Seattle Public Utilities

2013
Construction & Demolition Waste Composition Study
FINAL Report

prepared by
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in cooperation with
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September 2017

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1. Overview

Introduction and Background

From June 2013 to May 2014, nearly 100,000 tons of construction materials were hauled for disposal to three private transfer stations (Republic's Third & Lander and Black River facilities, and Waste Management's Eastmont transfer station)—and two railheads from construction and demolition (C&D) job sites in Seattle. This was a portion of the 386,000 tons of construction materials generated in 2013 with approximately 61% of the C&D generated recycled or salvaged and another 6% beneficially used as fuel end products.[1] In 2014 construction activities had fully rebounded from the economic recession and the amount of C&D generated increased overall to 485,000 tons with around 65% recycled and another 8% beneficially used.[2] These quantities do not include the construction materials delivered to the City transfer stations by self-haul customers or those materials found in loads of MSW from residential or commercial customers.

Seattle has adopted a construction and demolition recycling goal of 70% by 2020 and implemented a set of programs that include landfill disposal bans on targeted materials, mixed waste recycling facility certification and reporting requirements for a Waste Diversion Plan (prior to building permit issuance) and a Waste Diversion Report once a project is completed. The materials which were "banned" from landfill disposal in 2014 included concrete, asphalt paving, metal, cardboard and new construction gypsum scrap. Other materials such as unpainted and untreated woodwaste, tear-off asphalt shingles, carpet and plastic film wrap may be phased in starting in 2018 depending on the availability of local processing capacity and adequacy of end markets.

This C&D Waste Stream Composition Study characterizes the types and quantities of disposed construction and demolition materials delivered to private solid waste transfer stations and railheads in Seattle during the study period from **June 2013 – May 2014**. Only loads from job sites within the City of Seattle were included in the study.

The City commissioned this study to assess progress that is being made in reaching the City's 70% C&D recycling goal and how well targeted landfill disposal bans are being met by generators and facilities. The study objectives are:

- To estimate the composition of the disposed C&D waste stream,

- To identify the proportion of disposed materials at the included facilities that are potentially recyclable, and

- To characterize seasonal and substream differences so that targeted educational outreach can be designed.

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[1] *2016 Recycling Rate Report*, Seattle Public Utilities. July 1, 2017.
http://www.seattle.gov/util/cs/groups/public/@spu/@garbage/documents/webcontent/1_064754.pdf
[2] *Ibid.*

Seattle's previous comprehensive C&D Waste Stream Composition Study was conducted in 2007.[3] As in 2013/2014, sampling for the 2007 study took place at Eastmont, Third & Lander, and Black River as well as at job sites to characterize intermodal loads. A distinction from 2007 is that no processing residuals from these transfer station facilities were characterized in the 2013/2014 study. The 2013/2014 study also originally included sampling of inbound loads at a mixed C&D processing facility, CDL Recycle. Since that operation diverted at least 75% to 80% of its inbound material to recycling and beneficial use, SPU decided not to include those samples and results in this C&D disposal waste composition study. The study's original sampling plan is included as Appendix B and details the number of sampling days allocated to each facility.

This report, which consists of three sections, presents the results of 2013/2014 construction and demolition waste study. Section 1 briefly introduces the project and the methodology, and Section 2 details the findings for the overall disposed C&D waste stream and the various substreams. Section 4 presents construction & demolition permit data to provide context for the study results. Appendices follow the main body of the report and provide the following: material component definitions, sampling methodology, comments on sampling events, waste composition calculations, more composition tables, description of the analytical database, and copies of field forms.

Sampling Universe

This study sampled two C&D materials streams:

- C&D waste delivered for disposal at three private facilities (Eastmont, Third & Lander, and Black River);
- C&D waste hauled directly from C&D sites in intermodal containers to the railheads at Third & Lander and the Argo Yard.

Figure 1-1 shows the movement of Seattle's non-MSW C&D waste.

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[3] Field work for the previous study was conducted in 2007 and the report was finalized in 2008. The 2007 Construction & Demolition Waste Composition Study can be found on Seattle Public Utilities' website at http://www.seattle.gov/util/groups/public/@spu/@garbage/documents/webcontent/SPU01_003891.pdf

Figure 1-1: Flow of C&D Waste Sampled in 2013/2014 Study
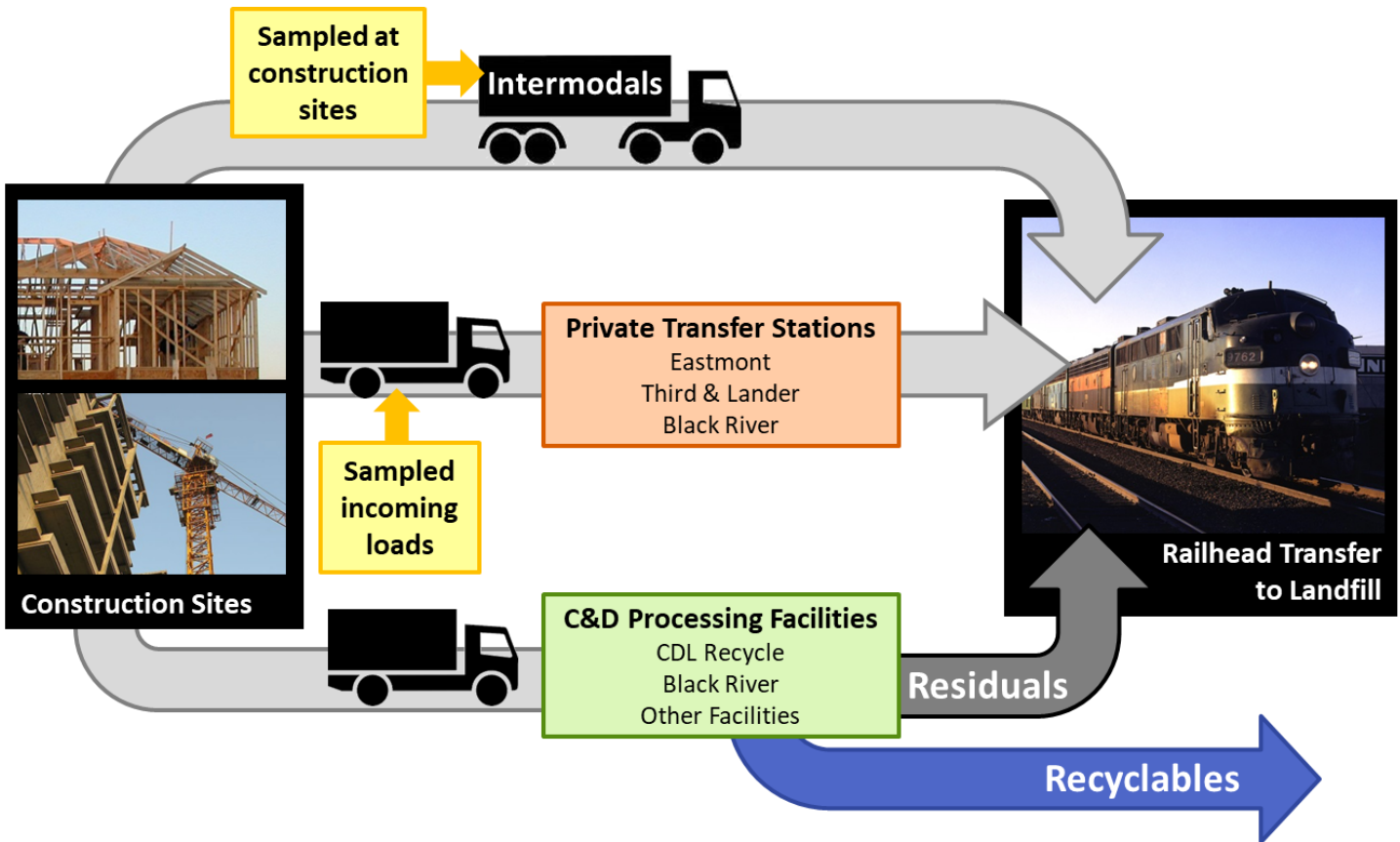
Study Methodology

The following section provides an overview of the 2013-2014 study methodology. As shown, there were five major steps involved in conducting this waste composition study. The steps are presented according to the order in which they occurred during the course of the study. Appendix B contains a detailed description of the study methodology including a field calendar and detailed sample counts.

Step 1: Develop Sampling Plan

- Samples were allocated among the five activity types (new construction, remodeling, demolition, roofing, and other/mixed C&D) plus intermodal loads.

- A sampling schedule was constructed for the study period, consisting of four to six sampling days every other month. The sampling days were randomly selected and adjusted to provide a representative distribution across the seasons as well as across the three transfer stations that receive C&D waste from Seattle: Black River, Eastmont, and Third & Lander.[4]

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[4] Inbound material was sampled at one other facility but the data was not used due to inability to determine which materials were disposed from those loads.

Step 2: Coordinate Sampling Events

- Prior to each month's sampling, facility representatives and affected personnel were contacted and notified about how sampling and surveying would occur at each site.
- Haulers were contacted to obtain information regarding scheduled intermodal jobs.

Step 3: Survey Vehicles and Select Samples

- **At transfer stations and processing facilities**:
- To quantify the waste associated with each activity type, surveys were conducted at the entrance of each participating facility. Data were recorded on a *Vehicle Survey Form*.

- The surveyor
    - verified that the load was C&D waste generated within the City of Seattle.
    - recorded the net weight.
    - observed the vehicle and hauler types.
    - asked the driver for the load's origin, construction activity type, and building type.
- The surveyor also selected loads for sampling based on the sampling plan and directed drivers to the sampling area. The entire load carried by each vehicle selected for sampling constituted one sample.
- **At construction sites**:
- Waste collected in intermodal containers was sampled through visual observation at construction sites as it was transferred into the containers.

Step 4: Characterize Samples

- A visual volumetric measurement protocol was used to characterize all loads of C&D waste. The

six steps in the protocol were:
1) Record the sample number and date.
2) Measure load volume.
3) Note which broad material component categories were present.
4) Estimate composition by volume for each broad material category.
5) Estimate composition by volume for each specific component.
6) Check and reconcile percentage data.

- For this study, a total of 606 samples were sorted into 68 distinct component categories, such as *clean engineered wood* or *composition roofing*.

Step 5: Analyze Data and Prepare Report

- After each sampling event, all sorting data were entered into a customized database and reviewed for data entry errors. Volume estimates for each sample were converted to weights using accepted volume-to-weight conversion factors, which are included in Appendix D.

- At the conclusion of the study, waste composition estimates were calculated by aggregating sampling data using a weighted average procedure. Tonnage data provided by SPU and survey results were used to estimate tonnages for the weighted average procedure.

- Once the data were analyzed, this report was prepared.

Subclass	Wta	Wtb	Wtc	Wtd
Newspaper	7.90	0.00	0.00	0.00
OCC/Kraft, unwaxed	19.60	0.00	0.00	0.00
OCC/Kraft, waxed	4.50	0.00	0.00	0.00
Mixed Low Grade	14.20	0.00	0.00	0.00
Phone Books	3.80	0.00	0.00	0.00
Office Paper	5.90	0.00	0.00	0.00
Computer Paper	0.30	0.00	0.00	0.00
Milk/Juice Polycoats	0.60	0.00	0.00	0.00
Frozen Food Polycoats	0.00	0.00	0.00	0.00
Compostable/Soiled	15.10	0.00	0.00	0.00
Paper/Other Materials	0.60	0.00	0.00	0.00
Other Paper	0.00	0.00	0.00	0.00

2. Comparisons to Previous Studies

In this section, the study results from the 2013 study are compared to the 1994/95 and 2007 results. In order to be consistent with the 1994/95 study, only samples from loads delivered to transfer stations, not directly to railheads, were considered in the comparison calculations.[5] Although the methodologies have differed across study years, the composition results of the three studies can be compared. The comparisons were made by examining the changes in composition percentages for each of nine broad comparison classes: ***C&D: Wood***, ***C&D: Aggregates***, ***C&D: Other***, ***Metal***, ***Organics***, ***Paper***, ***Plastic***, ***Other Materials***, and ***MSW/Residue***. See Appendix E for details about year-to-year comparison calculations.

Changes in the Composition of C&D Waste Disposed: 1994/95 to 2013

Table 2-1 compares the composition percentages for each of nine broad comparison classes: ***C&D: Wood***, ***C&D: Aggregates***, ***C&D: Other***, ***Metal***, ***Organics***, ***Paper***, ***Plastic***, ***Other Materials***, and ***Other MSW/Residue***. Statistical t-tests were used to analyze differences in the composition percentages. The bolded broad material categories in Table 2-1 showed statistically significant changes between 1994/95 and 2013.[6] The proportion of ***C&D: Wood*** increased significantly in the C&D waste stream while the proportions of ***Metal***, ***Organics***, ***Paper***, and ***Other Materials*** decreased significantly. Though the changes were not significant, the percentages of ***C&D: Aggregates*** and ***C&D: Other*** each increased by

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[5] The composition figures presented in this section were calculated using an unweighted analytical process. Thus, they may not be equal to the composition percentages presented in the rest of the report as those were derived using a weighted process. Appendix D provides more detail on weighted averages, while Appendix E describes the comparison calculations.

[6] For the purposes of this study, only those calculation results with a p-value of less than 1.11% were considered to be statistically significant. For more detail about these calculations, please see Appendix E.

about 3% to 5%. See Appendix E for a table outlining changes in broad comparison categories across study periods.

Table 2-1: Changes in C&D Waste – 1994/95 to 2013 Study Periods

	Percent		Change in Composition %	
	1994/95	**2013**		
C&D: Wood	29.8%	39.6%	9.8%	
C&D: Aggregates	13.5%	16.7%	3.2%	
C&D: Other	22.6%	27.0%	4.4%	
Metal	9.7%	2.9%	-6.8%	
Organics	3.6%	1.3%	-2.3%	
Paper	5.2%	2.3%	-2.9%	
Plastic	4.3%	3.2%	-1.1%	
Other Materials	8.7%	4.4%	-4.3%	
Other MSW/Residue	2.5%	2.6%	0.1%	
Total	**100%**	**100%**		

Note: Bold type indicates statistically significant changes.

Changes in the Composition of C&D Waste Disposed: 2007 to 2013

As shown in Table 2-2, none of the comparison classes showed a significant change in composition from the 2007 study period to the 2013 study period. The largest change was an increase of almost 5 percentage points for **C&D: Wood**.

Table 2-2: Changes in C&D Waste – 2007 to 2013 Study Periods

	Percent		Change in Composition %	
	2007	**2013**		
C&D: Wood	34.7%	39.6%	4.9%	
C&D: Aggregates	19.4%	16.7%	-2.6%	
C&D: Other	27.7%	27.0%	-0.7%	
Metal	4.1%	2.9%	-1.3%	
Organics	2.1%	1.3%	-0.7%	
Paper	2.3%	2.3%	0.0%	
Plastic	2.0%	3.2%	1.3%	
Other Materials	3.5%	4.4%	0.9%	
Other MSW/Residue	4.3%	2.6%	-1.7%	
Total	**100%**	**100%**		

Note: Bold type indicates statistically significant changes.

3. Detailed Composition Data

Interpreting the Results

This section presents the characterization results for all sampled disposed C&D streams and substreams. For most subsections, the composition results are presented in three ways throughout this report.

- First, a pie chart reflects the composition percentages of nine broad material categories. In these charts the material components within the broad material category **C&D** has been divided into seven sub-categories:

- Next, a table that lists the top ten components, by weight, follows the pie charts.

- Finally, a detailed composition table lists the full composition results for all 68 components. Percentages may not add to 100% in tables throughout the report due to rounding.

The material components included in each of the nine material categories used in the pie chart are:

- **C&D: Clean, Recyclable Wood** includes the material components *clean dimensional lumber, clean engineered wood, pallets and crates,* and *other recyclable wood.*

- **C&D: Concrete, Asphalt, and Other Aggregates** includes the material components *concrete, asphalt paving, brick*, *ceramics*, and *other aggregates*.

- **C&D: Fines** includes the material components *rock and gravel* and *dirt and sand*.

- **C&D: Gypsum** includes the material components *clean gypsum board* and *painted/demolition gypsum*.

- **C&D Painted and Treated Wood** includes the material components *painted/stained wood, creosote-treated wood,* and *other treated wood*.

- **C&D: Remainder/Composite** includes the material components *cellulose insulation*, *fiberglass insulation, rigid foam wall insulation, ceiling tiles, cement fiber board siding (exterior)*, and *remainder/composite C&D*.

- **C&D: Roofing Materials** includes the material components *composition roofing, single-ply roofing membrane,* and *other asphalt roofing*.

- **Other Recyclables** includes the following material components:

• *OCC*	• *Clean Plastic Sheeting and Agricultural Film*
• *Other Recyclable Paper*	• *Leaves and Grass*
• *HVAC Ducting*	• *Branches and Stumps*
• *Rebar*	• *Carpet/Carpet Tiles*
• *Studs (Steel Framing)*	• *Carpet Pad (Foam and Felt)*
• *Other Ferrous Metals*	
• *Other Non-Ferrous*	• *Furniture*

- **Small Consumer Electronics**
- **Computer Related Electronics**
- **Televisions/Other Items with CRT's**

- **Mattresses**
- **Textiles**
- **Tires**
- **Paint**

- *Other Waste* includes the remaining material components:

  - ✓ **Remainder/Composite Paper**
  - ✓ **Flat Window Glass**
  - ✓ **Other Glass**
  - ✓ **Remainder/Composite Glass**
  - ✓ **Major Appliances**
  - ✓ **Remainder/Composite Metal**
  - ✓ **Remainder/Composite Electronics**
  - ✓ **Dirty Plastic Sheeting and Agricultural Film**
  - ✓ **Plastic Piping**
  - ✓ **Expanded Polystyrene Block Packaging**
  - ✓ **Vinyl Exterior Siding**

  - ✓ **Plastic Lumber**
  - ✓ **Durable Plastic Items**
  - ✓ **Other Plastic**
  - ✓ **Remainder/Composite Plastic**
  - ✓ **Remainder/Composite Organics**
  - ✓ **Remainder/Composite Bulky Items and Textiles**
  - ✓ **Solvents and Paint Thinners**
  - ✓ **Asbestos Containing Items**
  - ✓ **Mercury Containing Items**
  - ✓ **Remainder/Composite Household Hazardous**
  - ✓ **Other MSW**
  - ✓ **Fines**

Means and Low/High Estimates

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.

All estimates of precision were calculated at the 90% confidence level. For example, the best estimate of the amount of *other recyclable wood* present in Seattle's disposed stream is 6.5% (see Table 3-3). When calculations are performed at the 90% confidence level, we are 90% certain that the true amount of *other recyclable wood* is between 5.3% and 7.6%. An explanation of these calculations is included in Appendix D.

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 waste composition tables and figures readable, estimated tonnages are rounded to the nearest ton, and estimated percentages are rounded to the nearest tenth of a percent. Due to this rounding, the **tonnages** presented in the report, when added together, may not exactly match the subtotals and totals shown in the tables. Similarly, the **percentages**, when added together, may not exactly match the subtotals or totals shown in the tables. Percentages less than 0.05% are shown as 0.0%.

It is important to recognize that the tons throughout the report were calculated using unrounded number. Therefore, using the rounded numbers shown in the tables to perform calculations may yield results that are slightly different than those shown in the report.

Sample Counts and Weights

A total of 428 loads were sampled from July 2013 to June 2014. Of these 428 loads, the field crew characterized 417 at the three included facilities and 11 at job sites as the material was being loaded into intermodal containers. All loads were categorized into substreams by building type, activity type, hauler type, and vehicle type. Table 3-1 summarizes the sample information for each C&D substream. The average sample weight was approximately 5,700 pounds. Seattle Public Utilities provided the total tonnages presented in this section of the report.

Table 3-1: Overview of Samples
(July 2013 – June 2014)

Subpopulation	Sample Count	(All Weights in pounds) Total Sample	Average Sample
Waste Hauled to Included Facilities			
Building Type			
Residential	250	1,018,549	4,074
Non-residential	120	582,127	4,851
Mixed Loads	25	93,599	3,744
Other Structures	22	94,386	4,290
Activity Type			
New Construction	90	402,034	4,467
Remodeling	181	545,059	3,011
Demolition	82	508,773	6,205
Roofing	30	184,658	6,155
Mixed/Other C&D	34	148,137	4,357
Hauler Type			
Contracted Haulers	52	330,401	6,354
C&D Haulers	100	615,776	6,158
Business Self-haulers	235	788,815	3,357
Homeowner Self-haulers	24	42,501	1,771
Property Clean-up Companies	6	11,166	1,861
Vehicle Type			
Drop Boxes	135	887,305	6,573
End Dumps	188	660,407	3,513
Other Large Vehicles	18	51,624	2,868
Pick-up/Passenger Vehicles	73	146,952	2,013
Semi Truck	3	42,372	14,124
Intermodal Containers Hauled to Railheads	11	660,000	60,000
C&D Waste by Season			
Spring	127	665,142	5,237
Summer	97	665,989	6,866
Fall	124	801,496	6,464
Winter	80	316,034	3,950
Overall C&D	**428**	**2,448,660**	**5,721.17**

Overall Disposed Composition

For this study, 428 C&D waste loads were sampled between July 2013 and June 2014.[7] A total of 91,486 tons of C&D waste was delivered to facilities for disposal in Seattle during this time.[8] The composition estimates were applied to these tons to estimate the amount of waste by material component.

