WASTE CHARACTERIZATION REPORT

City of Portland Downtown Public Waste Sorts

2011

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Waste Characterization Report
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WASTE CHARACTERIZATION REPORT
City of Portland Downtown Public Waste Sorts

BACKGROUND

In September 2009, the City of Portland contracted with the Solid Waste Assessment Team from Community Environmental Services (CES) at Portland State University to conduct four waste sorts for four different geographic areas of downtown Portland. The collected waste was comprised of materials contained in 285 32- gallon public waste containers and represented one day (24 hours) of public usage.

In 2011 the City contracted CES to conduct waste sorts in four similar geographic areas to the 2009 sorts to determine the composition of landfill bound waste, as well as segregated materials collected in the recycling containers installed along the transit mall in March 2011. The transit mall is one of the four geographic areas. The waste was comprised of materials contained in 303 32- gallon public waste containers and 160 recycling containers. The waste and recycling represented one day (24 hours) of public usage. The geographic study areas were determined by the City of Portland staff and Trashco. The four area geographic boundaries for 2011 follow in Table 1.

Table 1. Geographic Boundaries of Four Study Areas

Area 1: Yamhill- Morrison Transit Corridor • N SW Morrison (both sides) • S SW Yamhill (both sides) • E SW 1st Ave (both sides) • W SW 12th Ave (both sides) Note: 5th and 6th Ave were not included.	**Area 2: 5th and 6th Transit Mall*** • N NW Irving (both sides) • S SW Jackson (both sides) • E 5th Ave (both sides) • W 6th Ave (both sides) • Note: SW Morrison and SW Yamhill note included
Area 3: Old Town Chinatown • N NW Everett (both sides) • S SW Alder (both sides) • E 1st Ave (both sides) • W 4th Ave (both sides)	**Area 4: 6th to 11th, Morrison to Burnside** • N NW Burnside (both sides) • S SW Morrison (all containers on Morrison are in Area 1) • E 6th Ave (all containers on SW 6th Ave are in Area 2) • W 11th Ave (both sides)

*In 2009, the northern boundary for Area 2 was Burnside. In 2011, the northern boundary of Area 2 extended from Burnside to Irving. In 2009 Area 2 served as a rail transit mall only. In 2011, Area 2 serves as a rail and bus transit mall.

In 2009 there were no public recycling containers along the transit mall. In the Spring of 2011, the City installed public recycling containers along the transit mall (Area 2). Refer to Figure 1 for examples of landfill bound waste and recycling containers present in each area.

Figure 1. Examples of Landfill Bound Waste and Recycling Containers Downtown Study Areas

Area 1 – Landfill Bound Waste Containers		Area 2 – Landfill Bound Waste and Recycling Containers	
SW 10th and Alder	SW 3rd and Yamhill	SW 5th and Main	SW 6th and Mill
Area 3 – Landfill Bound Waste Containers		**Area 4 – Landfill Bound Waste Containers**	
NW 3rd and Davis	SW 3rd and Oak	SW 10th and Morrison	SW Stark and Broadway

Recycling containers are designed to capture three separate streams of recycling: 1) Newspaper and Magazines, 2) Plastic Bottles and Metal Cans, 3) Glass Bottles. Each label has an image with text and stipulates that "No Cups" be placed in the bins (Figure 2.)

Figure 2. Recycling Receptacle Signage

2011 WASTE SORT METHODOLOGY

On September 21st, 22nd, 28th and 29th of 2011, the Solid Waste Assessment Services Team from CES sorted public landfill bound waste and recycling collected from the four geographic areas. All materials were collected by Trashco and delivered to Metro Central Transfer Station where the sorts were conducted. Six loads were collected and sorted separately on four separate days. The sorts included (4) four loads of landfill bound waste, (1) load of commingled recycling and (1) one load of glass recycling. Commingled recycling and glass recycling were collected in one truck but kept separate to be sorted separately. Typically, Trashco drivers remove visible glass out of the commingled recycling as they empty the containers. For this study, however, drivers were asked to leave the recycling bins 'as-is' to provide insight on recycling contamination levels. The recycling bins are designed to collect both glass and commingled recycling in one container. Each load represented one day (24 hours) of public usage. The waste sort and pick up schedule follows:

- 21 September, Wednesday - Area 1 (Yamhill-Morrison) Landfill Bound waste Sort
- 22 September, Thursday - Area 2 (5th & 6th) Landfill Bound, Commingled Recycling, and Glass Recycling Sorts
- 28 September, Wednesday - Area 3 (Old Chinatown) Landfill Bound Sort
- 29 September, Thursday - Area 4 (Morrison-Burnside) Landfill Bound Sort

The waste from the four landfill bound loads was sorted into fifteen material categories: corrugated cardboard, mixed papers, newspaper, asceptic cartons, glass bottles and jars, aluminum and tin cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper bags and waxed paper, other materials, plastic bags and liquid. Liquid was collected from containers in order to obtain more accurate measurements for the specific material so as to reduce skewing weight data. See Appendix A: Glossary of Sort Categories for more specific information of each material category.

The recycling sort included the fifteen material categories with an additional category for napkins, for a total of sixteen categories.

Sorts included bagged and loose waste. All bagged materials were subject to detailed hand sorting into the same categories.

A brief summary of each waste sort methodology follows:

- Area 1 – Landfill Bound Waste – the entire load was hand sorted, 100% of the load made up the sample.
- Area 2 – Commingled Recycling – the entire load was hand sorted, 100% of the load made up the sample.
- Area 2 – Glass Recycling – the entire load was hand sorted, 100% of the load made up the sample.
- Area 2 – Landfill Bound Waste - roughly one third of the load was hand sorted, a 30% sample was drawn and sorted.
- Area 3 – Landfill Bound Waste - roughly one third of the load was hand sorted, a 30% sample was drawn and sorted*.
- Area 4 – Landfill Bound Waste - the entire load was hand sorted, 100% of the load made up the sample.

*loads from area 1 and 4 (approximately 300 pounds each) were very homogeneous, supporting a smaller sample to be taken from area 2 and 3 (approximately 1,000 pounds each).

For each sort, all material categories were weighed, measured for volume, and data was cataloged. Volume and weight data area expressed by their true weight and volume and as a percent of the total load. Volume measurements are important to consider--materials with low weight measurements may occupy a larger percentage of the load when measured by volume. In addition, volume measurements should also be considered when materials such as papers absorb significant amounts of liquid which can misrepresent their true weight.

For additional details each area's sorting methodology, refer to Appendices A-G at the end of this document.

FINDINGS –DOWNTOWN LANDFILL BOUND WASTE SORTS

To obtain an overview of the total sort waste stream, the data from the four landfill bound sorts were combined to reveal an estimated composition of entire downtown study area. Weight data from the fifteen material categories sorted from the study area landfill bound containers are presented in Table 2. For more details on each material category, see the Glossary of Material Categories in Appendix A. To condense the general landfill bound waste composition of the study area, the fifteen material categories can be viewed as part of three general categories: Recyclables, Food Related Waste and Non- Recyclables. The general waste composition is described by weight and volume, as seen in Tables 2 and 3.

Table 2. Landfill Bound Weight Data for Areas 1, 2, 3 and 4

	Area 1		Area 2		Area 3		Area 4		Total	Total
Material Type	**Weight (lbs)**	**Weight Percent**	**Weight (lbs)**	**Weight Percent**	**Weight (lbs)**	**Weight Percent**	**Weight (lbs)**	**Weight Percent**	**Weight (lbs)**	**%**
Recyclables										
CORRUGATED CARDBOARD	10.4	4%	0.0	0%	34.7	8%	3.2	1%	48.4	3%
MIXED PAPERS	30.2	10%	7.5	2%	30.7	7%	21.7	6%	90.3	7%
ASCEPTIC CARTONS	1.1	0%	1.0	0%	1.2	0%	0.3	0%	3.5	0%
NEWSPAPER	16.9	6%	29.7	9%	25.6	6%	17.7	5%	90.1	7%
GLASS BOTTLES & JARS	18.1	6%	13.6	4%	24.5	6%	11.5	4%	67.9	5%
ALUMINUM & TIN CANS	3.1	1%	3.5	1%	7.5	2%	7.7	2%	21.9	2%
PLASTIC BOTTLES	10.3	4%	8.0	3%	10.2	3%	9.6	3%	38.1	3%
Total Recyclables	90.0	31%	63.2	19%	134.5	32%	71.7	21%	360.2	26%
Food Related Waste										
FOOD SCRAPS	29.2	10%	32.9	11%	46.1	11%	42.6	12%	151.2	11%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	21.6	7%	28.3	9%	37.1	9%	28.9	8%	116.1	8%
HOT DRINK CUPS	18.8	8%	16.3	5%	15.2	4%	25.9	8%	76.4	6%
COLD DRINK CUPS	20.1	7%	18.8	6%	9.8	2%	17.0	5%	65.9	5%
FOOD RELATED PAPER BAGS & WAX PAPER	8.8	3%	8.5	3%	13.0	3%	12.2	4%	42.5	3%
Total Food Related Waste	98.6	35%	104.8	34%	121.1	29%	126.6	37%	452.1	33%
Non-Recyclables										
OTHER MATERIALS	93.6	32%	139.1	44%	147.3	35%	120.3	35%	501.4	36%
PLASTIC BAGS	3.4	1%	5.5	2%	5.1	1%	6.4	2%	20.5	1%
LIQUID	3.3	1%	4.3	1%	10.8	3%	18.5	5%	36.9	3%
Total Non-Recyclables	100.3	34%	148.9	47%	163.2	39%	145.1	42%	558.7	41%
TOTAL	**288.9**	**100%**	**317.0**	**100%**	**418.8**	**100%**	**343.5**	**100%**	**1371.1**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

As illustrated in Table 2, recyclable materials contributed to 26% of the weight the load for all four landfill bound sorts (360.2/1,371.1 = 26%).

Volume data from the fifteen material categories sorted from the study area landfill bound containers are presented in Table 3.

Table 3. Landfill Bound Volume Data Areas 1, 2, 3 and 4

	Area 1		Area 2		Area 3		Area 4		Total	Total
Material Type	**Volume (# of Bins)**	**Volume Percent**	**Volume (# of Bins)**	**Volume Percent**	**Volume (# of Bins)**	**Volume Percent**	**Volume (# of Bins)**	**Volume Percent**	**Volume (# of Bins)**	**%**
Recyclables										
CORRUGATED CARDBOARD	2.0	5%	0.0	0%	4.0	9%	0.5	1%	6.5	4%
MIXED PAPERS	2.5	6%	1.0	3%	2.0	5%	3.0	6%	8.5	5%
ASCEPTIC CARTONS	0.5	1%	0.2	0%	0.2	0%	0.1	0%	0.9	1%
NEWSPAPER	1.0	3%	1.5	4%	1.8	4%	1.5	3%	5.8	3%
GLASS BOTTLES & JARS	0.5	1%	0.5	1%	0.8	2%	0.3	1%	2.0	1%
ALUMINUM & TIN CANS	0.9	2%	0.8	2%	2.0	5%	1.8	4%	5.5	3%
PLASTIC BOTTLES	2.1	5%	2.0	6%	2.5	6%	2.5	5%	9.1	5%
Total Recyclables	9.5	23%	5.9	16%	13.2	31%	9.6	20%	38.2	23%
Food Related Waste										
FOOD SCRAPS	0.6	2%	0.8	2%	1.0	2%	0.9	2%	3.3	2%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	6.0	15%	7.5	21%	8.0	18%	12.0	25%	33.5	20%
HOT DRINK CUPS	5.8	15%	4.0	11%	3.8	9%	8.2	17%	21.7	13%
COLD DRINK CUPS	8.7	22%	6.0	16%	4.0	9%	7.1	14%	25.8	15%
FOOD RELATED PAPER BAGS & WAX PAPER	1.8	5%	1.5	4%	0.8	2%	1.7	3%	5.8	3%
Total Food Related Waste	22.9	59%	19.8	54%	17.5	40%	29.9	61%	90.0	54%
Non-Recyclables										
OTHER MATERIALS	6.0	15%	10.0	27%	10.2	24%	8.2	17%	34.4	20%
PLASTIC BAGS	1.0	3%	1.0	3%	2.0	5%	1.0	2%	5.0	3%
LIQUID	0.0	0%	0.1	0%	0.1	0%	0.2	0%	0.4	0%
Total Non-Recyclables	7.0	18%	11.1	30%	12.3	29%	9.4	19%	39.8	24%
TOTAL	**39.4**	**100%**	**36.7**	**100%**	**43.0**	**100%**	**48.9**	**100%**	**168.0**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

As illustrated in Table 2, recyclable materials contributed to 23% of the weight the load for all four landfill bound sorts (38.2/168.0 = 26%).

Areas 1-4 combined landfill bound waste composition can be described as follows:

By Weight:
- Recyclables – 26%;
- Food Related Waste – 33%;
- Non-Recyclables – 41%.

By Volume:
- Recyclables – 23%;
- Food Related Waste– 54%;
- Non-Recyclables – 24%.

When waste composition is looked at by weight and volume for "Food Related Waste", for example, it is apparent that single use food related items-- hot and cold drink cups-- that have a low weight (33%) have a high volume (53%). Figures 3a and 3b show the combined landfill bound waste composition in percent by weight and volume of the downtown study areas.

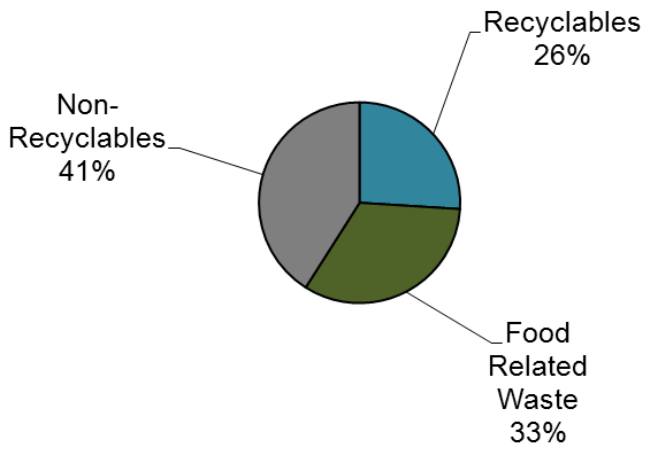


Figure 3a: Percentage of General Landfill Bound Waste Composition of Downtown Study Area by Weight

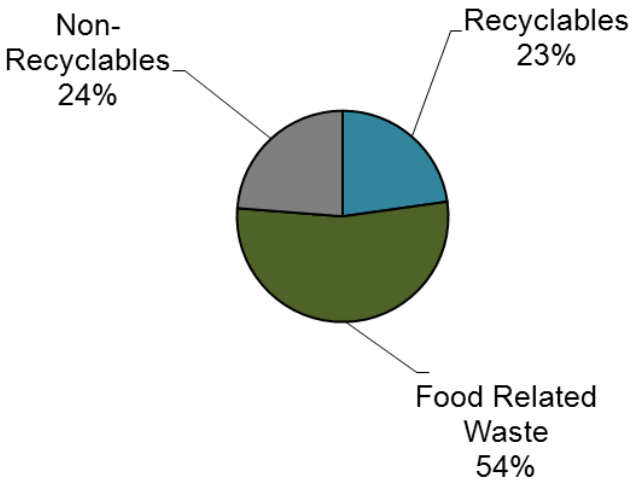


Figure 3b: Percentage of General Landfill Bound Waste Composition of Downtown Study Area by Volume

Figure 4a displays percent by weight of the general waste categories for areas 1-4. The graph below suggests that Area 2 had lower amounts of recyclable materials when compared to areas 1, 3 and 4. However, we also see low amounts of recyclable materials in area 4.This graph also shows that on average, a third of the landfill bound waste for each area consists of food related waste by weight.

