.5%	208.1	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	4.3
Glass	**8.5%**		**1,210**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.3
Glass Beverage Containers	8.39%	0.3%	1,197.0	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.3%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.09%	0.2%	13.2	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**4.9%**		**696**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.18%	0.3%	168.1	Other Hazardous Chemicals	0.00%	0.0%	0.0
Aluminum Foil/Containers	0.10%	0.0%	14.5	Other Non-hazardous Chemicals	0.05%	0.0%	6.5
Other Nonferrous	0.07%	0.1%	9.3				
Tin Food Cans	1.32%	0.2%	188.7	**C&D Wastes**	**1.4%**		**196**
Empty Aerosol Cans	0.09%	0.1%	12.7	Dimension Lumber	0.11%	0.1%	16.2
Other Ferrous	1.15%	0.8%	163.9	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.19%	0.3%	27.5
Mixed Metals/Material	0.97%	0.9%	139.0	Contaminated Wood	0.42%	0.3%	59.4
				New Gypsum Scrap	0.00%	0.0%	0.3
Organic	**2.0%**		**280**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	0.11%	0.2%	16.2	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.04%	0.1%	5.0	Rock/Concrete/Bricks	0.13%	0.2%	18.6
Prunings Less than 2"	0.02%	0.0%	2.4	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.00%	0.0%	0.0	Other Construction Debris	0.52%	0.7%	73.8
Prunings Greater than 12"	0.10%	0.2%	14.3				
Purchased Food	1.52%	0.6%	217.4	**Totals**	**100%**		**14,270**
Homegrown Food	0.00%	0.0%	0.0				
Beverages and Liquids	0.17%	0.1%	24.7	**Sample Count**			**20**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 44. Composition by Material Class, Area D Recycling

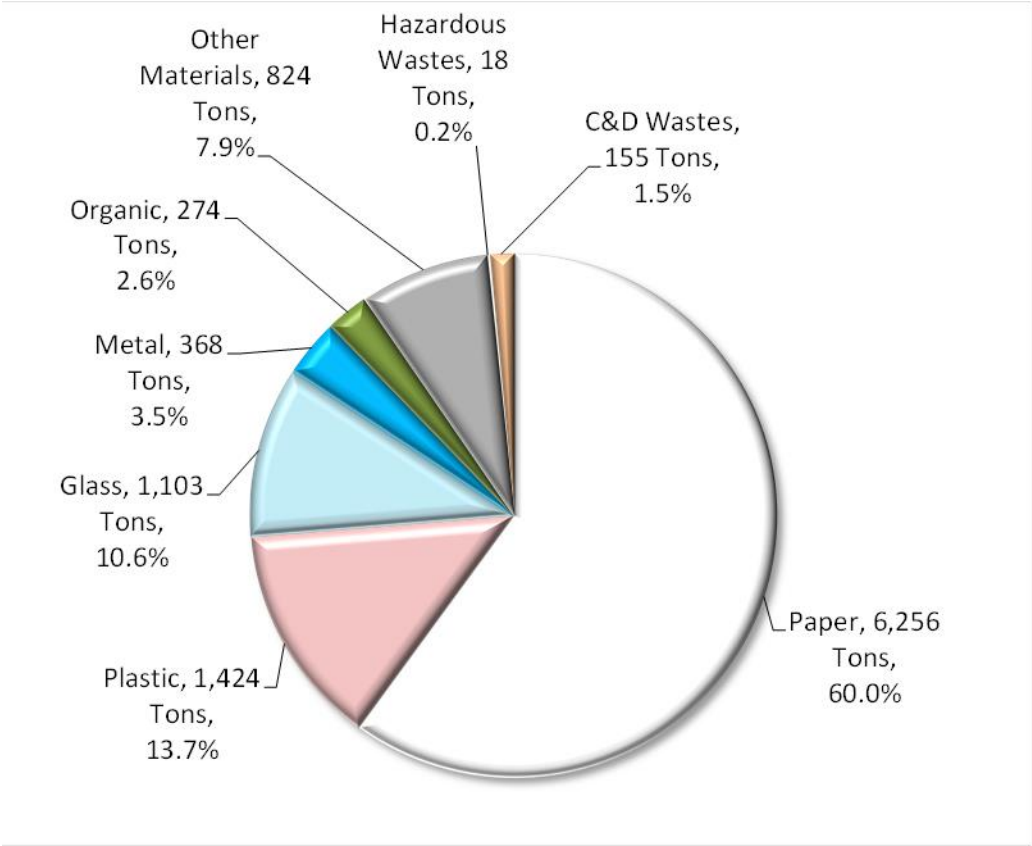


Figure 45. Composition by Recoverability Group, Area D Recycling

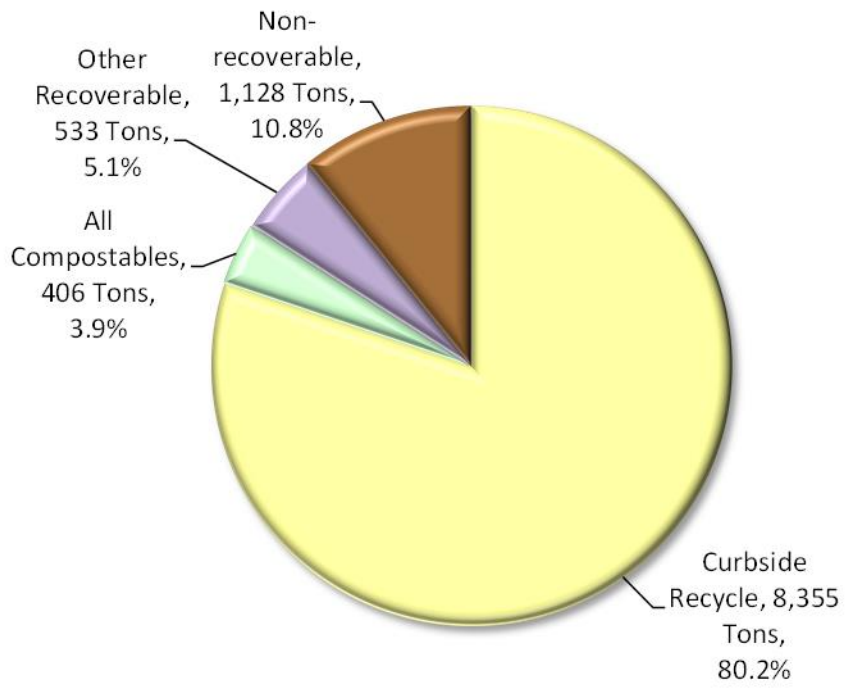


Table 87. Ten Most Prevalent Material Types, Area D Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	27.34%	27.34%	2,848.8
Newspaper	14.84%	42.18%	1,546.7
Plain OCC/Kraft Paper	13.72%	55.90%	1,429.8
Glass Beverage Containers	10.30%	66.19%	1,073.0
#1 PET Bottles	3.30%	69.49%	343.5
Non-distinct Fines	2.95%	72.43%	307.0
Textiles	2.55%	74.98%	265.6
Mixed Rigid Plastics	1.95%	76.94%	203.4
Purchased Food	1.86%	78.80%	193.8
Paper/Other Materials	1.64%	80.43%	170.7
Subtotal	***80.4%***		***8,382***
All other material types	19.6%		2,039.2
Total	**100%**		**10,421**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 88. Detailed Composition, Area D Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**60.0%**		**6,256**	**Other Materials**	**7.9%**		**824**
Newspaper	14.84%	2.8%	1,546.7	Textiles	2.55%	1.5%	265.6
Plain OCC/Kraft Paper	13.72%	2.3%	1,429.8	Carpet/Upholstery	0.00%	0.0%	0.0
Waxed OCC/Kraft Paper	0.20%	0.3%	21.2	Leather	0.00%	0.0%	0.5
High Grade Paper	0.71%	0.4%	73.5	Disposable Diapers	0.40%	0.3%	41.3
Mixed Low-grade Paper	27.34%	2.7%	2,848.8	Animal By-products	0.27%	0.3%	28.2
Milk/Juice Polycoated Paper	0.49%	0.1%	50.6	Rubber Products	0.33%	0.2%	34.4
Frozen Food Polycoated Paper	0.02%	0.0%	1.7	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	1.08%	0.4%	112.9	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.64%	0.9%	170.7	Furniture	0.08%	0.1%	8.8
				Mattresses	0.00%	0.0%	0.0
Plastic	**13.7%**		**1,424**	Small Appliances	0.09%	0.2%	9.8
#1 PET Bottles	3.30%	0.5%	343.5	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.83%	0.2%	86.3	Other Electronics	0.75%	0.4%	77.9
#2 HDPE Natural Bottles	1.10%	0.2%	114.4	Ceramics/Porcelain	0.18%	0.2%	19.2
#2 HDPE Colored Bottles	0.98%	0.2%	101.8	Non-distinct Fines	2.95%	0.7%	307.0
#2 HDPE Other Packaging	0.34%	0.2%	35.0	Miscellaneous Organics	0.07%	0.1%	7.2
Other Rigid Plastic Packaging	1.39%	0.4%	145.0	Miscellaneous Inorganics	0.23%	0.2%	23.7
Expanded Polystyrene	0.59%	0.2%	61.2				
Compostable Plastics	0.00%	0.0%	0.2	**Hazardous Wastes**	**0.2%**		**18**
Plastic Grocery/Merchandise Bags	0.50%	0.1%	51.7	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.04%	0.0%	3.8	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.36%	0.1%	38.0	Non-hazardous Adhesives/Glues	0.01%	0.0%	0.9
Other Plastic Film	1.58%	0.3%	164.6	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.95%	0.7%	203.4	Hazardous Cleaners	0.00%	0.0%	0.2
Plastic/Other Materials	0.72%	0.2%	75.5	Pesticides/Herbicides	0.03%	0.0%	2.6
				Non-rechargeable Dry-cell Batteries	0.05%	0.0%	5.5
Glass	**10.6%**		**1,103**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	10.30%	0.2%	1,073.0	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.2%	0.2	Asbestos	0.00%	0.0%	0.0
Other Glass	0.29%	0.2%	30.0	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**3.5%**		**368**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.94%	0.3%	97.7	Other Hazardous Chemicals	0.04%	0.0%	4.3
Aluminum Foil/Containers	0.13%	0.0%	13.4	Other Non-hazardous Chemicals	0.04%	0.1%	4.4
Other Nonferrous	0.11%	0.1%	11.3				
Tin Food Cans	1.35%	0.2%	140.9	**C&D Wastes**	**1.5%**		**155**
Empty Aerosol Cans	0.13%	0.1%	13.1	Dimension Lumber	0.02%	0.0%	2.5
Other Ferrous	0.24%	0.1%	24.6	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.11%	0.1%	11.5
Mixed Metals/Material	0.64%	0.4%	67.1	Contaminated Wood	0.77%	0.7%	80.1
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**2.6%**		**274**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	0.43%	0.5%	45.1	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.02%	0.0%	2.2	Rock/Concrete/Bricks	0.37%	0.6%	38.9
Prunings Less than 2"	0.03%	0.0%	3.6	Asphaltic Roofing	0.00%	0.0%	0.2
Prunings 2" to 12"	0.01%	0.0%	1.4	Other Construction Debris	0.21%	0.3%	21.7
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	1.86%	1.0%	193.8	**Totals**	**100%**		**10,421**
Homegrown Food	0.03%	0.1%	3.2				
Beverages and Liquids	0.23%	0.1%	24.3	**Sample Count**			**24**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 46. Composition by Material Class, Area E Recycling