As shown in Figure 3-1, the largest sub-category, **C&D: Clean, Recyclable Wood,** accounted for an estimated 26% of disposed C&D waste, while **C&D: Gypsum** made up about 14% of the total, by weight.

Figure 3-1: Composition Summary – Overall Disposed C&D (July 2013 – June 2014)
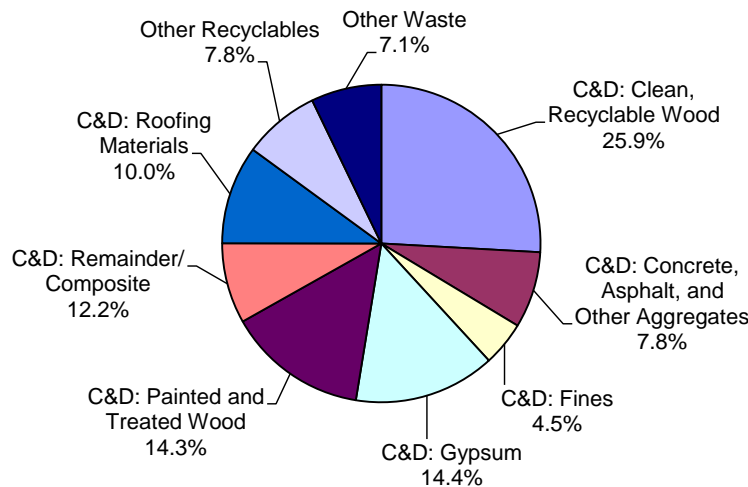
The top ten components of Seattle's overall disposed C&D waste are listed in Table 3-2. When summed, they account for approximately 71% of the overall disposed C&D tonnage. The three most prevalent material components were *painted/stained wood* (13.1%) *painted/demolition gypsum board* (9.9%), and *clean engineered wood* (7.7%). Table 3-2 lists the composition percentages, by weight, of each of 68 material components in Seattle's disposed C&D substream.[9] The detailed results are presented in Table 3-3.

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[7] Inbound material was sampled at one other facility but the data was not used due to inability to determine which materials were disposed from those loads.

[8] The total C&D disposed tonnage number was revised by Seattle Public Utilities in April 2017 after the report was completed. The revised number is 92,324 tons for the report time period (instead of the 91,486 tons originally reported to the City – a difference of 838 tons).

[9] All waste composition results were derived using a 90% confidence level, meaning that there is a 90% certainty that the actual composition is within the calculated range. In charts throughout this report, the values graphed represent the mean component percentage, not the range.

Table 3-2: Top Ten Components – Overall Disposed C&D
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	13.1%	13.1%	11,993
Painted/Demolition Gypsum Board	9.9%	23.0%	9,073
Clean Engineered Wood	7.7%	30.7%	7,024
Remainder/Composite Building Materials	7.3%	38.0%	6,677
Clean Dimensional Lumber	6.8%	44.8%	6,185
Composition Roofing	6.7%	51.5%	6,135
Other Recyclable Wood	6.5%	57.9%	5,908
Pallets and Crates	5.0%	62.9%	4,561
Clean Gypsum Board	4.5%	67.4%	4,076
Dirt and Sand	3.9%	71.2%	3,536
Total	**71.2%**		**65,167**

Table 3-3: Composition by Weight – Overall Disposed C&D
(July 2013 – June 2014)

	Tons	Mean	Low	High
Paper	**1,935**	**2.1%**		
OCC	902	1.0%	0.8%	1.1%
Other Recyclable Paper	821	0.9%	0.7%	1.1%
Remainder/Composite Paper	212	0.2%	0.1%	0.3%
Glass	**1,535**	**1.7%**		
Flat Window Glass	604	0.7%	0.2%	1.1%
Other Glass	267	0.3%	0.0%	0.6%
Remainder/Composite Glass	664	0.7%	0.2%	1.2%
Metal	**2,450**	**2.7%**		
Major Appliances	51	0.1%	0.0%	0.1%
HVAC Ducting	84	0.1%	0.0%	0.1%
Rebar	30	0.0%	0.0%	0.1%
Studs (Steel Framing)	432	0.5%	0.3%	0.6%
Other Ferrous Metals	767	0.8%	0.6%	1.1%
Other Non-Ferrous	543	0.6%	0.4%	0.8%
Remainder/Composite Metal	542	0.6%	0.4%	0.8%
Plastic	**1,710**	**1.9%**		
Clean Plastic Sheeting and Agricultural Film	231	0.3%	0.2%	0.3%
Dirty Plastic Sheeting and Agricultural Film	167	0.2%	0.1%	0.2%
Plastic Piping	732	0.8%	0.7%	0.9%
Expanded Polystyrene Block Packaging	181	0.2%	0.1%	0.3%
Vinyl Exterior Siding	16	0.0%	0.0%	0.0%
Plastic Lumber	18	0.0%	0.0%	0.0%
Durable Plastic Items	95	0.1%	0.1%	0.1%
Other Plastic	138	0.2%	0.1%	0.2%
Remainder/Composite Plastic	132	0.1%	0.1%	0.2%
Aggregates	**11,260**	**12.3%**		
Concrete	2,965	3.2%	1.9%	4.5%
Asphalt Paving	138	0.2%	0.0%	0.3%
Brick	2,008	2.2%	1.1%	3.2%
Rock and Gravel	614	0.7%	0.3%	1.0%
Dirt and Sand	3,536	3.9%	2.3%	5.4%
Ceramics	732	0.8%	0.4%	1.2%
Other Aggregates	1,268	1.4%	0.8%	2.0%
Roofing	**9,185**	**10.0%**		
Composition Roofing	6,135	6.7%	5.2%	8.2%
Single Ply Roofing Membrane	540	0.6%	0.3%	0.9%
Other Asphalt Roofing	2,510	2.7%	1.6%	3.9%
Wood	**36,727**	**40.1%**		
Clean Dimensional Lumber	6,185	6.8%	5.8%	7.7%
Clean Engineered Wood	7,024	7.7%	6.6%	8.7%
Pallets and Crates	4,561	5.0%	4.1%	5.9%
Other Recyclable Wood	5,908	6.5%	5.3%	7.6%
Painted/Stained Wood	11,993	13.1%	10.8%	15.4%
Creosote-treated Wood	452	0.5%	0.1%	0.9%
Other Treated Wood	604	0.7%	0.0%	1.3%

	Tons	Mean	Low	High
Gypsum Wallboard	**13,149**	**14.4%**		
Clean Gypsum Board	4,076	4.5%	3.4%	5.5%
Painted/Demolition Gypsum Board	9,073	9.9%	7.8%	12.1%
Insulation	**783**	**0.9%**		
Cellulose Insulation	11	0.0%	0.0%	0.0%
Fiberglass Insulation	142	0.2%	0.1%	0.2%
Rigid Foam Wall Insulation	629	0.7%	0.3%	1.1%
Other C&D	**8,040**	**8.8%**		
Carpet/Carpet Tiles	1,052	1.1%	0.6%	1.7%
Carpet Pad (Foam and Felt)	273	0.3%	0.1%	0.4%
Ceiling Tiles	17	0.0%	0.0%	0.0%
Cement Fiber Board Siding (Exterior)	22	0.0%	0.0%	0.1%
Remainder/Composite Building Materials	6,677	7.3%	5.9%	8.7%
Organics	**1,137**	**1.2%**		
Leaves and Grass	563	0.6%	0.3%	0.9%
Branches and Stumps	417	0.5%	0.3%	0.7%
Remainder/Composite Organics	156	0.2%	0.1%	0.3%
E-Waste	**74**	**0.1%**		
Small Consumer Electronics	30	0.0%	0.0%	0.0%
Computer Related Electronics	2	0.0%	0.0%	0.0%
Televisions/Other Items with CRT's	9	0.0%	0.0%	0.0%
Remainder/Composite Electronics	33	0.0%	0.0%	0.1%
Hazardous Waste	**250**	**0.3%**		
Paint	20	0.0%	0.0%	0.0%
Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Asbestos Containing Items	210	0.2%	0.0%	0.6%
Mercury Containing Items	3	0.0%	0.0%	0.0%
Remainder/Composite Household Hazardous	17	0.0%	0.0%	0.0%
Bulky Items and Textiles	**972**	**1.1%**		
Furniture	461	0.5%	0.2%	0.8%
Mattresses	36	0.0%	0.0%	0.1%
Textiles	448	0.5%	0.1%	0.8%
Tires	7	0.0%	0.0%	0.0%
Remainder/Composite Bulky Items and Textiles	20	0.0%	0.0%	0.1%
Mixed Residue/MSW	**2,280**	**2.5%**		
Other MSW	2,144	2.3%	1.9%	2.8%
Fines	136	0.1%	0.0%	0.3%
Total Percentage	**100%**			
Total Tons	**91,486**			
Sample Count	**428**			

Calculated at a 90% confidence level

Waste Hauled to Facilities

▪ This section presents sampling results for loads hauled to the three facilities for disposal. Detailed results are presented by building type, activity type, hauler type, and vehicle type. These results do not include the intermodal composition or tonnage. Since building type, activity type, and hauler type have the greatest effect on composition, these profiles were weighted, while vehicle type profiles were not. Please refer to Appendix D for an explanation of the weighted average calculations.

By Building Type

As shown in Figure 3-2, ***C&D: Clean, Recyclable Wood*** composed at least 25% of C&D waste in residential and non-residential buildings and at least 39% in other structures (39.4%) and mixed loads (43.0%). ***C&D: Gypsum*** accounted for at least 20% in non-residential buildings and mixed loads and an estimated 11% in loads from residential structures. **Other Recyclables** were prevalent in non-residential buildings (10.0%) and mixed loads (15.0%). Residential building loads contained the highest percentage of ***C&D: Concrete, Asphalt, and Other Aggregates*** (9.2%), ***C&D: Painted and Treated Wood*** (15.2%), ***C&D: Roofing Materials*** (13.8%), and ***C&D: Fines*** (5.7%) compared to the other building activities.

Figure 3-2: Composition Summary, by Building Type
(July 2013 – June 2014)

Mixed Loads

- Other Waste 8.3%
- Other Recyclables 15.0%
- C&D: Roofing Materials 1.5%
- C&D: Remainder/ Composite 12.2%
- C&D: Painted and Treated Wood 2.0%
- C&D: Gypsum 20.1%
- C&D: Fines 0.5%
- C&D: Concrete, Asphalt, and Other Aggregates 5.0%
- C&D: Clean, Recyclable Wood 43.0%

Other Structures

- C&D: Concrete, Asphalt, and Other Aggregates 6.1%
- C&D: Fines 1.5%
- C&D: Gypsum 2.1%
- C&D: Painted and Treated Wood 10.8%
- C&D: Remainder/ Composite 12.2%
- C&D: Roofing Materials 0.0%
- Other Recyclables 5.6%
- Other Waste 17.0%
- C&D: Clean, Recyclable Wood 39.4%

Residential Buildings

A total of 250 loads were sampled from residential buildings during the 2013/2014 study period. C&D waste from this type of construction resulted in the generation of an estimated 47,128 tons during the study period. As shown in Table 3-4, the three most prevalent categories were *painted/stained wood* (15.2%), *composition roofing* (9.8%), and *clean engineered wood* (8.7%). The top ten components summed to approximately 74% of the total, by weight. The full composition results for residential buildings are presented in Table 3-8.

Table 3-4: Top Ten Components – Residential Buildings
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	15.2%	15.2%	7,157
Composition Roofing	9.8%	25.0%	4,637
Clean Engineered Wood	8.7%	33.7%	4,078
Clean Dimensional Lumber	7.5%	41.2%	3,525
Painted/Demolition Gypsum Board	7.2%	48.4%	3,396
Other Recyclable Wood	6.8%	55.1%	3,197
Remainder/Composite Building Materials	6.5%	61.7%	3,078
Dirt and Sand	5.4%	67.1%	2,543
Brick	3.6%	70.7%	1,690
Concrete	3.5%	74.2%	1,666
Total	**74.2%**		**34,967**

Non-residential Buildings

During the 2013/2014 study, 120 C&D loads coming from non-residential buildings were sampled. Waste from non-residential buildings was estimated to account for approximately 30,168 tons from June 2013 to May 2014. As shown in Table 3-5, *painted/demolition gypsum board* (15.5%) and *painted/stained wood* (10.0%) were the two most prevalent components. The top ten components

summed to approximately 73% of the total, by weight. The full composition results for non-residential buildings are presented in Table 3-9.

Table 3-5: Top Ten Components – Non-residential Buildings
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Demolition Gypsum Board	15.5%	15.5%	4,669
Painted/Stained Wood	10.0%	25.4%	3,002
Remainder/Composite Building Materials	8.6%	34.0%	2,580
Pallets and Crates	8.0%	42.0%	2,416
Clean Engineered Wood	7.3%	49.3%	2,200
Clean Gypsum Board	6.4%	55.6%	1,918
Clean Dimensional Lumber	5.1%	60.7%	1,534
Other Recyclable Wood	4.7%	65.4%	1,419
Composition Roofing	4.4%	69.8%	1,324
Other Asphalt Roofing	3.4%	73.3%	1,038
Total	**73.3%**		**22,099**

Mixed Loads

Twenty-five mixed loads were sampled during the 2013/2014 study. Waste from this type of construction accounted for approximately 4,086 tons of waste. The weighted composition estimates were applied to these tons to estimate the amount of waste generated for each component category. As shown in Table 3-6, the four most prevalent components were *pallets and crates* (13.7%), *clean dimensional lumber* (13.1%), *clean gypsum board* (12.4%), and *clean engineered wood* (11.2%). The top ten components summed to approximately 77% of the total, by weight. The full composition results for mixed loads are presented in Table 3-10.

Table 3-6: Top Ten Components – Mixed Loads
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Pallets and Crates	13.7%	13.7%	560
Clean Dimensional Lumber	13.1%	26.8%	536
Clean Gypsum Board	12.4%	39.2%	505
Clean Engineered Wood	11.2%	50.4%	457
Painted/Demolition Gypsum Board	7.7%	58.1%	314
Other Recyclable Wood	5.0%	63.0%	202
Other MSW	4.0%	67.0%	164
Other Aggregates	3.6%	70.6%	146
OCC	3.4%	73.9%	137
Rigid Foam Wall Insulation	2.6%	76.5%	105
Total	**76.5%**		**3,126**

Other Structures

During the 2013/2014 study period, 22 samples were characterized from loads hauling waste from other structures. Approximately, 4,463 tons of waste were estimated to have been generated from this substream. As shown in Table 3-7, *remainder/composite building materials* (17.3%) was the most

prevalent material. The next three most prevalent materials were all wood categories – *other recyclable wood* (13.3%), *pallets and crates* (12.7%), and *creosote-treated wood* (10.0%). The top ten components summed to approximately 85% of the total, by weight. The full composition results for other structures are presented in Table 3-11.

Table 3-7: Top Ten Components - Other Structures
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Remainder/Composite Building Materials	17.3%	17.3%	774
Other Recyclable Wood	13.3%	30.7%	595
Pallets and Crates	12.7%	43.3%	565
Creosote-treated Wood	10.0%	53.3%	446
Clean Dimensional Lumber	8.2%	61.5%	365
Other MSW	6.9%	68.4%	307
Clean Engineered Wood	5.2%	73.6%	234
Plastic Piping	4.8%	78.4%	215
Other Aggregates	4.3%	82.7%	191
Painted/Demolition Gypsum Board	2.1%	84.8%	95
Total	**84.8%**		**3,786**

Comparisons among Building Types

For all building types, *clean engineered wood, clean dimensional lumber, other recyclable wood,* and *painted/demolition gypsum board* were among the top ten material components. *Pallets and crates* were top ten components in all building types with the exception of residential structures. *Dirt and sand*, *brick*, and *concrete* were unique to the top ten components from residential structures. *Painted/stained wood* and *composition roofing* were only in the top ten lists for residential and non-residential structures. *OCC* and *rigid foam wall insulation* were unique to the top ten components for mixed loads while *creosote-treated wood* and *plastic piping* were unique to the top ten list for other structures.

Table 3-8: Composition by Weight – Residential Buildings
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**948**	**2.0%**			*Gypsum Wallboard*	**5,048**	**10.7%**		
OCC	331	0.7%	0.6%	0.8%	Clean Gypsum Board	1,652	3.5%	2.0%	5.0%
Other Recyclable Paper	463	1.0%	0.7%	1.2%	Painted/Demolition Gypsum Board	3,396	7.2%	5.2%	9.2%
Remainder/Composite Paper	154	0.3%	0.1%	0.5%	*Insulation*	**178**	**0.4%**		
Glass	**703**	**1.5%**			Cellulose Insulation	1	0.0%	0.0%	0.0%
Flat Window Glass	198	0.4%	0.1%	0.7%	Fiberglass Insulation	71	0.2%	0.1%	0.2%
Other Glass	242	0.5%	0.0%	1.2%	Rigid Foam Wall Insulation	106	0.2%	0.0%	0.4%
Remainder/Composite Glass	262	0.6%	0.0%	1.2%	*Other C&D*	**3,718**	**7.9%**		
Metal	**728**	**1.5%**			Carpet/Carpet Tiles	466	1.0%	0.5%	1.5%
Major Appliances	33	0.1%	0.0%	0.2%	Carpet Pad (Foam and Felt)	145	0.3%	0.2%	0.5%
HVAC Ducting	55	0.1%	0.0%	0.2%	Ceiling Tiles	8	0.0%	0.0%	0.0%
Rebar	11	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	22	0.0%	0.0%	0.1%
Studs (Steel Framing)	12	0.0%	0.0%	0.0%	Remainder/Composite Building Materials	3,078	6.5%	4.5%	8.6%
Other Ferrous Metals	267	0.6%	0.4%	0.7%	*Organics*	**809**	**1.7%**		
Other Non-Ferrous	205	0.4%	0.2%	0.6%	Leaves and Grass	347	0.7%	0.2%	1.3%
Remainder/Composite Metal	145	0.3%	0.2%	0.4%	Branches and Stumps	384	0.8%	0.4%	1.2%
Plastic	**795**	**1.7%**			Remainder/Composite Organics	77	0.2%	0.0%	0.3%
Clean Plastic Sheeting and Agricultural Film	100	0.2%	0.2%	0.3%	*E-Waste*	**49**	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	91	0.2%	0.1%	0.3%	Small Consumer Electronics	20	0.0%	0.0%	0.1%
Plastic Piping	355	0.8%	0.6%	0.9%	Computer Related Electronics	1	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	48	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	9	0.0%	0.0%	0.0%
Vinyl Exterior Siding	6	0.0%	0.0%	0.0%	Remainder/Composite Electronics	19	0.0%	0.0%	0.1%
Plastic Lumber	18	0.0%	0.0%	0.1%	*Hazardous Waste*	**228**	**0.5%**		
Durable Plastic Items	47	0.1%	0.1%	0.1%	Paint	11	0.0%	0.0%	0.1%
Other Plastic	73	0.2%	0.1%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	58	0.1%	0.1%	0.2%	Asbestos Containing Items	210	0.4%	0.0%	1.2%
Aggregates	**7,017**	**14.9%**			Mercury Containing Items	2	0.0%	0.0%	0.0%
Concrete	1,666	3.5%	1.3%	5.7%	Remainder/Composite Household Hazardous	5	0.0%	0.0%	0.0%
Asphalt Paving	8	0.0%	0.0%	0.1%	*Bulky Items and Textiles*	**318**	**0.7%**		
Brick	1,690	3.6%	1.7%	5.4%	Furniture	149	0.3%	0.2%	0.4%
Rock and Gravel	155	0.3%	0.0%	0.7%	Mattresses	36	0.1%	0.0%	0.1%
Dirt and Sand	2,543	5.4%	2.7%	8.1%	Textiles	113	0.2%	0.0%	0.4%
Ceramics	462	1.0%	0.5%	1.5%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	493	1.0%	0.4%	1.7%	Remainder/Composite Bulky Items and Textiles	20	0.0%	0.0%	0.1%
Roofing	**6,504**	**13.8%**			*Mixed Residue/MSW*	**1,086**	**2.3%**		
Composition Roofing	4,637	9.8%	7.8%	11.9%	Other MSW	1,047	2.2%	1.6%	2.9%
Single Ply Roofing Membrane	532	1.1%	0.5%	1.8%	Fines	39	0.1%	0.0%	0.2%
Other Asphalt Roofing	1,335	2.8%	1.4%	4.3%					
Wood	**19,000**	**40.3%**							
Clean Dimensional Lumber	3,525	7.5%	6.1%	8.9%					
Clean Engineered Wood	4,078	8.7%	7.1%	10.2%					
Pallets and Crates	1,021	2.2%	1.6%	2.7%					
Other Recyclable Wood	3,197	6.8%	4.9%	8.7%					
Painted/Stained Wood	7,157	15.2%	11.7%	18.6%	**Total Percentage**	**100%**			
Creosote-treated Wood	6	0.0%	0.0%	0.0%	**Total Tons**	**47,128**			
Other Treated Wood	16	0.0%	0.0%	0.1%	**Sample Count**	**250**			