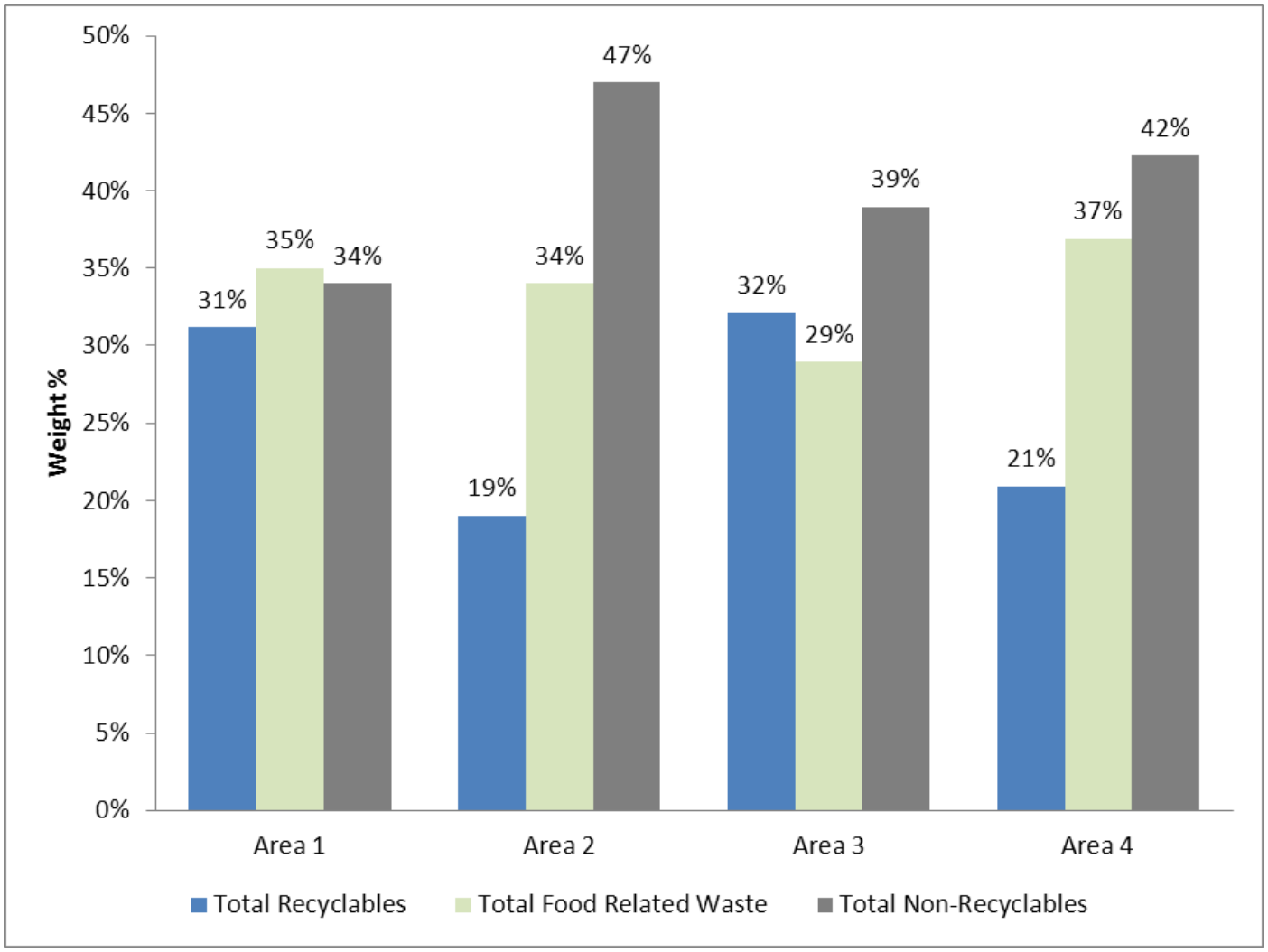


Figure 4a. Comparison of General Landfill Bound Waste Composition for all Areas by Weight.

Percent of volume of the general waste categories for each area is presented in Figure 4b. The volume data reveals that the food related waste such as single use food containers, and hot and cold drink cups contribute to the largest volume of the downtown landfill bound waste load. Recyclable materials and non-recyclables each contribute to less than a third of the volume.

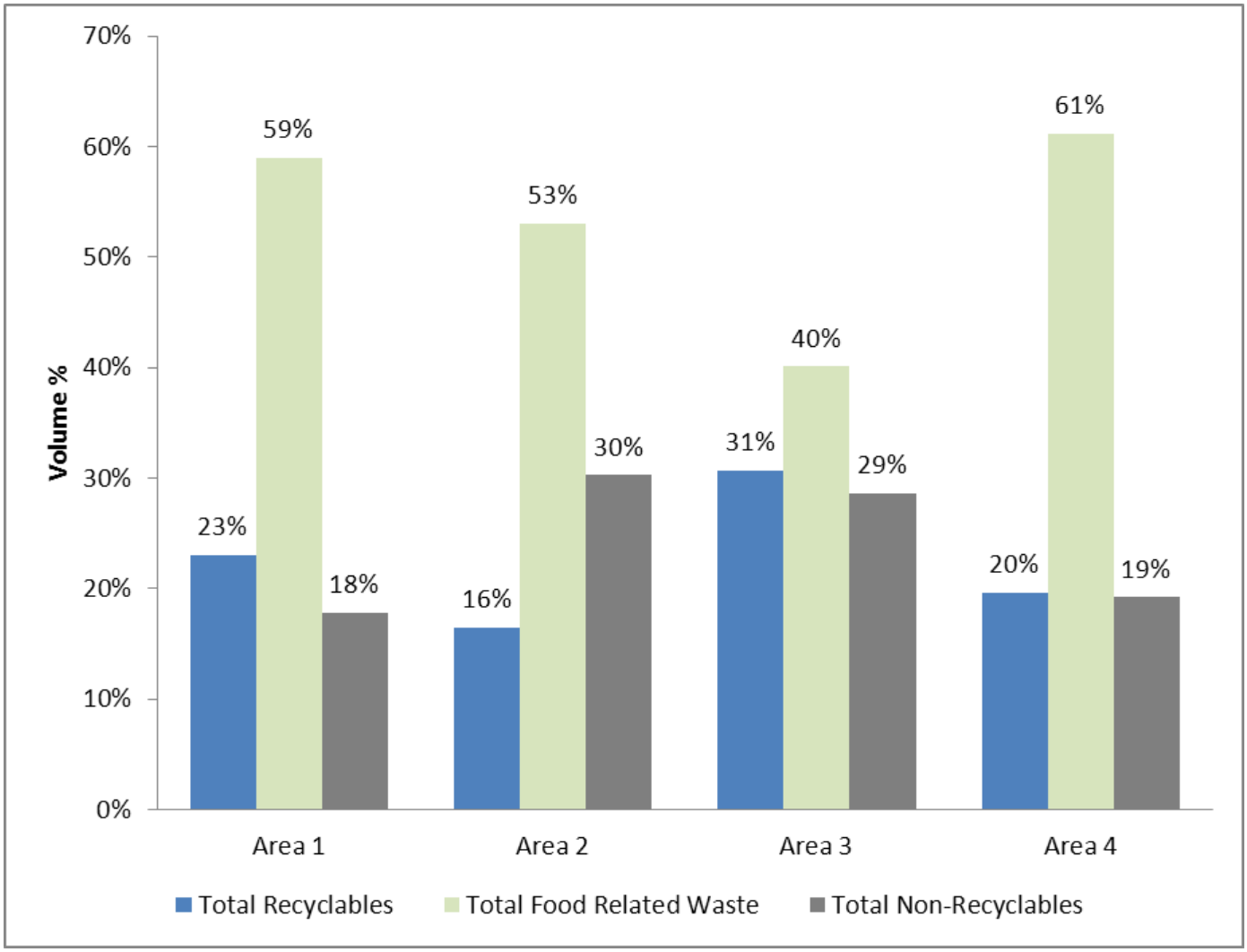


Figure 4b. Comparison of General Landfill Bound Waste Composition for all Areas by Volume.

Table 4 provides weight data from Area 2 and the aggregate of Areas 1, 3 and 4. The table shows that the landfill bound waste of Area 2 (by weight) consisted of 19% recyclable materials as compared to 28% of aggreted areas 1, 3 and 4. Food related waste contributed to 34% of Area 2's waste as compared to 33% of the aggregated areas 1, 3 and 4. Non recycleable waste contributed to 47% of Area 2's waste as compared to 39% of aggregated areas 1,3 and 4.

Table 4. Landfill bound Weight Data from Area 2 and an Aggregate of 1, 3 and 4.

	Area 2		Aggregate of Areas 1,3 & 4	
Material Type	**Weight (lbs)**	**Weight Percent**	**Weight (lbs)**	**Weight Percent**
Recyclables				
CORRUGATED CARDBOARD	0.0	0%	48.3	5%
MIXED PAPERS	7.5	2%	82.7	8%
ASCEPTIC CARTONS	1.0	0%	2.6	0%
NEWSPAPER	29.7	9%	60.2	6%
GLASS BOTTLES & JARS	13.6	4%	54.2	5%
ALUMINUM & TIN CANS	3.5	1%	18.3	2%
PLASTIC BOTTLES	8.0	3%	30.0	3%
Total Recyclables	63.2	19%	296.2	28%
Food Related Waste				
FOOD SCRAPS	32.9	11%	117.9	11%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	28.3	9%	87.6	8%
HOT DRINK CUPS	16.3	5%	59.9	6%
COLD DRINK CUPS	18.8	6%	46.9	4%
FOOD RELATED PAPER BAGS & WAX PAPER	8.5	3%	33.9	3%
Total Food Related Waste	104.8	34%	346.3	33%
Non-Recyclables				
OTHER MATERIALS	139.1	44%	361.2	34%
PLASTIC BAGS	5.5	2%	14.9	1%
LIQUID	4.3	1%	32.6	3%
Total Non-Recyclables	148.9	47%	408.6	39%
TOTAL	**317.0**	**100%**	**1051.1**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

Table 4 provides weight data from Area 2 and the aggregate of Areas 1, 3 and 4. The table shows that the landfill bound waste of Area 2 (by weight) consisted of 19% recyclable materials as compared to 28% of aggreted areas 1, 3 and 4. Food related waste contributed to 34% of Area 2's waste as compared to 33% of the aggregated areas 1, 3 and 4. Non recycleable waste contributed to 47% of Area 2's waste as compared to 39% of aggregated areas 1,3 and 4.

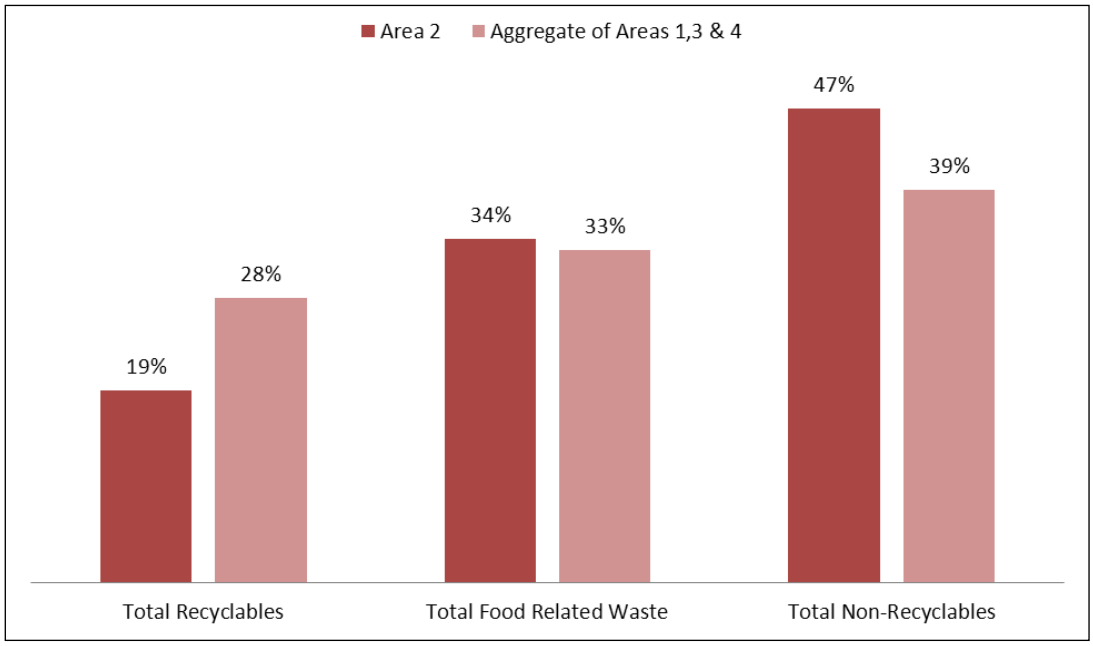
Table 5. Landfill Bound Volume Data from Area 2 and an Aggregate of Areas 1, 3 and 4.