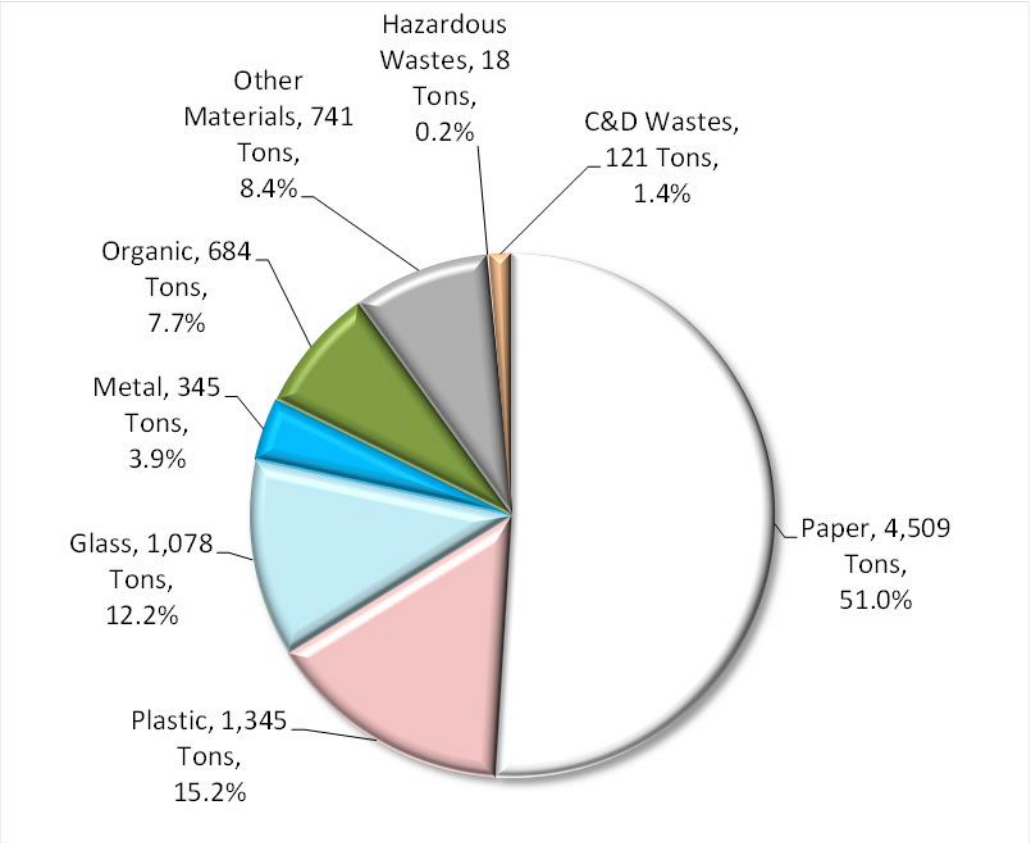


Figure 47. Composition by Recoverability Group, Area E Recycling

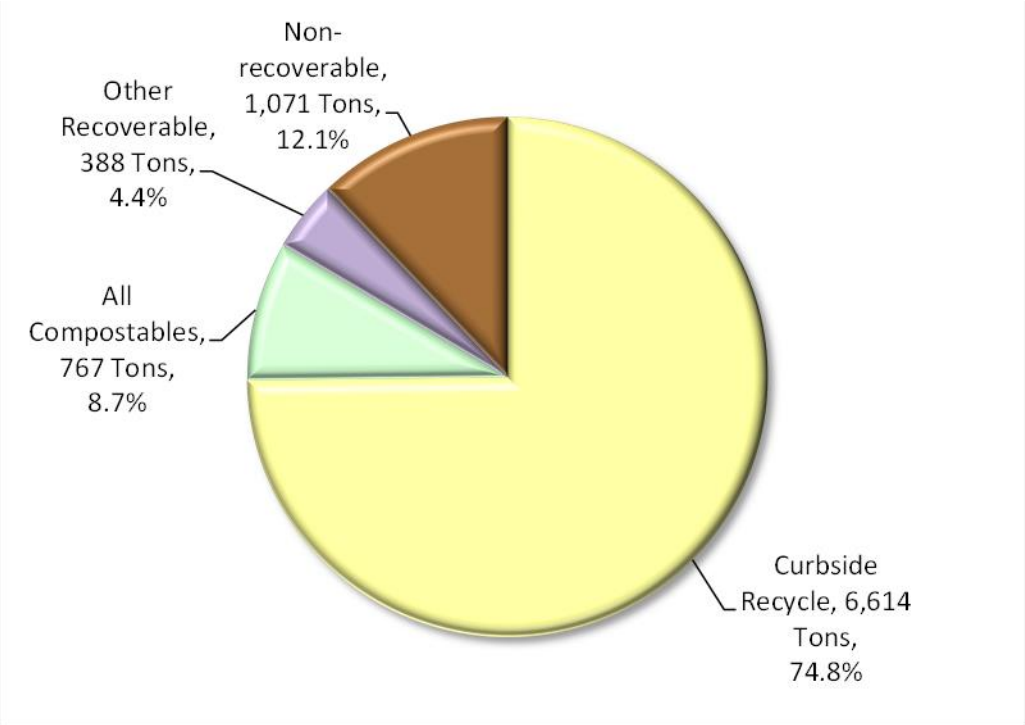


Table 89. Ten Most Prevalent Material Types, Area E Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	25.25%	25.25%	2,232.1
Plain OCC/Kraft Paper	14.09%	39.34%	1,245.9
Glass Beverage Containers	11.42%	50.76%	1,010.0
Newspaper	8.71%	59.47%	769.9
Leaves & Grass	5.35%	64.82%	473.0
#1 PET Bottles	3.65%	68.47%	322.4
Non-distinct Fines	2.94%	71.40%	259.5
Textiles	2.34%	73.74%	207.0
Mixed Rigid Plastics	2.07%	75.82%	183.1
Purchased Food	1.73%	77.55%	153.3
Subtotal	***77.5%***		***6,856***
All other material types	22.5%		1,984.9
Total	**100%**		**8,841**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 90. Detailed Composition, Area E Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**51.0%**		**4,509**	**Other Materials**	**8.4%**		**741**
Newspaper	8.71%	2.1%	769.9	Textiles	2.34%	1.2%	207.0
Plain OCC/Kraft Paper	14.09%	1.8%	1,245.9	Carpet/Upholstery	0.83%	1.4%	73.1
Waxed OCC/Kraft Paper	0.00%	0.0%	0.0	Leather	0.04%	0.0%	3.1
High Grade Paper	0.70%	0.4%	62.2	Disposable Diapers	0.50%	0.4%	43.9
Mixed Low-grade Paper	25.25%	2.7%	2,232.1	Animal By-products	0.01%	0.0%	0.8
Milk/Juice Polycoated Paper	0.50%	0.1%	44.0	Rubber Products	0.41%	0.5%	36.1
Frozen Food Polycoated Paper	0.03%	0.0%	3.1	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	1.16%	0.3%	103.0	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.55%	0.3%	48.5	Furniture	0.67%	0.9%	58.9
				Mattresses	0.00%	0.0%	0.0
Plastic	**15.2%**		**1,345**	Small Appliances	0.00%	0.0%	0.0
#1 PET Bottles	3.65%	0.5%	322.4	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.93%	0.2%	82.1	Other Electronics	0.23%	0.2%	20.7
#2 HDPE Natural Bottles	1.50%	0.3%	132.8	Ceramics/Porcelain	0.11%	0.1%	9.7
#2 HDPE Colored Bottles	1.22%	0.2%	108.0	Non-distinct Fines	2.94%	0.8%	259.5
#2 HDPE Other Packaging	0.26%	0.1%	23.2	Miscellaneous Organics	0.14%	0.1%	12.3
Other Rigid Plastic Packaging	1.25%	0.5%	110.2	Miscellaneous Inorganics	0.18%	0.2%	16.2
Expanded Polystyrene	0.66%	0.3%	58.6				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.2%**		**18**
Plastic Grocery/Merchandise Bags	0.67%	0.2%	59.6	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.03%	0.0%	2.7	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.35%	0.1%	31.0	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.67%	0.4%	148.0	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	2.07%	0.6%	183.1	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	0.94%	0.4%	83.5	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.04%	0.0%	3.8
Glass	**12.2%**		**1,078**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	11.42%	0.3%	1,010.0	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.2%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.77%	0.1%	67.7	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**3.9%**		**345**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.74%	0.1%	65.1	Other Hazardous Chemicals	0.01%	0.0%	0.9
Aluminum Foil/Containers	0.17%	0.1%	15.2	Other Non-hazardous Chemicals	0.15%	0.2%	13.7
Other Nonferrous	0.07%	0.1%	6.0				
Tin Food Cans	1.64%	0.3%	145.0	**C&D Wastes**	**1.4%**		**121**
Empty Aerosol Cans	0.17%	0.1%	15.1	Dimension Lumber	0.00%	0.0%	0.0
Other Ferrous	0.44%	0.1%	39.0	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.2	Treated Wood	0.18%	0.2%	16.2
Mixed Metals/Material	0.67%	0.3%	59.6	Contaminated Wood	0.88%	1.0%	77.6
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**7.7%**		**684**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	5.35%	5.4%	473.0	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.22%	0.3%	19.7	Rock/Concrete/Bricks	0.25%	0.3%	21.9
Prunings Less than 2"	0.04%	0.0%	3.1	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.01%	0.0%	0.7	Other Construction Debris	0.06%	0.1%	5.0
Prunings Greater than 12"	0.00%	0.0%	0.1				
Purchased Food	1.73%	1.0%	153.3	**Totals**	**100%**		**8,841**
Homegrown Food	0.14%	0.2%	12.2				
Beverages and Liquids	0.25%	0.1%	21.9	**Sample Count**			**21**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 48. Composition by Material Class, Area F Recycling

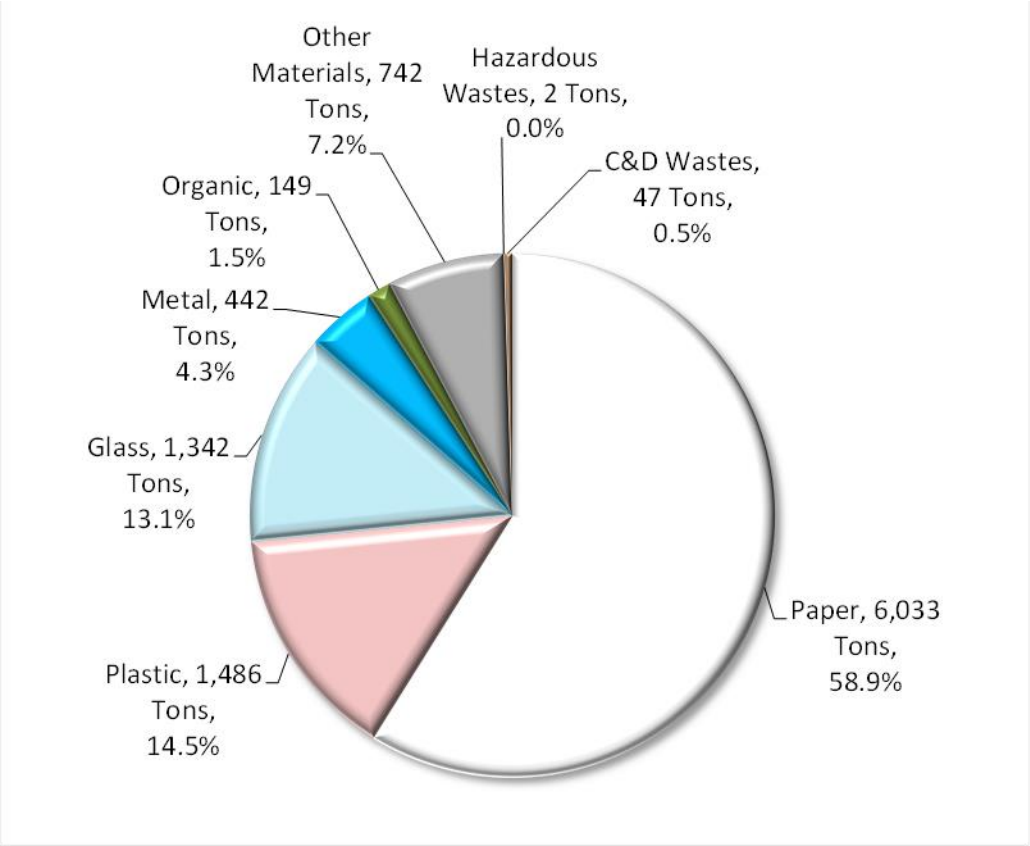


Figure 49. Composition by Recoverability Group, Area F Recycling

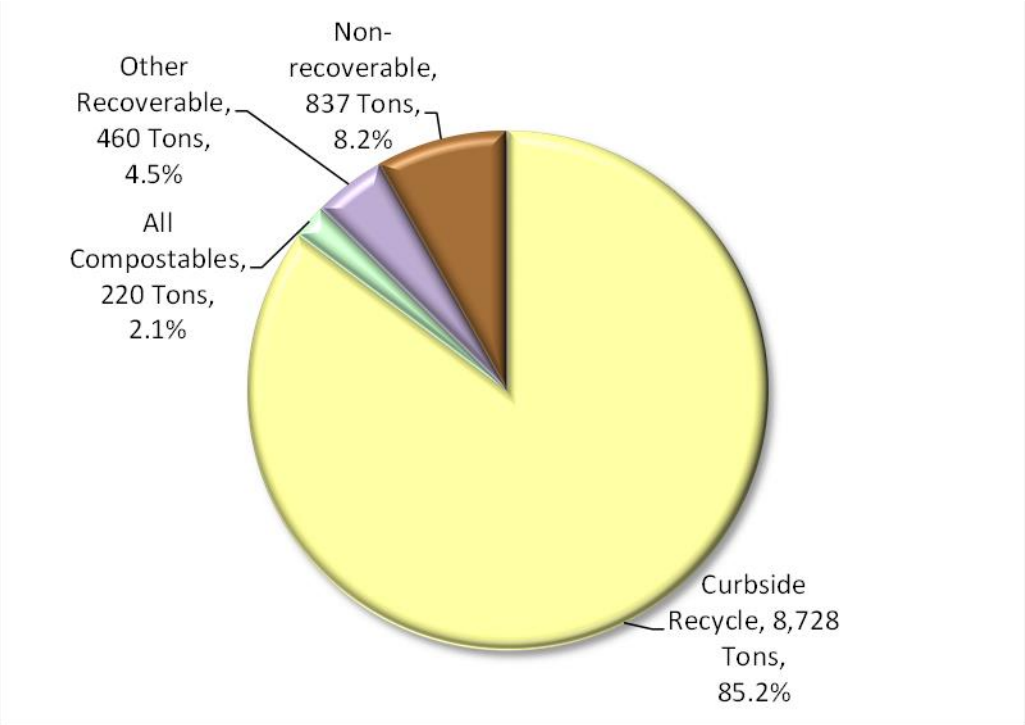


Table 91. Ten Most Prevalent Material Types, Area F Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	25.74%	25.74%	2,636.7
Plain OCC/Kraft Paper	15.79%	41.53%	1,618.1
Glass Beverage Containers	12.87%	54.41%	1,318.9
Newspaper	12.50%	66.91%	1,280.3
#1 PET Bottles	4.01%	70.91%	410.4
High Grade Paper	3.01%	73.92%	307.9
Non-distinct Fines	2.52%	76.44%	258.3
Textiles	1.92%	78.36%	196.9
Mixed Rigid Plastics	1.72%	80.08%	175.8
Tin Food Cans	1.41%	81.49%	144.7
Subtotal	***81.5%***		***8,348***
All other material types	18.5%		1,896.4
Total	**100%**		**10,244**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 92. Detailed Composition, Area F Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**58.9%**		**6,033**	**Other Materials**	**7.2%**		**742**
Newspaper	12.50%	1.9%	1,280.3	Textiles	1.92%	1.2%	196.9
Plain OCC/Kraft Paper	15.79%	2.3%	1,618.1	Carpet/Upholstery	0.05%	0.1%	4.7
Waxed OCC/Kraft Paper	0.01%	0.0%	0.8	Leather	0.08%	0.1%	8.2
High Grade Paper	3.01%	2.4%	307.9	Disposable Diapers	0.61%	0.7%	62.7
Mixed Low-grade Paper	25.74%	2.9%	2,636.7	Animal By-products	0.00%	0.0%	0.0
Milk/Juice Polycoated Paper	0.45%	0.1%	45.6	Rubber Products	0.41%	0.5%	42.4
Frozen Food Polycoated Paper	0.02%	0.0%	1.7	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	0.75%	0.3%	77.3	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.63%	0.3%	64.4	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**14.5%**		**1,486**	Small Appliances	0.24%	0.4%	24.6
#1 PET Bottles	4.01%	0.4%	410.4	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.97%	0.2%	99.0	Other Electronics	1.16%	0.9%	118.6
#2 HDPE Natural Bottles	1.34%	0.2%	137.0	Ceramics/Porcelain	0.02%	0.0%	2.0
#2 HDPE Colored Bottles	1.14%	0.2%	116.7	Non-distinct Fines	2.52%	0.6%	258.3
#2 HDPE Other Packaging	0.32%	0.1%	32.7	Miscellaneous Organics	0.04%	0.0%	4.5
Other Rigid Plastic Packaging	1.28%	0.3%	131.6	Miscellaneous Inorganics	0.19%	0.2%	19.5
Expanded Polystyrene	0.46%	0.1%	46.8				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.0%**		**2**
Plastic Grocery/Merchandise Bags	0.56%	0.1%	57.1	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.23%	0.3%	23.1	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.39%	0.1%	39.7	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.41%	0.3%	144.1	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.72%	0.6%	175.8	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	0.71%	0.2%	72.4	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.01%	0.0%	1.0
Glass	**13.1%**		**1,342**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	12.87%	0.2%	1,318.9	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.2%	0.2	Asbestos	0.00%	0.0%	0.0
Other Glass	0.22%	0.1%	22.8	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**4.3%**		**442**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.29%	0.3%	131.6	Other Hazardous Chemicals	0.00%	0.0%	0.3
Aluminum Foil/Containers	0.28%	0.2%	28.7	Other Non-hazardous Chemicals	0.01%	0.0%	1.0
Other Nonferrous	0.28%	0.3%	28.3				
Tin Food Cans	1.41%	0.2%	144.7	**C&D Wastes**	**0.5%**		**47**
Empty Aerosol Cans	0.13%	0.1%	13.6	Dimension Lumber	0.00%	0.0%	0.0
Other Ferrous	0.67%	0.7%	68.6	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.09%	0.1%	8.9
Mixed Metals/Material	0.26%	0.2%	26.2	Contaminated Wood	0.13%	0.1%	13.2
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**1.5%**		**149**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	0.06%	0.1%	6.4	Insulation	0.04%	0.1%	3.7
Unaccepted Yard Waste	0.00%	0.0%	0.1	Rock/Concrete/Bricks	0.06%	0.1%	5.7
Prunings Less than 2"	0.00%	0.0%	0.2	Asphaltic Roofing	0.13%	0.2%	12.8
Prunings 2" to 12"	0.00%	0.0%	0.3	Other Construction Debris	0.03%	0.0%	3.3
Prunings Greater than 12"	0.08%	0.1%	7.9				
Purchased Food	1.07%	0.6%	109.9	**Totals**	**100%**		**10,244**
Homegrown Food	0.00%	0.0%	0.2				
Beverages and Liquids	0.24%	0.1%	24.5	**Sample Count**			**22**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 50. Composition by Material Class, Area G Recycling