Calculated at a 90% confidence level

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**681**	**2.3%**			*Gypsum Wallboard*	**6,587**	**21.8%**		
OCC	404	1.3%	0.9%	1.7%	Clean Gypsum Board	1,918	6.4%	4.3%	8.4%
Other Recyclable Paper	224	0.7%	0.4%	1.0%	Painted/Demolition Gypsum Board	4,669	15.5%	9.9%	21.1%
Remainder/Composite Paper	52	0.2%	0.0%	0.3%	*Insulation*	**486**	**1.6%**		
Glass	**729**	**2.4%**			Cellulose Insulation	10	0.0%	0.0%	0.0%
Flat Window Glass	330	1.1%	0.0%	2.2%	Fiberglass Insulation	60	0.2%	0.1%	0.3%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	415	1.4%	0.1%	2.6%
Remainder/Composite Glass	399	1.3%	0.1%	2.5%	*Other C&D*	**3,225**	**10.7%**		
Metal	**1,194**	**4.0%**			Carpet/Carpet Tiles	521	1.7%	0.4%	3.1%
Major Appliances	18	0.1%	0.0%	0.2%	Carpet Pad (Foam and Felt)	115	0.4%	0.0%	0.8%
HVAC Ducting	17	0.1%	0.0%	0.1%	Ceiling Tiles	10	0.0%	0.0%	0.1%
Rebar	8	0.0%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	319	1.1%	0.6%	1.5%	Remainder/Composite Building Materials	2,580	8.6%	5.7%	11.4%
Other Ferrous Metals	362	1.2%	0.5%	1.9%	*Organics*	**176**	**0.6%**		
Other Non-Ferrous	226	0.7%	0.4%	1.1%	Leaves and Grass	148	0.5%	0.0%	0.9%
Remainder/Composite Metal	244	0.8%	0.3%	1.3%	Branches and Stumps	20	0.1%	0.0%	0.1%
Plastic	**466**	**1.5%**			Remainder/Composite Organics	8	0.0%	0.0%	0.1%
Clean Plastic Sheeting and Agricultural Film	82	0.3%	0.2%	0.4%	*E-Waste*	**15**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	48	0.2%	0.1%	0.2%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	133	0.4%	0.2%	0.7%	Computer Related Electronics	1	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	58	0.2%	0.0%	0.4%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	11	0.0%	0.0%	0.1%	Remainder/Composite Electronics	14	0.0%	0.0%	0.1%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**14**	**0.0%**		
Durable Plastic Items	26	0.1%	0.0%	0.1%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	55	0.2%	0.1%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	52	0.2%	0.1%	0.3%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**2,398**	**7.9%**			Mercury Containing Items	1	0.0%	0.0%	0.0%
Concrete	802	2.7%	1.2%	4.1%	Remainder/Composite Household Hazardous	13	0.0%	0.0%	0.1%
Asphalt Paving	99	0.3%	0.0%	0.7%	*Bulky Items and Textiles*	**582**	**1.9%**		
Brick	0	0.0%	0.0%	0.0%	Furniture	301	1.0%	0.0%	2.0%
Rock and Gravel	344	1.1%	0.3%	2.0%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	694	2.3%	0.4%	4.2%	Textiles	276	0.9%	0.0%	1.9%
Ceramics	225	0.7%	0.0%	1.5%	Tires	6	0.0%	0.0%	0.1%
Other Aggregates	234	0.8%	0.0%	1.5%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**2,369**	**7.9%**			*Mixed Residue/MSW*	**664**	**2.2%**		
Composition Roofing	1,324	4.4%	1.1%	7.7%	Other MSW	611	2.0%	1.4%	2.7%
Single Ply Roofing Membrane	8	0.0%	0.0%	0.1%	Fines	52	0.2%	0.0%	0.4%
Other Asphalt Roofing	1,038	3.4%	0.7%	6.2%					
Wood	**10,584**	**35.1%**							
Clean Dimensional Lumber	1,534	5.1%	3.5%	6.6%					
Clean Engineered Wood	2,200	7.3%	5.5%	9.1%					
Pallets and Crates	2,416	8.0%	5.6%	10.4%					
Other Recyclable Wood	1,419	4.7%	3.7%	5.7%					
Painted/Stained Wood	3,002	10.0%	7.2%	12.7%	**Total Percentage**	**100%**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	**30,168**			
Other Treated Wood	13	0.0%	0.0%	0.1%	**Sample Count**	**120**			

Calculated at a 90% confidence level

Table 3-10: Composition by Weight - Mixed Loads
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	242	5.9%			*Gypsum Wallboard*	819	20.1%		
OCC	137	3.4%	1.9%	4.8%	Clean Gypsum Board	505	12.4%	6.5%	18.2%
Other Recyclable Paper	105	2.6%	1.4%	3.8%	Painted/Demolition Gypsum Board	314	7.7%	2.4%	13.0%
Remainder/Composite Paper	0	0.0%	0.0%	0.0%	*Insulation*	108	2.6%		
Glass	19	0.5%			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	0	0.0%	0.0%	0.0%	Fiberglass Insulation	3	0.1%	0.0%	0.1%
Other Glass	19	0.5%	0.0%	1.2%	Rigid Foam Wall Insulation	105	2.6%	1.4%	3.7%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	114	2.8%		
Metal	274	6.7%			Carpet/Carpet Tiles	25	0.6%	0.0%	1.3%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	9	0.2%	0.0%	0.5%
HVAC Ducting	8	0.2%	0.0%	0.5%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	11	0.3%	0.0%	0.6%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	28	0.7%	0.0%	1.5%	Remainder/Composite Building Materials	81	2.0%	1.2%	2.8%
Other Ferrous Metals	87	2.1%	1.5%	2.8%	*Organics*	11	0.3%		
Other Non-Ferrous	98	2.4%	0.0%	5.9%	Leaves and Grass	0	0.0%	0.0%	0.0%
Remainder/Composite Metal	42	1.0%	0.1%	1.9%	Branches and Stumps	2	0.0%	0.0%	0.2%
Plastic	142	3.5%			Remainder/Composite Organics	9	0.2%	0.0%	0.5%
Clean Plastic Sheeting and Agricultural Film	36	0.9%	0.5%	1.3%	*E-Waste*	10	0.2%		
Dirty Plastic Sheeting and Agricultural Film	18	0.4%	0.2%	0.7%	Small Consumer Electronics	10	0.2%	0.0%	0.5%
Plastic Piping	30	0.7%	0.4%	1.1%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	44	1.1%	0.0%	2.4%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	8	0.2%		
Durable Plastic Items	10	0.2%	0.1%	0.3%	Paint	8	0.2%	0.0%	0.6%
Other Plastic	1	0.0%	0.0%	0.0%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	5	0.1%	0.1%	0.2%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	226	5.5%			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	15	0.4%	0.0%	1.1%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	51	1.2%		
Brick	0	0.0%	0.0%	0.0%	Furniture	5	0.1%	0.1%	0.1%
Rock and Gravel	20	0.5%	0.5%	0.5%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	0	0.0%	0.0%	0.0%	Textiles	46	1.1%	0.0%	2.4%
Ceramics	45	1.1%	0.7%	1.5%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	146	3.6%	0.0%	9.3%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	60	1.5%			*Mixed Residue/MSW*	164	4.0%		
Composition Roofing	0	0.0%	0.0%	0.0%	Other MSW	164	4.0%	1.9%	6.1%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	60	1.5%	1.5%	1.5%					
Wood	1,837	45.0%							
Clean Dimensional Lumber	536	13.1%	10.0%	16.2%					
Clean Engineered Wood	457	11.2%	8.0%	14.3%					
Pallets and Crates	560	13.7%	9.1%	18.3%					
Other Recyclable Wood	202	5.0%	1.8%	8.1%					
Painted/Stained Wood	82	2.0%	0.1%	3.9%	**Total Percentage**	100%			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	4,086			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	25			

Calculated at a 90% confidence level

Table 3-11: Composition by Weight - Other Structures
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**63**	**1.4%**			***Gypsum Wallboard***	**95**	**2.1%**		
OCC	29	0.6%	0.5%	0.8%	Clean Gypsum Board	1	0.0%	0.0%	0.0%
Other Recyclable Paper	29	0.6%	0.4%	0.8%	Painted/Demolition Gypsum Board	95	2.1%	1.5%	2.7%
Remainder/Composite Paper	6	0.1%	0.0%	0.3%	***Insulation***	**5**	**0.1%**		
Glass	**8**	**0.2%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	0	0.0%	0.0%	0.0%	Fiberglass Insulation	2	0.0%	0.0%	0.1%
Other Glass	6	0.1%	0.0%	0.3%	Rigid Foam Wall Insulation	3	0.1%	0.0%	0.1%
Remainder/Composite Glass	3	0.1%	0.1%	0.1%	***Other C&D***	**795**	**17.8%**		
Metal	**167**	**3.7%**			Carpet/Carpet Tiles	20	0.5%	0.5%	0.5%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0	0.0%	0.0%	0.0%
HVAC Ducting	1	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	17	0.4%	0.4%	0.4%	Remainder/Composite Building Materials	774	17.3%	15.5%	19.2%
Other Ferrous Metals	46	1.0%	0.0%	2.8%	***Organics***	**123**	**2.8%**		
Other Non-Ferrous	13	0.3%	0.1%	0.5%	Leaves and Grass	60	1.3%	1.3%	1.3%
Remainder/Composite Metal	90	2.0%	1.0%	3.1%	Branches and Stumps	7	0.2%	0.0%	0.5%
Plastic	**307**	**6.9%**			Remainder/Composite Organics	56	1.3%	0.9%	1.6%
Clean Plastic Sheeting and Agricultural Film	14	0.3%	0.3%	0.3%	***E-Waste***	**0**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	9	0.2%	0.1%	0.3%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	215	4.8%	3.4%	6.3%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	30	0.7%	0.0%	1.4%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	***Hazardous Waste***	**0**	**0.0%**		
Durable Plastic Items	12	0.3%	0.0%	0.5%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	9	0.2%	0.2%	0.3%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	17	0.4%	0.0%	0.8%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**339**	**7.6%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	81	1.8%	0.6%	3.0%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	***Bulky Items and Textiles***	**15**	**0.3%**		
Brick	0	0.0%	0.0%	0.0%	Furniture	1	0.0%	0.0%	0.1%
Rock and Gravel	0	0.0%	0.0%	0.0%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	67	1.5%	0.0%	4.2%	Textiles	13	0.3%	0.0%	0.7%
Ceramics	0	0.0%	0.0%	0.0%	Tires	1	0.0%	0.0%	0.1%
Other Aggregates	191	4.3%	1.4%	7.2%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**0**	**0.0%**			***Mixed Residue/MSW***	**307**	**6.9%**		
Composition Roofing	0	0.0%	0.0%	0.0%	Other MSW	307	6.9%	5.5%	8.3%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	0	0.0%	0.0%	0.0%					
Wood	**2,238**	**50.1%**							
Clean Dimensional Lumber	365	8.2%	6.6%	9.8%					
Clean Engineered Wood	234	5.2%	4.1%	6.4%					
Pallets and Crates	565	12.7%	9.7%	15.6%					
Other Recyclable Wood	595	13.3%	8.6%	18.1%					
Painted/Stained Wood	34	0.8%	0.8%	0.8%	**Total Percentage**	**100%**			
Creosote-treated Wood	446	10.0%	1.3%	18.7%	**Total Tons**	**4,463**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**22**			

Calculated at a 90% confidence level

By Activity Type

As shown in Figure 3-3, *C&D: Clean, Recyclable Wood* made up between 14% and 45% for new construction, remodeling, demolition, and mixed/other C&D loads. Roofing loads, as expected, contained the highest percentage of *C&D: Roofing Materials* (73.5%). *C&D: Gypsum* made up approximately 20% of remodeling loads.

Figure 3-3: Composition Summary, by Activity Type
(July 2013 – June 2014)
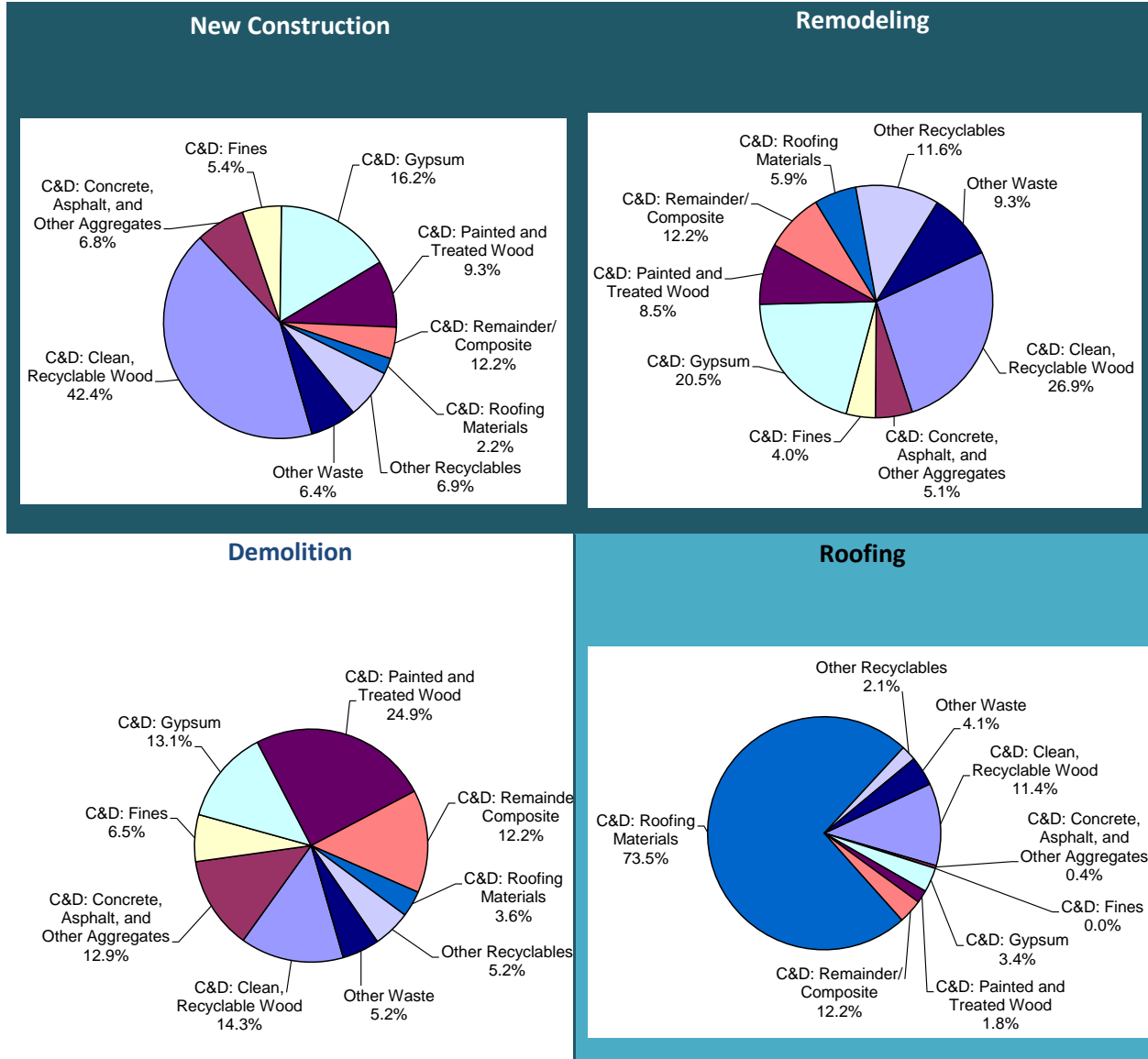
Mixed/Other C&D
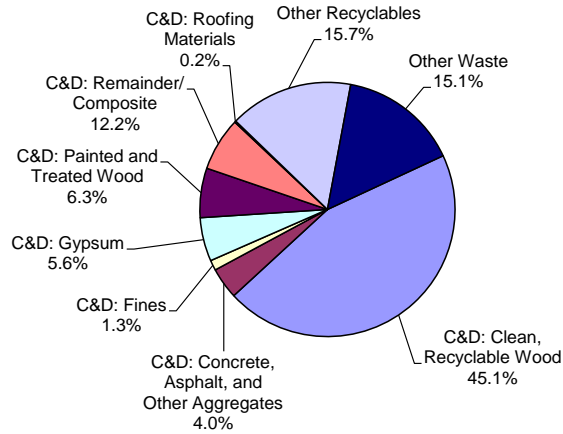
New Construction

A total of 90 loads were sampled from new construction projects during the 2013/2014 study period. An estimated 18,813 tons of C&D waste was attributable to this construction activity type. *Clean engineered wood* (15.5%) was the most prevalent material, followed by *pallets and crates* and *clean dimensional lumber* (Table 3-12). *Clean gypsum board* (9.8%) was the largest non-wood component. The full composition results for new construction activities are presented in Table 3-17.

Table 3-12: Top Ten Components – New Construction
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Clean Engineered Wood	15.5%	15.5%	2,921
Pallets and Crates	11.0%	26.5%	2,062
Clean Dimensional Lumber	10.6%	37.0%	1,985
Clean Gypsum Board	9.8%	46.8%	1,836
Painted/Stained Wood	9.3%	56.1%	1,750
Painted/Demolition Gypsum Board	6.4%	62.5%	1,205
Other Recyclable Wood	5.4%	67.9%	1,007
Remainder/Composite Building Materials	3.7%	71.6%	699
Dirt and Sand	3.6%	75.2%	680
Concrete	2.7%	77.9%	516
Total	**77.9%**		**14,661**

Remodeling

During the 2013/2014 study period, 181 vehicles hauling remodeling waste were sampled. Waste from this activity was estimated to account for approximately 27,633 tons during the study period. As shown in Table 3-13, *painted/demolition gypsum board* (15.4%) accounted for the largest percentage of this waste. *Painted/stained wood* and *clean engineered wood* were each at least 8% of the total. The full composition results from remodeling activities are presented in Table 3-18.

Table 3-13: Top Ten Components – Remodeling
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Demolition Gypsum Board	15.4%	15.4%	4,259
Painted/Stained Wood	8.4%	23.8%	2,317
Clean Engineered Wood	8.2%	32.0%	2,270
Other Recyclable Wood	7.3%	39.4%	2,029
Clean Dimensional Lumber	7.3%	46.7%	2,024
Remainder/Composite Building Materials	6.7%	53.3%	1,841
Clean Gypsum Board	5.1%	58.4%	1,397
Pallets and Crates	4.1%	62.5%	1,120
Dirt and Sand	3.5%	65.9%	962
Other MSW	3.4%	69.3%	943
Total	**69.3%**		**19,162**

Demolition

From July 2013 to June 2014, 82 demolition loads were sampled. Waste from demolition projects was estimated to amount to 24,490 tons. The weighted composition estimates were applied to these tons to estimate the amount of waste for each component category. As shown in Table 3-14, *painted/stained wood* (24.7%), *remainder/composite building materials* (13.4%), and *painted/demolition gypsum board* (10.9%) were the three largest components in this waste. When added together, the top ten components made up about 83% of the total, by weight. The full composition results from demolition activities are presented in Table 3-19.