	Area 2		Aggregate of Areas 1,3 & 4	
Material Type	**Volume (# of Bins)**	**Volume Percent**	**Volume (# of Bins)**	**Volume Percent**
Recyclables				
CORRUGATED CARDBOARD	0.0	0%	6.5	5%
MIXED PAPERS	1.0	3%	7.5	6%
ASCEPTIC CARTONS	0.2	0%	0.8	1%
NEWSPAPER	1.5	4%	4.3	3%
GLASS BOTTLES & JARS	0.5	1%	1.5	1%
ALUMINUM & TIN CANS	0.8	2%	4.7	4%
PLASTIC BOTTLES	2.0	6%	7.1	5%
Total Recyclables	5.9	16%	32.3	25%
Food Related Waste				
FOOD SCRAPS	0.8	2%	2.5	2%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	7.5	21%	26.0	20%
HOT DRINK CUPS	4.0	11%	17.7	13%
COLD DRINK CUPS	6.0	16%	19.8	15%
FOOD RELATED PAPER BAGS & WAX PAPER	1.5	4%	4.3	3%
Total Food Related Waste	19.8	53%	70.3	53%
Non-Recyclables				
OTHER MATERIALS	10.0	27%	24.4	19%
PLASTIC BAGS	1.0	3%	4.0	3%
LIQUID	0.1	0%	0.3	0%
Total Non-Recyclables	11.1	30%	28.7	22%
TOTAL	**36.7**	**100%**	**131.3**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

Figure 5 and 6 display the percent of weight and volume data from Area 2 and the aggregate of Areas 1, 3 and 4.

Figure 5. Comparison of Area 2 and Aggregate of Area's 1, 3 & 4 by Weight



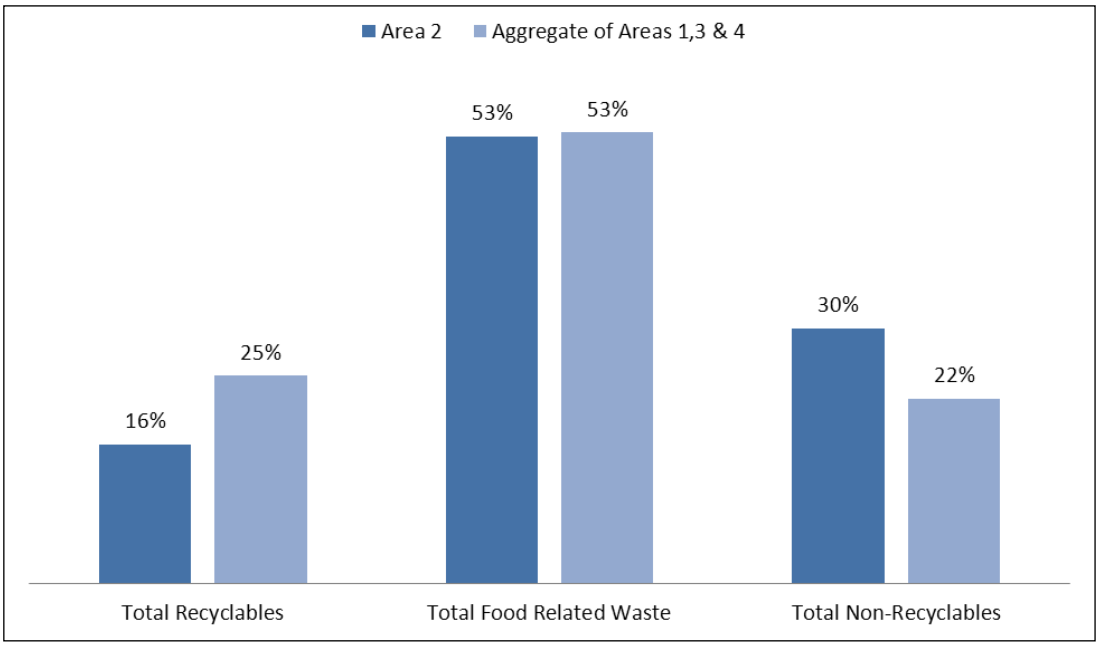


Figure 6. Comparison of Area 2 and Aggregate of Area's 1, 3 & 4 by Volume

OVERALL FINDINGS FROM THE 2011 DOWNTOWN STUDY AREA

The four loads comprised of homogeneous mixes with some variations from area to area, see Tables 1 and 2.

Recyclable Materials:

An estimated 26% (by weight) of the materials found in the landfill bound waste are currently recyclable in the Region's two stream recycling system. Ten percent of that weight is corrugated cardboard and mixed paper. It should be noted that much of the corrugated cardboard and mixed paper appeared to be generated from commercial waste. Those materials are not currently stipulated by the signage on the recycling containers found in area 2 as accepted materials. However, this is an indication that a significant amount of additional waste could be diverted into the recycling stream.

Food Related Waste:

An estimated 33% (452 pounds) of food related waste contributed to the waste composition of the landfill bound waste in the four study areas. These same materials contributed to over half of the waste composition by volume (54%).

Non Recyclables:

All loads were comprised of loose waste and bagged waste. Bagged waste included materials presumed to be generated by "Clean and Safe" downtown janitorial, street vendors, personal waste, and illegal dumping. The presence of shredded papers, bathroom waste, kitchen waste, and sales receipts provided evidence of bagged retail waste. Area 3 contained higher volumes of bagged waste, see Appendix F: Area 3 Waste Sort - Landfill bound Waste for further details.

COMPARISONS OF TOTAL LANDFILL BOUND WASTE DATA FROM YEAR 2009 AND 2011

To compare the waste composition from year 2009 and 2011, Figures 5 and 6 from the 2009 Waste Characterization Report have been incorporated in this report. Figure 7 presents the specific material categories from the downtown study area of 2009 and 2011 waste sorts in percent of total by weight. Consider the following differences in the material categories from year 2009 data to 2011:

- Recyclable Materials are the same for both years, with the exception that Newspapers were part of Mixed Papers in 2009.
- Food Related Paper Bags and Wax Paper were added to the Food Related waste in 2011 and would have been part of Non Recycled waste in 2009.
- Plastic Bags and Liquid would have been placed in the Non- Recyclable material category in 2009.
- In 2011, the Non-Recyclable material category was renamed as Other Materials.

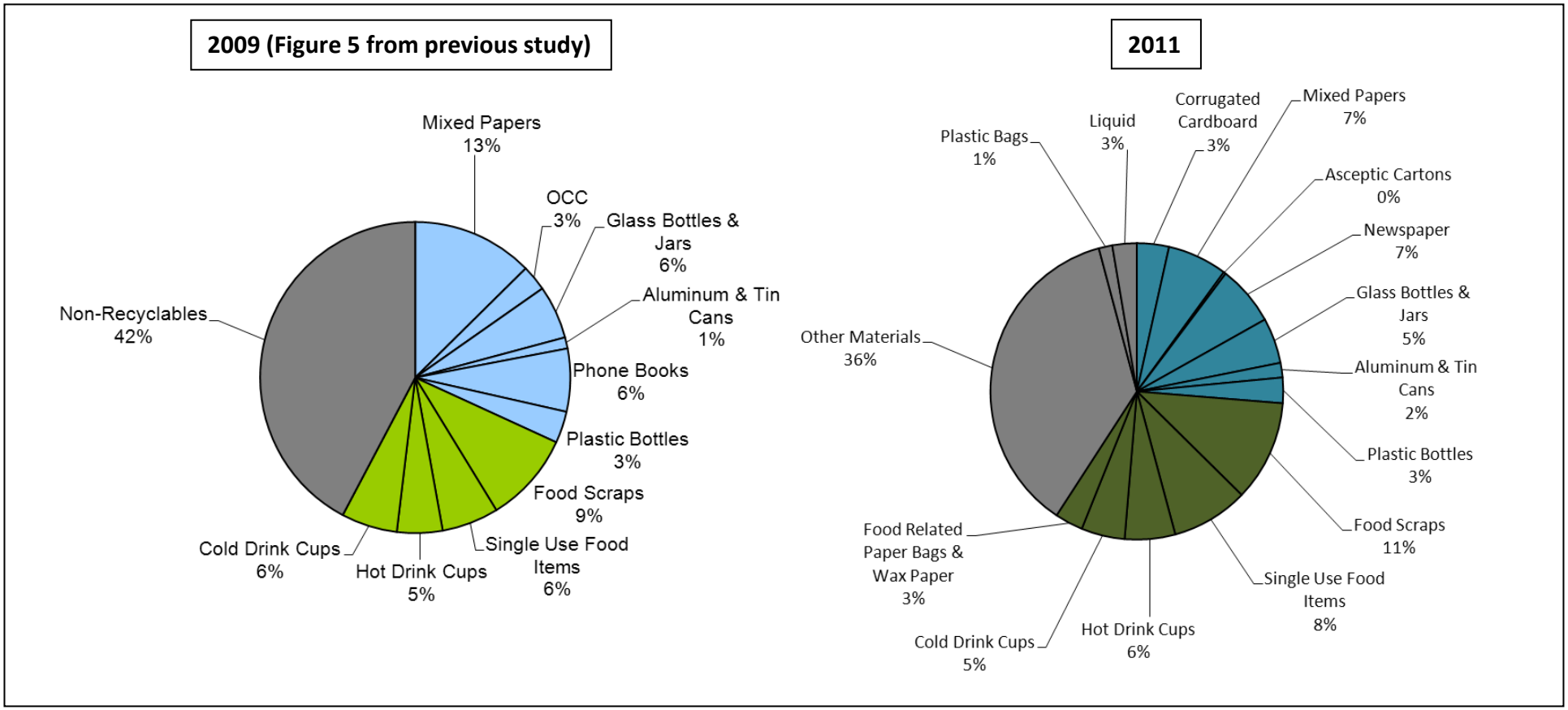


Figure 7: 2009 and 2011 Specific Material Category Landfill Bound Waste Composition from all Study Areas by Weight

Figure 8 presents the specific material categories from the downtown study area of 2009 and 2011 waste sorts by volume.

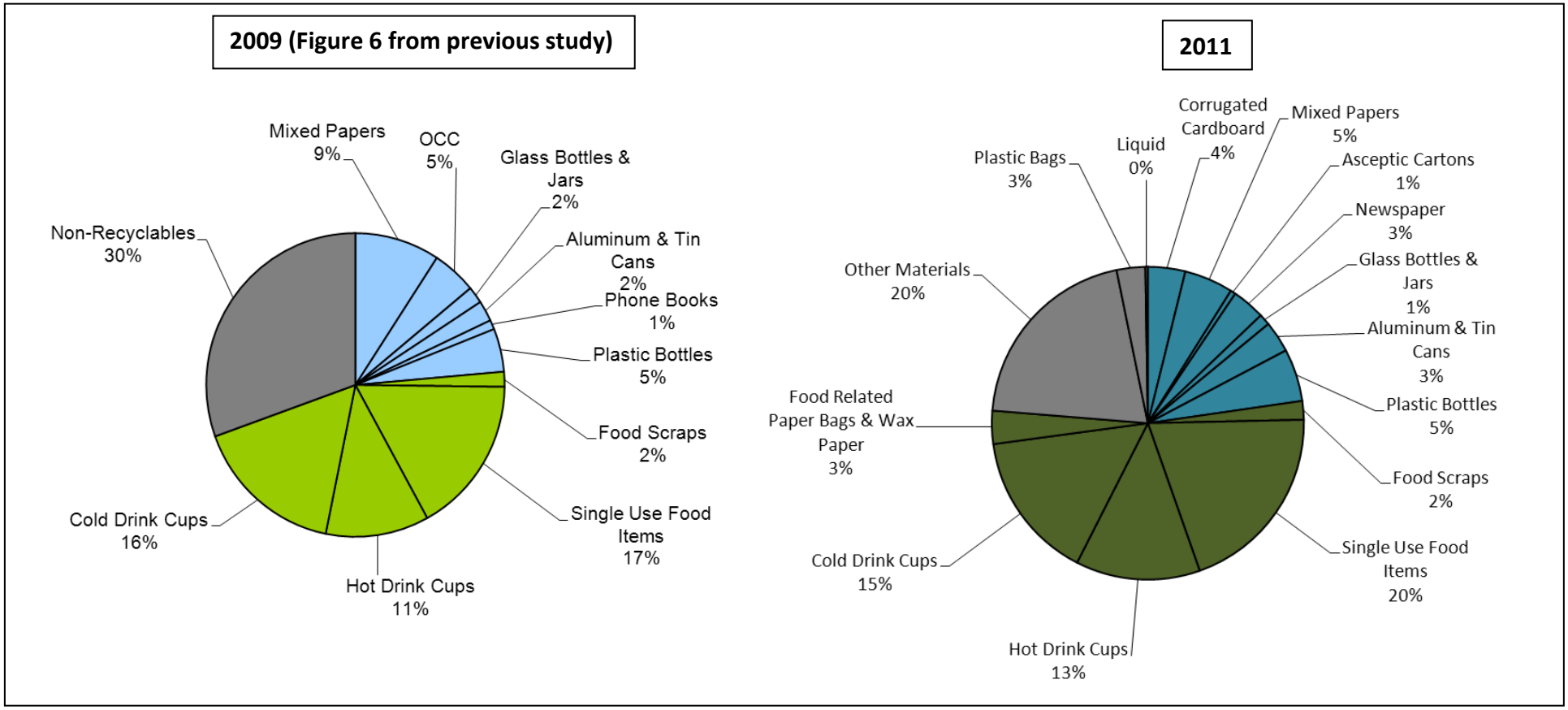


Figure 8: 2009 and 2011 Specific Material Category Landfill Bound Waste Composition from all Study Areas by Volume

COMPARISONS OF AREA 2 LANDFILL BOUND WASTE DATA FROM YEAR 2009 AND 2011

To compare the waste composition of Area 2 from year 2009 and 2011, Figures 23 and 24 from the 2009 Waste Characterization Report have been incorporated in this report. Figure 9 present the general material categories from 2009 and 2011 waste sorts of Area 2 by weight. Figure 10 presents the general material categories from the 2009 and 2011 waste sorts of Area 2 by volume.