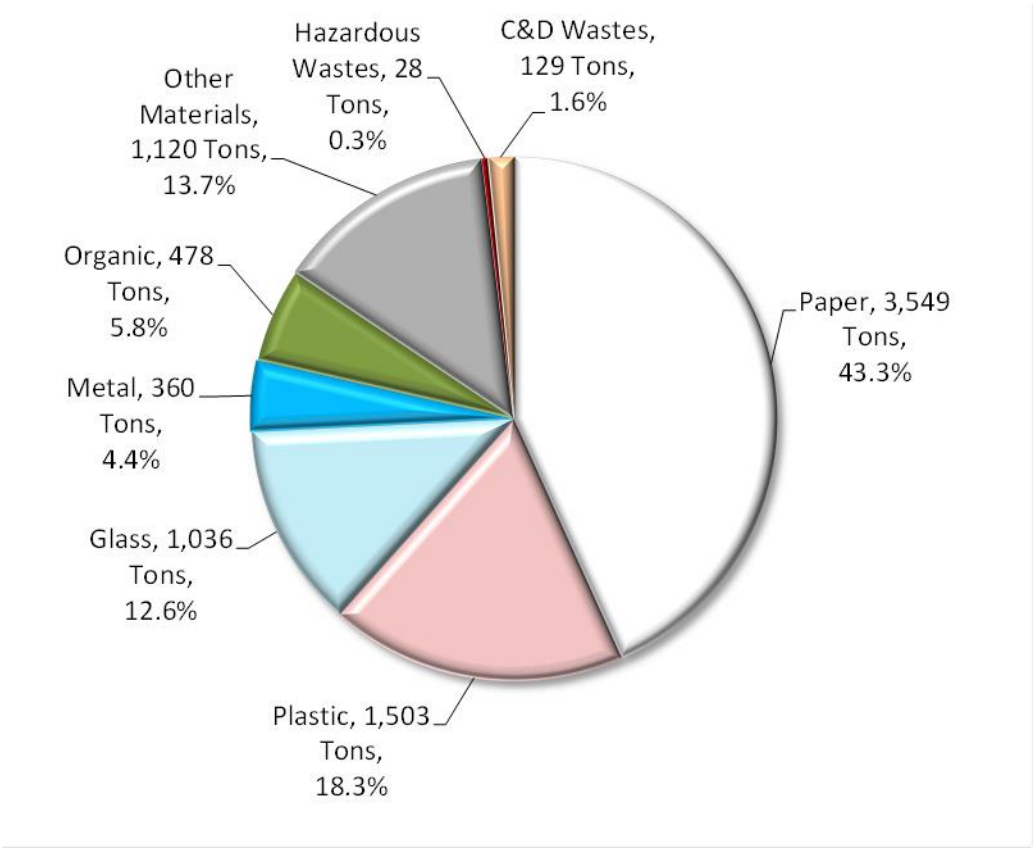


Figure 51. Composition by Recoverability Group, Area G Recycling

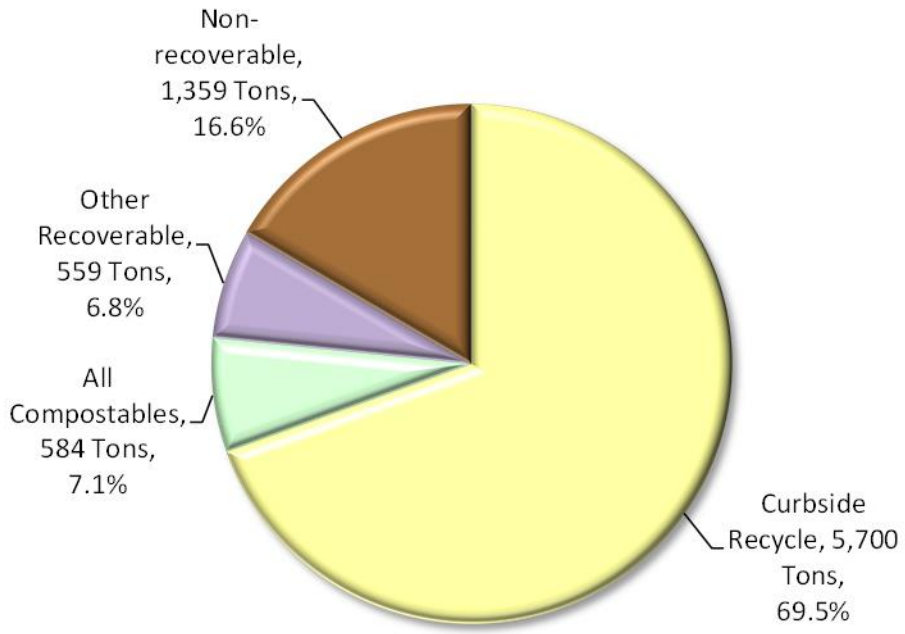


Table 93. Ten Most Prevalent Material Types, Area G Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	20.41%	20.41%	1,674.5
Plain OCC/Kraft Paper	15.00%	35.41%	1,230.3
Glass Beverage Containers	12.20%	47.61%	1,000.8
Non-distinct Fines	5.09%	52.71%	417.9
Purchased Food	4.47%	57.18%	366.6
Newspaper	4.31%	61.48%	353.4
#1 PET Bottles	4.05%	65.54%	332.5
Mixed Rigid Plastics	3.12%	68.66%	255.8
Textiles	3.06%	71.72%	251.3
Disposable Diapers	2.37%	74.09%	194.7
Subtotal	***74.1%***		***6,078***
All other material types	25.9%		2,125.2
Total	**100%**		**8,203**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 94. Detailed Composition, Area G Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**43.3%**		**3,549**	**Other Materials**	**13.7%**		**1,120**
Newspaper	4.31%	1.2%	353.4	Textiles	3.06%	0.8%	251.3
Plain OCC/Kraft Paper	15.00%	2.2%	1,230.3	Carpet/Upholstery	0.01%	0.0%	0.6
Waxed OCC/Kraft Paper	0.00%	0.0%	0.0	Leather	0.04%	0.1%	3.1
High Grade Paper	0.60%	0.4%	49.1	Disposable Diapers	2.37%	1.1%	194.7
Mixed Low-grade Paper	20.41%	1.9%	1,674.5	Animal By-products	0.04%	0.0%	3.0
Milk/Juice Polycoated Paper	0.40%	0.1%	32.5	Rubber Products	0.63%	0.3%	51.3
Frozen Food Polycoated Paper	0.02%	0.0%	1.3	Tires	0.26%	0.4%	21.1
Compostable/Food Soiled Paper	1.30%	0.3%	106.5	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.24%	0.8%	101.5	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**18.3%**		**1,503**	Small Appliances	0.01%	0.0%	1.0
#1 PET Bottles	4.05%	0.5%	332.5	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	1.07%	0.5%	88.1	Other Electronics	1.13%	0.6%	92.5
#2 HDPE Natural Bottles	2.06%	0.4%	168.6	Ceramics/Porcelain	0.09%	0.1%	7.0
#2 HDPE Colored Bottles	1.38%	0.3%	112.9	Non-distinct Fines	5.09%	2.2%	417.9
#2 HDPE Other Packaging	0.36%	0.1%	29.2	Miscellaneous Organics	0.82%	0.7%	67.3
Other Rigid Plastic Packaging	1.05%	0.3%	86.0	Miscellaneous Inorganics	0.11%	0.1%	9.1
Expanded Polystyrene	0.64%	0.1%	52.4				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.3%**		**28**
Plastic Grocery/Merchandise Bags	1.06%	0.2%	86.8	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.02%	0.0%	1.8	Hazardous Adhesives/Glues	0.01%	0.0%	0.4
Plastic Garbage Bags	0.37%	0.1%	30.7	Non-hazardous Adhesives/Glues	0.14%	0.2%	11.8
Other Plastic Film	1.93%	0.4%	158.0	Oil-based Paint/Solvent	0.01%	0.0%	0.7
Mixed Rigid Plastics	3.12%	1.0%	255.8	Hazardous Cleaners	0.00%	0.0%	0.0
Plastic/Other Materials	1.22%	0.3%	100.0	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.07%	0.1%	5.6
Glass	**12.6%**		**1,036**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	12.20%	0.4%	1,000.8	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.3%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.43%	0.1%	35.1	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.04%	0.1%	3.4
Metal	**4.4%**		**360**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.58%	0.2%	47.4	Other Hazardous Chemicals	0.01%	0.0%	0.6
Aluminum Foil/Containers	0.14%	0.1%	11.4	Other Non-hazardous Chemicals	0.07%	0.1%	5.6
Other Nonferrous	0.13%	0.1%	10.7				
Tin Food Cans	1.40%	0.3%	114.5	**C&D Wastes**	**1.6%**		**129**
Empty Aerosol Cans	0.37%	0.4%	30.2	Dimension Lumber	0.00%	0.0%	0.1
Other Ferrous	0.87%	0.4%	71.4	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.19%	0.3%	16.0
Mixed Metals/Material	0.91%	0.5%	74.5	Contaminated Wood	1.11%	0.7%	90.8
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**5.8%**		**478**	Demo Gypsum Scrap	0.01%	0.0%	1.0
Leaves & Grass	0.47%	0.3%	38.8	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.01%	0.0%	0.4	Rock/Concrete/Bricks	0.11%	0.1%	9.1
Prunings Less than 2"	0.03%	0.0%	2.7	Asphaltic Roofing	0.06%	0.1%	5.2
Prunings 2" to 12"	0.00%	0.0%	0.3	Other Construction Debris	0.09%	0.1%	7.2
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	4.47%	1.7%	366.6	**Totals**	**100%**		**8,203**
Homegrown Food	0.19%	0.2%	15.3				
Beverages and Liquids	0.66%	0.3%	53.9	**Sample Count**			**21**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