Table 3-14: Top Ten Components – Demolition
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	24.7%	24.7%	6,054
Remainder/Composite Building Materials	13.4%	38.1%	3,273
Painted/Demolition Gypsum Board	10.9%	49.0%	2,673
Dirt and Sand	6.5%	55.5%	1,595
Concrete	6.3%	61.8%	1,548
Clean Dimensional Lumber	5.4%	67.2%	1,325
Brick	5.1%	72.3%	1,245
Clean Engineered Wood	4.5%	76.8%	1,095
Other Recyclable Wood	4.0%	80.8%	986
Composition Roofing	2.2%	83.1%	546
Total	**83.1%**		**20,341**

Roofing

A total of 30 roofing loads were sampled during the 2013/2014 study. An estimated 8,172 tons of waste were generated from roofing activities between June 2013 and May 2014. As shown in Table 3-15, *composition roofing* made up over half of this waste (54.0%), followed by *other asphalt roofing* (18.9%). *Other asphalt roofing*, also called built-up roofing, is made of layers of felt, asphalt, aggregates, and roofing tar and tar paper. When added together, the top ten components make up about 95% of the total, by weight. The full composition results from roofing activities are presented in Table 3-20.

Table 3-15: Top Ten Components – Roofing
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Composition Roofing	54.0%	54.0%	4,413
Other Asphalt Roofing	18.9%	72.9%	1,548
Clean Engineered Wood	5.0%	78.0%	410
Clean Gypsum Board	3.4%	81.3%	277
Other Recyclable Wood	3.2%	84.5%	262
Remainder/Composite Building Materials	3.1%	87.6%	252
Asbestos Containing Items	2.6%	90.2%	210
Pallets and Crates	1.8%	92.0%	145
Painted/Stained Wood	1.7%	93.7%	138
Clean Dimensional Lumber	1.4%	95.1%	118
Total	**95.1%**		**7,771**

Mixed/Other C&D

A total of 34 samples were characterized from mixed/other C&D loads during the 2013/2014 study period. Waste from these projects was calculated to account for 6,737 tons of waste in that time period. *Other recyclable wood* (16.8%) and *pallets and crates* (16.7%) were the two largest components in this waste (Table 3-16). When added together, the top ten components make up about 77% of the total, by weight. The full composition results from mixed/other C&D activities are presented in Table 3-21.

Table 3-16: Top Ten Components – Mixed/Other C&D
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Other Recyclable Wood	16.8%	16.8%	1,130
Pallets and Crates	16.7%	33.5%	1,126
Other MSW	7.7%	41.2%	521
Clean Dimensional Lumber	7.5%	48.8%	508
Remainder/Composite Building Materials	6.6%	55.4%	448
Creosote-treated Wood	6.1%	61.5%	408
Painted/Demolition Gypsum Board	5.0%	66.4%	336
Clean Engineered Wood	4.1%	70.5%	274
Branches and Stumps	3.2%	73.7%	214
Carpet/Carpet Tiles	3.1%	76.8%	212
Total	**76.8%**		**5,175**

Comparison among Activity Types

For all activity types, the top ten components included *clean engineered wood*, *clean dimensional lumber*, *other recyclable wood*, and *remainder/composite building materials*. *Pallets and crates* was in the top ten lists for all activity types other than demolition, and *painted/demolition gypsum board* was in the top ten lists for all activity types other than roofing. *Painted/stained wood* was common to all of the lists other than mixed/other C&D. Several material components only appeared in the top ten component list for one activity type: *brick* for demolition; *other asphalt roofing* and *asbestos containing items* for roofing; and *creosote-treated wood*, *branches and stumps*, and *carpet/carpet tiles* for mixed/other C&D.

Table 3-17: Composition by Weight – New Construction
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**626**	**3.3%**			*Gypsum Wallboard*	**3,041**	**16.2%**		
OCC	306	1.6%	1.2%	2.0%	Clean Gypsum Board	1,836	9.8%	5.7%	13.8%
Other Recyclable Paper	229	1.2%	0.8%	1.6%	Painted/Demolition Gypsum Board	1,205	6.4%	3.1%	9.7%
Remainder/Composite Paper	91	0.5%	0.3%	0.7%	*Insulation*	**98**	**0.5%**		
Glass	**96**	**0.5%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	69	0.4%	0.0%	1.0%	Fiberglass Insulation	39	0.2%	0.0%	0.4%
Other Glass	26	0.1%	0.0%	0.3%	Rigid Foam Wall Insulation	59	0.3%	0.2%	0.5%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	**801**	**4.3%**		
Metal	**548**	**2.9%**			Carpet/Carpet Tiles	53	0.3%	0.1%	0.5%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	18	0.1%	0.0%	0.2%
HVAC Ducting	37	0.2%	0.1%	0.3%	Ceiling Tiles	9	0.0%	0.0%	0.1%
Rebar	25	0.1%	0.0%	0.2%	Cement Fiber Board Siding (Exterior)	22	0.1%	0.0%	0.3%
Studs (Steel Framing)	41	0.2%	0.0%	0.4%	Remainder/Composite Building Materials	699	3.7%	2.1%	5.4%
Other Ferrous Metals	177	0.9%	0.5%	1.4%	*Organics*	**44**	**0.2%**		
Other Non-Ferrous	168	0.9%	0.1%	1.7%	Leaves and Grass	8	0.0%	0.0%	0.1%
Remainder/Composite Metal	101	0.5%	0.2%	0.8%	Branches and Stumps	21	0.1%	0.0%	0.2%
Plastic	**472**	**2.5%**			Remainder/Composite Organics	16	0.1%	0.0%	0.1%
Clean Plastic Sheeting and Agricultural Film	77	0.4%	0.3%	0.5%	*E-Waste*	**23**	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	75	0.4%	0.1%	0.7%	Small Consumer Electronics	10	0.1%	0.0%	0.1%
Plastic Piping	190	1.0%	0.6%	1.4%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	48	0.3%	0.1%	0.4%	Televisions/Other Items with CRT's	1	0.0%	0.0%	0.0%
Vinyl Exterior Siding	4	0.0%	0.0%	0.0%	Remainder/Composite Electronics	12	0.1%	0.0%	0.2%
Plastic Lumber	5	0.0%	0.0%	0.1%	*Hazardous Waste*	**24**	**0.1%**		
Durable Plastic Items	21	0.1%	0.1%	0.2%	Paint	19	0.1%	0.0%	0.2%
Other Plastic	31	0.2%	0.1%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	22	0.1%	0.1%	0.2%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**2,308**	**12.3%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	516	2.7%	1.7%	3.8%	Remainder/Composite Household Hazardous	5	0.0%	0.0%	0.1%
Asphalt Paving	99	0.5%	0.0%	1.2%	*Bulky Items and Textiles*	**105**	**0.6%**		
Brick	328	1.7%	0.2%	3.2%	Furniture	3	0.0%	0.0%	0.0%
Rock and Gravel	344	1.8%	0.4%	3.3%	Mattresses	5	0.0%	0.0%	0.1%
Dirt and Sand	680	3.6%	0.6%	6.6%	Textiles	96	0.5%	0.1%	1.0%
Ceramics	68	0.4%	0.1%	0.6%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	273	1.5%	0.1%	2.8%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**414**	**2.2%**			*Mixed Residue/MSW*	**487**	**2.6%**		
Composition Roofing	347	1.8%	0.0%	6.4%	Other MSW	487	2.6%	1.9%	3.3%
Single Ply Roofing Membrane	7	0.0%	0.0%	0.1%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	60	0.3%	0.3%	0.3%					
Wood	**9,725**	**51.7%**							
Clean Dimensional Lumber	1,985	10.6%	8.1%	13.0%					
Clean Engineered Wood	2,921	15.5%	12.5%	18.6%					
Pallets and Crates	2,062	11.0%	8.6%	13.3%					
Other Recyclable Wood	1,007	5.4%	3.9%	6.8%					
Painted/Stained Wood	1,750	9.3%	3.5%	15.1%	**Total Percentage**	**100%**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	**18,813**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**90**			

Calculated at a 90% confidence level

Table 3-18: Composition by Weight – Remodeling
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**861**	**3.1%**			*Gypsum Wallboard*	**5,656**	**20.5%**		
OCC	407	1.5%	1.1%	1.8%	Clean Gypsum Board	1,397	5.1%	3.3%	6.9%
Other Recyclable Paper	356	1.3%	0.9%	1.7%	Painted/Demolition Gypsum Board	4,259	15.4%	10.0%	20.8%
Remainder/Composite Paper	99	0.4%	0.0%	0.7%	*Insulation*	**426**	**1.5%**		
Glass	**704**	**2.5%**			Cellulose Insulation	2	0.0%	0.0%	0.0%
Flat Window Glass	281	1.0%	0.0%	2.2%	Fiberglass Insulation	69	0.3%	0.2%	0.3%
Other Glass	231	0.8%	0.0%	2.0%	Rigid Foam Wall Insulation	355	1.3%	0.3%	2.3%
Remainder/Composite Glass	192	0.7%	0.0%	1.6%	*Other C&D*	**2,454**	**8.9%**		
Metal	**972**	**3.5%**			Carpet/Carpet Tiles	472	1.7%	0.7%	2.7%
Major Appliances	33	0.1%	0.0%	0.3%	Carpet Pad (Foam and Felt)	132	0.5%	0.2%	0.7%
HVAC Ducting	37	0.1%	0.0%	0.2%	Ceiling Tiles	9	0.0%	0.0%	0.1%
Rebar	5	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	113	0.4%	0.1%	0.7%	Remainder/Composite Building Materials	1,841	6.7%	4.6%	8.7%
Other Ferrous Metals	348	1.3%	0.5%	2.0%	*Organics*	**557**	**2.0%**		
Other Non-Ferrous	218	0.8%	0.5%	1.1%	Leaves and Grass	355	1.3%	0.3%	2.3%
Remainder/Composite Metal	218	0.8%	0.3%	1.3%	Branches and Stumps	138	0.5%	0.2%	0.8%
Plastic	**541**	**2.0%**			Remainder/Composite Organics	64	0.2%	0.0%	0.5%
Clean Plastic Sheeting and Agricultural Film	103	0.4%	0.3%	0.4%	*E-Waste*	**6**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	43	0.2%	0.1%	0.2%	Small Consumer Electronics	5	0.0%	0.0%	0.0%
Plastic Piping	148	0.5%	0.3%	0.8%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	102	0.4%	0.1%	0.6%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	1	0.0%	0.0%	0.0%	*Hazardous Waste*	**1**	**0.0%**		
Durable Plastic Items	32	0.1%	0.1%	0.2%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	53	0.2%	0.2%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	58	0.2%	0.1%	0.3%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**2,533**	**9.2%**			Mercury Containing Items	1	0.0%	0.0%	0.0%
Concrete	440	1.6%	0.6%	2.6%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	8	0.0%	0.0%	0.1%	*Bulky Items and Textiles*	**541**	**2.0%**		
Brick	99	0.4%	0.0%	0.8%	Furniture	301	1.1%	0.0%	2.1%
Rock and Gravel	155	0.6%	0.0%	1.2%	Mattresses	25	0.1%	0.0%	0.2%
Dirt and Sand	962	3.5%	0.0%	7.2%	Textiles	194	0.7%	0.0%	1.7%
Ceramics	339	1.2%	0.5%	2.0%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	530	1.9%	0.7%	3.2%	Remainder/Composite Bulky Items and Textiles	20	0.1%	0.0%	0.2%
Roofing	**1,619**	**5.9%**			*Mixed Residue/MSW*	**982**	**3.6%**		
Composition Roofing	643	2.3%	1.0%	3.7%	Other MSW	943	3.4%	2.2%	4.6%
Single Ply Roofing Membrane	488	1.8%	0.7%	2.9%	Fines	39	0.1%	0.0%	0.4%
Other Asphalt Roofing	488	1.8%	0.0%	4.3%					
Wood	**9,780**	**35.4%**							
Clean Dimensional Lumber	2,024	7.3%	5.7%	8.9%					
Clean Engineered Wood	2,270	8.2%	5.9%	10.5%					
Pallets and Crates	1,120	4.1%	1.9%	6.2%					
Other Recyclable Wood	2,029	7.3%	5.6%	9.1%					
Painted/Stained Wood	2,317	8.4%	6.0%	10.8%	**Total Percentage**	**100%**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	**27,633**			
Other Treated Wood	19	0.1%	0.0%	0.1%	**Sample Count**	**181**			

Calculated at a 90% confidence level

Table 3-19: Composition by Weight – Demolition
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**223**	**0.9%**			*Gypsum Wallboard*	**3,201**	**13.1%**		
OCC	57	0.2%	0.1%	0.4%	Clean Gypsum Board	528	2.2%	0.8%	3.5%
Other Recyclable Paper	151	0.6%	0.3%	0.9%	Painted/Demolition Gypsum Board	2,673	10.9%	6.5%	15.3%
Remainder/Composite Paper	15	0.1%	0.0%	0.1%	*Insulation*	**220**	**0.9%**		
Glass	**560**	**2.3%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	150	0.6%	0.0%	1.2%	Fiberglass Insulation	28	0.1%	0.1%	0.2%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	192	0.8%	0.0%	1.9%
Remainder/Composite Glass	409	1.7%	0.1%	3.2%	*Other C&D*	**3,624**	**14.8%**		
Metal	**517**	**2.1%**			Carpet/Carpet Tiles	295	1.2%	0.7%	1.7%
Major Appliances	18	0.1%	0.0%	0.2%	Carpet Pad (Foam and Felt)	56	0.2%	0.1%	0.4%
HVAC Ducting	7	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	131	0.5%	0.1%	1.0%	Remainder/Composite Building Materials	3,273	13.4%	9.0%	17.8%
Other Ferrous Metals	168	0.7%	0.5%	0.9%	*Organics*	**133**	**0.5%**		
Other Non-Ferrous	116	0.5%	0.1%	0.8%	Leaves and Grass	73	0.3%	0.0%	0.6%
Remainder/Composite Metal	77	0.3%	0.0%	0.6%	Branches and Stumps	41	0.2%	0.0%	0.3%
Plastic	**333**	**1.4%**			Remainder/Composite Organics	19	0.1%	0.0%	0.2%
Clean Plastic Sheeting and Agricultural Film	13	0.1%	0.0%	0.1%	*E-Waste*	**38**	**0.2%**		
Dirty Plastic Sheeting and Agricultural Film	31	0.1%	0.0%	0.2%	Small Consumer Electronics	15	0.1%	0.0%	0.1%
Plastic Piping	194	0.8%	0.5%	1.0%	Computer Related Electronics	2	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	5	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	7	0.0%	0.0%	0.0%
Vinyl Exterior Siding	11	0.0%	0.0%	0.1%	Remainder/Composite Electronics	14	0.1%	0.0%	0.1%
Plastic Lumber	11	0.0%	0.0%	0.1%	*Hazardous Waste*	**15**	**0.1%**		
Durable Plastic Items	16	0.1%	0.0%	0.1%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	19	0.1%	0.0%	0.1%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	33	0.1%	0.1%	0.2%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**4,751**	**19.4%**			Mercury Containing Items	2	0.0%	0.0%	0.0%
Concrete	1,548	6.3%	2.0%	10.7%	Remainder/Composite Household Hazardous	13	0.1%	0.0%	0.1%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**154**	**0.6%**		
Brick	1,245	5.1%	1.8%	8.4%	Furniture	128	0.5%	0.2%	0.8%
Rock and Gravel	0	0.0%	0.0%	0.0%	Mattresses	6	0.0%	0.0%	0.1%
Dirt and Sand	1,595	6.5%	3.5%	9.6%	Textiles	15	0.1%	0.0%	0.2%
Ceramics	292	1.2%	0.2%	2.2%	Tires	6	0.0%	0.0%	0.1%
Other Aggregates	69	0.3%	0.0%	0.8%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**882**	**3.6%**			*Mixed Residue/MSW*	**224**	**0.9%**		
Composition Roofing	546	2.2%	0.8%	3.6%	Other MSW	172	0.7%	0.4%	1.0%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	52	0.2%	0.0%	0.6%
Other Asphalt Roofing	336	1.4%	0.3%	2.4%					
Wood	**9,615**	**39.3%**							
Clean Dimensional Lumber	1,325	5.4%	3.7%	7.1%					
Clean Engineered Wood	1,095	4.5%	3.1%	5.8%					
Pallets and Crates	107	0.4%	0.2%	0.7%					
Other Recyclable Wood	986	4.0%	0.9%	7.2%					
Painted/Stained Wood	6,054	24.7%	19.4%	30.0%	**Total Percentage**	**100%**			
Creosote-treated Wood	38	0.2%	0.2%	0.2%	**Total Tons**	**24,490**			
Other Treated Wood	10	0.0%	0.0%	0.1%	**Sample Count**	**82**			

Calculated at a 90% confidence level

Table 3-20: Composition by Weight – Roofing
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**34**	**0.4%**			*Gypsum Wallboard*	**277**	**3.4%**		
OCC	15	0.2%	0.1%	0.3%	Clean Gypsum Board	277	3.4%	3.4%	3.4%
Other Recyclable Paper	19	0.2%	0.0%	0.5%	Painted/Demolition Gypsum Board	0	0.0%	0.0%	0.0%
Remainder/Composite Paper	0	0.0%	0.0%	0.0%	*Insulation*	**22**	**0.3%**		
Glass	**60**	**0.7%**			Cellulose Insulation	9	0.1%	0.1%	0.1%
Flat Window Glass	0	0.0%	0.0%	0.0%	Fiberglass Insulation	0	0.0%	0.0%	0.0%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	13	0.2%	0.0%	0.3%
Remainder/Composite Glass	60	0.7%	0.0%	2.0%	*Other C&D*	**252**	**3.1%**		
Metal	**136**	**1.7%**			Carpet/Carpet Tiles	0	0.0%	0.0%	0.0%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0	0.0%	0.0%	0.0%
HVAC Ducting	0	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	90	1.1%	1.1%	1.1%	Remainder/Composite Building Materials	252	3.1%	0.0%	6.2%
Other Ferrous Metals	10	0.1%	0.0%	0.2%	*Organics*	**9**	**0.1%**		
Other Non-Ferrous	11	0.1%	0.1%	0.2%	Leaves and Grass	7	0.1%	0.0%	0.2%
Remainder/Composite Metal	25	0.3%	0.2%	0.4%	Branches and Stumps	1	0.0%	0.0%	0.0%
Plastic	**39**	**0.5%**			Remainder/Composite Organics	0	0.0%	0.0%	0.0%
Clean Plastic Sheeting and Agricultural Film	16	0.2%	0.1%	0.3%	*E-Waste*	**7**	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	1	0.0%	0.0%	0.0%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	3	0.0%	0.0%	0.0%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	2	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	7	0.1%	0.0%	0.2%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**210**	**2.6%**		
Durable Plastic Items	3	0.0%	0.0%	0.1%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	11	0.1%	0.1%	0.1%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	4	0.0%	0.0%	0.1%	Asbestos Containing Items	210	2.6%	0.0%	6.9%
Aggregates	**33**	**0.4%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	0	0.0%	0.0%	0.0%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**3**	**0.0%**		
Brick	18	0.2%	0.0%	0.6%	Furniture	3	0.0%	0.0%	0.0%
Rock and Gravel	0	0.0%	0.0%	0.0%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	0	0.0%	0.0%	0.0%	Textiles	0	0.0%	0.0%	0.0%
Ceramics	15	0.2%	0.0%	0.4%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	0	0.0%	0.0%	0.0%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**6,004**	**73.5%**			*Mixed Residue/MSW*	**7**	**0.1%**		
Composition Roofing	4,413	54.0%	42.0%	66.0%	Other MSW	7	0.1%	0.0%	0.2%
Single Ply Roofing Membrane	44	0.5%	0.1%	0.9%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	1,548	18.9%	9.3%	28.6%					
Wood	**1,079**	**13.2%**							
Clean Dimensional Lumber	118	1.4%	0.0%	3.1%					
Clean Engineered Wood	410	5.0%	2.7%	7.3%					
Pallets and Crates	145	1.8%	0.6%	3.0%					
Other Recyclable Wood	262	3.2%	2.0%	4.4%					
Painted/Stained Wood	138	1.7%	0.0%	3.4%	**Total Percentage**	**100%**			
Creosote-treated Wood	6	0.1%	0.0%	0.2%	**Total Tons**	**8,172**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**30**			