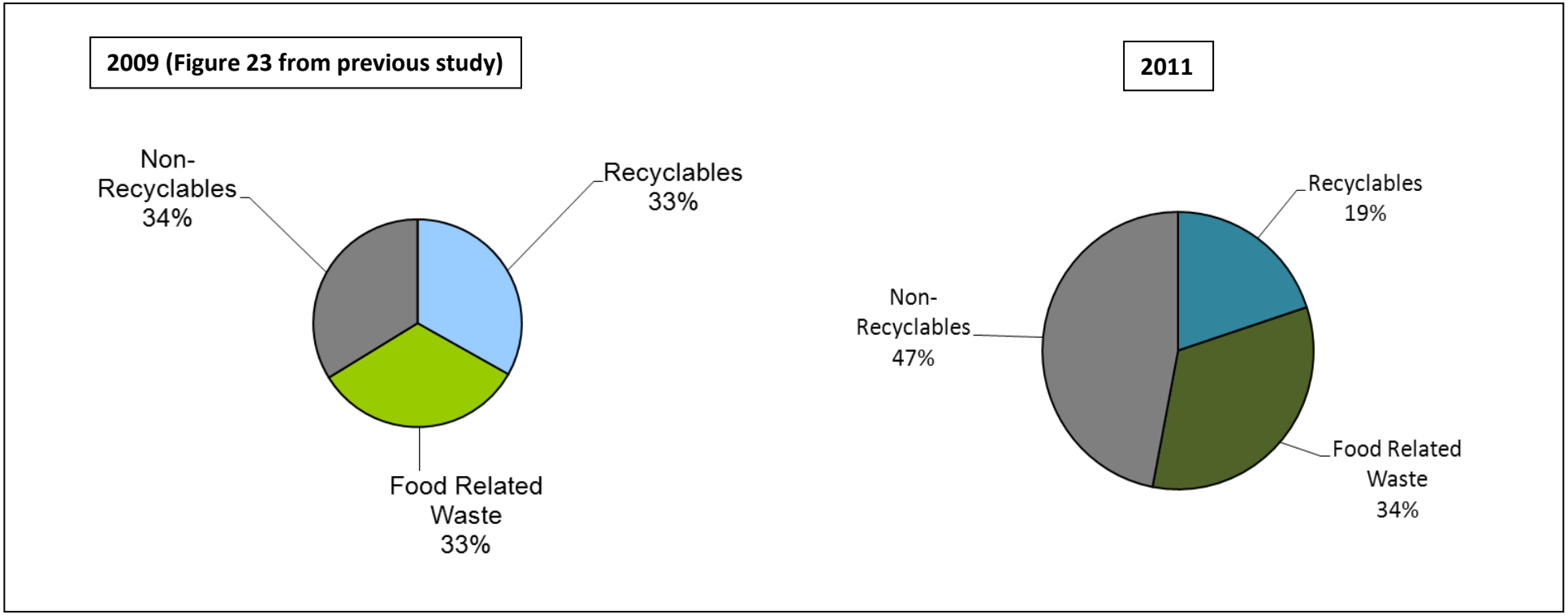


Figure 9: 2009 and 2011 Specific General Material Category Landfill Bound Waste Composition from Area 2 by Weight

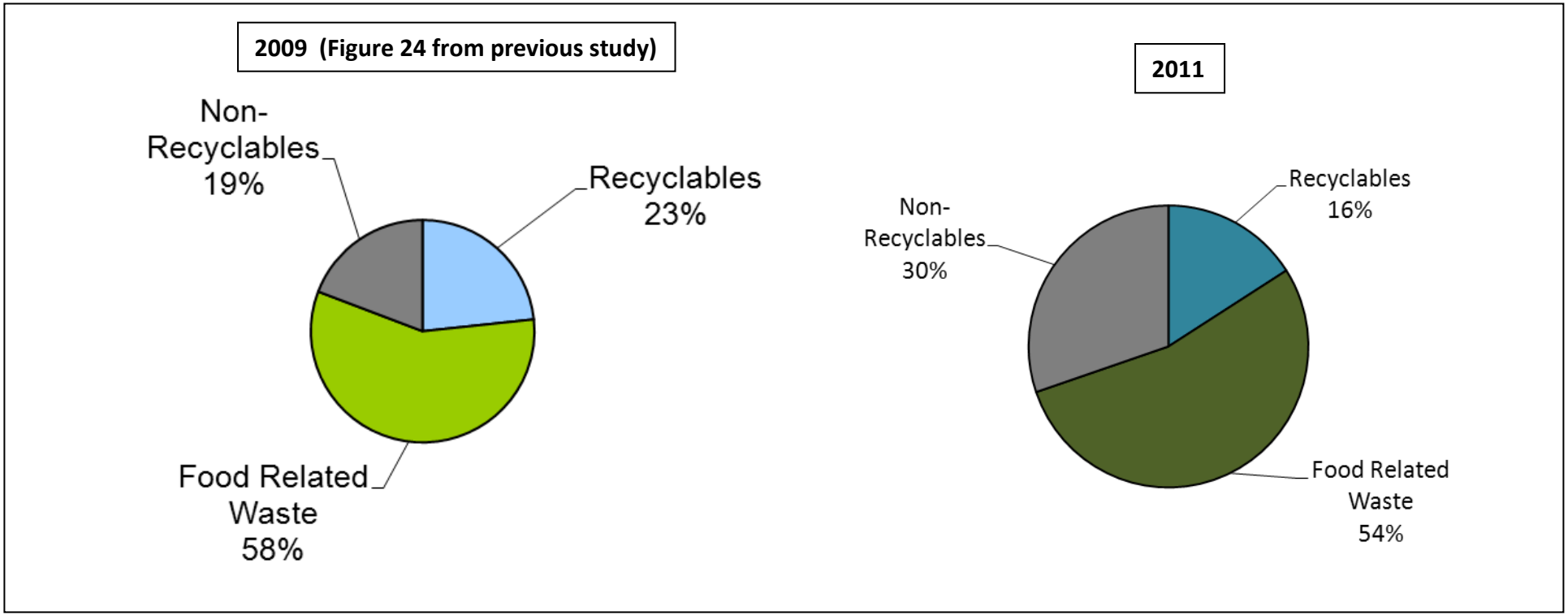


Figure 10: 2009 and 2011 General Material Category Landfill Bound Waste Composition from Area 2 by Volume

Figure 11a and 11b provide additional points of comparison for the general materials categories of Area 2 from 2009 and 2011 data. Again, these figures show that recyclable materials have decreased in Area 2 from year 2009 to 2011 and non-recyclable materials appear to have increased by weight and volume.

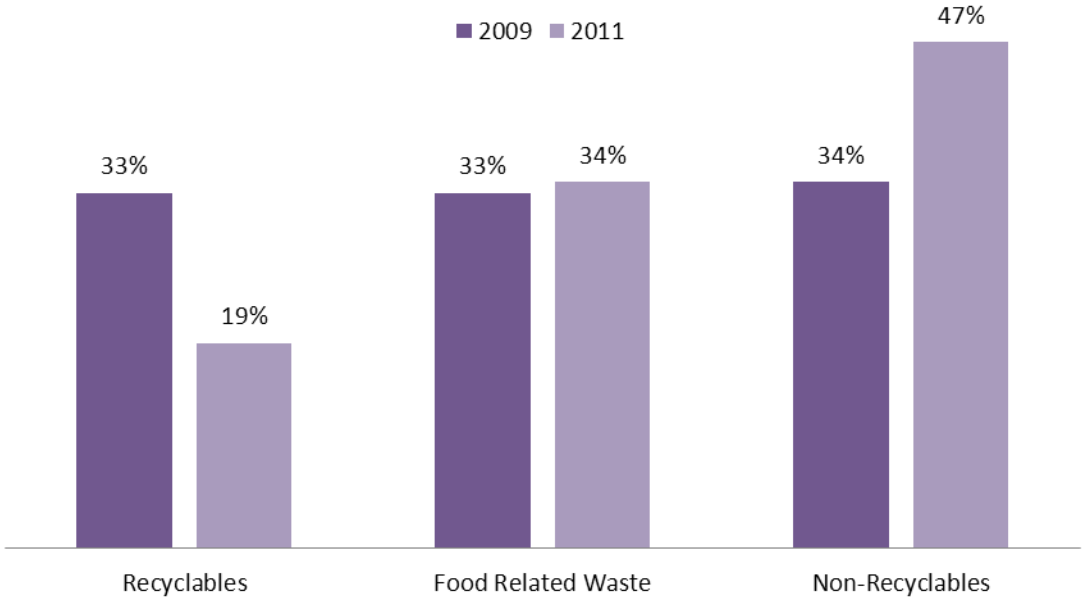


Figure 11a. **2009 and 2011 General Material Category Landfill Bound Waste Composition from Area 2 by Weight**

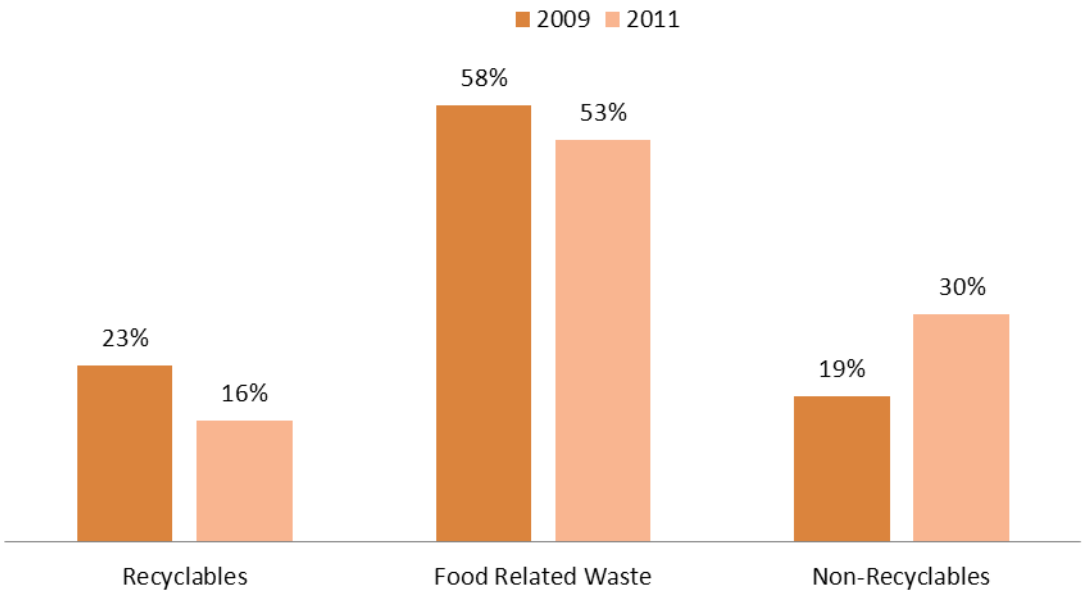


Figure 11a. **2009 and 2011 General Material Category Landfill Bound Waste Composition from Area 2 by Volume**

AREA 2 RECYCLING WASTE SORT FINDINGS

In March of 2011, 160 recycling containers were installed by the City of Portland in Area 2. There are 165 garbage containers in addition to the 160 recycling containers in Area 2. To obtain an overview of the downtown recycling waste stream, the waste compositions from Area 2 commingled, glass and landfill bound waste sort data were placed side by side to assess the recycling capture in the recently installed containers. The sampled waste stream compositions of the three streams are presented in Table 6.

Table 6. Area 2 Landfill Bound Waste, Recycling Waste and Glass Waste Composition by Weight

Material Type	Commingled Recycling Weight (lbs)	Glass Recycling Weight (lbs)	Garbage Weight (lbs)
Recyclables			
CORRUGATED CARDBOARD	26.6	0.0	0.0
MIXED PAPERS	116.0	0.0	7.5
ASCEPTIC CARTONS	1.1	0.0	1.0
NEWSPAPER	286.7	0.0	29.7
GLASS BOTTLES & JARS	30.5	364.3	13.6
ALUMINUM & TIN CANS	6.1	0.1	3.5
PLASTIC BOTTLES	63.9	1.7	8.0
Total Recyclables	530.8	366.0	63.2
Food Related Waste			
FOOD SCRAPS	3.0	0.0	32.9
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	12.0	0.0	28.3
HOT DRINK CUPS	6.8	0.0	16.3
COLD DRINK CUPS	16.7	0.1	18.8
FOOD RELATED PAPER BAGS & WAX PAPER	5.8	0.0	8.5
NAPKINS	3.9	0.0	0.0
Total Food Related Waste	48.2	0.1	104.8
Non-Recyclables			
OTHER MATERIALS	83.3	1.5	139.1
PLASTIC BAGS	2.0	0.0	5.5
LIQUID	3.9	1.7	4.3
Total Non-Recyclables	89.1	3.2	148.9
TOTAL	**668.2**	369.4	317.0

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

Based on the data gathered for Area 2, overall contamination rates by weight were estimated for commingled recycling and glass recycling. Commingled recycling contamination rates by weight were calculated using the following equation:

$$\text{Commingled Recycling Contamination Rate by Weight} = \frac{\text{Contaminants*}}{\text{All Material Placed In Commingled Recycling Receptacle}} = \frac{167.8 \text{ lbs}}{668.2 \text{ lbs}} = 25\%$$

*Note: Contaminants are materials incorrectly placed in the recycling (i.e. plastic bags). Glass was considered a contaminant if it was placed in the commingled recycling receptacle.

Glass contamination rates by weight were calculated using the following equation:

$$\text{Glass Recycling Contamination Rate} = \frac{\text{Contaminants*}}{\text{All Material Placed In Commingled Glass Receptacle}} = \frac{5.1 \text{ lbs}}{369.38 \text{ lbs}} = 1\%$$

*Note: Any material other than glass.

Table 7 presents sampled volume data of the fifteen material categories sorted from Area 2 landfill bound waste and recycling containers.

Table 7. Area 2 Landfill Bound Waste, Recycling Waste and Glass Waste Composition by Volume.

Material Type	Commingled Recycling Volume (# of Bins)	Glass Recycling Volume (# of Bins)	Garbage Volume (# of Bins)
Recyclables			
CORRUGATED CARDBOARD	4.0	0.0	0.0
MIXED PAPERS	8.0	0.0	1.0
ASCEPTIC CARTONS	0.3	0.0	0.2
NEWSPAPER	17.0	0.0	1.5
GLASS BOTTLES & JARS	1.0	12.2	0.5
ALUMINUM & TIN CANS	1.0	0.0	0.8
PLASTIC BOTTLES	14.0	0.1	2.0
Total Recyclables	45.3	12.3	5.9
Food Related Waste			
FOOD SCRAPS	0.2	0.0	0.8
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	4.3	0.0	7.5
HOT DRINK CUPS	2.0	0.0	4.0
COLD DRINK CUPS	6.5	0.1	6.0
FOOD RELATED PAPER BAGS & WAX PAPER	0.8	0.0	1.5
NAPKINS	2.5	0.0	0.0
Total Food Related Waste	16.2	0.1	19.8
Non-Recyclables			
OTHER MATERIALS	12.3	0.1	10.0
PLASTIC BAGS	1.0	0.0	1.0
LIQUID	0.0	0.0	0.1
Total Non-Recyclables	13.3	0.1	11.1
TOTAL	**74.8**	**12.6**	**36.7**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

Figures 12 and 13 illustrate contamination rates for commingled recycling by weight and volume respectively. An estimated contamination rate of 25% was calculated based on weight data. When considering volume data, the contamination rate is estimated to be 48%.