**Figure 52. Composition by Material Class,
Area H Recycling**

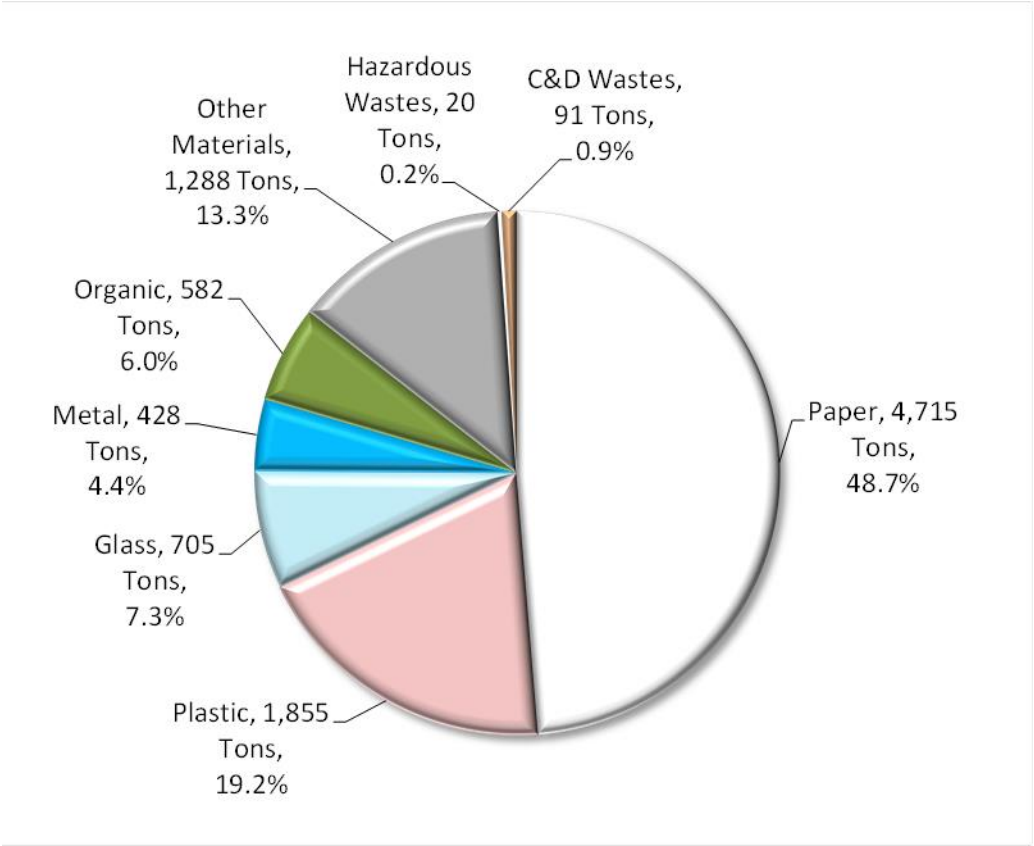


Figure 53. Composition by Recoverability Group, Area H Recycling

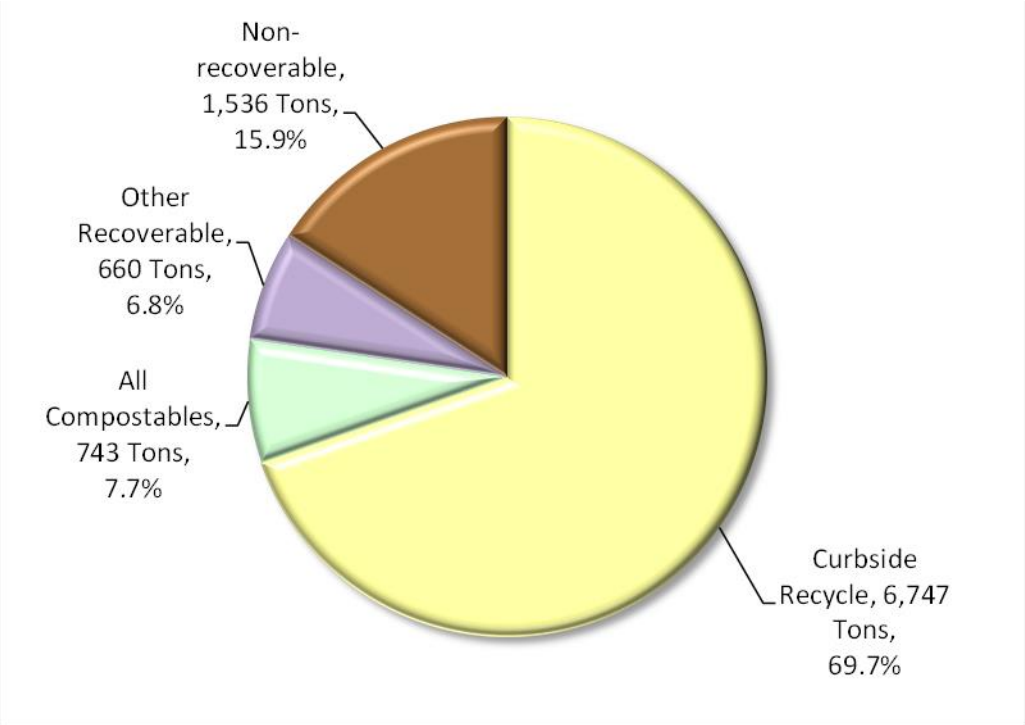


Table 95. Ten Most Prevalent Material Types, Area H Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	21.29%	21.29%	2,062.2
Plain OCC/Kraft Paper	19.59%	40.88%	1,897.4
Glass Beverage Containers	6.92%	47.81%	670.5
#1 PET Bottles	4.54%	52.34%	439.6
Newspaper	4.27%	56.62%	414.0
Non-distinct Fines	3.73%	60.35%	361.0
Purchased Food	3.69%	64.04%	357.8
Textiles	2.86%	66.90%	277.2
Other Plastic Film	2.25%	69.16%	218.3
Plastic/Other Materials	2.16%	71.32%	209.4
Subtotal	***71.3%***		***6,907***
All other material types	28.7%		2,777.9
Total	**100%**		**9,685**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 96. Detailed Composition, Area H Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**48.7%**		**4,715**	**Other Materials**	**13.3%**		**1,288**
Newspaper	4.27%	1.2%	414.0	Textiles	2.86%	0.9%	277.2
Plain OCC/Kraft Paper	19.59%	3.7%	1,897.4	Carpet/Upholstery	1.96%	2.2%	189.8
Waxed OCC/Kraft Paper	0.00%	0.0%	0.0	Leather	0.21%	0.3%	20.7
High Grade Paper	0.62%	0.6%	59.9	Disposable Diapers	1.68%	0.7%	163.0
Mixed Low-grade Paper	21.29%	1.8%	2,062.2	Animal By-products	0.01%	0.0%	1.0
Milk/Juice Polycoated Paper	0.38%	0.1%	36.7	Rubber Products	0.38%	0.2%	37.0
Frozen Food Polycoated Paper	0.04%	0.1%	3.6	Tires	0.04%	0.1%	4.3
Compostable/Food Soiled Paper	1.70%	0.6%	165.0	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.79%	0.3%	76.3	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**19.2%**		**1,855**	Small Appliances	0.00%	0.0%	0.0
#1 PET Bottles	4.54%	0.6%	439.6	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.88%	0.2%	85.0	Other Electronics	1.64%	1.2%	158.9
#2 HDPE Natural Bottles	2.07%	0.3%	200.2	Ceramics/Porcelain	0.21%	0.3%	20.7
#2 HDPE Colored Bottles	1.86%	0.4%	180.4	Non-distinct Fines	3.73%	1.2%	361.0
#2 HDPE Other Packaging	0.29%	0.1%	28.2	Miscellaneous Organics	0.42%	0.3%	41.0
Other Rigid Plastic Packaging	1.18%	0.3%	114.4	Miscellaneous Inorganics	0.14%	0.1%	13.7
Expanded Polystyrene	0.70%	0.1%	68.1				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.2%**		**20**
Plastic Grocery/Merchandise Bags	0.85%	0.2%	82.2	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.07%	0.0%	7.0	Hazardous Adhesives/Glues	0.01%	0.0%	0.5
Plastic Garbage Bags	0.35%	0.1%	34.2	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	2.25%	0.4%	218.3	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.95%	0.6%	188.4	Hazardous Cleaners	0.01%	0.0%	0.7
Plastic/Other Materials	2.16%	1.2%	209.4	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.01%	0.0%	0.8
Glass	**7.3%**		**705**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.3
Glass Beverage Containers	6.92%	0.3%	670.5	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.4%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.36%	0.1%	34.9	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.05%	0.1%	4.7
Metal	**4.4%**		**428**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	0.80%	0.2%	77.7	Other Hazardous Chemicals	0.10%	0.1%	9.7
Aluminum Foil/Containers	0.19%	0.1%	18.2	Other Non-hazardous Chemicals	0.03%	0.0%	3.0
Other Nonferrous	0.07%	0.0%	7.2				
Tin Food Cans	1.54%	0.2%	148.7	**C&D Wastes**	**0.9%**		**91**
Empty Aerosol Cans	0.26%	0.1%	24.7	Dimension Lumber	0.26%	0.4%	25.0
Other Ferrous	0.92%	0.5%	89.5	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.14%	0.1%	13.5	Treated Wood	0.06%	0.0%	5.7
Mixed Metals/Material	0.50%	0.3%	48.4	Contaminated Wood	0.47%	0.3%	45.4
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**6.0%**		**582**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	1.11%	1.8%	107.9	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.04%	0.1%	4.3	Rock/Concrete/Bricks	0.01%	0.0%	0.5
Prunings Less than 2"	0.94%	1.2%	90.8	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.02%	0.0%	2.2	Other Construction Debris	0.15%	0.2%	14.3
Prunings Greater than 12"	0.00%	0.0%	0.1				
Purchased Food	3.69%	1.5%	357.8	**Totals**	**100%**		**9,685**
Homegrown Food	0.00%	0.0%	0.2				
Beverages and Liquids	0.19%	0.1%	18.9	**Sample Count**			**21**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 54. Composition by Material Class, Area I Recycling

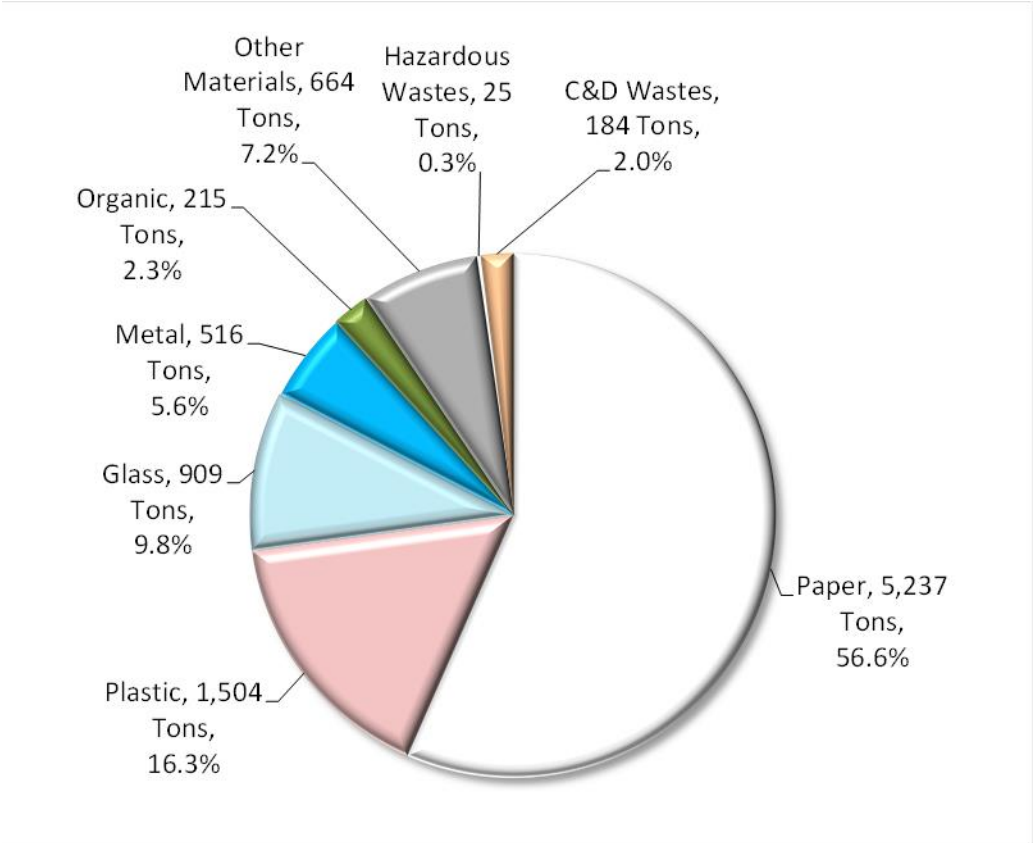


Figure 55. Composition by Recoverability Group, Area I Recycling

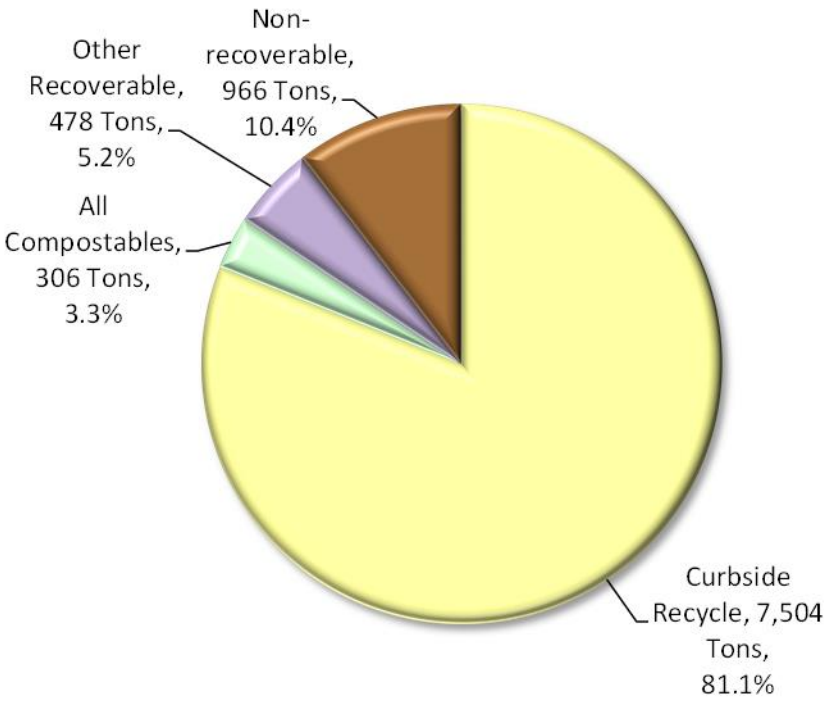


Table 97. Ten Most Prevalent Material Types, Area I Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	25.30%	25.30%	2,341.2
Plain OCC/Kraft Paper	19.17%	44.47%	1,774.1
Glass Beverage Containers	9.55%	54.02%	883.9
Newspaper	9.03%	63.05%	835.4
#1 PET Bottles	3.81%	66.86%	352.5
Mixed Rigid Plastics	2.24%	69.09%	207.0
Non-distinct Fines	2.18%	71.27%	201.4
Textiles	2.06%	73.33%	190.3
Other Ferrous	1.97%	75.30%	182.4
Other Plastic Film	1.85%	77.14%	170.8
Subtotal	***77.1%***		***7,139***
All other material types	22.9%		2,115.4
Total	**100%**		**9,254**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 98. Detailed Composition, Area I Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**56.6%**		**5,237**	**Other Materials**	**7.2%**		**664**
Newspaper	9.03%	2.4%	835.4	Textiles	2.06%	0.7%	190.3
Plain OCC/Kraft Paper	19.17%	4.1%	1,774.1	Carpet/Upholstery	0.00%	0.0%	0.0
Waxed OCC/Kraft Paper	0.00%	0.0%	0.0	Leather	0.00%	0.0%	0.0
High Grade Paper	0.84%	0.4%	78.1	Disposable Diapers	0.20%	0.1%	18.4
Mixed Low-grade Paper	25.30%	2.7%	2,341.2	Animal By-products	0.02%	0.0%	1.9
Milk/Juice Polycoated Paper	0.50%	0.1%	46.4	Rubber Products	0.78%	0.7%	71.9
Frozen Food Polycoated Paper	0.07%	0.1%	6.5	Tires	0.29%	0.5%	27.0
Compostable/Food Soiled Paper	0.99%	0.2%	91.9	Ash	0.00%	0.0%	0.0
Paper/Other Materials	0.68%	0.4%	63.0	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**16.3%**		**1,504**	Small Appliances	0.22%	0.4%	20.2
#1 PET Bottles	3.81%	0.5%	352.5	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.62%	0.2%	57.6	Other Electronics	0.77%	0.6%	71.6
#2 HDPE Natural Bottles	1.32%	0.2%	122.3	Ceramics/Porcelain	0.16%	0.2%	14.7
#2 HDPE Colored Bottles	1.48%	0.2%	137.3	Non-distinct Fines	2.18%	0.6%	201.4
#2 HDPE Other Packaging	0.63%	0.4%	58.0	Miscellaneous Organics	0.31%	0.3%	28.5
Other Rigid Plastic Packaging	1.45%	0.2%	133.8	Miscellaneous Inorganics	0.20%	0.2%	18.3
Expanded Polystyrene	0.45%	0.1%	41.4				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.3%**		**25**
Plastic Grocery/Merchandise Bags	0.66%	0.1%	61.3	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.08%	0.0%	7.8	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.31%	0.1%	28.4	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.85%	0.3%	170.8	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	2.24%	0.6%	207.0	Hazardous Cleaners	0.01%	0.0%	0.5
Plastic/Other Materials	1.36%	0.5%	125.8	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	2.4
Glass	**9.8%**		**909**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.0
Glass Beverage Containers	9.55%	0.2%	883.9	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.18%	0.2%	16.6	Asbestos	0.00%	0.0%	0.0
Other Glass	0.09%	0.4%	8.1	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**5.6%**		**516**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.32%	0.2%	121.9	Other Hazardous Chemicals	0.20%	0.3%	18.3
Aluminum Foil/Containers	0.12%	0.1%	11.5	Other Non-hazardous Chemicals	0.05%	0.1%	4.2
Other Nonferrous	0.19%	0.1%	17.8				
Tin Food Cans	1.35%	0.2%	125.0	**C&D Wastes**	**2.0%**		**184**
Empty Aerosol Cans	0.13%	0.1%	11.6	Dimension Lumber	0.14%	0.2%	12.6
Other Ferrous	1.97%	1.3%	182.4	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.00%	0.0%	0.0	Treated Wood	0.26%	0.3%	23.9
Mixed Metals/Material	0.49%	0.3%	45.7	Contaminated Wood	1.09%	1.2%	101.2
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**2.3%**		**215**	Demo Gypsum Scrap	0.25%	0.4%	23.0
Leaves & Grass	0.20%	0.2%	18.5	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.01%	0.0%	0.9	Rock/Concrete/Bricks	0.06%	0.1%	5.1
Prunings Less than 2"	0.01%	0.0%	0.7	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.02%	0.0%	2.0	Other Construction Debris	0.20%	0.2%	18.6
Prunings Greater than 12"	0.00%	0.0%	0.0				
Purchased Food	1.72%	0.8%	159.5	**Totals**	**100%**		**9,254**
Homegrown Food	0.06%	0.1%	5.9				
Beverages and Liquids	0.30%	0.2%	27.6	**Sample Count**			**20**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Figure 56. Composition by Material Class, Area J Recycling