Calculated at a 90% confidence level

|	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**188**	**2.8%**			*Gypsum Wallboard*	**374**	**5.6%**		
OCC	116	1.7%	0.7%	2.7%	Clean Gypsum Board	38	0.6%	0.6%	0.6%
Other Recyclable Paper	66	1.0%	0.4%	1.5%	Painted/Demolition Gypsum Board	336	5.0%	3.6%	6.3%
Remainder/Composite Paper	6	0.1%	0.0%	0.2%	*Insulation*	**10**	**0.2%**		
Glass	**40**	**0.6%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	27	0.4%	0.4%	0.4%	Fiberglass Insulation	0	0.0%	0.0%	0.0%
Other Glass	10	0.2%	0.0%	0.3%	Rigid Foam Wall Insulation	10	0.2%	0.0%	0.4%
Remainder/Composite Glass	3	0.0%	0.0%	0.0%	*Other C&D*	**721**	**10.7%**		
Metal	**190**	**2.8%**			Carpet/Carpet Tiles	212	3.1%	0.0%	8.4%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	62	0.9%	0.0%	2.5%
HVAC Ducting	1	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	0	0.0%	0.0%	0.0%	Remainder/Composite Building Materials	448	6.6%	5.4%	7.9%
Other Ferrous Metals	59	0.9%	0.0%	2.1%	*Organics*	**376**	**5.6%**		
Other Non-Ferrous	29	0.4%	0.2%	0.7%	Leaves and Grass	111	1.7%	1.1%	2.2%
Remainder/Composite Metal	101	1.5%	0.4%	2.5%	Branches and Stumps	214	3.2%	0.9%	5.5%
Plastic	**323**	**4.8%**			Remainder/Composite Organics	51	0.8%	0.5%	1.0%
Clean Plastic Sheeting and Agricultural Film	23	0.3%	0.1%	0.6%	*E-Waste*	**0**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	16	0.2%	0.1%	0.3%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	198	2.9%	2.0%	3.9%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	23	0.3%	0.0%	0.8%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	1	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**0**	**0.0%**		
Durable Plastic Items	23	0.3%	0.1%	0.6%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	23	0.3%	0.1%	0.5%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	15	0.2%	0.0%	0.5%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**356**	**5.3%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	59	0.9%	0.1%	1.6%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**164**	**2.4%**		
Brick	0	0.0%	0.0%	0.0%	Furniture	20	0.3%	0.1%	0.5%
Rock and Gravel	20	0.3%	0.3%	0.3%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	67	1.0%	0.0%	2.8%	Textiles	143	2.1%	0.3%	3.9%
Ceramics	18	0.3%	0.0%	0.5%	Tires	1	0.0%	0.0%	0.1%
Other Aggregates	191	2.8%	0.9%	4.8%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**12**	**0.2%**			*Mixed Residue/MSW*	**521**	**7.7%**		
Composition Roofing	12	0.2%	0.2%	0.2%	Other MSW	521	7.7%	5.9%	9.6%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	0	0.0%	0.0%	0.0%					
Wood	**3,461**	**51.4%**							
Clean Dimensional Lumber	508	7.5%	3.3%	11.8%					
Clean Engineered Wood	274	4.1%	2.2%	5.9%					
Pallets and Crates	1,126	16.7%	12.9%	20.6%					
Other Recyclable Wood	1,130	16.8%	13.2%	20.3%					
Painted/Stained Wood	16	0.2%	0.2%	0.2%	**Total Percentage**	**100%**			
Creosote-treated Wood	408	6.1%	0.3%	11.8%	**Total Tons**	**6,737**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**34**			

Calculated at a 90% confidence level

By Hauler Type

As shown in Figure 3-4, *C&D: Clean, Recyclable Wood* made up between 21% and 35% of the total for contracted haulers, C&D haulers, business self-haulers, and homeowner self-haulers. The largest material classes for property clean-up companies were *C&D: Gypsum* (37.0%) and *Other Recyclables* (20.4%). **Other Recyclables** was the largest material class for homeowner self-haulers at 35%.

**Figure 3-4: Composition Summary, by Hauler Type
(July 2013 – June 2014)**
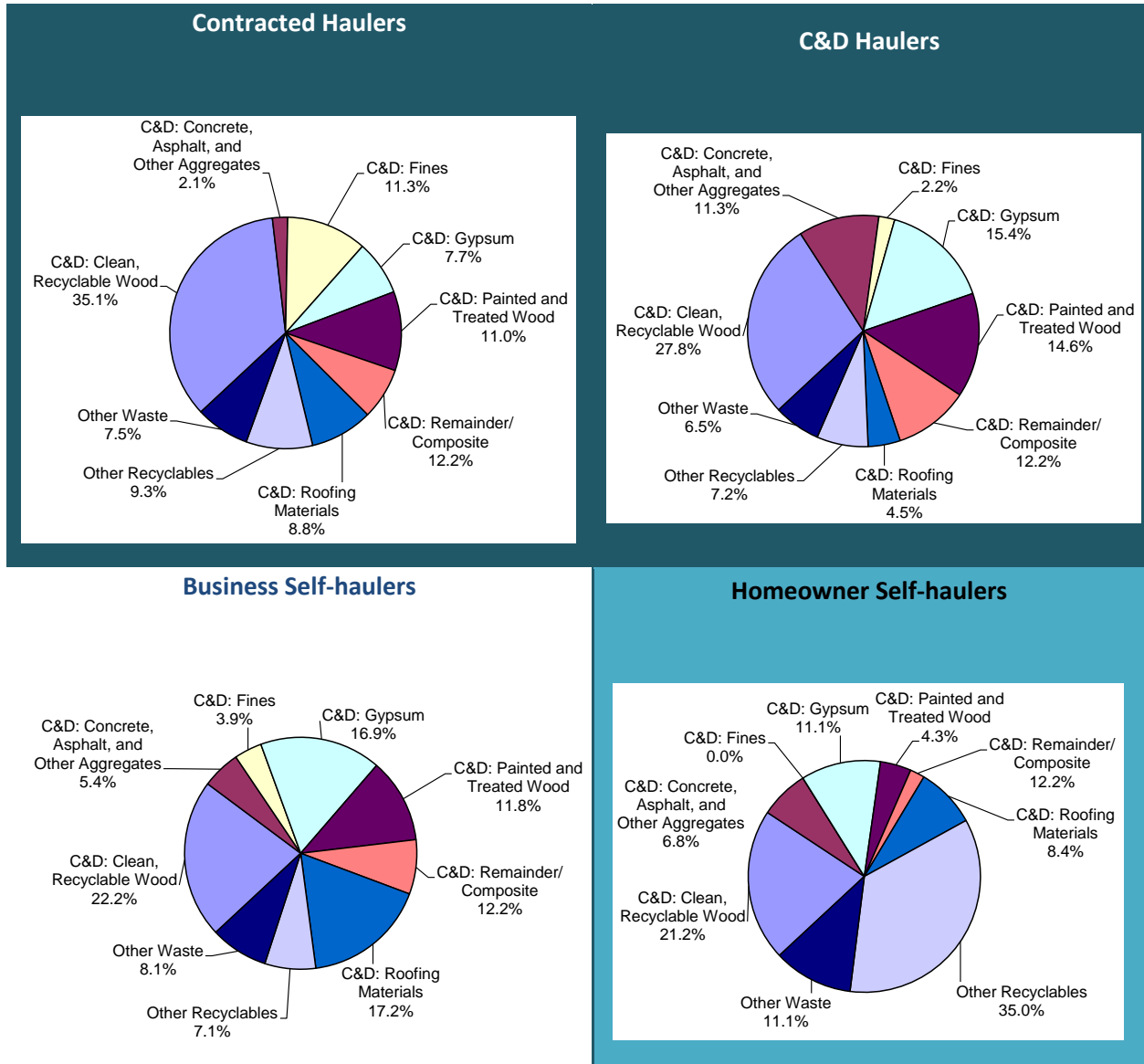
Property Clean-up Companies
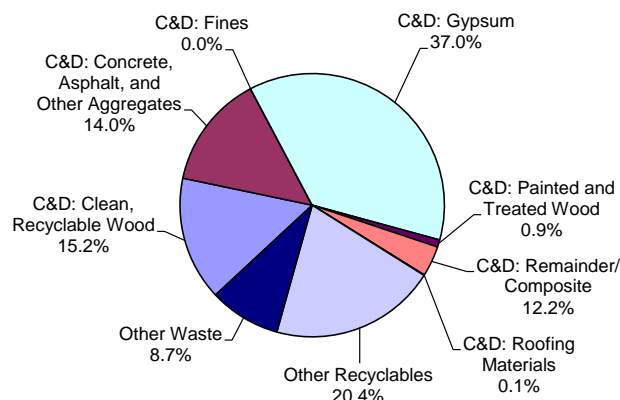
Contracted Haulers

A total of 52 loads were sampled from contracted hauler (the City contracts with Waste Management for hauling non-recyclable C&D waste) during the 2013/2014 study period. An estimated 15,565 tons of C&D waste was delivered to facilities by contracted haulers. As shown in Table 3-22, the three most prevalent materials were *clean engineered wood* (11.8%), *pallets and crates* (11.2%), and *painted/stained wood* (11.0%). The top ten components summed to approximately 77% of the total, by weight. The full composition results for contracted haulers are presented in Table 3-27.

Table 3-22: Top Ten Components – Contracted Haulers
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Clean Engineered Wood	11.8%	11.8%	1,835
Pallets and Crates	11.2%	23.0%	1,745
Painted/Stained Wood	11.0%	34.0%	1,718
Dirt and Sand	9.3%	43.3%	1,441
Clean Dimensional Lumber	9.1%	52.4%	1,422
Composition Roofing	7.9%	60.3%	1,227
Remainder/Composite Building Materials	6.1%	66.4%	947
Clean Gypsum Board	4.4%	70.8%	685
Painted/Demolition Gypsum Board	3.3%	74.1%	508
Other Recyclable Wood	3.0%	77.1%	464
Total	**77.1%**		**11,993**

C&D Haulers

A total of 100 samples were characterized from C&D hauler loads during the 2013/2014 study period. C&D haulers are companies whose principal business includes demolition and/or hauling of C&D waste,

such as large construction or demolition contractors. This hauler type delivered an estimated 33,726 tons of C&D waste to the included facilities. As shown in Table 3-23, the most prevalent materials were *painted/stained wood* (13.3%), *painted/demolition gypsum board* (10.8%), and *remainder/composite building materials* (9.0%). The full composition results for C&D haulers are presented in Table 3-28.

Table 3-23: Top Ten Components – C&D Haulers
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	13.3%	13.3%	4,470
Painted/Demolition Gypsum Board	10.8%	24.0%	3,631
Remainder/Composite Building Materials	9.0%	33.0%	3,032
Other Recyclable Wood	7.7%	40.7%	2,596
Clean Dimensional Lumber	7.3%	48.0%	2,451
Clean Engineered Wood	6.9%	54.9%	2,333
Pallets and Crates	5.9%	60.8%	2,007
Concrete	5.9%	66.7%	1,989
Clean Gypsum Board	4.6%	71.3%	1,551
Brick	3.1%	74.4%	1,049
Total	**74.4%**		**25,108**

Business Self-haulers

During the 2013/2014 study, 235 business self-hauler loads were sampled. Business self-haulers delivered approximately 34,292 tons of C&D waste to facilities from June 2013 to May 2014. As shown in Table 3-24, *painted/stained wood*, *painted/demolition gypsum board*, and *composition roofing* each accounted for at least 11% of this waste, by weight. Detailed composition results from business self-haulers are presented in Table 3-29.

Table 3-24: Top Ten Components – Business Self-haulers
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	11.7%	11.7%	4,006
Painted/Demolition Gypsum Board	11.6%	23.3%	3,976
Composition Roofing	11.1%	34.3%	3,792
Clean Engineered Wood	8.0%	42.3%	2,747
Remainder/Composite Building Materials	7.2%	49.6%	2,481
Other Recyclable Wood	6.0%	55.5%	2,042
Clean Dimensional Lumber	5.9%	61.5%	2,033
Clean Gypsum Board	5.3%	66.8%	1,822
Other Asphalt Roofing	4.8%	71.6%	1,650
Dirt and Sand	3.3%	74.9%	1,147
Total	**74.9%**		**25,696**

Homeowner Self-haulers

Twenty-four samples were completed on loads from homeowner self-haulers during the 2013/2014 study period. A total of 1,779 tons of C&D waste was delivered by homeowner self-haulers during the study period. As shown in Table 3-25, *other recyclable wood* (13.4%), *branches and stumps* (12.2%),

leaves and grass (10.4%), and *painted/demolition gypsum board* (10.1%) were the four most prevalent components in waste from loads. The full composition results from homeowner self-haulers are presented in Table 3-30.

Table 3-25: Top Ten Components – Homeowner Self-haulers
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Other Recyclable Wood	13.4%	13.4%	238
Branches and Stumps	12.2%	25.6%	217
Leaves and Grass	10.4%	35.9%	184
Painted/Demolition Gypsum Board	10.1%	46.0%	179
Other MSW	6.7%	52.7%	119
Ceramics	6.2%	58.9%	111
Composition Roofing	5.8%	64.7%	103
Painted/Stained Wood	4.3%	69.0%	77
Carpet/Carpet Tiles	3.3%	72.3%	58
Clean Engineered Wood	3.0%	75.3%	54
Total	**75.3%**		**1,340**

Property Clean-up Companies

Six property clean-up company loads were sampled for this study. These loads were estimated to haul approximately 483 tons during the study period. As shown in Table 3-26, *painted/demolition gypsum board* made up over one-third of this waste (37.0%), followed by *other recyclable wood* (15.2%) and *ceramics* (11.1%). The top ten components made up about 90% of the total, by weight. The detailed composition results for this substream are shown in Table 3-31.

Table 3-26: Top Ten Components – Property Clean-up Companies
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Demolition Gypsum Board	37.0%	37.0%	178
Other Recyclable Wood	15.2%	52.2%	74
Ceramics	11.1%	63.3%	54
Furniture	5.7%	69.1%	28
Carpet/Carpet Tiles	5.3%	74.3%	25
Other MSW	4.9%	79.2%	23
Remainder/Composite Building Materials	3.6%	82.8%	17
Brick	2.9%	85.6%	14
Remainder/Composite Metal	2.4%	88.1%	12
Leaves and Grass	2.4%	90.4%	11
Total	**90.4%**		**436**

Comparisons among Hauler Types

Other recyclable wood and *painted/demolition gypsum board* appeared in the list of top ten components for all five hauler types. *Clean engineered wood* and *painted/stained wood* appeared in the top ten lists for all hauler types except for property clean-up companies, while *remainder/composite building materials* appeared in all lists other than homeowner self-haulers. *Clean dimensional lumber*

and *clean gypsum board* appeared in the top ten lists for all hauler types except for homeowner self-haulers and property clean-up companies. Several materials were unique to the top ten list for one hauler type: *concrete* for C&D haulers; *other asphalt roofing* for business self-haulers; *branches and stumps* for homeowner self-haulers; and *furniture* and *remainder/composite metal* for property clean-up companies.

Table 3-27: Composition by Weight – Contracted Haulers
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	431	2.8%			*Gypsum Wallboard*	1,194	7.7%		
OCC	272	1.7%	1.2%	2.3%	Clean Gypsum Board	685	4.4%	2.3%	6.5%
Other Recyclable Paper	157	1.0%	0.6%	1.4%	Painted/Demolition Gypsum Board	508	3.3%	1.0%	5.5%
Remainder/Composite Paper	2	0.0%	0.0%	0.0%	*Insulation*	178	1.1%		
Glass	90	0.6%			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	69	0.4%	0.0%	1.2%	Fiberglass Insulation	11	0.1%	0.0%	0.1%
Other Glass	20	0.1%	0.0%	0.3%	Rigid Foam Wall Insulation	166	1.1%	0.1%	2.0%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	1,259	8.1%		
Metal	493	3.2%			Carpet/Carpet Tiles	235	1.5%	0.0%	3.8%
Major Appliances	18	0.1%	0.0%	0.3%	Carpet Pad (Foam and Felt)	77	0.5%	0.0%	1.2%
HVAC Ducting	23	0.1%	0.0%	0.3%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	13	0.1%	0.0%	0.2%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	5	0.0%	0.0%	0.1%	Remainder/Composite Building Materials	947	6.1%	3.7%	8.5%
Other Ferrous Metals	144	0.9%	0.4%	1.5%	*Organics*	124	0.8%		
Other Non-Ferrous	161	1.0%	0.1%	2.0%	Leaves and Grass	31	0.2%	0.0%	0.4%
Remainder/Composite Metal	128	0.8%	0.4%	1.3%	Branches and Stumps	46	0.3%	0.0%	0.7%
Plastic	509	3.3%			Remainder/Composite Organics	47	0.3%	0.0%	0.7%
Clean Plastic Sheeting and Agricultural Film	92	0.6%	0.4%	0.8%	*E-Waste*	15	0.1%		
Dirty Plastic Sheeting and Agricultural Film	36	0.2%	0.2%	0.3%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	243	1.6%	1.1%	2.0%	Computer Related Electronics	1	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	34	0.2%	0.1%	0.3%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	12	0.1%	0.0%	0.2%	Remainder/Composite Electronics	14	0.1%	0.0%	0.2%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	9	0.1%		
Durable Plastic Items	27	0.2%	0.1%	0.3%	Paint	8	0.1%	0.0%	0.1%
Other Plastic	42	0.3%	0.2%	0.3%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	23	0.1%	0.1%	0.2%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	2,082	13.4%			Mercury Containing Items	1	0.0%	0.0%	0.0%
Concrete	68	0.4%	0.2%	0.7%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	8	0.1%	0.0%	0.2%	*Bulky Items and Textiles*	180	1.2%		
Brick	0	0.0%	0.0%	0.0%	Furniture	42	0.3%	0.0%	0.6%
Rock and Gravel	311	2.0%	0.3%	3.7%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	1,441	9.3%	1.9%	16.6%	Textiles	137	0.9%	0.1%	1.6%
Ceramics	61	0.4%	0.2%	0.6%	Tires	1	0.0%	0.0%	0.0%
Other Aggregates	193	1.2%	0.0%	2.8%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	1,363	8.8%			*Mixed Residue/MSW*	455	2.9%		
Composition Roofing	1,227	7.9%	2.1%	13.6%	Other MSW	403	2.6%	1.7%	3.4%
Single Ply Roofing Membrane	76	0.5%	0.5%	0.5%	Fines	52	0.3%	0.0%	0.9%
Other Asphalt Roofing	60	0.4%	0.4%	0.4%					
Wood	7,185	46.2%							
Clean Dimensional Lumber	1,422	9.1%	6.3%	11.9%					
Clean Engineered Wood	1,835	11.8%	8.9%	14.7%					
Pallets and Crates	1,745	11.2%	9.3%	13.2%					
Other Recyclable Wood	464	3.0%	2.3%	3.7%					
Painted/Stained Wood	1,718	11.0%	8.0%	14.1%	**Total Percentage**	100%			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	15,565			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	52			

Calculated at a 90% confidence level

Table 3-28: Composition by Weight – C&D Haulers
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**638**	**1.9%**			*Gypsum Wallboard*	**5,182**	**15.4%**		
OCC	289	0.9%	0.6%	1.1%	Clean Gypsum Board	1,551	4.6%	2.8%	6.4%
Other Recyclable Paper	291	0.9%	0.5%	1.2%	Painted/Demolition Gypsum Board	3,631	10.8%	6.0%	15.5%
Remainder/Composite Paper	58	0.2%	0.1%	0.3%	*Insulation*	**486**	**1.4%**		
Glass	**453**	**1.3%**			Cellulose Insulation	9	0.0%	0.0%	0.0%
Flat Window Glass	240	0.7%	0.0%	1.6%	Fiberglass Insulation	47	0.1%	0.1%	0.2%
Other Glass	6	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	430	1.3%	0.2%	2.3%
Remainder/Composite Glass	208	0.6%	0.0%	1.4%	*Other C&D*	**3,303**	**9.8%**		
Metal	**1,083**	**3.2%**			Carpet/Carpet Tiles	206	0.6%	0.4%	0.8%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	34	0.1%	0.0%	0.2%
HVAC Ducting	23	0.1%	0.0%	0.1%	Ceiling Tiles	9	0.0%	0.0%	0.1%
Rebar	13	0.0%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	22	0.1%	0.0%	0.2%
Studs (Steel Framing)	231	0.7%	0.3%	1.0%	Remainder/Composite Building Materials	3,032	9.0%	6.2%	11.8%
Other Ferrous Metals	358	1.1%	0.4%	1.7%	*Organics*	**219**	**0.7%**		
Other Non-Ferrous	220	0.7%	0.3%	1.0%	Leaves and Grass	139	0.4%	0.0%	0.8%
Remainder/Composite Metal	237	0.7%	0.3%	1.1%	Branches and Stumps	30	0.1%	0.0%	0.2%
Plastic	**578**	**1.7%**			Remainder/Composite Organics	51	0.2%	0.0%	0.3%
Clean Plastic Sheeting and Agricultural Film	75	0.2%	0.1%	0.3%	*E-Waste*	**12**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	40	0.1%	0.1%	0.2%	Small Consumer Electronics	11	0.0%	0.0%	0.1%
Plastic Piping	236	0.7%	0.4%	1.0%	Computer Related Electronics	1	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	101	0.3%	0.1%	0.5%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	4	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**21**	**0.1%**		
Durable Plastic Items	25	0.1%	0.0%	0.1%	Paint	11	0.0%	0.0%	0.1%
Other Plastic	41	0.1%	0.1%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	56	0.2%	0.1%	0.3%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**4,550**	**13.5%**			Mercury Containing Items	2	0.0%	0.0%	0.0%
Concrete	1,989	5.9%	2.6%	9.2%	Remainder/Composite Household Hazardous	7	0.0%	0.0%	0.0%
Asphalt Paving	99	0.3%	0.0%	0.7%	*Bulky Items and Textiles*	**491**	**1.5%**		
Brick	1,049	3.1%	0.8%	5.5%	Furniture	226	0.7%	0.0%	1.5%
Rock and Gravel	33	0.1%	0.0%	0.3%	Mattresses	21	0.1%	0.0%	0.2%
Dirt and Sand	716	2.1%	0.6%	3.6%	Textiles	238	0.7%	0.0%	1.6%
Ceramics	150	0.4%	0.0%	1.1%	Tires	6	0.0%	0.0%	0.0%
Other Aggregates	514	1.5%	0.6%	2.5%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**1,517**	**4.5%**			*Mixed Residue/MSW*	**891**	**2.6%**		
Composition Roofing	839	2.5%	1.9%	3.1%	Other MSW	891	2.6%	1.8%	3.5%
Single Ply Roofing Membrane	3	0.0%	0.0%	0.0%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	676	2.0%	0.0%	4.1%					
Wood	**14,303**	**42.4%**							
Clean Dimensional Lumber	2,451	7.3%	5.7%	8.8%					
Clean Engineered Wood	2,333	6.9%	5.0%	8.8%					
Pallets and Crates	2,007	5.9%	3.9%	8.0%					
Other Recyclable Wood	2,596	7.7%	5.1%	10.3%					
Painted/Stained Wood	4,470	13.3%	9.2%	17.4%	**Total Percentage**	**100%**			
Creosote-treated Wood	446	1.3%	0.2%	2.5%	**Total Tons**	**33,726**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**100**			