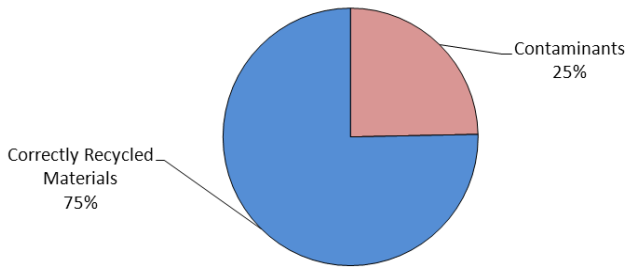


Figure 12. Commingled Recycling Rate By Weight

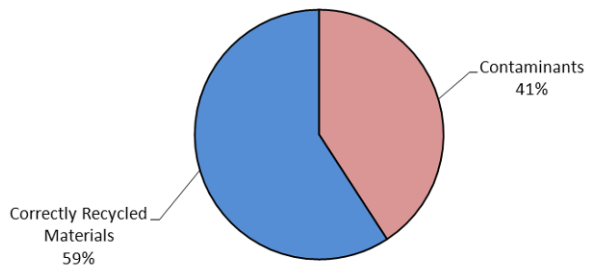


Figure 13. Commingled Recycling Rate by Volume

Figures 14 and 15 illustrate contamination rates for glass recycling by weight and volume respectively. The contamination rates for glass recycling is lower than 5% for both weight and volume data.

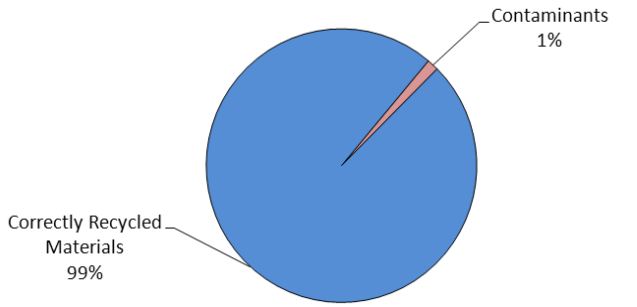


Figure 14. Glass Recycling Rate By Weight

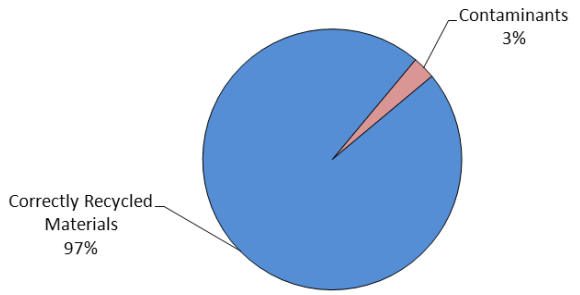


Figure 15. Glass Recycling Rate by Volume

Trashco reported 1,100 pounds of commingled and glass recycling, and 1,020 pounds of landfill bound waste were delivered to the transfer station for Area 2's sorts. Based on the reported weight data, an overall diversion rate of 52% was estimated for Area 2. The Diversion rate was calculated using the following equation:

$$\text{Diversion Rate} = \frac{\text{All Materials Collected in Recycling Containers*}}{\text{Materials Collected for Commingled Recycling, Glass Recycling and Garbage}}$$

*Note: This included non-recyclable materials

An estimated diversion rate of 52% was calculated for the waste stream of Area 2. Figures 16 provides and illustration of diversion rate for Area 2.

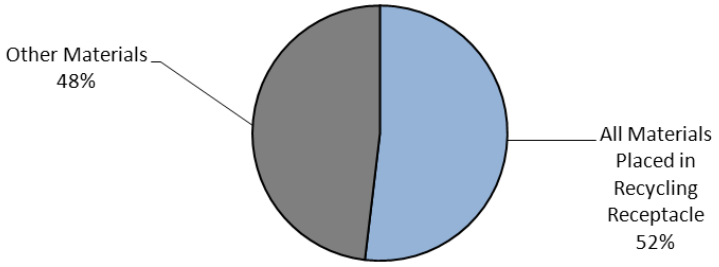


Figure 16. Overall Diversion Rate for Area 2

The recycling containers are open and allow collection of containers that are redeemable for deposits. The data presented in this report will not be able to account for the containers that were collected for redemption.

RECOMMENDATIONS

Considering the findings of this report it is recommended that the City of Portland's Bureau of Planning and Sustainability continue to move forward with the goal of introducing public place recycling containers throughout downtown Portland. Based on the samples documented, the presence of recycling containers would provide the opportunity to divert from landfill and estimated 150,891 pounds[1] of recyclables or 26% of the waste from the 303 studied containers annually. Primary recommendations of the Solid Waste Assessment Team follow:

- Maintain consistent signage (written and graphic) for recycling of current materials. Additional material categories are not recommended.
- Consider public campaigns to encourage proper recycling of materials in public places – for example the Sam Adams video was great. On landfill bound waste containers, indicate that single use food and drink containers should be placed in them.
- Continue to communicate with "Clean and Safe" to promote separation of recyclables from landfill bound waste.
- Look for opportunities to reduce the amount of single use food and drink containers.
- Work with businesses, especially in Area 3, to ensure that they are equipped with the means to dispose of their landfill bound waste and recycling within their establishment.
- Consider hauler feedback when evaluating recycling container use; drivers are familiar with their areas and see the contents of the recycling containers as they do their routes.
- Consider volume of each material category in receptacle selection.
- Consider the presence of hazardous materials, such as feces and syringes, in the development of a public place recycling system.

[1] This figure assumes 1,590 pounds of waste generation a day, multiplied by 365 days in a year for the 303 studied downtown garbage containers.

APPENDIX A: GLOSSARY OF SORT CATEGORIES

Aluminum and Tin Cans – Containers made of aluminum, steel, or tin including containers for beverages and other materials. Empty aerosol cans and clean tin foil are included in this category.

Asceptic Cartons - Liquid containers made of a mix of materials, paper, polyethylene, and aluminum that allow the storage of perishable liquids to hold for longer periods of time in room temperature conditions.

Corrugated Cardboard - Corrugated boxes or sheets used for shipping and packaging materials.

Food Scraps – Vegetables, fruit, meat, breads. Post-consumer food waste, excluding food soiled fibers and waxed paper.

Food Related Paper Bags & Wax Paper – Paper bags and waxed paper used to contain and transport to-go food.

Glass Bottles and Jars – Containers made of glass exhibiting a neck or threaded top. This category includes soda and beer bottles.

Liquid – Liquid contained in bottles, jars, cups and containers that will likely skew the weight of the material it was contained in.

Mixed Papers – Office paper, paper board, soft cardboard, folders, scrap paper, sticky notes, shredded paper, paper bags, and non-corrugated cardboard.

Newspaper – Paper used for periodicals and as not described under mixed paper.

Other Materials – Materials that are not readily recycled including non-compostable fiber waste, hazardous materials, packaging film, and a range of consumer durables such as Ziploc bags, dog poop bags, potato chip bags, cigarette butts, cigarette boxes, and pavement sweepings.

Plastic Bags – Plastic bags provided by retailers to customers transport merchandise.

Plastic Bottles – Plastic containers with a neck and plastic tub-shaped containers generally designed for beverages and fluids. Tubs, primarily food grade plastics, without a neck such as single serving yogurt containers.

Single Use Cold Drink Cups – Disposable drink containers designed to contain cold drinks such as soda, smoothies and other iced drinks. Cold drink cups vary in material, rigid plastics and wax/plastic coated fiber containers are included in the majority of cold drink cups. Many Cold drink cups include plastic lids and straws which are included in this category.

Single Use Food Containers and Associated Wares – Rigid to-go food containers, vended by retailers for on-the-go consumption of foods. Containers vary in material, including Styrofoam, rigid plastic and rigid fibers. This category also includes utensils vended for the consumption of foods.

Single Use Hot Drink Cups – Disposable drink containers designed to contain hot drinks such as coffee, tea and hot chocolate. Majority of hot drink cups comprise of fibers lined with plastic coating and include a plastic lid and a paper sleeve.

APPENDIX B: AREA 1 WASTE SORT - LANDFILL BOUND WASTE

(Yamhill/Morrison Transit Corridor)

Waste Sort Date: September 21, 2011

Waste from Area 1, Yamhill and Morrison transit corridor from 1st to 12th, was collected and sorted into fifteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, other materials, plastics bags, asceptic cartons, and liquid. The load was spread out with a small bobcat and the entire load was sorted. A total of 288.9 pounds of materials were weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general landfill bound waste of Area 1 comprised of:

- By Weight:
  - recyclables – 31%
  - food related waste – 34%
  - non-recyclables – 35%
- By Volume:
  - recyclables – 23%
  - food related waste – 58%
  - non-recyclables – 19%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 1. The fifteen specific categories of materials sorted from Area 1 follow in Table 1 and are illustrated in Figures 3 and 4. See Appendix B2 for images of the Area 1 waste sort.

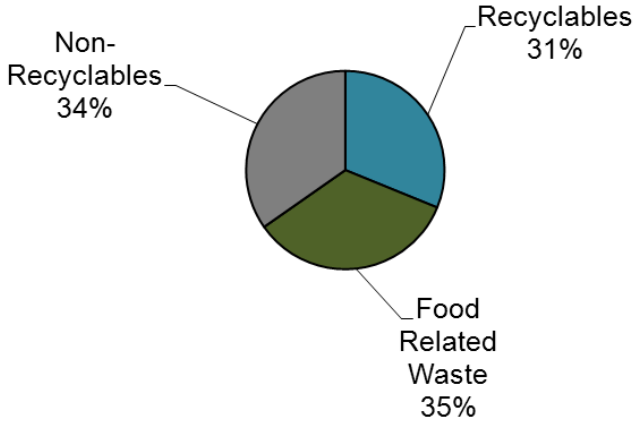


Figure 1: Percent of Waste Stream by Weight – Area 1

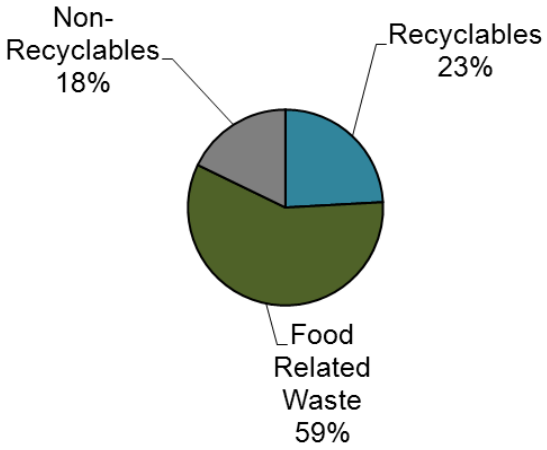


Figure 2: Percent of Waste Stream by Volume – Area 1

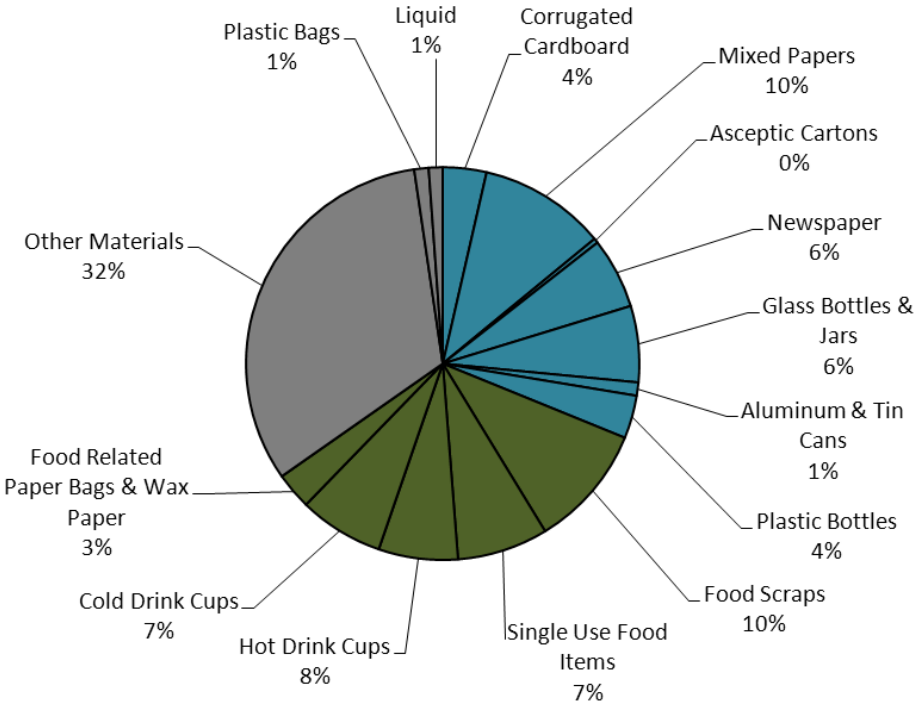


Figure 3: Percentage of Weight by Specific Materials – Area 1

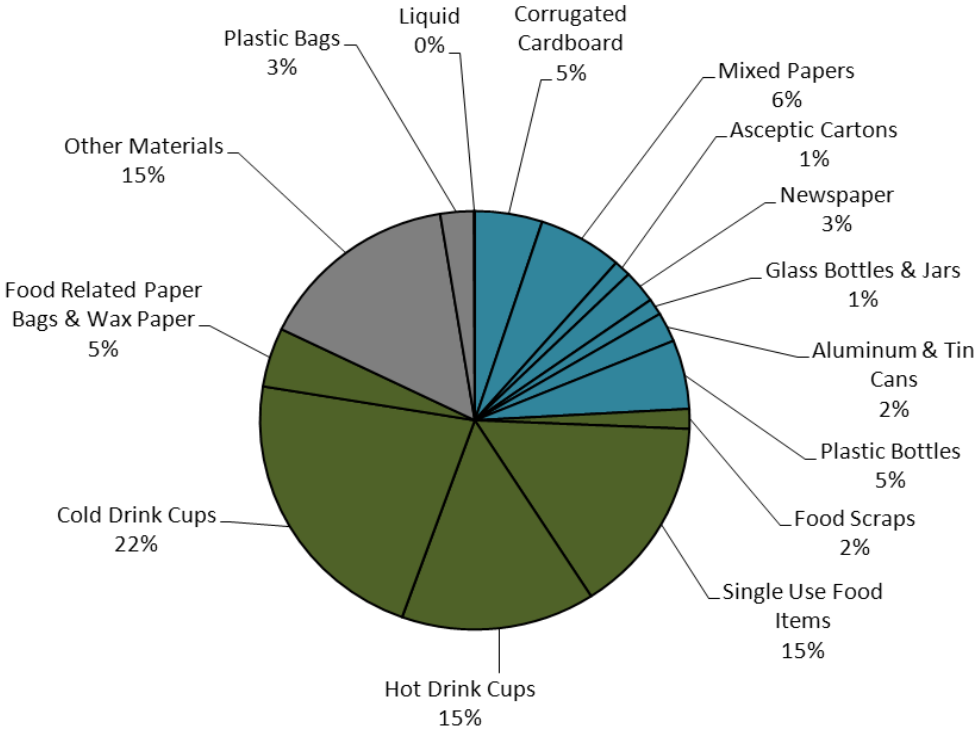


Figure 4: Percentage of Volume by Specific Materials – Area 1

Table 1. Landfill Bound Waste Composition – Area 1

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	2.0	5%	10.4	4%
MIXED PAPERS	2.5	6%	30.2	10%
ASCEPTIC CARTONS	0.5	1%	1.1	0%
NEWSPAPER	1.0	3%	16.9	6%
GLASS BOTTLES & JARS	0.5	1%	18.1	6%
ALUMINUM & TIN CANS	0.9	2%	3.1	1%
PLASTIC BOTTLES	2.1	5%	10.3	4%
Total Recyclables	9.5	23%	90.0	31%
Food Related Waste				
FOOD SCRAPS	0.6	2%	29.2	10%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	6.0	15%	21.6	7%
HOT DRINK CUPS	5.8	15%	18.8	8%
COLD DRINK CUPS	8.7	22%	20.1	7%
FOOD RELATED PAPER BAGS & WAX PAPER	1.8	5%	8.8	3%
Total Food Related Waste	22.9	59%	98.6	35%
Non-Recyclables				
OTHER MATERIALS	6.0	15%	93.6	32%
PLASTIC BAGS	1.0	3%	3.4	1%
LIQUID	0.0	0%	3.3	1%
Total Non-Recyclables	7.0	18%	100.3	34%
TOTAL	**39.4**	**100%**	**288.9**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

See Appendix A: Glossary of Sort Categories for more details on each material category.