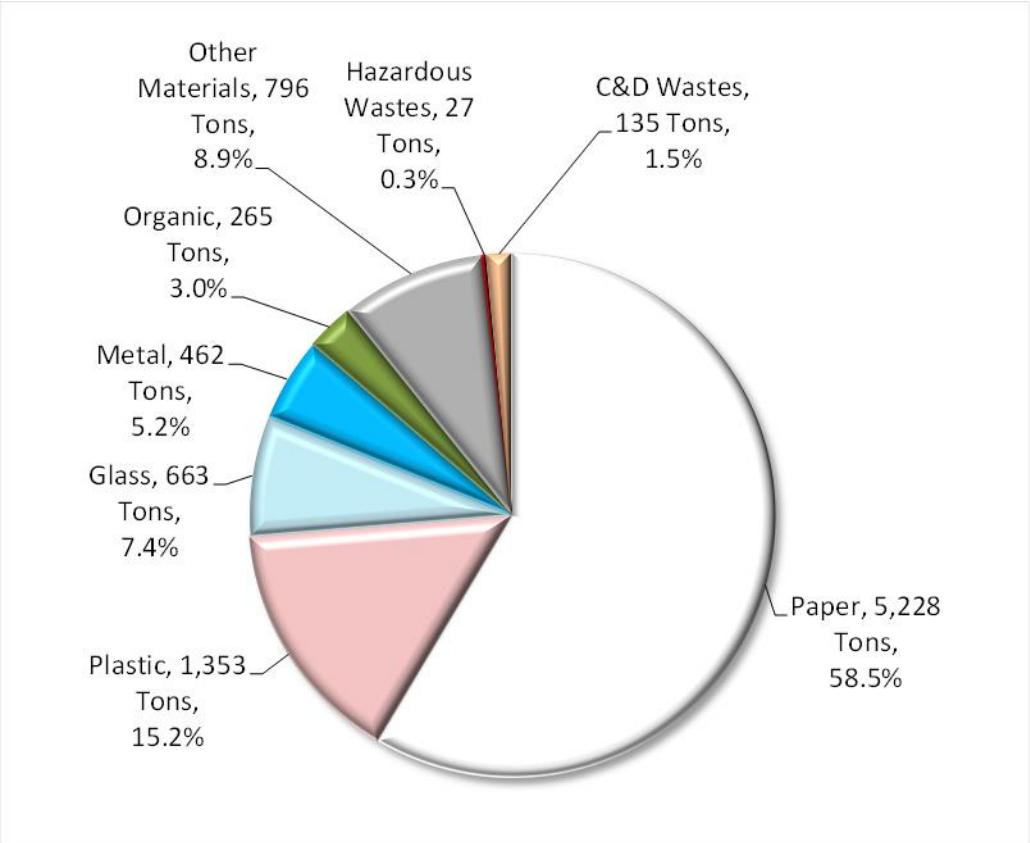


Figure 57. Composition by Recoverability Group, Area J Recycling

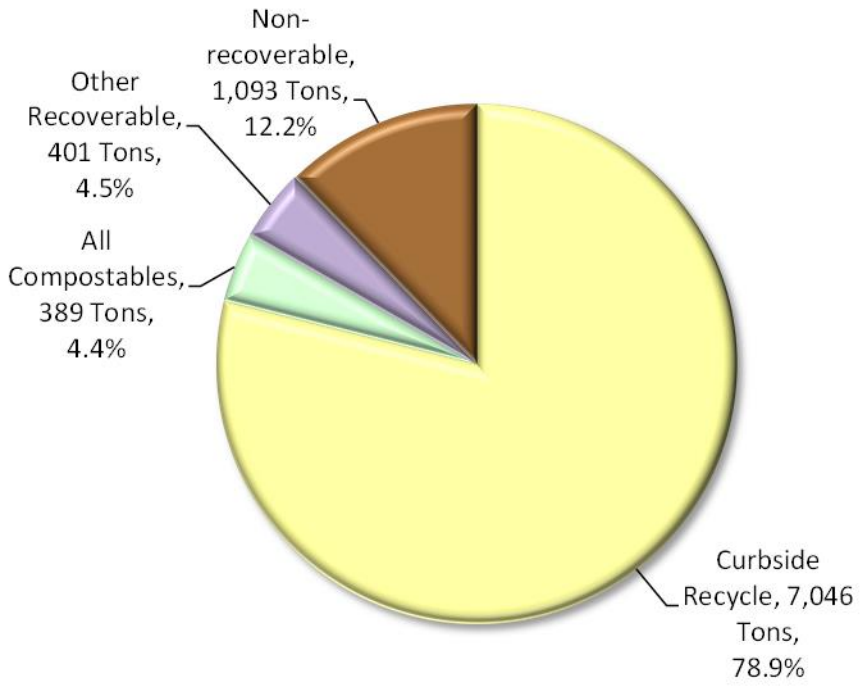


Table 99. Ten Most Prevalent Material Types, Area J Recycling

Material Type	Estimated Percent	Cumulative Percent	Estimated Tons
Mixed Low-grade Paper	24.31%	24.31%	2,170.6
Plain OCC/Kraft Paper	21.62%	45.93%	1,930.4
Newspaper	8.45%	54.37%	754.3
Glass Beverage Containers	7.32%	61.70%	654.1
#1 PET Bottles	3.79%	65.48%	338.0
Textiles	2.45%	67.93%	218.4
Non-distinct Fines	2.32%	70.25%	207.4
Miscellaneous Organics	2.31%	72.57%	206.7
Purchased Food	1.98%	74.55%	177.0
Tin Food Cans	1.83%	76.38%	163.3
Subtotal	***76.4%***		***6,820***
All other material types	23.6%		2,109.3
Total	**100%**		**8,929**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Table 100. Detailed Composition, Area J Recycling

Material	Estimated Percent	+/-	Estimated Tons	Material	Estimated Percent	+/-	Estimated Tons
Paper	**58.5%**		**5,228**	**Other Materials**	**8.9%**		**796**
Newspaper	8.45%	2.3%	754.3	Textiles	2.45%	1.0%	218.4
Plain OCC/Kraft Paper	21.62%	3.6%	1,930.4	Carpet/Upholstery	0.25%	0.4%	22.3
Waxed OCC/Kraft Paper	0.02%	0.0%	2.0	Leather	0.00%	0.0%	0.0
High Grade Paper	1.12%	0.4%	100.0	Disposable Diapers	0.29%	0.2%	26.0
Mixed Low-grade Paper	24.31%	2.3%	2,170.6	Animal By-products	0.03%	0.1%	2.8
Milk/Juice Polycoated Paper	0.58%	0.1%	51.9	Rubber Products	0.15%	0.1%	13.7
Frozen Food Polycoated Paper	0.04%	0.1%	3.8	Tires	0.00%	0.0%	0.0
Compostable/Food Soiled Paper	1.39%	0.6%	123.8	Ash	0.00%	0.0%	0.0
Paper/Other Materials	1.02%	0.3%	91.5	Furniture	0.00%	0.0%	0.0
				Mattresses	0.00%	0.0%	0.0
Plastic	**15.2%**		**1,353**	Small Appliances	0.00%	0.0%	0.0
#1 PET Bottles	3.79%	0.4%	338.0	CRTs	0.00%	0.0%	0.0
#1 PET Other Packaging	0.86%	0.4%	76.9	Other Electronics	0.97%	0.8%	87.0
#2 HDPE Natural Bottles	1.28%	0.2%	113.9	Ceramics/Porcelain	0.09%	0.1%	8.3
#2 HDPE Colored Bottles	1.17%	0.3%	104.6	Non-distinct Fines	2.32%	0.7%	207.4
#2 HDPE Other Packaging	0.32%	0.2%	28.4	Miscellaneous Organics	2.31%	3.5%	206.7
Other Rigid Plastic Packaging	1.57%	0.5%	140.6	Miscellaneous Inorganics	0.03%	0.0%	3.0
Expanded Polystyrene	1.09%	0.7%	97.5				
Compostable Plastics	0.00%	0.0%	0.0	**Hazardous Wastes**	**0.3%**		**27**
Plastic Grocery/Merchandise Bags	0.54%	0.1%	48.3	Latex Paint	0.00%	0.0%	0.0
Other Clean Plastic Consumer Product Bags	0.06%	0.0%	5.5	Hazardous Adhesives/Glues	0.00%	0.0%	0.0
Plastic Garbage Bags	0.28%	0.1%	24.8	Non-hazardous Adhesives/Glues	0.00%	0.0%	0.0
Other Plastic Film	1.83%	0.3%	163.1	Oil-based Paint/Solvent	0.00%	0.0%	0.0
Mixed Rigid Plastics	1.53%	0.6%	136.4	Hazardous Cleaners	0.20%	0.3%	17.9
Plastic/Other Materials	0.84%	0.2%	74.9	Pesticides/Herbicides	0.00%	0.0%	0.0
				Non-rechargeable Dry-cell Batteries	0.03%	0.0%	2.5
Glass	**7.4%**		**663**	Rechargeable Dry-cell Batteries	0.00%	0.0%	0.3
Glass Beverage Containers	7.32%	0.2%	654.1	Wet-cell (car) Batteries	0.00%	0.0%	0.0
Fluorescent Tubes	0.00%	0.3%	0.0	Asbestos	0.00%	0.0%	0.0
Other Glass	0.10%	0.2%	8.6	Explosives	0.00%	0.0%	0.0
				Vehicle and Equipment Fluids	0.00%	0.0%	0.0
Metal	**5.2%**		**462**	Pool Chemicals	0.00%	0.0%	0.0
Aluminum Cans	1.42%	0.3%	127.2	Other Hazardous Chemicals	0.01%	0.0%	0.5
Aluminum Foil/Containers	0.22%	0.1%	19.5	Other Non-hazardous Chemicals	0.07%	0.1%	6.1
Other Nonferrous	0.61%	0.7%	54.4				
Tin Food Cans	1.83%	0.5%	163.3	**C&D Wastes**	**1.5%**		**135**
Empty Aerosol Cans	0.13%	0.1%	12.0	Dimension Lumber	0.09%	0.2%	8.3
Other Ferrous	0.74%	0.5%	66.0	Pallets/Crates	0.00%	0.0%	0.0
Oil Filters	0.15%	0.2%	13.5	Treated Wood	0.06%	0.1%	5.6
Mixed Metals/Material	0.07%	0.1%	6.1	Contaminated Wood	1.35%	0.9%	120.6
				New Gypsum Scrap	0.00%	0.0%	0.0
Organic	**3.0%**		**265**	Demo Gypsum Scrap	0.00%	0.0%	0.0
Leaves & Grass	0.65%	0.7%	57.7	Insulation	0.00%	0.0%	0.0
Unaccepted Yard Waste	0.00%	0.0%	0.0	Rock/Concrete/Bricks	0.01%	0.0%	0.7
Prunings Less than 2"	0.01%	0.0%	0.7	Asphaltic Roofing	0.00%	0.0%	0.0
Prunings 2" to 12"	0.02%	0.0%	2.0	Other Construction Debris	0.00%	0.0%	0.2
Prunings Greater than 12"	0.02%	0.0%	1.5				
Purchased Food	1.98%	1.1%	177.0	**Totals**	**100%**		**8,929**
Homegrown Food	0.00%	0.0%	0.3				
Beverages and Liquids	0.29%	0.2%	25.9	**Sample Count**			**20**

Confidence intervals calculated at the 90% confidence level. Due to rounding in the tables, sums may not exactly match subtotals and totals shown.

Appendix E: Bid Area Comparisons

A piece of the analysis included comparing the garbage and recycling composition in each bid area against the composition of all the other bid areas combined. The purpose of the comparisons was to detect any statistically significant differences in the composition for a particular bid area. For example, Does area B disposed of more **Paper** than the other areas of the City, potentially making them a good target for a paper recycling education campaign. A t-test was used to check for statistically significant differences in composition data between bid areas. This statistical calculation was used to test the null hypothesis "There is no statistically significant difference between the percentage of **Paper** in the bid area A garbage and the garbage in the other bid areas." The same null hypothesis was also tested for each of the other material classes, the other bid areas, and for the recycling stream. The calculations and a discussion of the t-test are included in Appendix C: Waste Characterization Calculations, Table X summarizes the statistically significant differences discovered. The detailed t-test tables follow the summary.

Table 101. Summary of Statistically Significant Differences Between Bid Areas

District	Material Type	Material Class	Notes
A	Garbage	Other Materials	The proportion of **Other Materials** in the garbage is 5.7 percentage points lower in A than in the other bid areas combined
A	Garbage	C&D	The proportion of **C&D** in the garbage is 5.0 percentage points higher in A than in the other bid areas combined
C	Garbage	Plastic	The proportion of **Plastic** in the garbage is 2.3 percentage points lower in C than in the other bid areas combined
E	Garbage	Paper	The proportion of **Paper** in the garbage is 3.3 percentage points lower in E than in the other bid areas combined
H	Garbage	Paper	The proportion of **Paper** in the garbage is 3.1 percentage points higher in H than in the other bid areas combined
A	Recycle	Paper	The proportion of **Paper** in the recycle is 7.6 percentage points lower in A than in the other bid areas combined
A	Recycle	HHW	The proportion of **HHW** in the recycle is 0.4 percentage points higher in A than in the other bid areas combined
A	Recycle	C&D	The proportion of **C&D** in the recycle is 1.6 percentage points higher in A than in the other bid areas combined
C	Recycle	Paper	The proportion of **Paper** in the recycle is 7.9 percentage points higher in C than in the other bid areas combined
E	Recycle	Organics	The proportion of **Organics** in the recycle is 4.0 percentage points higher in E than in the other bid areas combined
G	Recycle	Paper	The proportion of **Paper** in the recycle is 12.3 percentage points lower in G than in the other bid areas combined
H	Recycle	Plastic	The proportion of **Plastic** in the recycle is 3.4% higher in H than in the other bid areas combined

Table 102. Statistically Significant Differences in the Garbage, Compares Bid Area A Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	1.0% ⬆	0.8876	0.3756	No
Plastic	-1.7% ⬇	1.9306	0.0546	No
Glass	-0.3% ⬇	0.8771	0.3812	No
Metal	0.8% ⬆	1.2380	0.2168	No
Organics	-0.3% ⬇	0.1018	0.9190	No
Other Materials	5.7% ⬆	2.6232	**0.0092** *	**Yes**
HHW	-0.2% ⬇	0.9204	0.3582	No
C&D	-5.0% ⬇	3.4795	**0.0006** *	**Yes**

**cutoff for statistically significant change is 0.0125*

Table 103. Statistically Significant Differences in the Garbage, Compares Bid Area B Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	0.8% ⬆	0.6944	0.4880	No
Plastic	1.0% ⬆	1.1012	0.2718	No
Glass	0.5% ⬆	1.7677	0.0783	No
Metal	0.0% ⬌	0.0577	0.9540	No
Organics	-0.1% ⬇	0.0430	0.9657	No
Other Materials	-2.6% ⬇	1.1619	0.2463	No
HHW	0.0% ⬌	0.1181	0.9061	No
C&D	0.3% ⬆	0.2353	0.8142	No

**cutoff for statistically significant change is 0.0125*

Table 104. Statistically Significant Differences in the Garbage, Compares Bid Area C Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	0.5% ⬆	0.4257	0.6707	No
Plastic	2.3% ⬆	2.5788	**0.0105** *	**Yes**
Glass	0.3% ⬆	0.9755	0.3302	No
Metal	-1.4% ⬇	2.2536	0.0251	No
Organics	-2.7% ⬇	0.9434	0.3463	No
Other Materials	0.8% ⬆	0.3795	0.7046	No
HHW	-0.2% ⬇	0.9270	0.3548	No
C&D	0.4% ⬆	0.2521	0.8011	No

**cutoff for statistically significant change is 0.0125*

Table 105. Statistically Significant Differences in the Garbage, Compares Bid Area D Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-0.2% ⬇	0.1783	0.8586	No
Plastic	1.4% ⬆	1.5210	0.1295	No
Glass	0.2% ⬆	0.6660	0.5060	No
Metal	0.5% ⬆	0.7643	0.4454	No
Organics	-2.6% ⬇	0.9359	0.3502	No
Other Materials	-1.5% ⬇	0.7080	0.4796	No
HHW	-0.1% ⬇	0.4102	0.6820	No
C&D	2.4% ⬆	1.6616	0.0978	No

**cutoff for statistically significant change is 0.0125*

Table 106. Statistically Significant Differences in the Garbage, Compares Bid Area E Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	3.3% ⬆	3.1535	**0.0018 ***	**Yes**
Plastic	0.4% ⬆	0.5064	0.6130	No
Glass	0.2% ⬆	0.6288	0.5300	No
Metal	1.0% ⬆	1.6335	0.1036	No
Organics	-5.1% ⬇	1.8610	0.0639	No
Other Materials	1.0% ⬆	0.4740	0.6359	No
HHW	0.3% ⬆	1.5811	0.1151	No
C&D	-1.2% ⬇	0.8584	0.3915	No

**cutoff for statistically significant change is 0.0125*

Table 107. Statistically Significant Differences in the Garbage, Compares Bid Area F Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-0.1% ⬇	0.0814	0.9352	No
Plastic	-1.7% ⬇	1.8700	0.0626	No
Glass	0.0% ⬌	0.0395	0.9685	No
Metal	-0.2% ⬇	0.2846	0.7761	No
Organics	-1.7% ⬇	0.6149	0.5392	No
Other Materials	2.9% ⬆	1.3074	0.1922	No
HHW	0.1% ⬆	0.2474	0.8048	No
C&D	0.8% ⬆	0.5415	0.5886	No