Calculated at a 90% confidence level

Table 3-29: Composition by Weight – Business Self-haulers
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**815**	**2.4%**			*Gypsum Wallboard*	**5,798**	**16.9%**		
OCC	324	0.9%	0.7%	1.2%	Clean Gypsum Board	1,822	5.3%	3.3%	7.3%
Other Recyclable Paper	339	1.0%	0.7%	1.2%	Painted/Demolition Gypsum Board	3,976	11.6%	8.6%	14.6%
Remainder/Composite Paper	152	0.4%	0.2%	0.7%	*Insulation*	**112**	**0.3%**		
Glass	**917**	**2.7%**			Cellulose Insulation	2	0.0%	0.0%	0.0%
Flat Window Glass	219	0.6%	0.2%	1.1%	Fiberglass Insulation	77	0.2%	0.1%	0.3%
Other Glass	241	0.7%	0.0%	1.6%	Rigid Foam Wall Insulation	33	0.1%	0.0%	0.2%
Remainder/Composite Glass	456	1.3%	0.2%	2.4%	*Other C&D*	**3,120**	**9.1%**		
Metal	**734**	**2.1%**			Carpet/Carpet Tiles	507	1.5%	0.7%	2.3%
Major Appliances	33	0.1%	0.0%	0.2%	Carpet Pad (Foam and Felt)	123	0.4%	0.2%	0.5%
HVAC Ducting	34	0.1%	0.0%	0.2%	Ceiling Tiles	9	0.0%	0.0%	0.1%
Rebar	4	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	139	0.4%	0.2%	0.6%	Remainder/Composite Building Materials	2,481	7.2%	4.9%	9.5%
Other Ferrous Metals	259	0.8%	0.5%	1.0%	*Organics*	**363**	**1.1%**		
Other Non-Ferrous	141	0.4%	0.2%	0.6%	Leaves and Grass	190	0.6%	0.3%	0.8%
Remainder/Composite Metal	123	0.4%	0.1%	0.6%	Branches and Stumps	121	0.4%	0.2%	0.5%
Plastic	**570**	**1.7%**			Remainder/Composite Organics	52	0.2%	0.1%	0.2%
Clean Plastic Sheeting and Agricultural Film	62	0.2%	0.1%	0.2%	*E-Waste*	**34**	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	86	0.3%	0.1%	0.4%	Small Consumer Electronics	13	0.0%	0.0%	0.1%
Plastic Piping	222	0.6%	0.5%	0.8%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	44	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	2	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	19	0.1%	0.0%	0.1%
Plastic Lumber	18	0.1%	0.0%	0.1%	*Hazardous Waste*	**221**	**0.6%**		
Durable Plastic Items	36	0.1%	0.1%	0.1%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	52	0.2%	0.1%	0.2%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	50	0.1%	0.1%	0.2%	Asbestos Containing Items	210	0.6%	0.0%	1.6%
Aggregates	**3,160**	**9.2%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	497	1.4%	0.9%	2.0%	Remainder/Composite Household Hazardous	11	0.0%	0.0%	0.1%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**175**	**0.5%**		
Brick	626	1.8%	0.8%	2.8%	Furniture	118	0.3%	0.2%	0.5%
Rock and Gravel	176	0.5%	0.0%	1.0%	Mattresses	9	0.0%	0.0%	0.1%
Dirt and Sand	1,147	3.3%	1.6%	5.1%	Textiles	43	0.1%	0.0%	0.3%
Ceramics	357	1.0%	0.5%	1.6%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	356	1.0%	0.3%	1.7%	Remainder/Composite Bulky Items and Textiles	4	0.0%	0.0%	0.0%
Roofing	**5,903**	**17.2%**			*Mixed Residue/MSW*	**732**	**2.1%**		
Composition Roofing	3,792	11.1%	8.0%	14.1%	Other MSW	693	2.0%	1.4%	2.7%
Single Ply Roofing Membrane	461	1.3%	0.4%	2.2%	Fines	39	0.1%	0.0%	0.3%
Other Asphalt Roofing	1,650	4.8%	2.5%	7.2%					
Wood	**11,640**	**33.9%**							
Clean Dimensional Lumber	2,033	5.9%	4.6%	7.3%					
Clean Engineered Wood	2,747	8.0%	6.5%	9.6%					
Pallets and Crates	776	2.3%	1.6%	3.0%					
Other Recyclable Wood	2,042	6.0%	4.6%	7.3%					
Painted/Stained Wood	4,006	11.7%	8.5%	14.8%	**Total Percentage**	**100%**			
Creosote-treated Wood	6	0.0%	0.0%	0.0%	**Total Tons**	**34,292**			
Other Treated Wood	29	0.1%	0.0%	0.2%	**Sample Count**	**235**			

Calculated at a 90% confidence level

Table 3-30: Composition by Weight – Homeowner Self-haulers
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**45**	**2.5%**			*Gypsum Wallboard*	**198**	**11.1%**		
OCC	14	0.8%	0.2%	1.4%	Clean Gypsum Board	18	1.0%	0.0%	2.4%
Other Recyclable Paper	30	1.7%	0.0%	3.8%	Painted/Demolition Gypsum Board	179	10.1%	3.5%	16.7%
Remainder/Composite Paper	0	0.0%	0.0%	0.0%	*Insulation*	**1**	**0.0%**		
Glass	**0**	**0.0%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	0	0.0%	0.0%	0.0%	Fiberglass Insulation	1	0.0%	0.0%	0.1%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0	0.0%	0.0%	0.0%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	**118**	**6.6%**		
Metal	**36**	**2.0%**			Carpet/Carpet Tiles	58	3.3%	0.0%	8.6%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	24	1.3%	0.0%	3.6%
HVAC Ducting	0	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	0	0.0%	0.0%	0.0%	Remainder/Composite Building Materials	36	2.0%	0.0%	4.3%
Other Ferrous Metals	0	0.0%	0.0%	0.0%	*Organics*	**401**	**22.6%**		
Other Non-Ferrous	15	0.9%	0.0%	1.7%	Leaves and Grass	184	10.4%	0.0%	23.2%
Remainder/Composite Metal	21	1.2%	0.0%	2.5%	Branches and Stumps	217	12.2%	3.6%	20.8%
Plastic	**43**	**2.4%**			Remainder/Composite Organics	0	0.0%	0.0%	0.0%
Clean Plastic Sheeting and Agricultural Film	2	0.1%	0.0%	0.2%	*E-Waste*	**6**	**0.3%**		
Dirty Plastic Sheeting and Agricultural Film	2	0.1%	0.1%	0.2%	Small Consumer Electronics	6	0.3%	0.2%	0.4%
Plastic Piping	31	1.8%	0.2%	3.3%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	2	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**0**	**0.0%**		
Durable Plastic Items	4	0.2%	0.0%	0.4%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	2	0.1%	0.1%	0.1%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	1	0.1%	0.0%	0.1%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**122**	**6.8%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	10	0.5%	0.0%	1.3%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**87**	**4.9%**		
Brick	1	0.1%	0.0%	0.1%	Furniture	42	2.4%	1.2%	3.5%
Rock and Gravel	0	0.0%	0.0%	0.0%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	0	0.0%	0.0%	0.0%	Textiles	29	1.6%	0.0%	4.5%
Ceramics	111	6.2%	0.0%	15.7%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	0	0.0%	0.0%	0.0%	Remainder/Composite Bulky Items and Textiles	16	0.9%	0.0%	2.4%
Roofing	**149**	**8.4%**			*Mixed Residue/MSW*	**119**	**6.7%**		
Composition Roofing	103	5.8%	4.9%	6.6%	Other MSW	119	6.7%	1.7%	11.7%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	47	2.6%	2.4%	2.8%					
Wood	**454**	**25.5%**							
Clean Dimensional Lumber	53	3.0%	0.4%	5.5%					
Clean Engineered Wood	54	3.0%	0.0%	6.0%					
Pallets and Crates	33	1.9%	0.0%	4.1%					
Other Recyclable Wood	238	13.4%	8.0%	18.7%					
Painted/Stained Wood	77	4.3%	0.0%	9.4%	**Total Percentage**	**100%**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	**1,779**			
Other Treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**24**			

Calculated at a 90% confidence level

Table 3-31: Composition by Weight – Property Clean-up Companies
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**6**	**1.2%**			*Gypsum Wallboard*	**178**	**37.0%**		
OCC	2	0.5%	0.5%	0.5%	Clean Gypsum Board	0	0.0%	0.0%	0.0%
Other Recyclable Paper	3	0.7%	0.7%	0.7%	Painted/Demolition Gypsum Board	178	37.0%	37.0%	37.0%
Remainder/Composite Paper	0	0.0%	0.0%	0.0%	*Insulation*	**1**	**0.1%**		
Glass	**0**	**0.0%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	0	0.0%	0.0%	0.0%	Fiberglass Insulation	1	0.1%	0.0%	0.5%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0	0.0%	0.0%	0.0%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	**53**	**10.9%**		
Metal	**17**	**3.6%**			Carpet/Carpet Tiles	25	5.3%	0.0%	11.3%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	10	2.0%	0.0%	4.6%
HVAC Ducting	0	0.0%	0.0%	0.0%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	0	0.0%	0.0%	0.0%	Remainder/Composite Building Materials	17	3.6%	3.6%	3.6%
Other Ferrous Metals	1	0.2%	0.2%	0.2%	*Organics*	**11**	**2.4%**		
Other Non-Ferrous	5	1.0%	1.0%	1.0%	Leaves and Grass	11	2.4%	2.4%	2.4%
Remainder/Composite Metal	12	2.4%	2.1%	2.7%	Branches and Stumps	0	0.0%	0.0%	0.0%
Plastic	**7**	**1.5%**			Remainder/Composite Organics	0	0.0%	0.0%	0.0%
Clean Plastic Sheeting and Agricultural Film	0	0.0%	0.0%	0.0%	*E-Waste*	**7**	**1.4%**		
Dirty Plastic Sheeting and Agricultural Film	0	0.0%	0.0%	0.0%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	0	0.0%	0.0%	0.0%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	7	1.4%	1.4%	1.4%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**0**	**0.0%**		
Durable Plastic Items	4	0.8%	0.5%	1.1%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	2	0.3%	0.3%	0.3%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	2	0.3%	0.2%	0.5%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**67**	**14.0%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	0	0.0%	0.0%	0.0%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**33**	**6.9%**		
Brick	14	2.9%	1.1%	4.7%	Furniture	28	5.7%	5.7%	5.7%
Rock and Gravel	0	0.0%	0.0%	0.0%	Mattresses	6	1.2%	1.2%	1.2%
Dirt and Sand	0	0.0%	0.0%	0.0%	Textiles	0	0.0%	0.0%	0.0%
Ceramics	54	11.1%	9.8%	12.4%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	0	0.0%	0.0%	0.0%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**0**	**0.1%**			*Mixed Residue/MSW*	**23**	**4.9%**		
Composition Roofing	0	0.0%	0.0%	0.0%	Other MSW	23	4.9%	4.4%	5.3%
Single Ply Roofing Membrane	0	0.1%	0.1%	0.1%	Fines	0	0.0%	0.0%	0.0%
Other Asphalt Roofing	0	0.0%	0.0%	0.0%					
Wood	**78**	**16.1%**							
Clean Dimensional Lumber	0	0.0%	0.0%	0.0%					
Clean Engineered Wood	0	0.0%	0.0%	0.0%					
Pallets and Crates	0	0.0%	0.0%	0.0%					
Other Recyclable Wood	74	15.2%	10.5%	19.9%	**Total Percentage**	**100%**			
Painted/Stained Wood	4	0.9%	0.9%	0.9%	**Total Tons**	**483**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Sample Count**	**6**			
Other Treated Wood	0	0.0%	0.0%	0.0%					

Calculated at a 90% confidence level

By Vehicle Type

As shown in Figure 3-5, **C&D: Clean, Recyclable Wood** was the largest sub-category, by weight, for all vehicle types except other large vehicles and semi-trucks. **C&D: Gypsum** was also a large class for all vehicle types except other large vehicles and semi-trucks. **C&D: Painted and Treated Wood** was the largest sub-category, by weight, for other large vehicles and semi-trucks.

The figures for composition by vehicle type were estimated using an unweighted process; consequently, composition percentages were not applied to tonnages.

Figure 3-5: Composition Summary, by Vehicle Type
(July 2013 – June 2014)
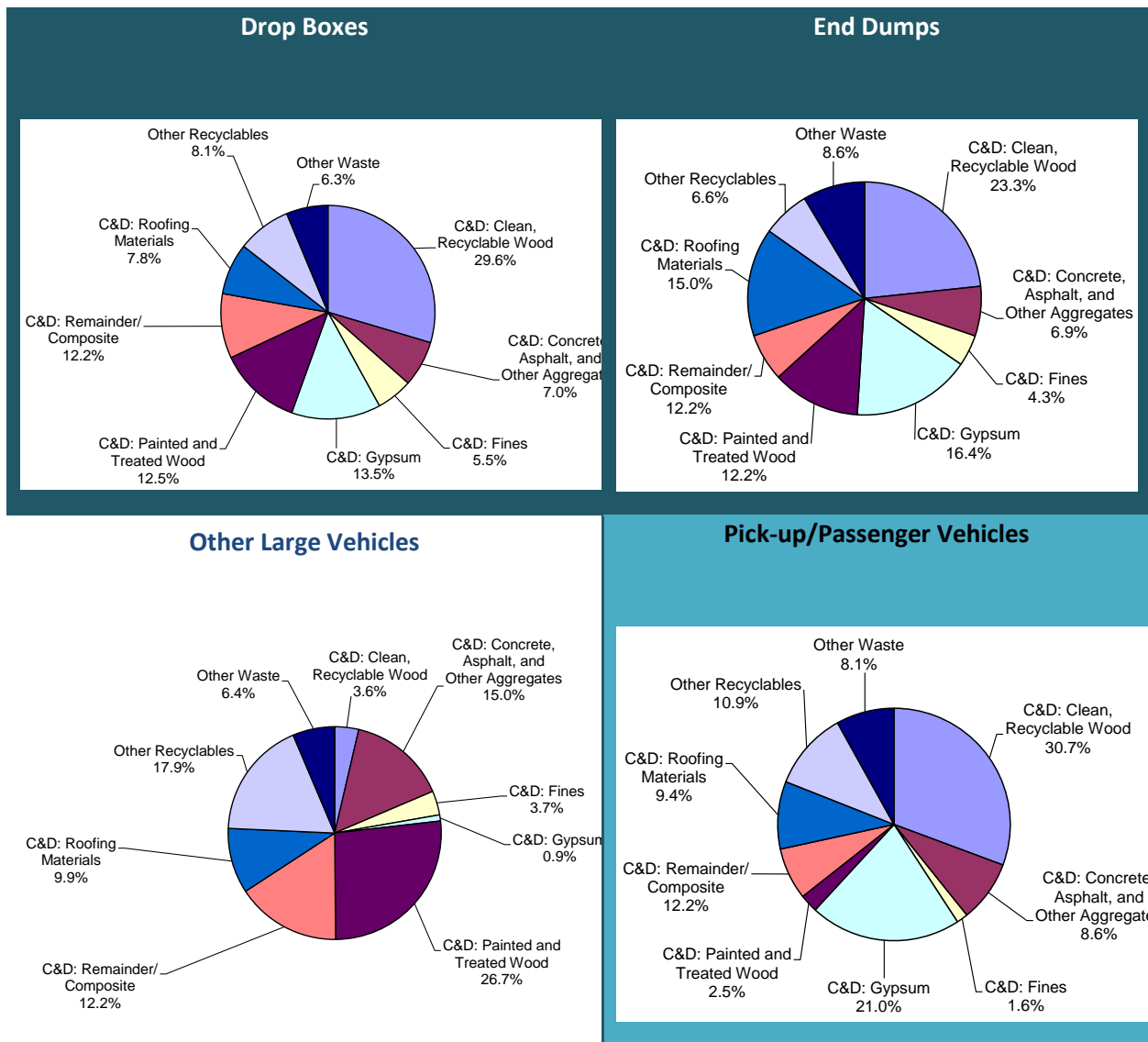
Semi-trucks
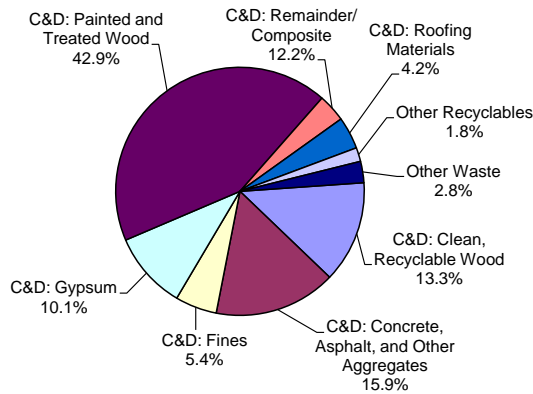
Drop Boxes

A total of 135 drop box loads were sampled during the 2013/2014 study period. As shown in Table 3-32, the most prevalent component of this waste stream was *painted/stained wood* (11.5%), followed by *painted/demolition gypsum board* (8.7%), *remainder/composite building materials* (8.7%), and *clean engineered wood* (8.6%). The top ten components for drop box waste accounted for almost 74% of the total, by weight. Table 3-37 presents the detailed composition results for this waste substream.

Table 3-32: Top Ten Components – Drop Boxes
(July 2013 – June 2014)

Component	Mean	Cum. %
Painted/Stained Wood	11.5%	11.5%
Painted/Demolition Gypsum Board	8.7%	20.2%
Remainder/Composite Building Materials	8.7%	28.9%
Clean Engineered Wood	8.6%	37.5%
Clean Dimensional Lumber	7.4%	44.9%
Pallets and Crates	7.2%	52.0%
Other Recyclable Wood	6.5%	58.5%
Composition Roofing	5.9%	64.4%
Clean Gypsum Board	4.8%	69.1%
Dirt and Sand	4.6%	73.8%
Total	**73.8%**	

End Dumps

During the 2013/2014 study period, 188 end dumps were sampled. As listed in Table 3-33, the most prevalent material components were *painted/stained wood* (12.2%) and *painted/demolition gypsum board* (10.3%). The top ten components summed to approximately 73% of the total, by weight. The full end dump composition results are detailed in Table 3-38.