APPENDIX B2: SELECTED WASTE SORT PHOTOS FROM AREA 1- LANDFILL BOUND WASTE

Figure 1: Pre-Sort Load

Figure 2: Sorted Load

Figure 3: Sorted Corrugated Cardboard

Figure 4: Sorted Mixed Paper

Figure 5: Sorted Newspaper

Figure 6: Sorted Glass Bottles and Jars

SELECTED WASTE SORT PHOTOS FROM AREA 1- LANDFILL BOUND WASTE

Figure 7: Sorted Aluminum and Tin Cans

Figure 8: Sorted Plastic Bottles and Tubs

Figure 9: Sorted Single Use Food Containers

Figure 10: Sorted Cold Drink Cups

Figure 11: Sorted Hot Drink Cups

Figure 12: Sorted Plastic Bags

APPENDIX C: AREA 2 WASTE SORT - COMINGLED RECYCLING

(5th and 6th Transit Mall)

Waste Sort Date: September 22, 2011

Comingle Recycling from Area 2, 5th and 6th Transit Mall from NW Irving to SW Jackson, was collected and sorted into sixteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, napkins, other materials, plastics bags, asceptic cartons, and liquid.

The load was spread out with a small bobcat and all the recyclable materials were pulled out from the load. Food related materials were also pulled out and liquid was collected. Fifty percent of the remaining materials were sorted through to find plastic bags and napkins. The remaining materials were considered "other materials" and included very small amounts of single use food related items, small pieces of shredded paper and napkins. The entire load of 668.2 pounds was weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general commingled recycling stream of Area 2 was comprised of:

- By Weight:
  - recyclables – 80%;
  - food related waste – 7%
  - non-recyclables – 13%
- By Volume:
  - recyclables – 60%
  - food related waste – 22%
  - non-recyclables – 18%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 2 Comingle Recycling. The sixteen specific categories of materials sorted from the commingled recycling in Area 2 follow in Table 1 and are illustrated in Figures 3 and 4. See Appendix C2 for images of the Area 2 Comingle Recycling sort.

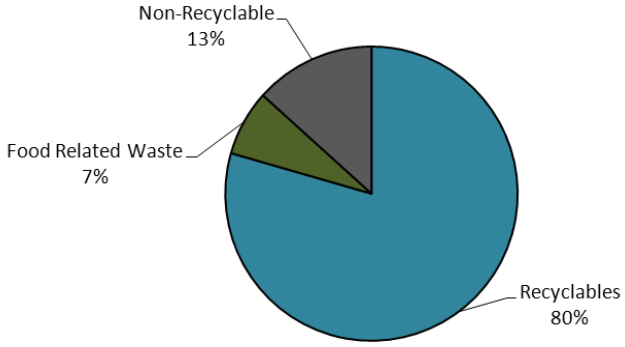


Figure 1: Percentage of General Waste Stream by Weight

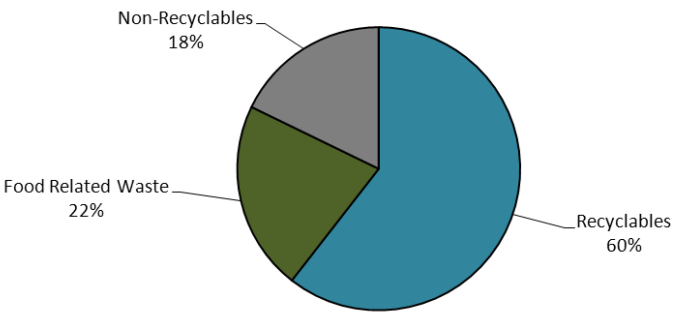


Figure 2: Percentage of General Waste Stream by Volume

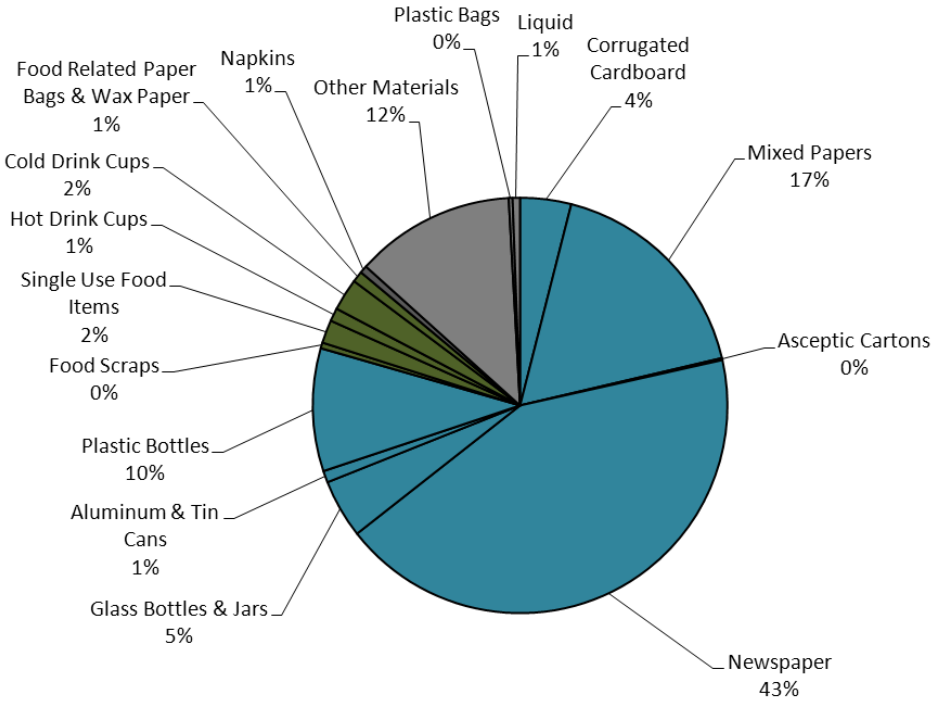


Figure 3: Percentage of Weight by Specific Materials – Area 2 Comingle

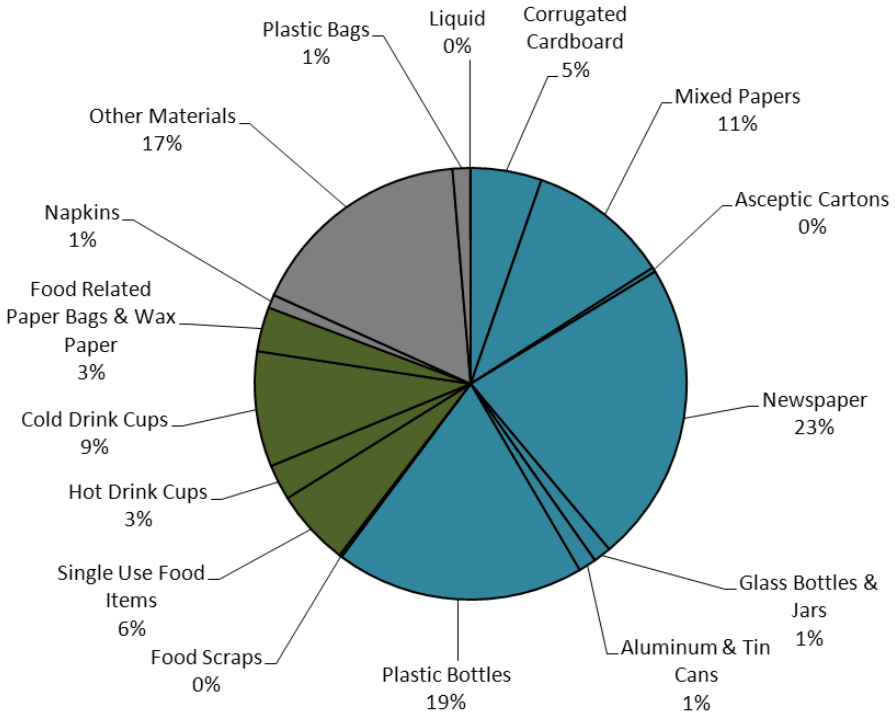


Figure 4: Percentage of Volume by Specific Materials – Area 2 Comingle

Table 1. Comingle Recycling Waste Composition - Area 2

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	4.0	5%	26.6	4%
MIXED PAPERS	8.0	11%	116.0	17%
ASCEPTIC CARTONS	0.3	0%	1.1	0%
NEWSPAPER	17.0	23%	286.7	43%
GLASS BOTTLES & JARS	1.0	1%	30.5	5%
ALUMINUM & TIN CANS	1.0	1%	6.1	1%
PLASTIC BOTTLES	14.0	19%	63.9	10%
Total Recyclables	45.3	60%	530.8	80%
Food Related Waste				
FOOD SCRAPS	0.2	0%	3.0	0%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	4.3	6%	12.0	2%
HOT DRINK CUPS	2.0	3%	6.8	1%
COLD DRINK CUPS	6.5	9%	16.7	2%
FOOD RELATED PAPER BAGS & WAX PAPER	2.5	3%	5.8	1%
NAPKINS	0.8	1%	3.9	1%
Total Food Related Waste	16.2	22%	48.2	7%
Non-Recyclables				
OTHER MATERIALS	12.3	17%	83.3	12%
PLASTIC BAGS	1.0	1%	2.0	0%
LIQUID	0.0	0%	3.9	1%
Total Non-Recyclables	13.3	18%	89.1	13%
TOTAL	**74.8**	**100%**	**668.2**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

See Appendix A: Glossary of Sort Categories for more details on each material category.

APPENDIX C2: SELECTED WASTE SORT PHOTOS FROM AREA 2 – COMINGLE RECYCLING

Figure 1: Pre-Sort Load

Figure 2: Sorted Comingle Recycling

Figure 3: Sorted Corrugated Cardboard

Figure 4: Sorted Mixed Paper

Figure 5: Sorted Newspaper

Figure 6: Sorted Glass

SELECTED WASTE SORT PHOTOS FROM AREA 2 – COMINGLE RECYCLING

Figure 7: Sorted Aluminum and Tin Cans

Figure 8: Sorted Plastic Bottles and Tubs

Figure 9: Sorted Napkins

Figure 10: Sorted Food Related Paper

Figure 11: Sorted Single Use Cold Cups

Figure 12: Sorted Single Use Hot Cups

APPENDIX D: AREA 2 WASTE SORT – GLASS RECYCLING
(5th and 6th Transit Mall)

Waste Sort Date: September 22, 2011

Glass Recycling from Area 2, 5th and 6th Transit Mall from NW Irving to SW Jackson, was collected and sorted into sixteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, napkins, other materials, plastics bags, asceptic cartons, and liquid.
The entire load of 369.4 pounds of materials was weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general glass recycling stream of Area 2 was comprised of:

- By Weight:
  - recyclables – 99%
  - food related waste – 0%
  - non-recyclables – 1%
- By Volume:
  - recyclables – 98%
  - food related waste – 1%
  - non-recyclables – 1%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 2 Glass Recycling. The sixteen specific categories of materials sorted the glass recycling in Area 2 follows in Table 1. See Appendix C2 for images of the Area 2 glass recycling sort.

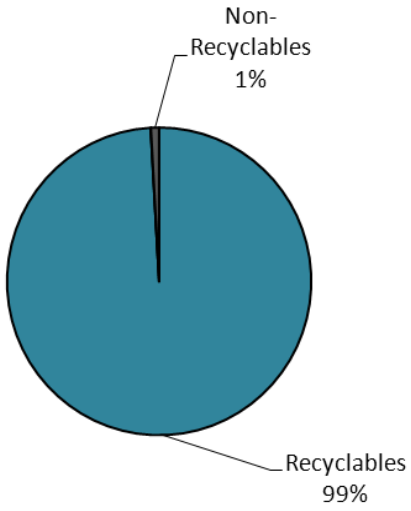


Figure 1: Percentage of Waste Stream by Weight

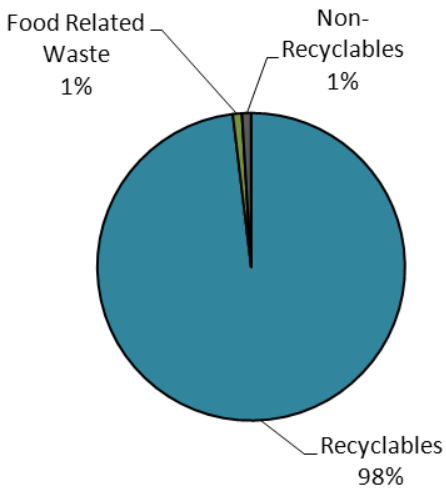


Figure 2: Percentage of Waste Stream by Volume

Table 1. Glass Recycling Waste Composition - Area 2

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	0.0	0%	0.0	0%
MIXED PAPERS	0.0	0%	0.0	0%
ASCEPTIC CARTONS	0.0	0%	0.0	0%
NEWSPAPER	0.0	0%	0.0	0%
GLASS BOTTLES & JARS	12.2	97%	364.3	99%
ALUMINUM & TIN CANS	0.0	0%	0.1	0%
PLASTIC BOTTLES	0.1	1%	1.7	0%
Total Recyclables	12.3	98%	366.0	99%
Food Related Waste				
FOOD SCRAPS	0.0	0%	0.0	0%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	0.0	0%	0.0	0%
HOT DRINK CUPS	0.0	0%	0.0	0%
COLD DRINK CUPS	0.1	1%	0.1	0%
FOOD RELATED PAPER BAGS & WAX PAPER	0.0	0%	0.0	0%
NAPKINS	0.0	0%	0.0	0%
Total Food Related Waste	0.1	1%	0.1	0%
Non-Recyclables				
OTHER MATERIALS	0.1	1%	1.5	0.4%
PLASTIC BAGS	0.0	0%	0.0	0.0%
LIQUID	0.0	0%	1.7	1.0%
Total Non-Recyclables	0.1	1%	3.2	1%
TOTAL	**12.6**	**100%**	**369.4**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

APPENDIX D2: SELECTED WASTE SORT PHOTOS FROM AREA 2 – GLASS RECYCLING

Figure 1: Pre-Sorted Glass Load

Figure 2: Sorted Glass Recycling

Figure 3: Sorted Glass

Figure 4: Sorted Contaminants in Glass Recycling

Figure 5: Sorted Plastics in Glass Recycling

Figure 6: Sorted Contaminants in Glass Recycling

APPENDIX E: AREA 2 WASTE SORT - LANDFILL BOUND WASTE
(5th and 6th Transit Mall)

Waste Sort Date: September 22, 2011

Waste from Area 2 Old Chinatown from NW Everett to SW Alder and between 1st Avenue and 4th Avenue was collected and sorted into fifteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, other materials, plastics bags, asceptic cartons, and liquid. One third of the estimated volume of the load was sorted. A total of 317.0 pounds of materials were weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general landfill bound waste of Area 2 landfill bound waste stream was comprised of:

- By Weight:
  - recyclables – 19%
  - food related waste – 34%
  - non-recyclables – 47%
- By Volume:
  - recyclables – 16%
  - food related waste – 54%
  - non-recyclables – 30%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 2. The fifteen specific categories of materials sorted from the downtown study area are as follows in Table 1 and illustrated in Figures 3 and 4. See Appendix B2 for images of the Area 2 landfill bound waste sort.