**cutoff for statistically significant change is 0.0125*

Table 108. Statistically Significant Differences in the Garbage, Compares Bid Area G Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	0.2% ⬆	0.1397	0.8890	No
Plastic	-0.9% ⬇	0.9754	0.3303	No
Glass	-0.1% ⬇	0.4293	0.6681	No
Metal	1.0% ⬆	1.5726	0.1170	No
Organics	2.4% ⬆	0.8710	0.3846	No
Other Materials	-1.6% ⬇	0.7603	0.4478	No
HHW	0.3% ⬆	1.3001	0.1947	No
C&D	-1.2% ⬇	0.8237	0.4108	No

**cutoff for statistically significant change is 0.0125*

Table 109. Statistically Significant Differences in the Garbage, Compares Bid Area H Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-3.1% ⬇	2.7624	**0.0061 ***	**Yes**
Plastic	-1.5% ⬇	1.6009	0.1106	No
Glass	-0.5% ⬇	1.6404	0.1021	No
Metal	-0.1% ⬇	0.0924	0.9264	No
Organics	3.7% ⬆	1.2688	0.2056	No
Other Materials	0.8% ⬆	0.3563	0.7219	No
HHW	-0.2% ⬇	1.1262	0.2611	No
C&D	0.9% ⬆	0.6182	0.5370	No

**cutoff for statistically significant change is 0.0125*

Table 110. Statistically Significant Differences in the Garbage, Compares Bid Area I Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-1.7% ⬇	1.4689	0.1431	No
Plastic	-0.6% ⬇	0.6095	0.5427	No
Glass	0.2% ⬆	0.6963	0.4869	No
Metal	-0.6% ⬇	0.8889	0.3749	No
Organics	4.3% ⬆	1.5078	0.1328	No
Other Materials	-3.4% ⬇	1.5411	0.1245	No
HHW	-0.1% ⬇	0.6704	0.5032	No
C&D	1.8% ⬆	1.2219	0.2228	No

**cutoff for statistically significant change is 0.0125*

Table 111. Statistically Significant Differences in the Garbage, Compares Bid Area J Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-1.2% ⬇	1.0454	0.2968	No
Plastic	1.1% ⬆	1.2088	0.2278	No
Glass	-0.5% ⬇	1.7584	0.0799	No
Metal	-1.2% ⬇	1.9126	0.0569	No
Organics	2.8% ⬆	0.9865	0.3248	No
Other Materials	-2.2% ⬇	0.9811	0.3274	No
HHW	0.2% ⬆	0.8574	0.3920	No
C&D	1.0% ⬆	0.6863	0.4932	No

**cutoff for statistically significant change is 0.0125*

Table 112. Statistically Significant Differences in the Recycling, Compares Bid Area A Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	7.6% ⬆	2.7319	**0.0068 ***	**Yes**
Plastic	-1.6% ⬇	1.3032	0.1939	No
Glass	3.3% ⬆	2.0658	0.0401	No
Metal	-0.1% ⬇	0.1281	0.8982	No
Organics	-3.5% ⬇	2.2545	0.0252	No
Other Materials	-3.6% ⬇	1.9363	0.0542	No
HHW	-0.4% ⬇	3.1606	**0.0018 ***	**Yes**
C&D	-1.6% ⬇	2.6413	**0.0089 ***	**Yes**

**cutoff for statistically significant change is 0.0125*

Table 113. Statistically Significant Differences in the Recycling, Compares Bid Area B Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-2.7% ⬇	0.9507	0.3429	No
Plastic	0.9% ⬆	0.7052	0.4815	No
Glass	0.7% ⬆	0.4402	0.6603	No
Metal	-0.6% ⬇	0.9859	0.3253	No
Organics	1.4% ⬆	0.8742	0.3830	No
Other Materials	-0.6% ⬇	0.3134	0.7543	No
HHW	0.1% ⬆	0.9053	0.3664	No
C&D	0.8% ⬆	1.3666	0.1732	No

**cutoff for statistically significant change is 0.0125*

Table 114. Statistically Significant Differences in the Recycling, Compares Bid Area C Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-7.9% ⬇	2.8013	**0.0056 ***	**Yes**
Plastic	-0.1% ⬇	0.0447	0.9644	No
Glass	1.5% ⬆	0.9075	0.3652	No
Metal	-0.4% ⬇	0.5431	0.5877	No
Organics	2.4% ⬆	1.4608	0.1456	No
Other Materials	4.3% ⬆	2.2715	0.0241	No
HHW	0.1% ⬆	0.8814	0.3791	No
C&D	0.0% ⬌	0.0723	0.9424	No

**cutoff for statistically significant change is 0.0125*

Table 115. Statistically Significant Differences in the Recycling, Compares Bid Area D Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-6.5% ⬇	2.4929	0.0135	No
Plastic	2.7% ⬆	2.4356	0.0157	No
Glass	-0.9% ⬇	0.5814	0.5616	No
Metal	1.2% ⬆	1.9638	0.0509	No
Organics	1.7% ⬆	1.1151	0.2661	No
Other Materials	1.8% ⬆	1.0271	0.3056	No
HHW	0.1% ⬆	0.5789	0.5633	No
C&D	-0.1% ⬇	0.1444	0.8853	No

**cutoff for statistically significant change is 0.0125*

Table 116. Statistically Significant Differences in the Recycling, Compares Bid Area E Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	3.6% ⬆	1.2990	0.1954	No
Plastic	1.0% ⬆	0.7974	0.4261	No
Glass	-2.6% ⬇	1.6616	0.0981	No
Metal	0.7% ⬆	1.1552	0.2493	No
Organics	-4.0% ⬇	2.5671	**0.0110 ***	**Yes**
Other Materials	1.3% ⬆	0.6647	0.5070	No
HHW	0.0% ⬌	0.2446	0.8070	No
C&D	0.1% ⬆	0.0848	0.9325	No

**cutoff for statistically significant change is 0.0125*

Table 117. Statistically Significant Differences in the Recycling, Compares Bid Area F Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-5.2% ⬇	1.8879	0.0604	No
Plastic	1.8% ⬆	1.4953	0.1364	No
Glass	-3.7% ⬇	2.3987	0.0173	No
Metal	0.3% ⬆	0.4462	0.6559	No
Organics	3.0% ⬆	1.9135	0.0571	No
Other Materials	2.5% ⬆	1.3795	0.1692	No
HHW	0.2% ⬆	1.8172	0.0706	No
C&D	1.1% ⬆	1.7977	0.0737	No

**cutoff for statistically significant change is 0.0125*

Table 118. Statistically Significant Differences in the Recycling, Compares Bid Area G Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	12.3% ⬆	4.5734	**0.0000 ***	**Yes**
Plastic	-2.5% ⬇	2.0834	0.0384	No
Glass	-3.1% ⬇	1.9896	0.0479	No
Metal	0.2% ⬆	0.3022	0.7628	No
Organics	-1.9% ⬇	1.2186	0.2244	No
Other Materials	-4.6% ⬇	2.4740	0.0142	No
HHW	-0.1% ⬇	0.8543	0.3939	No
C&D	-0.2% ⬇	0.3001	0.7644	No

**cutoff for statistically significant change is 0.0125*

Table 119. Statistically Significant Differences in the Recycling, Compares Bid Area H Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	6.2% ⬆	2.2430	0.0259	No
Plastic	-3.4% ⬇	2.8813	**0.0044 ***	**Yes**
Glass	2.8% ⬆	1.7826	0.0761	No
Metal	0.2% ⬆	0.2486	0.8040	No
Organics	-2.1% ⬇	1.3518	0.1779	No
Other Materials	-4.2% ⬇	2.2618	0.0247	No
HHW	0.0% ⬌	0.2819	0.7783	No
C&D	0.5% ⬆	0.8672	0.3868	No

**cutoff for statistically significant change is 0.0125*

Table 120. Statistically Significant Differences in the Recycling, Compares Bid Area I Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-2.5% ⬇	0.8862	0.3765	No
Plastic	-0.2% ⬇	0.1505	0.8805	No
Glass	0.0% ⬌	0.0023	0.9982	No
Metal	-1.1% ⬇	1.7306	0.0850	No
Organics	1.9% ⬆	1.2114	0.2271	No
Other Materials	2.6% ⬆	1.3419	0.1811	No
HHW	0.0% ⬌	0.2920	0.7706	No
C&D	-0.6% ⬇	1.0276	0.3053	No

**cutoff for statistically significant change is 0.0125*

Table 121. Statistically Significant Differences in the Recycling, Compares Bid Area J Against Other Bid Areas Combined

Material Class	Change in Composition	t-Statistic	p-Value	Statistically Significant Change*
Paper	-4.7% ⬇	1.6515	0.1001	No
Plastic	1.0% ⬆	0.8338	0.4054	No
Glass	2.6% ⬆	1.6376	0.1030	No
Metal	-0.7% ⬇	1.0506	0.2947	No
Organics	1.2% ⬆	0.7685	0.4431	No
Other Materials	0.7% ⬆	0.3459	0.7298	No
HHW	-0.1% ⬇	0.5459	0.5857	No
C&D	-0.1% ⬇	0.1824	0.8554	No

**cutoff for statistically significant change is 0.0125*

Appendix F: Example Field Forms

This appendix contains examples of the field forms used throughout the study:

- Vehicle Tracking Sheet for Pre-selected Routes
- Sample Placard
- Material Weight Tally Sheet

Figure 58. Example Vehicle Tracking Sheet for Pre-Selected Routes

Vehicle Selection Sheet - Recycling Samples

Phoenix Residential Waste Composition Study

Monday, February 23, 2015 **Facility: North Gateway Transfer Station**

Sample ID	Sampled	Truck No.	Route	Bid Area	1st or 2nd Load?	Contigency Sample	Notes
R-3101			B2204	B	1		
R-3102			B2206	B	1		
R-3103			B2207	B	1	Contingency	
R-3104			C2203	C	1		
R-3105			C2208	C	2		
R-3106			G2202	G	1		
R-3107			H2204	H	1		
R-3108			I2202	I	1		
R-3109			I2205	I	1		
R-3110			I2206	I	1	Contingency	
R-3111			J2201	J	1		
R-3112			J2202	J	2		

Figure 59. Example Sample Placard

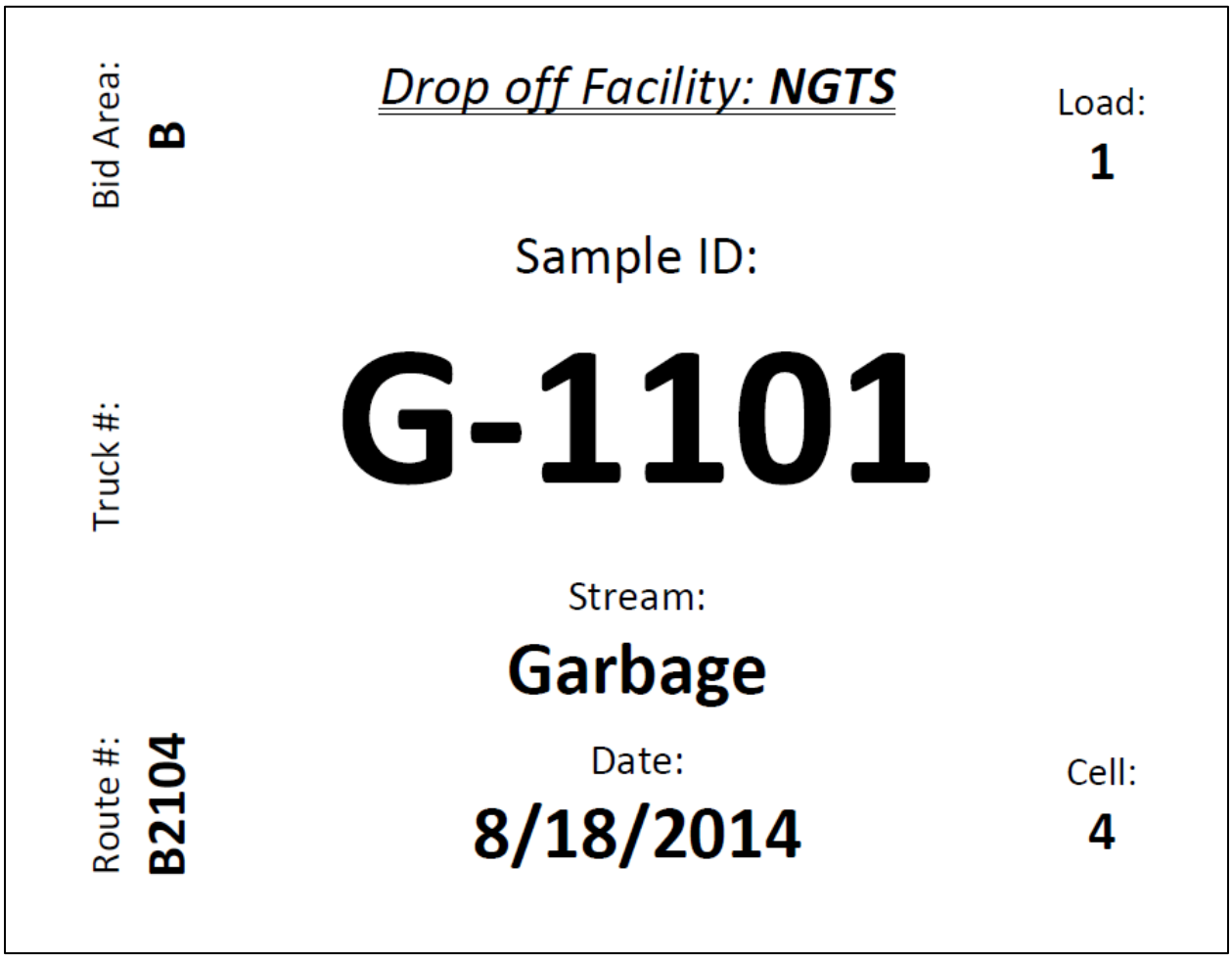


Figure 60. Example Material Weight Tally Sheet, Front

Tally Sheet - Page 1

2014 Phoenix Waste Composition Study

SAMPLE ID:		**DATE:**	
STREAM *(circle one)* **:**	**Garbage**		**Recycling**
FACILITY *(circle one)* **:**	**North Gateway**		**27th Ave**
ROUTE #:		**BID AREA:**	
TRUCK #:		**LOAD 1 or 2?:**	

PAPER	Newspaper				
	Plain OCC/Kraft Paper				
	Waxed OCC/Kraft Paper				
	High Grade Paper				
	Mixed Low-grade Paper				
	Milk/Juice Polycoat				
	Frozen Food Polycoats				
	Compostable/Food Soiled Paper				
	Paper/Other Materials				
PLASTIC	#1 PET Bottles				
	#1 PET Other Packaging				
	#2 HDPE Natural Bottles				
	#2 HDPE Colored Bottles				
	#2 HDPE Other Packaging				
	Other Rigid Packaging				
	Expanded Polystyrene				
	Compostable Plastics				
	Grocery/Bread Bags				
	Other Clean Consumer Product Bags				
	Garbage Bags				
	Other Film				
	Mixed Rigid Plastics				
	Plastic/Other Materials				
GLASS	Glass Beverage Containers				
	Fluorescent Tubes				
	Other Glass				

METAL	Aluminum Cans				
	Aluminum Foil/Containers				
	Other Nonferrous				
	Tin Food Cans				
	Empty Aerosol Cans				
	Other Ferrous				
	Oil filters				
	Mixed Metals/Material				
ORGANIC	Leaves & Grass				
	Unaccepted Yard Waste				
	Prunings Less than 2"				
	Prunings 2" to 12"				
	Prunings Greater than 12"				
	Purchased Food				
	Homegrown Food				
	Beverages and Liquids				
OTHER MATERIALS	Textiles				
	Carpet/Upholstery				
	Leather				
	Disposable Diapers				
	Animal By-products				
	Rubber Products				
	Tires				
	Ash				
	Furniture				
	Mattresses				
	Small Appliances				
	CRT's				
	Other Electronics				
	Ceramics/Porcelain				
	Non-distinct Fines				
	Miscellaneous Organics				
	Misce3llaneous Inorganics				