Table 3-33: Top Ten Components – End Dumps
(July 2013 – June 2014)

Component	Mean	Cum. %
Painted/Stained Wood	12.2%	12.2%
Painted/Demolition Gypsum Board	10.3%	22.4%
Composition Roofing	9.0%	31.4%
Clean Engineered Wood	7.4%	38.8%
Clean Dimensional Lumber	7.0%	45.8%
Clean Gypsum Board	6.2%	51.9%
Remainder/Composite Building Materials	6.1%	58.1%
Other Recyclable Wood	6.0%	64.0%
Other Asphalt Roofing	4.7%	68.7%
Dirt and Sand	4.0%	72.8%
Total	**72.8%**	

Other Large Vehicles

Eighteen other large vehicles were sampled during the 2013/2014 study period. *Composition roofing* (13.4%), *branches and stumps* (12.6%), *other MSW* (11.8%), *pallets and crates* (11.6%), and *other recyclable wood* (10.2%) each accounted for more than 10% of this substream. Detailed composition results for other large vehicles are presented in Table 3-39.

Table 3-34: Top Ten Components – Other Large Vehicles
(July 2013 – June 2014)

Component	Mean	Cum. %
Composition Roofing	13.4%	13.4%
Branches and Stumps	12.6%	25.9%
Other MSW	11.8%	37.7%
Pallets and Crates	11.6%	49.3%
Other Recyclable Wood	10.2%	59.5%
Painted/Demolition Gypsum Board	7.1%	66.6%
Clean Engineered Wood	4.9%	71.5%
Clean Gypsum Board	2.8%	74.4%
Clean Dimensional Lumber	2.6%	77.0%
Remainder/Composite Building Materials	2.4%	79.4%
Total	**79.4%**	

Pick-up / Passenger Vehicles

During the 2013/2014 study period, 73 pick-up/passenger vehicles were sampled. As presented below in Table 3-35, *painted/demolition gypsum board* (19.7%) was the most prevalent material component for this substream, followed by *clean engineered wood* (11.4%) and *other recyclable wood* (11.2%). The top ten components accounted for about 75% of the total, by weight. Detailed composition results for pick-up/passenger vehicles are presented in Table 3-40.

Table 3-35: Top Ten Components – Pick-up / Passenger Vehicles
(July 2013 – June 2014)

Component	Mean	Cum. %
Painted/Demolition Gypsum Board	19.7%	19.7%
Clean Engineered Wood	11.4%	31.1%
Other Recyclable Wood	11.2%	42.3%
Composition Roofing	7.2%	49.5%
Remainder/Composite Building Materials	7.0%	56.6%
Clean Dimensional Lumber	6.1%	62.6%
Other MSW	3.8%	66.5%
Leaves and Grass	3.4%	69.9%
Other Aggregates	2.9%	72.8%
Painted/Stained Wood	2.5%	75.3%
Total	**75.3%**	

Semi-trucks

Fourteen semi-trucks were sampled for this study. The most prevalent component was *painted/stained wood*, which accounted for about 33% of the total (Table 3-36). The top ten components made up about 88% of the total, by weight. The full semi-truck composition results are detailed in Table 3-41.

Table 3-36: Top Ten Components – Semi Truck
(July 2013 – June 2014)

Component	Mean	Cum. %
Painted/Stained Wood	33.3%	33.3%
Painted/Demolition Gypsum Board	10.0%	43.3%
Other Treated Wood	9.6%	52.9%
Other Recyclable Wood	8.2%	61.1%
Concrete	6.7%	67.8%
Brick	5.3%	73.1%
Clean Dimensional Lumber	3.9%	77.0%
Dirt and Sand	3.9%	80.9%
Remainder/Composite Building Materials	3.5%	84.4%
Other Aggregates	3.4%	87.8%
Total	**87.8%**	

Comparisons among Vehicle Types

Clean dimensional lumber, *other recyclable wood*, *painted/demolition gypsum board*, and *remainder/composite building materials* appeared in all the top ten component lists for vehicles. *Clean engineered wood* appeared in all lists but the semi-truck haulers*,* while *clean gypsum board* appeared in all the lists other than the pick-up/passenger vehicles and semi-trucks. *Painted/stained wood* appeared in all lists except for the other large vehicles. Several materials were unique to the top ten list for a single vehicle type: *other asphalt roofing* for end dumps; *brick* and *concrete* for semi-truck vehicles; *leaves and grass* for pick-up/passenger vehicles; and *branches and stumps* for other large vehicles.

Table 3-37: Composition by Weight – Drop Boxes
(July 2013 – June 2014)

	Mean	Low	High		Mean	Low	High
Paper	**2.1%**			**Gypsum Wallboard**	**13.5%**		
OCC	1.2%	0.9%	1.6%	Clean Gypsum Board	4.8%	2.7%	6.8%
Other Recyclable Paper	0.8%	0.6%	1.1%	Painted/Demolition Gypsum Board	8.7%	5.3%	12.1%
Remainder/Composite Paper	0.1%	0.0%	0.2%	**Insulation**	**1.1%**		
Glass	**0.8%**			Cellulose Insulation	0.0%	0.0%	0.1%
Flat Window Glass	0.3%	0.0%	0.6%	Fiberglass Insulation	0.1%	0.1%	0.2%
Other Glass	0.1%	0.0%	0.2%	Rigid Foam Wall Insulation	1.0%	0.4%	1.5%
Remainder/Composite Glass	0.4%	0.0%	1.0%	**Other C&D**	**10.2%**		
Metal	**3.7%**			Carpet/Carpet Tiles	1.3%	0.3%	2.3%
Major Appliances	0.0%	0.0%	0.1%	Carpet Pad (Foam and Felt)	0.2%	0.0%	0.5%
HVAC Ducting	0.0%	0.0%	0.1%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.1%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	0.6%	0.1%	1.2%	Remainder/Composite Building Materials	8.7%	6.0%	11.4%
Other Ferrous Metals	1.2%	0.6%	1.8%	**Organics**	**0.6%**		
Other Non-Ferrous	0.9%	0.4%	1.4%	Leaves and Grass	0.3%	0.0%	0.5%
Remainder/Composite Metal	0.8%	0.4%	1.2%	Branches and Stumps	0.2%	0.0%	0.3%
Plastic	**2.2%**			Remainder/Composite Organics	0.2%	0.0%	0.4%
Clean Plastic Sheeting and Agricultural Film	0.4%	0.2%	0.5%	**E-Waste**	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	0.1%	0.1%	0.2%	Small Consumer Electronics	0.0%	0.0%	0.1%
Plastic Piping	1.0%	0.6%	1.4%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.2%	0.1%	0.3%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.1%	Remainder/Composite Electronics	0.0%	0.0%	0.1%
Plastic Lumber	0.0%	0.0%	0.0%	**Hazardous Waste**	**0.1%**		
Durable Plastic Items	0.1%	0.1%	0.2%	Paint	0.0%	0.0%	0.1%
Other Plastic	0.2%	0.1%	0.3%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.2%	0.1%	0.2%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**12.4%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	3.1%	0.5%	5.6%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.1%
Asphalt Paving	0.0%	0.0%	0.0%	**Bulky Items and Textiles**	**0.9%**		
Brick	2.1%	0.1%	4.2%	Furniture	0.3%	0.0%	0.5%
Rock and Gravel	0.8%	0.0%	2.0%	Mattresses	0.0%	0.0%	0.0%
Dirt and Sand	4.6%	1.2%	8.1%	Textiles	0.6%	0.2%	1.0%
Ceramics	0.2%	0.0%	0.4%	Tires	0.0%	0.0%	0.0%
Other Aggregates	1.6%	0.5%	2.6%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.0%
Roofing	**7.8%**			**Mixed Residue/MSW**	**2.5%**		
Composition Roofing	5.9%	2.6%	9.1%	Other MSW	2.4%	1.6%	3.2%
Single Ply Roofing Membrane	0.1%	0.0%	0.2%	Fines	0.1%	0.0%	0.3%
Other Asphalt Roofing	1.8%	0.3%	3.4%				
Wood	**42.1%**						
Clean Dimensional Lumber	7.4%	5.8%	9.0%				
Clean Engineered Wood	8.6%	6.8%	10.4%				
Pallets and Crates	7.2%	4.9%	9.4%				
Other Recyclable Wood	6.5%	3.9%	9.0%				
Painted/Stained Wood	11.5%	8.0%	14.9%				
Creosote-treated Wood	1.0%	0.0%	2.1%	**Total Percentage**	**100%**		
Other Treated Wood	0.1%	0.0%	0.1%	**Sample Count**	**135**		

Calculated at a 90% confidence level

Table 3-38: Composition by Weight – End Dumps
(July 2013 – June 2014)

	Mean	Low	High		Mean	Low	High
Paper	**2.8%**			*Gypsum Wallboard*	**16.4%**		
OCC	1.1%	0.8%	1.4%	Clean Gypsum Board	6.2%	3.6%	8.8%
Other Recyclable Paper	1.1%	0.8%	1.5%	Painted/Demolition Gypsum Board	10.3%	7.1%	13.4%
Remainder/Composite Paper	0.6%	0.2%	0.9%	*Insulation*	**0.4%**		
Glass	**3.0%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	0.7%	0.1%	1.3%	Fiberglass Insulation	0.2%	0.1%	0.3%
Other Glass	0.8%	0.0%	1.9%	Rigid Foam Wall Insulation	0.1%	0.0%	0.2%
Remainder/Composite Glass	1.6%	0.2%	2.9%	*Other C&D*	**7.6%**		
Metal	**2.1%**			Carpet/Carpet Tiles	1.0%	0.4%	1.7%
Major Appliances	0.1%	0.0%	0.3%	Carpet Pad (Foam and Felt)	0.4%	0.2%	0.6%
HVAC Ducting	0.1%	0.0%	0.3%	Ceiling Tiles	0.1%	0.0%	0.1%
Rebar	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0.1%	0.0%	0.2%
Studs (Steel Framing)	0.3%	0.0%	0.6%	Remainder/Composite Building Materials	6.1%	3.3%	9.0%
Other Ferrous Metals	0.8%	0.5%	1.1%	*Organics*	**0.5%**		
Other Non-Ferrous	0.4%	0.2%	0.5%	Leaves and Grass	0.2%	0.1%	0.4%
Remainder/Composite Metal	0.3%	0.2%	0.5%	Branches and Stumps	0.2%	0.1%	0.4%
Plastic	**2.0%**			Remainder/Composite Organics	0.1%	0.0%	0.1%
Clean Plastic Sheeting and Agricultural Film	0.2%	0.1%	0.3%	*E-Waste*	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	0.3%	0.1%	0.5%	Small Consumer Electronics	0.0%	0.0%	0.1%
Plastic Piping	0.8%	0.3%	1.4%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	0.0%	0.0%	0.1%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.1%	0.0%	0.2%
Plastic Lumber	0.1%	0.0%	0.1%	*Hazardous Waste*	**0.8%**		
Durable Plastic Items	0.1%	0.1%	0.2%	Paint	0.0%	0.0%	0.1%
Other Plastic	0.2%	0.1%	0.2%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.2%	0.1%	0.3%	Asbestos Containing Items	0.7%	0.0%	1.9%
Aggregates	**11.2%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	2.5%	1.5%	3.4%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.0%	0.0%	0.1%	*Bulky Items and Textiles*	**0.7%**		
Brick	2.0%	0.7%	3.3%	Furniture	0.4%	0.2%	0.7%
Rock and Gravel	0.3%	0.0%	0.8%	Mattresses	0.1%	0.0%	0.2%
Dirt and Sand	4.0%	0.7%	7.4%	Textiles	0.1%	0.0%	0.2%
Ceramics	1.5%	0.7%	2.2%	Tires	0.0%	0.0%	0.0%
Other Aggregates	0.9%	0.3%	1.5%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.0%
Roofing	**15.0%**			*Mixed Residue/MSW*	**1.9%**		
Composition Roofing	9.0%	4.2%	13.9%	Other MSW	1.7%	1.3%	2.2%
Single Ply Roofing Membrane	1.3%	0.0%	3.3%	Fines	0.1%	0.0%	0.3%
Other Asphalt Roofing	4.7%	1.1%	8.3%				
Wood	**35.5%**						
Clean Dimensional Lumber	7.0%	5.0%	8.9%				
Clean Engineered Wood	7.4%	5.6%	9.2%				
Pallets and Crates	3.0%	2.0%	4.1%				
Other Recyclable Wood	6.0%	4.3%	7.6%				
Painted/Stained Wood	12.2%	8.3%	16.0%				
Creosote-treated Wood	0.0%	0.0%	0.0%	**Total Percentage**	**100%**		
Other Treated Wood	0.1%	0.0%	0.1%	**Sample Count**	**188**		

Calculated at a 90% confidence level

Table 3-39: Composition by Weight – Other Large Vehicles
(July 2013 – June 2014)

	Mean	Low	High		Mean	Low	High
Paper	**2.1%**			**Gypsum Wallboard**	**9.9%**		
OCC	0.6%	0.1%	1.1%	Clean Gypsum Board	2.8%	0.0%	5.8%
Other Recyclable Paper	1.5%	0.1%	2.9%	Painted/Demolition Gypsum Board	7.1%	0.0%	15.0%
Remainder/Composite Paper	0.0%	0.0%	0.0%	**Insulation**	**0.1%**		
Glass	**1.1%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	1.1%	0.0%	2.9%	Fiberglass Insulation	0.1%	0.0%	0.2%
Other Glass	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0.0%	0.0%	0.0%
Remainder/Composite Glass	0.0%	0.0%	0.0%	**Other C&D**	**5.0%**		
Metal	**2.3%**			Carpet/Carpet Tiles	2.0%	0.0%	5.3%
Major Appliances	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0.6%	0.0%	1.5%
HVAC Ducting	0.2%	0.0%	0.4%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.1%	0.0%	0.3%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	0.5%	0.0%	1.4%	Remainder/Composite Building Materials	2.4%	0.3%	4.6%
Other Ferrous Metals	0.6%	0.0%	1.3%	**Organics**	**15.0%**		
Other Non-Ferrous	0.4%	0.0%	0.8%	Leaves and Grass	2.4%	0.0%	4.8%
Remainder/Composite Metal	0.5%	0.0%	1.2%	Branches and Stumps	12.6%	0.0%	28.1%
Plastic	**2.6%**			Remainder/Composite Organics	0.0%	0.0%	0.0%
Clean Plastic Sheeting and Agricultural Film	0.2%	0.0%	0.4%	**E-Waste**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	0.2%	0.1%	0.4%	Small Consumer Electronics	0.0%	0.0%	0.0%
Plastic Piping	0.3%	0.0%	0.6%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	1.4%	0.1%	2.7%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.0%
Plastic Lumber	0.0%	0.0%	0.0%	**Hazardous Waste**	**0.0%**		
Durable Plastic Items	0.1%	0.0%	0.2%	Paint	0.0%	0.0%	0.0%
Other Plastic	0.1%	0.0%	0.2%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.2%	0.0%	0.4%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**4.7%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	2.3%	0.5%	4.0%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	1.4%	0.0%	3.7%	**Bulky Items and Textiles**	**1.8%**		
Brick	0.0%	0.0%	0.0%	Furniture	1.3%	0.0%	3.0%
Rock and Gravel	0.0%	0.0%	0.0%	Mattresses	0.1%	0.0%	0.3%
Dirt and Sand	0.0%	0.0%	0.0%	Textiles	0.0%	0.0%	0.0%
Ceramics	1.0%	0.0%	2.1%	Tires	0.0%	0.0%	0.0%
Other Aggregates	0.0%	0.0%	0.0%	Remainder/Composite Bulky Items and Textiles	0.4%	0.0%	1.2%
Roofing	**13.4%**			**Mixed Residue/MSW**	**11.8%**		
Composition Roofing	13.4%	0.0%	27.6%	Other MSW	11.8%	2.6%	21.0%
Single Ply Roofing Membrane	0.0%	0.0%	0.0%	Fines	0.0%	0.0%	0.0%
Other Asphalt Roofing	0.0%	0.0%	0.0%				
Wood	**30.2%**						
Clean Dimensional Lumber	2.6%	0.8%	4.4%				
Clean Engineered Wood	4.9%	0.1%	9.7%				
Pallets and Crates	11.6%	2.0%	21.1%				
Other Recyclable Wood	10.2%	3.0%	17.5%				
Painted/Stained Wood	0.7%	0.0%	1.6%				
Creosote-treated Wood	0.2%	0.0%	0.6%	**Total Percentage**	**100%**		
Other Treated Wood	0.0%	0.0%	0.0%	**Sample Count**	**18**		

Calculated at a 90% confidence level

	Mean	Low	High		Mean	Low	High
Paper	**1.6%**			*Gypsum Wallboard*	**21.0%**		
OCC	0.8%	0.4%	1.1%	Clean Gypsum Board	1.4%	0.0%	2.8%
Other Recyclable Paper	0.8%	0.2%	1.3%	Painted/Demolition Gypsum Board	19.7%	8.9%	30.4%
Remainder/Composite Paper	0.1%	0.0%	0.2%	*Insulation*	**0.2%**		
Glass	**1.1%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	0.9%	0.0%	1.7%	Fiberglass Insulation	0.2%	0.0%	0.3%
Other Glass	0.2%	0.0%	0.3%	Rigid Foam Wall Insulation	0.0%	0.0%	0.0%
Remainder/Composite Glass	0.1%	0.0%	0.2%	*Other C&D*	**9.7%**		
Metal	**2.1%**			Carpet/Carpet Tiles	2.1%	0.6%	3.5%
Major Appliances	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0.6%	0.1%	1.1%
HVAC Ducting	0.0%	0.0%	0.1%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.0%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	0.3%	0.0%	0.6%	Remainder/Composite Building Materials	7.0%	3.2%	10.9%
Other Ferrous Metals	0.1%	0.0%	0.3%	*Organics*	**4.4%**		
Other Non-Ferrous	0.8%	0.1%	1.4%	Leaves and Grass	3.4%	0.3%	6.5%
Remainder/Composite Metal	0.8%	0.0%	1.9%	Branches and Stumps	0.3%	0.1%	0.5%
Plastic	**1.5%**			Remainder/Composite Organics	0.7%	0.0%	1.8%
Clean Plastic Sheeting and Agricultural Film	0.1%	0.1%	0.2%	*E-Waste*	**0.2%**		
Dirty Plastic Sheeting and Agricultural Film	0.1%	0.1%	0.2%	Small Consumer Electronics	0.2%	0.0%	0.4%
Plastic Piping	0.6%	0.2%	1.0%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.0%
Plastic Lumber	0.0%	0.0%	0.0%	*Hazardous Waste*	**0.0%**		
Durable Plastic Items	0.1%	0.0%	0.3%	Paint	0.0%	0.0%	0.0%
Other Plastic	0.3%	0.1%	0.4%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.1%	0.0%	0.2%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**10.1%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	1.4%	0.0%	2.8%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**1.6%**		
Brick	2.4%	0.0%	6.3%	Furniture	0.6%	0.0%	1.4%
Rock and Gravel	1.3%	0.0%	2.9%	Mattresses	0.0%	0.0%	0.0%
Dirt and Sand	0.3%	0.0%	0.7%	Textiles	0.8%	0.0%	1.7%
Ceramics	1.8%	0.0%	3.8%	Tires	0.0%	0.0%	0.0%
Other Aggregates	2.9%	0.0%	5.8%	Remainder/Composite Bulky Items and Textiles	0.1%	0.0%	0.3%
Roofing	**9.4%**			*Mixed Residue/MSW*	**3.8%**		
Composition Roofing	7.2%	1.1%	13.4%	Other MSW	3.8%	2.2%	5.5%
Single Ply Roofing Membrane	1.7%	0.0%	3.8%	Fines	0.0%	0.0%	0.0%
Other Asphalt Roofing	0.5%	0.0%	1.1%				
Wood	**33.2%**						
Clean Dimensional Lumber	6.1%	3.1%	9.0%				
Clean Engineered Wood	11.4%	5.1%	17.7%				
Pallets and Crates	2.0%	0.6%	3.3%				
Other Recyclable Wood	11.2%	7.5%	15.0%				
Painted/Stained Wood	2.5%	1.1%	3.9%				
Creosote-treated Wood	0.0%	0.0%	0.0%	**Total Percentage**	**100%**		
Other Treated Wood	0.0%	0.0%	0.0%	**Sample Count**	**73**		

Calculated at a 90% confidence level

Table 3-41: Composition by Weight – Semi Truck
(July 2013 – June 2014)