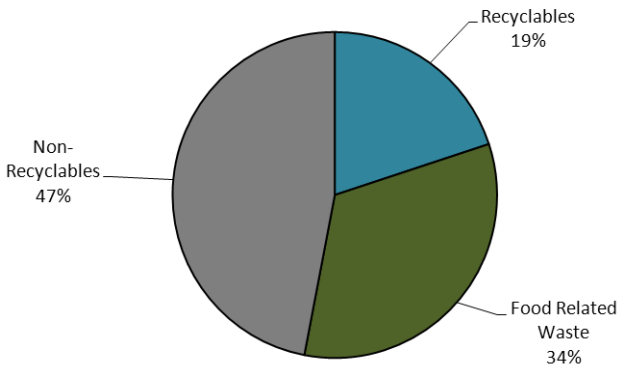


Figure 1: Percentage of Waste Stream by Weight

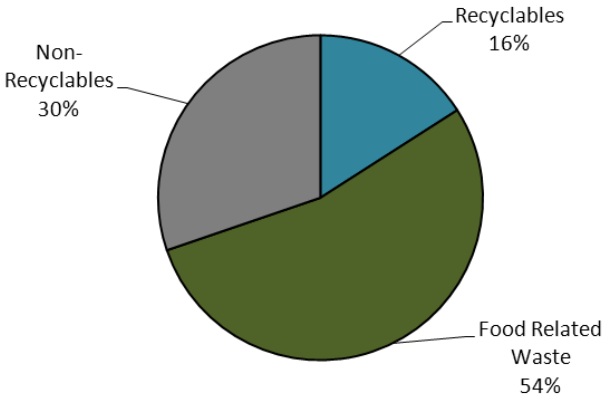


Figure 2: Percentage of Waste Stream by Volume

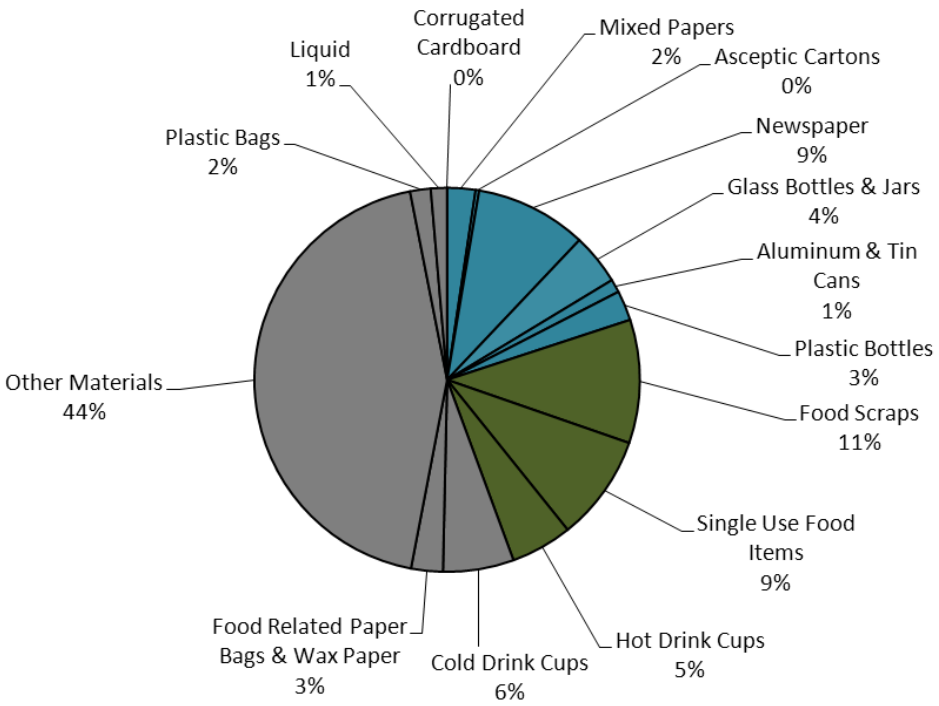


Figure 3: Percentage of Weight by Specific Materials – Area 2

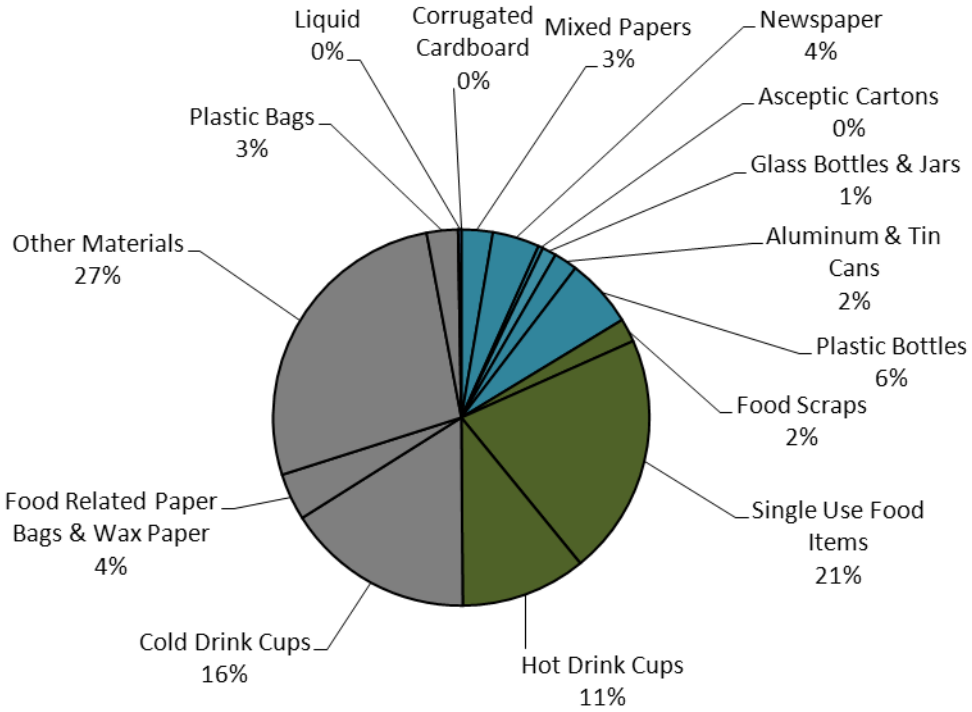


Figure 4: Percentage of Volume by Specific Materials – Area 2

Table 1. Landfill Bound Waste Composistion - Area 2

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	0.0	0%	0.0	0%
MIXED PAPERS	1.0	3%	7.5	2%
ASCEPTIC CARTONS	0.2	0%	1.0	0%
NEWSPAPER	1.5	4%	29.7	9%
GLASS BOTTLES & JARS	0.5	1%	13.6	4%
ALUMINUM & TIN CANS	0.8	2%	3.5	1%
PLASTIC BOTTLES	2.0	6%	8.0	3%
Total Recyclables	5.9	16%	63.2	19%
Food Related Waste				
FOOD SCRAPS	0.8	2%	32.9	11%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	7.5	21%	28.3	9%
HOT DRINK CUPS	4.0	11%	16.3	5%
COLD DRINK CUPS	6.0	16%	18.8	6%
FOOD RELATED PAPER BAGS & WAX PAPER	1.5	4%	8.5	3%
Total Food Related Waste	19.8	54%	104.8	34%
Non-Recyclables				
OTHER MATERIALS	10.0	27%	139.1	44%
PLASTIC BAGS	1.0	3%	5.5	2%
LIQUID	0.1	0%	4.3	1%
Total Non-Recyclables	11.1	30%	148.9	47%
TOTAL	**36.7**	**100%**	**317.0**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

APPENDIX E2: SELECTED WASTE SORT PHOTOS FROM AREA 2 - LANDFILL BOUND WASTE

Figure 1: Pre-Sort Load

Figure 2: Sorted Load

Figure 3: Sorted Newspaper

Figure 4: Sorted Mixed Paper

Figure 5: Sorted Aluminum Cans

Figure 6: Sorted Plastic Bottles and Tubs

Figure 7: Sorted Glass Bottles and Jars

Figure 8: Sorted Cold Drink Cups

Figure 9: Sorted Hot Drink Cups

Figure 10: Sorted Food Related Paper Bags and Wax Paper

Figure 11: Sorted Food Scraps

Figure 12: Clean and Safe Bagged Waste

APPENDIX F: AREA 3 WASTE SORT- LANDFILL BOUND WASTE

(Old Town China Town Boundaries)

Waste Sort Date: September 28, 2011

Waste from Area 3 Old Chinatown from NW Everett to SW Alder and between 1st Avenue and 4th Avenue was collected and sorted into fifteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, other materials, plastics bags, asceptic cartons, and liquid. One third of the estimated volume of the load was sorted. A total of 418.8 pounds of materials were weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
Area 3 had the most bagged waste of all areas. CES estimates that the load consisted of the following breakdown in terms of volume:

- Blue Bagged Waste – 18%
- Black Bagged Waste – 14%
- Other Bags (Clear, white, grocery bags) – 8%
- Loose Waste – 60%

To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general landfill bound waste of Area 3 landfill bound waste stream was comprised of:

- By Weight:
  - recyclables – 32%
  - food related waste – 29%
  - non-recyclables – 39%
- By Volume:
  - recyclables – 31%
  - food related waste – 40%
  - non-recyclables – 29%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 3. The fifteen specific categories of materials sorted from the downtown study area follow in Table 1 and are illustrated in Figures 3 and 4. See Appendix F2 for images of the Area 3 waste sort.