Revised 08/08/14

Figure 61. Example Material Weight Tally Sheet, Back

2014 Phoenix Waste Composition Study

Tally Sheet - Page 2

CONSTRUCTION AND DEMOLITION WASTES	Dimension Lumber				
	Pallets/Crates				
	Treated Wood				
	Contaminated Wood				
	New Gypsum Scrap				
	Demo Gypsum Scrap				
	Insulation				
	Rock/Concrete/Bricks				
	Asphaltic Roofing				
	Other Construction Debris				

HOUSEHOLD HAZARDOUS	Latex Paint				
	Hazardous Adhesives/Glues				
	Non-hazardous Adhesives/Glues				
	Oil-based Paint/Solvent				
	Hazardous Cleaners				
	Pesticides/Herbicides				
	Non-rechargeable Dry-cell Batteries				
	Rechargeable Dry-cell Batteries				
	Wet-cell Batteries				
	Asbestos				
	Explosives				
	Vehicle and Equipment Fluids				
	Pool Chemicals				
	Other Hazardous Chemicals				
	Other Non-hazardous Chemicals				

NOTES:

Revised 08/08/14

Appendix G: Complete List of Selected Routes

Table 122. Selected Garbage Routes

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/18	B	West Region (Glenrosa)	Monday	B2104	1	NGTS	No	N/A	Garbage
8/18	B	West Region (Glenrosa)	Monday	B2106	1	NGTS	No	N/A	Garbage
8/18	B	West Region (Glenrosa)	Monday	B2107	1	NGTS	No	N/A	Garbage
8/18	C	North Region (Union Hills)	Monday	C2103	1	NGTS	No	N/A	Garbage
8/18	C	North Region (Union Hills)	Monday	C2108	2	NGTS	No	N/A	Garbage
8/18	C	North Region (Union Hills)	Monday	C2110	2	NGTS	No	N/A	Garbage
8/18	E	East Region (Okemah)	Monday	E2105	1	27th Ave	Yes	NGTS	Garbage
8/18	I	North Region (Union Hills)	Monday	I2102	1	NGTS	No	N/A	Garbage
8/18	I	North Region (Union Hills)	Monday	I2105	1	NGTS	No	N/A	Garbage
8/18	I	North Region (Union Hills)	Monday	I2106	1	NGTS	No	N/A	Garbage
8/18	J	North Region (Union Hills)	Monday	J2101	1	NGTS	No	N/A	Garbage
8/18	J	North Region (Union Hills)	Monday	J2102	2	NGTS	No	N/A	Garbage
8/18	J	North Region (Union Hills)	Monday	J2106	2	NGTS	No	N/A	Garbage
8/19	B	West Region (Glenrosa)	Tuesday	B3103	2	NGTS	No	N/A	Garbage
8/19	B	West Region (Glenrosa)	Tuesday	B3104	2	NGTS	No	N/A	Garbage
8/19	B	West Region (Glenrosa)	Tuesday	B3106	2	NGTS	No	N/A	Garbage
8/19	C	North Region (Union Hills)	Tuesday	C3105	1	NGTS	No	N/A	Garbage
8/19	C	North Region (Union Hills)	Tuesday	C3106	2	NGTS	No	N/A	Garbage
8/19	C	North Region (Union Hills)	Tuesday	C3109	2	NGTS	No	N/A	Garbage
8/19	D	East Region (Okemah)	Tuesday	D3103	1	27th Ave	Yes	NGTS	Garbage
8/19	F	East Region (Okemah)	Tuesday	F3104	1	27th Ave	Yes	NGTS	Garbage
8/19	I	North Region (Union Hills)	Tuesday	I3101	1	NGTS	No	N/A	Garbage
8/19	I	North Region (Union Hills)	Tuesday	I3103	2	NGTS	No	N/A	Garbage
8/19	I	North Region (Union Hills)	Tuesday	I3106	2	NGTS	No	N/A	Garbage
8/19	J	North Region (Union Hills)	Tuesday	J3101	1	NGTS	No	N/A	Garbage
8/19	J	North Region (Union Hills)	Tuesday	J3105	1	NGTS	No	N/A	Garbage
8/19	J	North Region (Union Hills)	Tuesday	J3106	2	NGTS	No	N/A	Garbage
8/20	B	West Region (Glenrosa)	Wednesday	B4105	2	NGTS	No	N/A	Garbage
8/20	B	West Region (Glenrosa)	Wednesday	B4107	1	NGTS	No	N/A	Garbage
8/20	B	West Region (Glenrosa)	Wednesday	B4108	2	NGTS	No	N/A	Garbage
8/20	C	North Region (Union Hills)	Wednesday	C4102	2	NGTS	No	N/A	Garbage
8/20	C	North Region (Union Hills)	Wednesday	C4105	2	NGTS	No	N/A	Garbage
8/20	C	North Region (Union Hills)	Wednesday	C4108	1	NGTS	No	N/A	Garbage
8/20	G	South Region (Salt River)	Wednesday	G4101	1	27th Ave	Yes	NGTS	Garbage
8/20	H	South Region (Salt River)	Wednesday	H4106	1	27th Ave	Yes	NGTS	Garbage
8/20	I	North Region (Union Hills)	Wednesday	I4102	1	NGTS	No	N/A	Garbage
8/20	I	North Region (Union Hills)	Wednesday	I4103	1	NGTS	No	N/A	Garbage
8/20	I	North Region (Union Hills)	Wednesday	I4104	2	NGTS	No	N/A	Garbage
8/20	J	North Region (Union Hills)	Wednesday	J4102	1	NGTS	No	N/A	Garbage
8/20	J	North Region (Union Hills)	Wednesday	J4103	2	NGTS	No	N/A	Garbage
8/20	J	North Region (Union Hills)	Wednesday	J4106	1	NGTS	No	N/A	Garbage

Table 122. Selected Garbage Routes, continued

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/21	B	West Region (Glenrosa)	Thursday	B5102	1	NGTS	No	N/A	Garbage
8/21	B	West Region (Glenrosa)	Thursday	B5104	1	NGTS	No	N/A	Garbage
8/21	B	West Region (Glenrosa)	Thursday	B5109	1	NGTS	No	N/A	Garbage
8/21	C	North Region (Union Hills)	Thursday	C5102	1	NGTS	No	N/A	Garbage
8/21	C	North Region (Union Hills)	Thursday	C5106	2	NGTS	No	N/A	Garbage
8/21	C	North Region (Union Hills)	Thursday	C5107	2	NGTS	No	N/A	Garbage
8/21	E	East Region (Okemah)	Thursday	E5109	1	27th Ave	Yes	NGTS	Garbage
8/21	F	East Region (Okemah)	Thursday	F5102	1	27th Ave	Yes	NGTS	Garbage
8/21	I	North Region (Union Hills)	Thursday	I5104	1	NGTS	No	N/A	Garbage
8/21	I	North Region (Union Hills)	Thursday	I5105	2	NGTS	No	N/A	Garbage
8/21	I	North Region (Union Hills)	Thursday	I5106	2	NGTS	No	N/A	Garbage
8/21	J	North Region (Union Hills)	Thursday	J5103	1	NGTS	No	N/A	Garbage
8/21	J	North Region (Union Hills)	Thursday	J5104	1	NGTS	No	N/A	Garbage
8/21	J	North Region (Union Hills)	Thursday	J5106	2	NGTS	No	N/A	Garbage
8/22	A	West Region (Glenrosa)	Friday	A6106	1	27th Ave	Yes	NGTS	Garbage
8/22	B	West Region (Glenrosa)	Friday	B6102	1	NGTS	No	N/A	Garbage
8/22	B	West Region (Glenrosa)	Friday	B6106	1	NGTS	No	N/A	Garbage
8/22	B	West Region (Glenrosa)	Friday	B6108	1	NGTS	No	N/A	Garbage
8/22	C	North Region (Union Hills)	Friday	C6103	2	NGTS	No	N/A	Garbage
8/22	C	North Region (Union Hills)	Friday	C6104	2	NGTS	No	N/A	Garbage
8/22	C	North Region (Union Hills)	Friday	C6105	1	NGTS	No	N/A	Garbage
8/22	D	East Region (Okemah)	Friday	D6102	1	NGTS	No	N/A	Garbage
8/22	D	East Region (Okemah)	Friday	D6103	1	NGTS	No	N/A	Garbage
8/22	D	East Region (Okemah)	Friday	D6107	2	NGTS	No	N/A	Garbage
8/22	H	South Region (Salt River)	Friday	H6106	1	27th Ave	Yes	NGTS	Garbage
8/22	I	North Region (Union Hills)	Friday	I6101	2	NGTS	No	N/A	Garbage
8/22	I	North Region (Union Hills)	Friday	I6104	1	NGTS	No	N/A	Garbage
8/22	I	North Region (Union Hills)	Friday	I6105	1	NGTS	No	N/A	Garbage
8/22	J	North Region (Union Hills)	Friday	J6104	2	NGTS	No	N/A	Garbage
8/22	J	North Region (Union Hills)	Friday	J6105	2	NGTS	No	N/A	Garbage
8/22	J	North Region (Union Hills)	Friday	J6106	2	NGTS	No	N/A	Garbage
8/25	A	West Region (Glenrosa)	Monday	A2101	1	27th Ave	No	N/A	Garbage
8/25	A	West Region (Glenrosa)	Monday	A2103	1	27th Ave	No	N/A	Garbage
8/25	A	West Region (Glenrosa)	Monday	A2104	1	27th Ave	No	N/A	Garbage
8/25	D	East Region (Okemah)	Monday	D2103	1	27th Ave	No	N/A	Garbage
8/25	D	East Region (Okemah)	Monday	D2106	2	27th Ave	No	N/A	Garbage
8/25	D	East Region (Okemah)	Monday	D2107	2	27th Ave	No	N/A	Garbage
8/25	E	East Region (Okemah)	Monday	E2102	2	27th Ave	No	N/A	Garbage
8/25	E	East Region (Okemah)	Monday	E2109	2	27th Ave	No	N/A	Garbage
8/25	F	East Region (Okemah)	Monday	F2101	2	27th Ave	No	N/A	Garbage
8/25	F	East Region (Okemah)	Monday	F2103	1	27th Ave	No	N/A	Garbage
8/25	F	East Region (Okemah)	Monday	F2107	2	27th Ave	No	N/A	Garbage

Table 122. Selected Garbage Routes, continued

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/25	G	South Region (Salt River)	Monday	G2102	2	27th Ave	No	N/A	Garbage
8/25	G	South Region (Salt River)	Monday	G2105	1	27th Ave	Yes	NGTS	Garbage
8/25	G	South Region (Salt River)	Monday	G2106	2	27th Ave	No	N/A	Garbage
8/25	H	South Region (Salt River)	Monday	H2104	1	27th Ave	No	N/A	Garbage
8/25	H	South Region (Salt River)	Monday	H2105	1	27th Ave	No	N/A	Garbage
8/25	H	South Region (Salt River)	Monday	H2108	2	27th Ave	No	N/A	Garbage
8/26	A	West Region (Glenrosa)	Tuesday	A3103	1	27th Ave	No	N/A	Garbage
8/26	A	West Region (Glenrosa)	Tuesday	A3106	1	27th Ave	No	N/A	Garbage
8/26	A	West Region (Glenrosa)	Tuesday	A3107	2	27th Ave	No	N/A	Garbage
8/26	D	East Region (Okemah)	Tuesday	D3102	1	27th Ave	No	N/A	Garbage
8/26	D	East Region (Okemah)	Tuesday	D3105	2	27th Ave	No	N/A	Garbage
8/26	E	East Region (Okemah)	Tuesday	E3105	1	27th Ave	No	N/A	Garbage
8/26	E	East Region (Okemah)	Tuesday	E3106	1	27th Ave	No	N/A	Garbage
8/26	E	East Region (Okemah)	Tuesday	E3107	1	27th Ave	No	N/A	Garbage
8/26	F	East Region (Okemah)	Tuesday	F3101	1	27th Ave	No	N/A	Garbage
8/26	F	East Region (Okemah)	Tuesday	F3103	1	27th Ave	No	N/A	Garbage
8/26	G	South Region (Salt River)	Tuesday	G3101	1	27th Ave	No	N/A	Garbage
8/26	G	South Region (Salt River)	Tuesday	G3103	1	27th Ave	No	N/A	Garbage
8/26	G	South Region (Salt River)	Tuesday	G3104	2	27th Ave	No	N/A	Garbage
8/26	H	South Region (Salt River)	Tuesday	H3106	1	27th Ave	No	N/A	Garbage
8/26	H	South Region (Salt River)	Tuesday	H3107	2	27th Ave	No	N/A	Garbage
8/26	H	South Region (Salt River)	Tuesday	H3108	2	27th Ave	No	N/A	Garbage
8/27	A	West Region (Glenrosa)	Wednesday	A4102	2	27th Ave	No	N/A	Garbage
8/27	A	West Region (Glenrosa)	Wednesday	A4104	2	27th Ave	No	N/A	Garbage
8/27	A	West Region (Glenrosa)	Wednesday	A4105	2	27th Ave	No	N/A	Garbage
8/27	D	East Region (Okemah)	Wednesday	D4101	1	27th Ave	No	N/A	Garbage
8/27	D	East Region (Okemah)	Wednesday	D4104	2	27th Ave	No	N/A	Garbage
8/27	D	East Region (Okemah)	Wednesday	D4109	1	27th Ave	No	N/A	Garbage
8/27	E	East Region (Okemah)	Wednesday	E4102	1	27th Ave	No	N/A	Garbage
8/27	E	East Region (Okemah)	Wednesday	E4104	2	27th Ave	No	N/A	Garbage
8/27	E	East Region (Okemah)	Wednesday	E4105	1	27th Ave	No	N/A	Garbage
8/27	F	East Region (Okemah)	Wednesday	F4102	2	27th Ave	No	N/A	Garbage
8/27	F	East Region (Okemah)	Wednesday	F4106	2	27th Ave	No	N/A	Garbage
8/27	F	East Region (Okemah)	Wednesday	F4107	2	27th Ave	No	N/A	Garbage
8/27	G	South Region (Salt River)	Wednesday	G4105	2	27th Ave	No	N/A	Garbage
8/27	G	South Region (Salt River)	Wednesday	G4107	1	27th Ave	No	N/A	Garbage
8/27	H	South Region (Salt River)	Wednesday	H4107	2	27th Ave	No	N/A	Garbage
8/27	H	South Region (Salt River)	Wednesday	H4109	2	27th Ave	No	N/A	Garbage

Table 122. Selected Garbage Routes, continued

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/28	A	West Region (Glenrosa)	Thursday	A5102	2	27th Ave	No	N/A	Garbage
8/28	A	West Region (Glenrosa)	Thursday	A5105	1	27th Ave	No	N/A	Garbage
8/28	A	West Region (Glenrosa)	Thursday	A5107	2	27th Ave	No	N/A	Garbage
8/28	D	East Region (Okemah)	Thursday	D5101	1	27th Ave	No	N/A	Garbage
8/28	D	East Region (Okemah)	Thursday	D5103	1	27th Ave	No	N/A	Garbage
8/28	D	East Region (Okemah)	Thursday	D5105	2	27th Ave	No	N/A	Garbage
8/28	E	East Region (Okemah)	Thursday	E5101	1	27th Ave	No	N/A	Garbage
8/28	E	East Region (Okemah)	Thursday	E5105	1	27th Ave	No	N/A	Garbage
8/28	F	East Region (Okemah)	Thursday	F5104	1	27th Ave	No	N/A	Garbage
8/28	F	East Region (Okemah)	Thursday	F5105	1	27th Ave	No	N/A	Garbage
8/28	G	South Region (Salt River)	Thursday	G5102	1	27th Ave	No	N/A	Garbage
8/28	G	South Region (Salt River)	Thursday	G5107	1	27th Ave	No	N/A	Garbage
8/28	G	South Region (Salt River)	Thursday	G5108	1	27th Ave	No	N/A	Garbage
8/28	H	South Region (Salt River)	Thursday	H5101	1	27th Ave	No	N/A	Garbage
8/28	H	South Region (Salt River)	Thursday	H5104	1	27th Ave	No	N/A	Garbage
8/28	H	South Region (Salt River)	Thursday	H5106	2	27th Ave	No	N/A	Garbage
8/29	A	West Region (Glenrosa)	Friday	A6101	1	27th Ave	No	N/A	Garbage
8/29	A	West Region (Glenrosa)	Friday	A6104	2	27th Ave	No	N/A	Garbage
8/29	E	East Region (Okemah)	Friday	E6103	2	27th Ave	No	N/A	Garbage
8/29	E	East Region (Okemah)	Friday	E6106	1	27th Ave	No	N/A	Garbage
8/29	E	East Region (Okemah)	Friday	E6109	2	27th Ave	No	N/A	Garbage
8/29	F	East Region (Okemah)	Friday	F6101	1	27th Ave	No	N/A	Garbage
8/29	F	East Region (Okemah)	Friday	F6102	2	27th Ave	No	N/A	Garbage
8/29	F	East Region (Okemah)	Friday	F6104	2	27th Ave	No	N/A	Garbage
8/29	G	South Region (Salt River)	Friday	G6102	2	27th Ave	No	N/A	Garbage
8/29	G	South Region (Salt River)	Friday	G6103	2	27th Ave	No	N/A	Garbage
8/29	G	South Region (Salt River)	Friday	G6105	1	27th Ave	No	N/A	Garbage
8/29	H	South Region (Salt River)	Friday	H6103	1	27th Ave	No	N/A	Garbage
8/29	H	South Region (Salt River)	Friday	H6107	1	27th Ave	No	N/A	Garbage

Table 123. Selected Recycling Routes

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/22	B	West Region (Glenrosa)	Friday	B6202	1	NGTS	No	N/A	recycle
8/22	B	West Region (Glenrosa)	Friday	B6206	1	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6203	2	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6204	2	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6205	1	NGTS	No	N/A	recycle
8/22	D	East Region (Okemah)	Friday	D6202	1	NGTS	No	N/A	recycle
8/22	D	East Region (Okemah)	Friday	D6203	1	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6201	2	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6204	1	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6205	1	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6204	2	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6205	2	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6206	2	NGTS	No	N/A	recycle
8/25	A	West Region (Glenrosa)	Monday	A2201	1	27th Ave	No	N/A	recycle
8/25	A	West Region (Glenrosa)	Monday	A2203	1	27th Ave	No	N/A	recycle
8/25	D	East Region (Okemah)	Monday	D2203	1	27th Ave	No	N/A	recycle
8/25	D	East Region (Okemah)	Monday	D2206	2	27th Ave	No	N/A	recycle
8/25	E	East Region (Okemah)	Monday	E2202	2	27th Ave	No	N/A	recycle
8/25	E	East Region (Okemah)	Monday	E2205	1	27th Ave	No	N/A	recycle
8/25	F	East Region (Okemah)	Monday	F2201	2	27th Ave	No	N/A	recycle
8/25	F	East Region (Okemah)	Monday	F2203	1	27th Ave	No	N/A	recycle
8/25	G	South Region (Salt River)	Monday	G2203	2	27th Ave	No	N/A	recycle
8/25	H	South Region (Salt River)	Monday	H2202	1	27th Ave	No	N/A	recycle
8/25	H	South Region (Salt River)	Monday	H2205	1	27th Ave	No	N/A	recycle
8/26	A	West Region (Glenrosa)	Tuesday	A3203	1	27th Ave	No	N/A	recycle
8/26	A	West Region (Glenrosa)	Tuesday	A3206	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3202	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3203	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3205	2	27th Ave	No	N/A	recycle
8/26	E	East Region (Okemah)	Tuesday	E3205	1	27th Ave	No	N/A	recycle
8/26	E	East Region (Okemah)	Tuesday	E3206	1	27th Ave	No	N/A	recycle
8/26	F	East Region (Okemah)	Tuesday	F3201	1	27th Ave	No	N/A	recycle
8/26	F	East Region (Okemah)	Tuesday	F3203	1	27th Ave	No	N/A	recycle
8/26	G	South Region (Salt River)	Tuesday	G3203	1	27th Ave	No	N/A	recycle
8/26	G	South Region (Salt River)	Tuesday	G3204	2	27th Ave	No	N/A	recycle
8/26	H	South Region (Salt River)	Tuesday	H3203	1	27th Ave	No	N/A	recycle
8/26	H	South Region (Salt River)	Tuesday	H3206	1	27th Ave	No	N/A	recycle

Table 123. Selected Recycling Routes, continued

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/22	B	West Region (Glenrosa)	Friday	B6202	1	NGTS	No	N/A	recycle
8/22	B	West Region (Glenrosa)	Friday	B6206	1	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6203	2	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6204	2	NGTS	No	N/A	recycle
8/22	C	North Region (Union Hills)	Friday	C6205	1	NGTS	No	N/A	recycle
8/22	D	East Region (Okemah)	Friday	D6202	1	NGTS	No	N/A	recycle
8/22	D	East Region (Okemah)	Friday	D6203	1	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6201	2	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6204	1	NGTS	No	N/A	recycle
8/22	I	North Region (Union Hills)	Friday	I6205	1	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6204	2	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6205	2	NGTS	No	N/A	recycle
8/22	J	North Region (Union Hills)	Friday	J6206	2	NGTS	No	N/A	recycle
8/25	A	West Region (Glenrosa)	Monday	A2201	1	27th Ave	No	N/A	recycle
8/25	A	West Region (Glenrosa)	Monday	A2203	1	27th Ave	No	N/A	recycle
8/25	D	East Region (Okemah)	Monday	D2203	1	27th Ave	No	N/A	recycle
8/25	D	East Region (Okemah)	Monday	D2206	2	27th Ave	No	N/A	recycle
8/25	E	East Region (Okemah)	Monday	E2202	2	27th Ave	No	N/A	recycle
8/25	E	East Region (Okemah)	Monday	E2205	1	27th Ave	No	N/A	recycle
8/25	F	East Region (Okemah)	Monday	F2201	2	27th Ave	No	N/A	recycle
8/25	F	East Region (Okemah)	Monday	F2203	1	27th Ave	No	N/A	recycle
8/25	G	South Region (Salt River)	Monday	G2203	2	27th Ave	No	N/A	recycle
8/25	H	South Region (Salt River)	Monday	H2202	1	27th Ave	No	N/A	recycle
8/25	H	South Region (Salt River)	Monday	H2205	1	27th Ave	No	N/A	recycle
8/26	A	West Region (Glenrosa)	Tuesday	A3203	1	27th Ave	No	N/A	recycle
8/26	A	West Region (Glenrosa)	Tuesday	A3206	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3202	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3203	1	27th Ave	No	N/A	recycle
8/26	D	East Region (Okemah)	Tuesday	D3205	2	27th Ave	No	N/A	recycle
8/26	E	East Region (Okemah)	Tuesday	E3205	1	27th Ave	No	N/A	recycle
8/26	E	East Region (Okemah)	Tuesday	E3206	1	27th Ave	No	N/A	recycle
8/26	F	East Region (Okemah)	Tuesday	F3201	1	27th Ave	No	N/A	recycle
8/26	F	East Region (Okemah)	Tuesday	F3203	1	27th Ave	No	N/A	recycle
8/26	G	South Region (Salt River)	Tuesday	G3203	1	27th Ave	No	N/A	recycle
8/26	G	South Region (Salt River)	Tuesday	G3204	2	27th Ave	No	N/A	recycle
8/26	H	South Region (Salt River)	Tuesday	H3203	1	27th Ave	No	N/A	recycle
8/26	H	South Region (Salt River)	Tuesday	H3206	1	27th Ave	No	N/A	recycle

Table 123. Selected Recycling Routes, continued

Proposed Sampling Date	Bid Area	Region	Collection Day	Route	Load	Regular Transfer Station	Redirect	Redirect to	Material
8/27	A	West Region (Glenrosa)	Wednesday	A4202	2	27th Ave	No	N/A	recycle
8/27	A	West Region (Glenrosa)	Wednesday	A4204	2	27th Ave	No	N/A	recycle
8/27	A	West Region (Glenrosa)	Wednesday	A4205	2	27th Ave	No	N/A	recycle
8/27	D	East Region (Okemah)	Wednesday	D4201	1	27th Ave	No	N/A	recycle
8/27	D	East Region (Okemah)	Wednesday	D4204	2	27th Ave	No	N/A	recycle
8/27	E	East Region (Okemah)	Wednesday	E4202	1	27th Ave	No	N/A	recycle
8/27	E	East Region (Okemah)	Wednesday	E4204	2	27th Ave	No	N/A	recycle
8/27	E	East Region (Okemah)	Wednesday	E4205	1	27th Ave	No	N/A	recycle
8/27	F	East Region (Okemah)	Wednesday	F4206	2	27th Ave	No	N/A	recycle
8/27	G	South Region (Salt River)	Wednesday	G4201	1	27th Ave	No	N/A	recycle
8/27	G	South Region (Salt River)	Wednesday	G4205	2	27th Ave	No	N/A	recycle
8/27	H	South Region (Salt River)	Wednesday	H4204	1	27th Ave	No	N/A	recycle
8/28	A	West Region (Glenrosa)	Thursday	A5202	2	27th Ave	No	N/A	recycle
8/28	A	West Region (Glenrosa)	Thursday	A5205	1	27th Ave	No	N/A	recycle
8/28	D	East Region (Okemah)	Thursday	D5203	1	27th Ave	No	N/A	recycle
8/28	D	East Region (Okemah)	Thursday	D5205	2	27th Ave	No	N/A	recycle
8/28	E	East Region (Okemah)	Thursday	E5205	1	27th Ave	No	N/A	recycle
8/28	F	East Region (Okemah)	Thursday	F5202	1	27th Ave	No	N/A	recycle
8/28	F	East Region (Okemah)	Thursday	F5204	1	27th Ave	No	N/A	recycle
8/28	F	East Region (Okemah)	Thursday	F5205	1	27th Ave	No	N/A	recycle
8/28	G	South Region (Salt River)	Thursday	G5202	1	27th Ave	No	N/A	recycle
8/28	G	South Region (Salt River)	Thursday	G5204	1	27th Ave	No	N/A	recycle
8/28	H	South Region (Salt River)	Thursday	H5201	1	27th Ave	No	N/A	recycle
8/28	H	South Region (Salt River)	Thursday	H5204	1	27th Ave	No	N/A	recycle
8/28	H	South Region (Salt River)	Thursday	H5206	2	27th Ave	No	N/A	recycle
8/29	A	West Region (Glenrosa)	Friday	A6201	1	27th Ave	No	N/A	recycle
8/29	A	West Region (Glenrosa)	Friday	A6204	2	27th Ave	No	N/A	recycle
8/29	A	West Region (Glenrosa)	Friday	A6206	1	27th Ave	No	N/A	recycle
8/29	E	East Region (Okemah)	Friday	E6203	2	27th Ave	No	N/A	recycle
8/29	E	East Region (Okemah)	Friday	E6204	2	27th Ave	No	N/A	recycle
8/29	E	East Region (Okemah)	Friday	E6206	1	27th Ave	No	N/A	recycle
8/29	F	East Region (Okemah)	Friday	F6201	1	27th Ave	No	N/A	recycle
8/29	F	East Region (Okemah)	Friday	F6202	2	27th Ave	No	N/A	recycle
8/29	G	South Region (Salt River)	Friday	G6202	2	27th Ave	No	N/A	recycle
8/29	G	South Region (Salt River)	Friday	G6203	2	27th Ave	No	N/A	recycle
8/29	G	South Region (Salt River)	Friday	G6205	1	27th Ave	No	N/A	recycle
8/29	H	South Region (Salt River)	Friday	H6203	1	27th Ave	No	N/A	recycle
8/29	H	South Region (Salt River)	Friday	H6206	1	27th Ave	No	N/A	recycle

Appendix H: Detailed Tonnage Data

Table 124. Detailed Tonnage Summary

		2013							2014					
Commodity	**Area**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**Total**
Garbage	A	3,798	4,592	4,112	4,006	4,266	3,902	4,264	4,318	3,724	4,319	4,501	4,310	50,112
Recycle	A	715	826	798	866	918	881	1,014	1,004	852	954	972	957	10,756
Garbage	B	3,435	3,916	3,819	3,767	3,903	3,588	3,704	3,906	3,495	4,046	4,074	3,822	45,474
Recycle	B	869	927	881	898	983	904	1,084	1,030	844	941	958	957	11,277
Garbage	C	3,246	3,749	3,464	3,320	3,578	3,357	3,517	3,541	3,142	3,605	3,796	3,719	42,034
Recycle	C	1,077	1,153	1,147	1,095	1,213	1,203	1,396	1,277	1,050	1,166	1,239	1,255	14,270
Garbage	D	2,897	3,502	3,382	3,345	3,420	3,125	3,316	3,307	2,953	3,614	3,560	3,382	39,803
Recycle	D	763	836	796	825	929	879	1,032	989	818	769	906	879	10,421
Garbage	E	3,113	3,923	3,635	3,622	3,777	3,511	3,573	3,709	3,381	3,906	3,789	3,693	43,632
Recycle	E	644	701	691	666	823	741	836	769	661	724	792	792	8,841
Garbage	F	2,321	2,869	2,704	2,561	2,761	2,602	2,674	2,839	2,426	2,767	2,830	2,856	32,210
Recycle	F	771	868	851	794	840	873	1,012	964	772	851	770	880	10,244
Garbage	G	3,116	3,892	3,498	3,486	3,646	3,435	3,633	3,751	3,308	3,827	3,647	3,517	42,755
Recycle	G	610	706	664	630	675	690	758	734	627	695	699	715	8,203
Garbage	H	3,086	3,418	3,217	3,059	3,266	3,051	3,299	3,414	3,076	3,305	3,523	3,415	39,129
Recycle	H	615	830	801	766	828	785	939	793	747	861	863	859	9,685
Garbage	I	2,029	2,373	2,222	2,111	2,283	2,124	2,317	2,318	1,946	2,221	2,368	2,342	26,654
Recycle	I	685	760	727	713	798	764	904	841	696	765	814	788	9,254
Garbage	J	2,195	2,411	2,393	2,335	2,470	2,327	2,464	2,521	2,250	2,287	2,586	2,508	28,746
Recycle	J	691	742	725	703	748	712	864	819	676	738	740	771	8,929
Garbage Total		**29,236**	**34,643**	**32,446**	**31,610**	**33,369**	**31,022**	**32,761**	**33,624**	**29,702**	**33,896**	**34,674**	**33,563**	**390,548**
Recycle Total		**7,439**	**8,348**	**8,081**	**7,955**	**8,756**	**8,431**	**9,838**	**9,218**	**7,743**	**8,465**	**8,754**	**8,853**	**101,882**

Due to rounding in the tables, sums may not exactly match subtotals and totals shown.