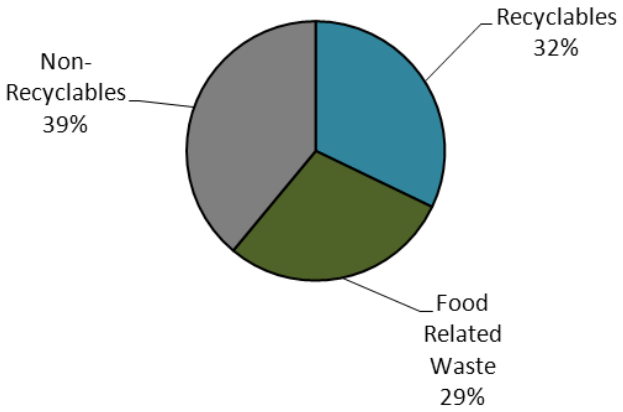


Figure 1: Percentage of Waste Stream by Weight

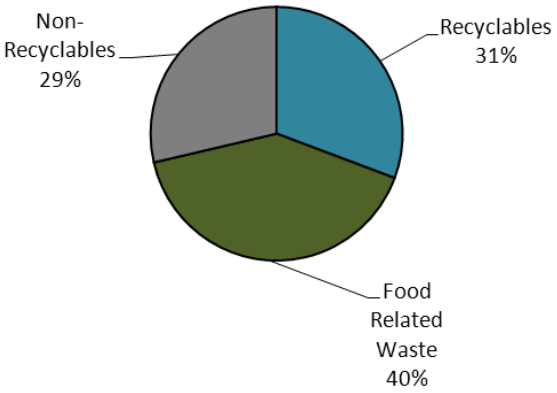


Figure 2: Percentage of Waste Stream by Volume

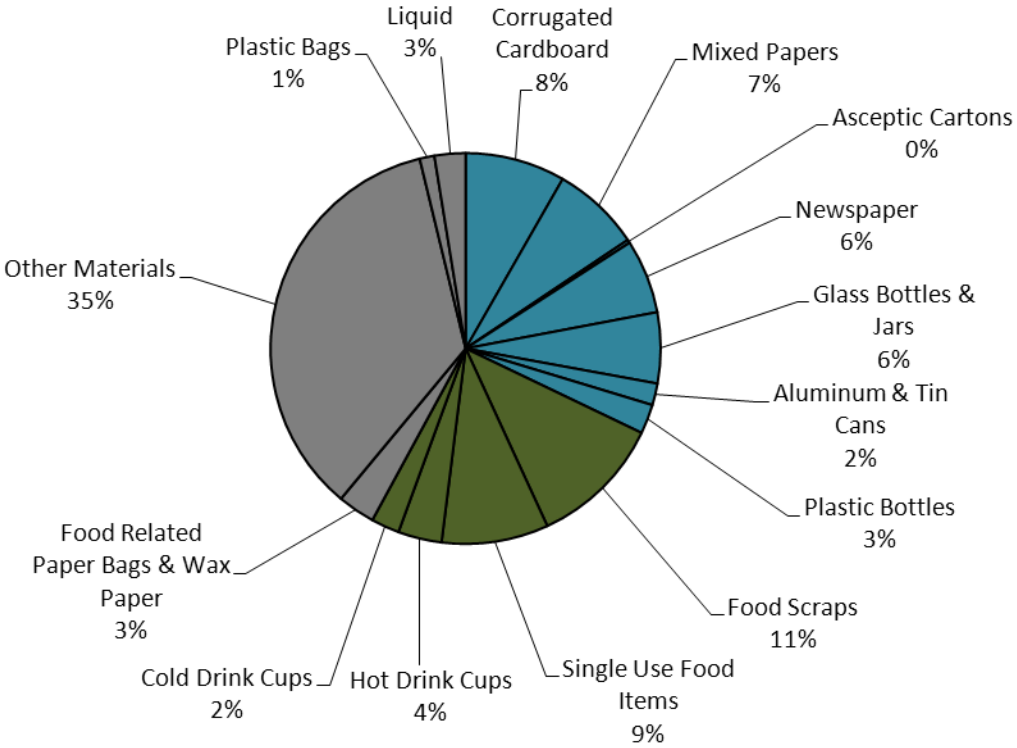


Figure 3: Percentage of Weight by Specific Materials – Area 3

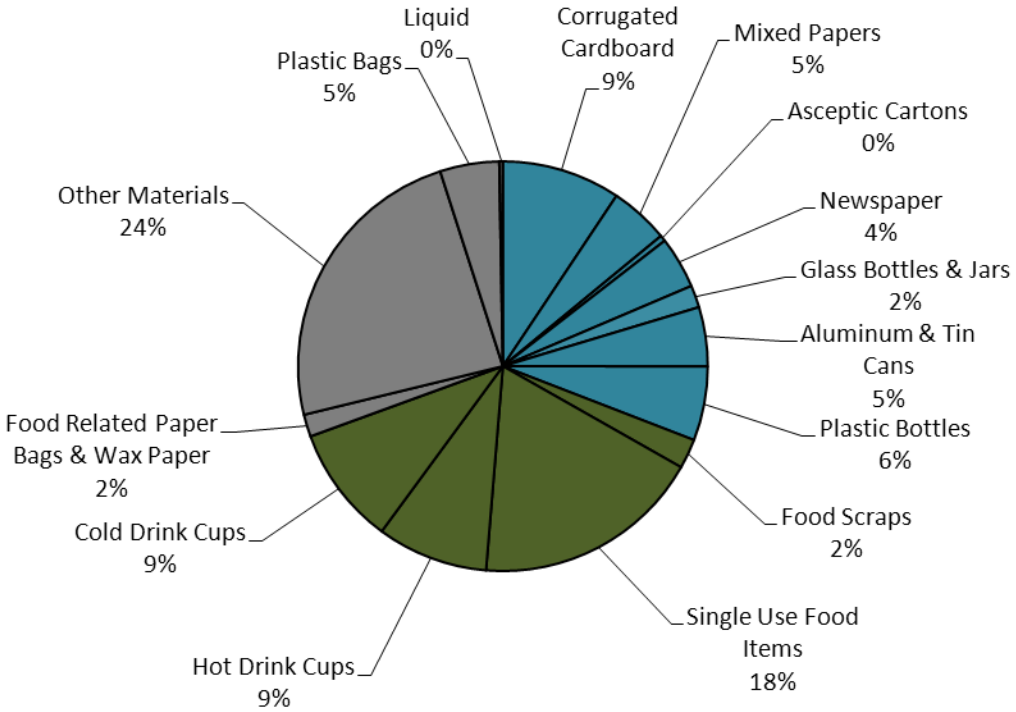


Figure 4: Percentage of Volume by Specific Materials – Area 3

Table 1. Landfill Bound Waste Composition - Area 3

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	4.0	9%	34.7	8%
MIXED PAPERS	2.0	5%	30.7	7%
ASCEPTIC CARTONS	0.2	0%	1.2	0%
NEWSPAPER	1.8	4%	25.6	6%
GLASS BOTTLES & JARS	0.8	2%	24.5	6%
ALUMINUM & TIN CANS	2.0	5%	7.5	2%
PLASTIC BOTTLES	2.5	6%	10.2	3%
Total Recyclables	13.2	31%	134.5	32%
Food Related Waste				
FOOD SCRAPS	1.0	2%	46.1	11%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	8.0	18%	37.1	9%
HOT DRINK CUPS	3.8	9%	15.2	4%
COLD DRINK CUPS	4.0	9%	9.8	2%
FOOD RELATED PAPER BAGS & WAX PAPER	0.8	2%	13.0	3%
Total Food Related Waste	17.5	40%	121.1	29%
Non-Recyclables				
OTHER MATERIALS	10.2	24%	147.3	35%
PLASTIC BAGS	2.0	5%	5.1	1%
LIQUID	0.1	0%	10.8	3%
Total Non-Recyclables	12.3	29%	163.2	39%
TOTAL	**43.0**	**100%**	**418.8**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

APPENDIX F2: SELECTED WASTE SORT PHOTOS FROM AREA 3 – LANDFILL BOUND WASTE

Figure 1: Pre-Sort Load

Figure 2: Sorted Load

Figure 3: Sorted Corrugated Cardboard

Figure 4: Sorted Mixed Paper

Figure 5: Sorted Newspaper

Figure 6: Sorted Glass Bottles and Jars

SELECTED WASTE SORT PHOTOS FROM AREA 3 – LANDFILL BOUND WASTE

Figure 7: Sorted Food Scraps

Figure 8: Sorted Cold Drink Cups

Figure 9: Sorted Single Use Food Containers

Figure 10: Example of Bathroom Waste in Black Bag

Figure 11: Example of Office Related Kitchen Waste

Figure 12: Blue, White, and Black Bags

APPENDIX G: AREA 4 WASTE SORT - LANDFILL BOUND WASTE

(6th to 11th, Morrison to Burnside)

Waste Sort Date: September 29, 2011

Waste from Area 4, 6th to 11th from SW Morrison to NW Burnside, was collected and sorted into fifteen material categories: corrugated cardboard, mixed papers, newspaper, glass bottles and jars, aluminum, tin and steel cans, plastic bottles and tubs, food scraps, single use food containers and associated wares, single use hot drink cups, single use cold drink cups, food related paper, other materials, plastics bags, asceptic cartons, and liquid. The entire load of 343.5 pounds of materials was weighed and recorded. Volumes were recorded for each material category sorted.

Findings:
To provide a general break out of the waste composition, the specific material categories can be viewed as three general categories. The general landfill bound waste of Area 4's landfill bound waste stream was comprised of:

- By Weight:
  - recyclables – 21%
  - food related waste – 37%
  - non-recyclables – 42%
- By Volume:
  - recyclables – 20%
  - food related waste – 61%
  - non-recyclables – 19%

Figure 1 and Figure 2 show the percent by weight and volume respectively for Area 4. The fifteen specific categories of materials sorted from the downtown study area are as follow in Table 1 and are illustrated in Figures 3 and 4. See Appendix G2 for images of the Area 4 waste sort.

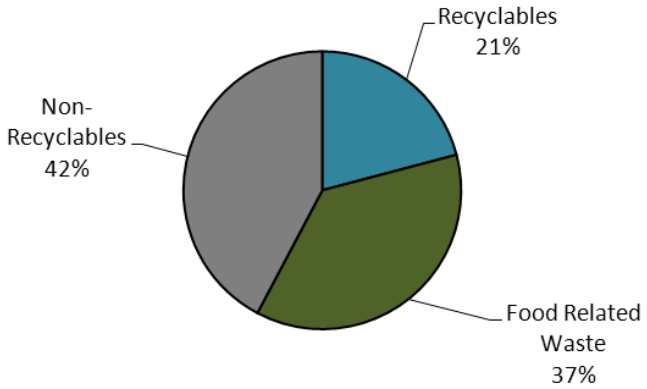


Figure 1: Percentage of Waste Stream by Weight

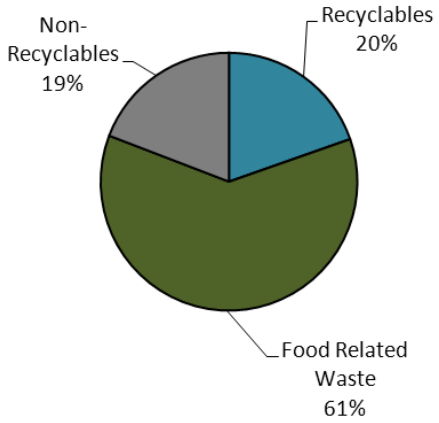
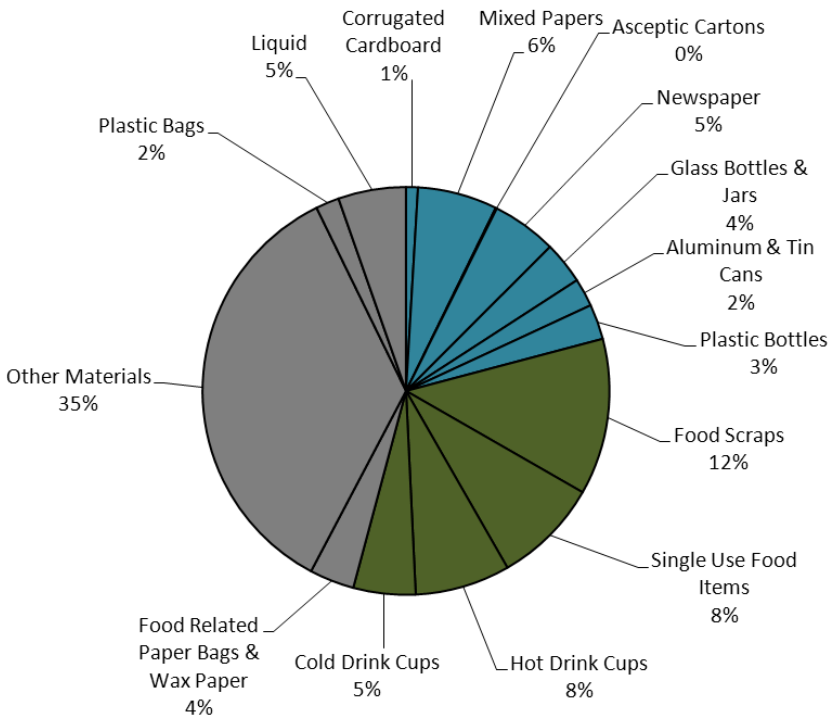
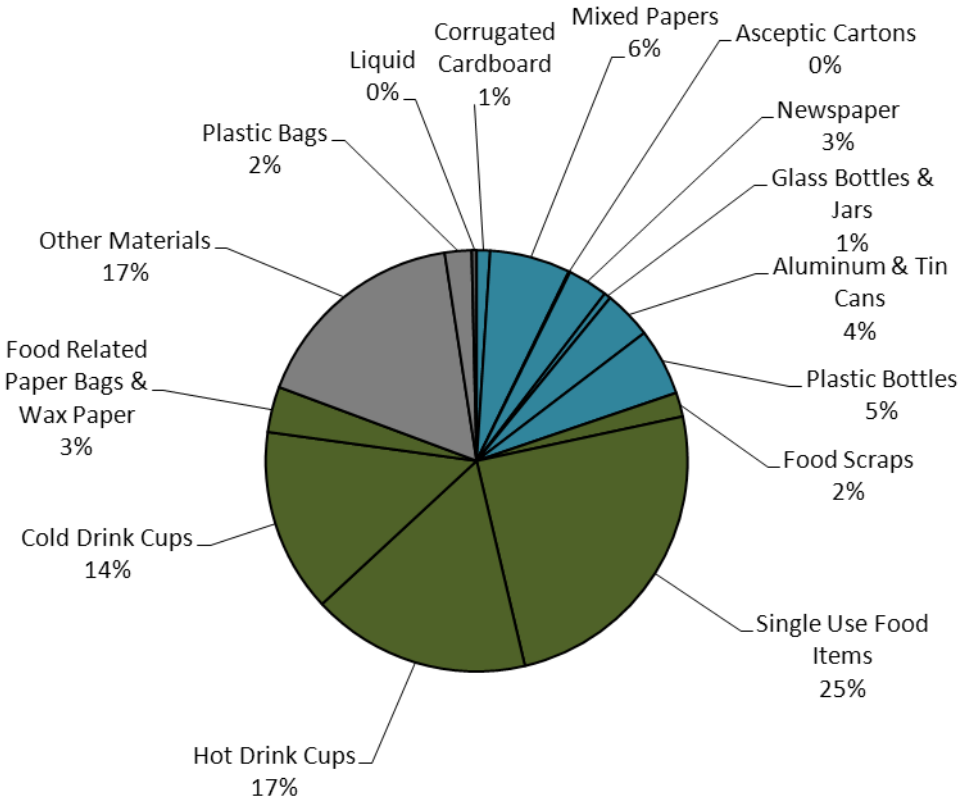


Figure 2: Percentage of Waste Stream by Volume



Figure?: Percentage of Weight by Specific Materials – Area 4



Figure?: Percentage of Volume by Specific Materials – Area 4

Table 1. Landfill Bound Waste Composition - Area 4

Material Type	Volume (# of Bins)	Volume Percent	Weight (lbs)	Weight Percent
Recyclables				
CORRUGATED CARDBOARD	0.5	1%	3.2	1%
MIXED PAPERS	3.0	6%	21.7	6%
ASCEPTIC CARTONS	0.1	0%	0.3	0%
NEWSPAPER	1.5	3%	17.7	5%
GLASS BOTTLES & JARS	0.3	1%	11.5	4%
ALUMINUM & TIN CANS	1.8	4%	7.7	2%
PLASTIC BOTTLES	2.5	5%	9.6	3%
Total Recyclables	9.6	20%	71.7	21%
Food Related Waste				
FOOD SCRAPS	0.9	2%	42.6	12%
SINGLE USE FOOD CONTAINERS & ASSOCIATED WARES	12.0	25%	28.9	8%
HOT DRINK CUPS	8.2	17%	25.9	8%
COLD DRINK CUPS	7.1	14%	17.0	5%
FOOD RELATED PAPER BAGS & WAX PAPER	1.7	3%	12.2	4%
Total Food Related Waste	29.9	61%	126.6	37%
Non-Recyclables				
OTHER MATERIALS	8.2	17%	120.3	35%
PLASTIC BAGS	1.0	2%	6.4	2%
LIQUID	0.2	0%	18.5	5%
Total Non-Recyclables	9.4	19%	145.1	42%
TOTAL	**48.9**	**100%**	**343.5**	**100%**

Note: Measurements were taken to the hundredth of a pound and reported to the tenth. Offages are due to rounding.

APPENDIX G2: SELECTED WASTE SORT PHOTOS FROM AREA 4 – LANDFILL BOUND WASTE

Figure 1: Pre-Sort Load

Figure 2: Sorted Load

Figure 3: Mixed Paper

Figure 4: Sorted Newspaper

Figure 5: Sorted Plastic Bottles and Jars

Figure 6: Sorted Aluminum and Tin Cans

SELECTED WASTE SORT PHOTOS FROM AREA 4 – LANDFILL BOUND WASTE

Figure 7: Sorted Single Use Food Containers

Figure 8: Sorted Hot Drink Cups

Figure 9: Sorted Cold Drink Cups

Figure 10: Compilation of Sorted Single Use Food Containers and Hot and Cold Drink Cups