	Mean	Low	High		Mean	Low	High
Paper	**0.0%**			*Gypsum Wallboard*	**10.1%**		
OCC	0.0%	0.0%	0.1%	Clean Gypsum Board	0.1%	0.0%	0.2%
Other Recyclable Paper	0.0%	0.0%	0.0%	Painted/Demolition Gypsum Board	10.0%	5.8%	14.2%
Remainder/Composite Paper	0.0%	0.0%	0.0%	*Insulation*	**0.1%**		
Glass	**1.3%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	1.3%	0.0%	3.3%	Fiberglass Insulation	0.1%	0.0%	0.2%
Other Glass	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0.0%	0.0%	0.0%
Remainder/Composite Glass	0.0%	0.0%	0.0%	*Other C&D*	**4.0%**		
Metal	**1.5%**			Carpet/Carpet Tiles	0.3%	0.0%	0.7%
Major Appliances	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0.1%	0.0%	0.1%
HVAC Ducting	0.1%	0.0%	0.1%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	0.9%	0.2%	1.7%	Remainder/Composite Building Materials	3.5%	0.2%	6.9%
Other Ferrous Metals	0.1%	0.0%	0.2%	*Organics*	**0.3%**		
Other Non-Ferrous	0.0%	0.0%	0.1%	Leaves and Grass	0.2%	0.0%	0.4%
Remainder/Composite Metal	0.3%	0.0%	0.7%	Branches and Stumps	0.1%	0.0%	0.2%
Plastic	**0.0%**			Remainder/Composite Organics	0.1%	0.0%	0.3%
Clean Plastic Sheeting and Agricultural Film	0.0%	0.0%	0.0%	*E-Waste*	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	0.0%	0.0%	0.0%	Small Consumer Electronics	0.0%	0.0%	0.0%
Plastic Piping	0.0%	0.0%	0.0%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.0%
Plastic Lumber	0.0%	0.0%	0.0%	*Hazardous Waste*	**0.0%**		
Durable Plastic Items	0.0%	0.0%	0.0%	Paint	0.0%	0.0%	0.0%
Other Plastic	0.0%	0.0%	0.0%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.0%	0.0%	0.0%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**21.3%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	6.7%	0.6%	12.8%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.5%	0.0%	1.3%	*Bulky Items and Textiles*	**0.1%**		
Brick	5.3%	0.0%	12.3%	Furniture	0.1%	0.0%	0.2%
Rock and Gravel	1.6%	0.0%	3.6%	Mattresses	0.0%	0.0%	0.0%
Dirt and Sand	3.9%	0.0%	8.0%	Textiles	0.0%	0.0%	0.0%
Ceramics	0.0%	0.0%	0.0%	Tires	0.0%	0.0%	0.0%
Other Aggregates	3.4%	0.0%	9.0%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.0%
Roofing	**4.2%**			*Mixed Residue/MSW*	**1.0%**		
Composition Roofing	2.9%	0.4%	5.4%	Other MSW	0.2%	0.0%	0.6%
Single Ply Roofing Membrane	0.0%	0.0%	0.0%	Fines	0.7%	0.0%	1.9%
Other Asphalt Roofing	1.3%	0.0%	3.4%				
Wood	**56.2%**						
Clean Dimensional Lumber	3.9%	1.1%	6.7%				
Clean Engineered Wood	1.1%	0.0%	2.7%				
Pallets and Crates	0.0%	0.0%	0.0%				
Other Recyclable Wood	8.2%	1.6%	14.9%				
Painted/Stained Wood	33.3%	15.9%	50.7%				
Creosote-treated Wood	0.0%	0.0%	0.0%	**Total Percentage**	**100%**		
Other Treated Wood	9.6%	0.3%	18.9%	**Sample Count**	**14**		

Calculated at a 90% confidence level

Intermodal Containers Hauled to Railheads for Landfill Disposal

A total of 11 samples of waste hauled in intermodal containers were characterized during the 2013/2014 study period. Waste from these loads amounted to approximately 5,641 tons of C&D waste from June 2013 to May 2014. The weighted composition estimates were applied to these tons to estimate the amount of waste disposed for each component category. As shown in Figure 3-6, *C&D: Painted and Treated Wood* accounted for almost 41% of C&D waste disposed in intermodal containers, while *C&D: Concrete, Asphalt, and Other Aggregates*, *C&D: Clean Recyclable Wood,* **C&D: Remainder/Composite**, and *C&D: Gypsum* each composed more than 10% of intermodal container waste.

Figure 3-6: Composition Summary, Intermodal Containers
(July 2013 – June 2014)
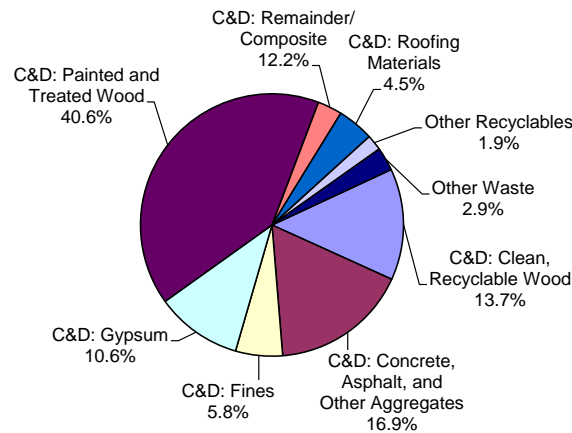
As shown in Table 3-42, *painted/stained wood* made up approximately 30% of the total, by weight. *Painted/demolition gypsum board* (10.6%) and *other treated wood* (10.2%) were also large components. The top ten components summed to approximately 88% of this waste. The full composition results for intermodal loads are presented in Table 3-43.

Table 3-42: Top Ten Components – Intermodal Containers
(July 2013 – June 2014)

Component	Mean	Cum. %	Tons
Painted/Stained Wood	30.4%	30.4%	1,718
Painted/Demolition Gypsum Board	10.6%	41.1%	600
Other Treated Wood	10.2%	51.3%	575
Other Recyclable Wood	8.8%	60.0%	494
Concrete	7.1%	67.2%	401
Brick	5.6%	72.8%	318
Dirt and Sand	4.1%	76.9%	232
Clean Dimensional Lumber	4.0%	80.9%	226
Other Aggregates	3.6%	84.5%	204
Composition Roofing	3.1%	87.6%	174
Total	**87.6%**		**4,942**

Table 3-43: Composition by Weight – Intermodal Containers for Landfill Disposal
(July 2013 – June 2014)

	Tons	Mean	Low	High		Tons	Mean	Low	High
Paper	**1**	**0.0%**			*Gypsum Wallboard*	**600**	**10.6%**		
OCC	1	0.0%	0.0%	0.1%	Clean Gypsum Board	0	0.0%	0.0%	0.0%
Other Recyclable Paper	0	0.0%	0.0%	0.0%	Painted/Demolition Gypsum Board	600	10.6%	6.2%	15.1%
Remainder/Composite Paper	0	0.0%	0.0%	0.0%	*Insulation*	**6**	**0.1%**		
Glass	**76**	**1.3%**			Cellulose Insulation	0	0.0%	0.0%	0.0%
Flat Window Glass	76	1.3%	0.0%	3.6%	Fiberglass Insulation	6	0.1%	0.0%	0.2%
Other Glass	0	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0	0.0%	0.0%	0.0%
Remainder/Composite Glass	0	0.0%	0.0%	0.0%	*Other C&D*	**188**	**3.3%**		
Metal	**87**	**1.5%**			Carpet/Carpet Tiles	19	0.3%	0.0%	0.7%
Major Appliances	0	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	5	0.1%	0.0%	0.2%
HVAC Ducting	3	0.1%	0.0%	0.1%	Ceiling Tiles	0	0.0%	0.0%	0.0%
Rebar	0	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0	0.0%	0.0%	0.0%
Studs (Steel Framing)	57	1.0%	0.2%	1.8%	Remainder/Composite Building Materials	164	2.9%	0.0%	6.3%
Other Ferrous Metals	5	0.1%	0.0%	0.2%	*Organics*	**18**	**0.3%**		
Other Non-Ferrous	1	0.0%	0.0%	0.1%	Leaves and Grass	8	0.2%	0.0%	0.4%
Remainder/Composite Metal	21	0.4%	0.0%	0.7%	Branches and Stumps	4	0.1%	0.0%	0.2%
Plastic	**1**	**0.0%**			Remainder/Composite Organics	6	0.1%	0.0%	0.3%
Clean Plastic Sheeting and Agricultural Film	0	0.0%	0.0%	0.0%	*E-Waste*	**0**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	1	0.0%	0.0%	0.0%	Small Consumer Electronics	0	0.0%	0.0%	0.0%
Plastic Piping	0	0.0%	0.0%	0.0%	Computer Related Electronics	0	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	0	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0	0.0%	0.0%	0.0%
Plastic Lumber	0	0.0%	0.0%	0.0%	*Hazardous Waste*	**0**	**0.0%**		
Durable Plastic Items	0	0.0%	0.0%	0.0%	Paint	0	0.0%	0.0%	0.0%
Other Plastic	0	0.0%	0.0%	0.0%	Solvents and Paint Thinners	0	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0	0.0%	0.0%	0.0%	Asbestos Containing Items	0	0.0%	0.0%	0.0%
Aggregates	**1,280**	**22.7%**			Mercury Containing Items	0	0.0%	0.0%	0.0%
Concrete	401	7.1%	0.6%	13.6%	Remainder/Composite Household Hazardous	0	0.0%	0.0%	0.0%
Asphalt Paving	31	0.5%	0.0%	1.4%	*Bulky Items and Textiles*	**5**	**0.1%**		
Brick	318	5.6%	0.0%	13.2%	Furniture	5	0.1%	0.0%	0.2%
Rock and Gravel	94	1.7%	0.0%	3.8%	Mattresses	0	0.0%	0.0%	0.0%
Dirt and Sand	232	4.1%	0.0%	8.5%	Textiles	0	0.0%	0.0%	0.0%
Ceramics	0	0.0%	0.0%	0.0%	Tires	0	0.0%	0.0%	0.0%
Other Aggregates	204	3.6%	0.0%	9.6%	Remainder/Composite Bulky Items and Textiles	0	0.0%	0.0%	0.0%
Roofing	**252**	**4.5%**			*Mixed Residue/MSW*	**59**	**1.0%**		
Composition Roofing	174	3.1%	0.4%	5.8%	Other MSW	15	0.3%	0.0%	0.7%
Single Ply Roofing Membrane	0	0.0%	0.0%	0.0%	Fines	44	0.8%	0.0%	2.1%
Other Asphalt Roofing	79	1.4%	0.0%	3.7%					
Wood	**3,068**	**54.4%**							
Clean Dimensional Lumber	226	4.0%	1.0%	7.0%					
Clean Engineered Wood	54	1.0%	0.0%	2.6%					
Pallets and Crates	0	0.0%	0.0%	0.0%					
Other Recyclable Wood	494	8.8%	1.6%	15.9%					
Painted/Stained Wood	1,718	30.4%	12.1%	48.8%	**Total Percentage**	**100%**			
Creosote-treated Wood	0	0.0%	0.0%	0.0%	**Total Tons**	**5,641**			
Other Treated Wood	575	10.2%	0.2%	20.2%	**Sample Count**	**11**			

Calculated at a 90% confidence level

C&D Waste by Season

The section presents results by season for waste from vehicles hauled to facilities as well as waste hauled to railheads in intermodal containers. As shown in Figure 3-7, **C&D: Clean, Recyclable Wood** was the largest material class in fall (25.2%) and winter (37.5%). **C&D: Painted and Treated Wood** was the largest class in spring (28.0%) and summer (28.8%). The figures for composition by season were estimated using an unweighted process; consequently, composition percentages were not applied to the tonnages.

Figure 3-7 : Composition Summary, by Season
(July 2013 – June 2014)
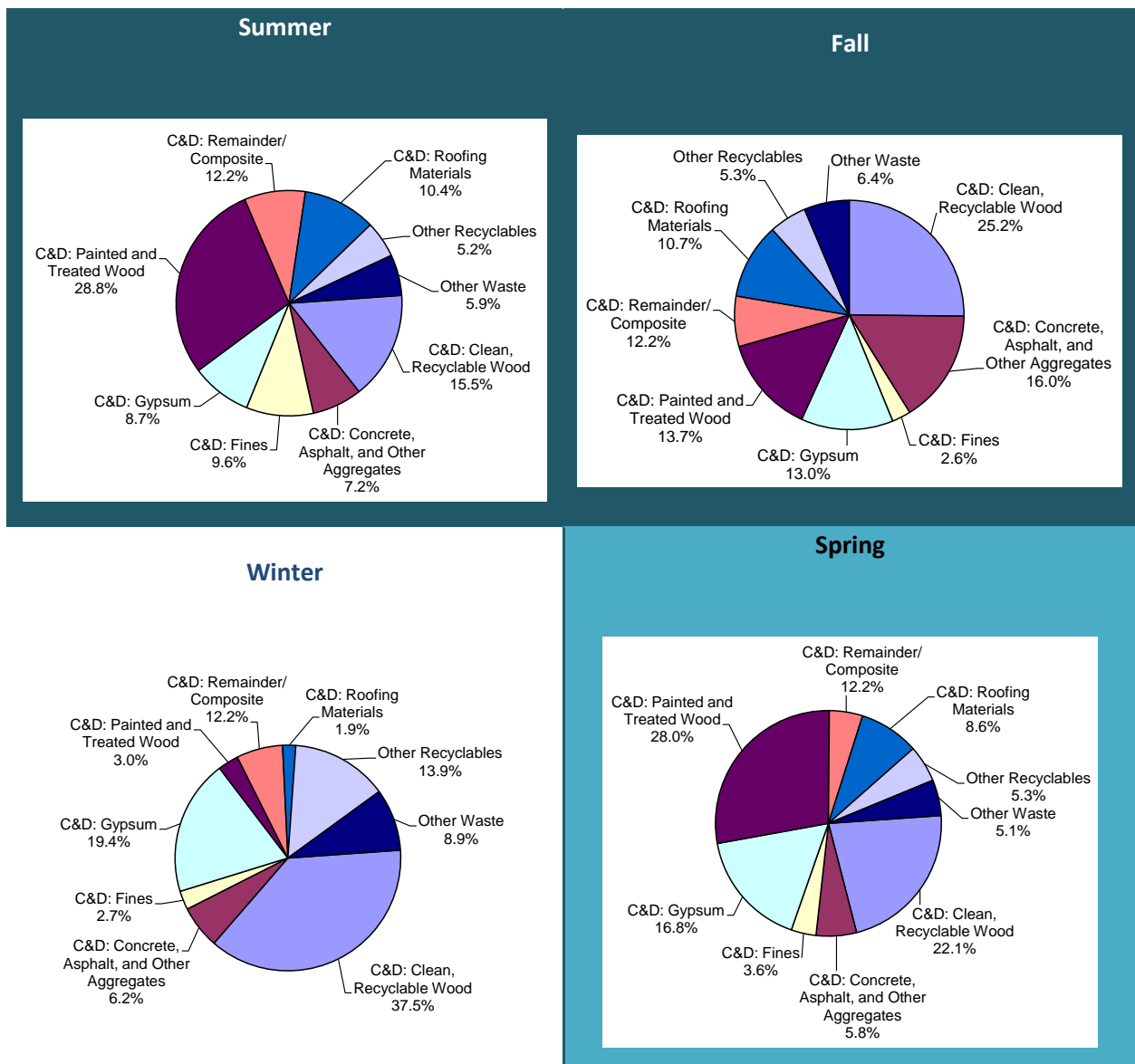
Summer

A total of 97 samples were sorted from loads during the summer 2013/2014 study months (July and August 2013 and June 2014). As shown in Table 3-44, *other recyclable wood* made up about 28% of the total, by weight. The next most prevalent components were *dirt and sand* (8.7%) and *remainder/composite building materials* (8.1%). The detailed summer composition results are presented in Table 3-48.

Table 3-44: Top Ten Components – Summer
(July and August 2013 and June 2014)

Component	Mean	Cum. %
Other Recyclable Wood	28.4%	28.4%
Dirt and Sand	8.7%	37.0%
Remainder/Composite Building Materials	8.1%	45.1%
Clean Engineered Wood	7.2%	52.4%
Clean Dimensional Lumber	6.7%	59.1%
Composition Roofing	6.6%	65.7%
Painted/Demolition Gypsum Board	4.8%	70.4%
Concrete	4.4%	74.8%
Clean Gypsum Board	3.9%	78.7%
Other Asphalt Roofing	2.6%	81.3%
Total	**81.3%**	

Fall

During the fall months in the study period (September, October, and November 2013), 124 samples were characterized. As shown in Table 3-45, *painted/stained wood* (12.6%) *other recyclable wood* (10.7%), *painted/demolition gypsum board* (9.2%), and *composition roofing* (8.8%) each accounted for at least 8% of the waste generated in fall 2013. Table 3-49 presents the full composition results for C&D generated in fall 2013.

Table 3-45: Top Ten Components – Fall
(September, October, and November 2013)

Component	Mean	Cum. %
Painted/Stained Wood	12.6%	12.6%
Other Recyclable Wood	10.7%	23.3%
Painted/Demolition Gypsum Board	9.2%	32.6%
Composition Roofing	8.8%	41.4%
Clean Dimensional Lumber	6.8%	48.1%
Remainder/Composite Building Materials	6.4%	54.5%
Concrete	6.0%	60.5%
Brick	5.7%	66.1%
Clean Engineered Wood	4.9%	71.0%
Clean Gypsum Board	3.8%	74.8%
Total	**74.8%**	

Winter

During winter of 2013/2014, 80 loads were sampled. As shown in Table 3-46, *painted/demolition gypsum board* (12.8%), *pallets and crates* (12.3%), and *other recyclable wood* (9.8%) were the three most prevalent components of the C&D waste generated in the winter. Table 3-50 presents detailed waste composition results for this season's C&D waste.

Table 3-46: Top Ten Components – Winter
(December 2013 and January and February 2014)

Component	Mean	Cum. %
Painted/Demolition Gypsum Board	12.8%	12.8%
Pallets and Crates	12.3%	25.1%
Other Recyclable Wood	9.8%	34.9%
Clean Engineered Wood	8.3%	43.2%
Clean Dimensional Lumber	7.1%	50.3%
Clean Gypsum Board	6.6%	56.9%
Remainder/Composite Building Materials	5.6%	62.5%
Other MSW	3.6%	66.1%
Painted/Stained Wood	2.9%	69.0%
Brick	2.9%	71.9%
Total	**71.9%**	

Spring

During spring 2014, 127 samples of C&D waste were completed. As shown in Table 3-47, *painted/stained wood* (18.2%) was the most prevalent material component, followed by *painted/demolition gypsum board* (15.3%). Table 3-51 lists the detailed composition results for waste generated in spring 2014.

Table 3-47: Top Ten Components – Spring
(March, April, and May 2014)

Component	Mean	Cum. %
Painted/Stained Wood	18.2%	18.2%
Painted/Demolition Gypsum Board	15.3%	33.5%
Other Treated Wood	9.0%	42.5%
Other Recyclable Wood	8.6%	51.1%
Clean Engineered Wood	5.8%	56.9%
Composition Roofing	4.8%	61.8%
Remainder/Composite Building Materials	4.6%	66.4%
Clean Dimensional Lumber	4.2%	70.7%
Other Asphalt Roofing	3.7%	74.3%
Pallets and Crates	3.4%	77.7%
Total	**77.7%**	

Comparisons among Seasons

The following material components were included in the list of top ten components in all seasons: *painted/demolition gypsum board*, *clean engineered wood*, *clean dimensional lumber*, *other recyclable*

wood, and *remainder/composite building materials*. *Painted/stained wood* was listed in the top ten components in all seasons other than summer, while *clean gypsum board* was absent only from the spring top ten list. Materials unique to one season included *other MSW* in winter and *other treated wood* in spring.

Table 3-48: Composition by Weight – Summer
(July and August 2013 and June 2014)

	Mean	Low	High		Mean	Low	High
Paper	**1.5%**			*Gypsum Wallboard*	**8.7%**		
OCC	0.4%	0.3%	0.6%	Clean Gypsum Board	3.9%	1.8%	6.0%
Other Recyclable Paper	1.0%	0.6%	1.4%	Painted/Demolition Gypsum Board	4.8%	2.9%	6.7%
Remainder/Composite Paper	0.0%	0.0%	0.1%	*Insulation*	**0.6%**		
Glass	**1.9%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	0.0%	0.0%	0.0%	Fiberglass Insulation	0.1%	0.0%	0.1%
Other Glass	0.7%	0.0%	1.8%	Rigid Foam Wall Insulation	0.5%	0.1%	0.9%
Remainder/Composite Glass	1.2%	0.0%	2.5%	*Other C&D*	**9.5%**		
Metal	**2.0%**			Carpet/Carpet Tiles	1.1%	0.4%	1.8%
Major Appliances	0.1%	0.0%	0.1%	Carpet Pad (Foam and Felt)	0.3%	0.1%	0.5%
HVAC Ducting	0.1%	0.0%	0.2%	Ceiling Tiles	0.0%	0.0%	0.1%
Rebar	0.0%	0.0%	0.0%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	0.3%	0.0%	0.6%	Remainder/Composite Building Materials	8.1%	4.6%	11.6%
Other Ferrous Metals	1.0%	0.7%	1.4%	*Organics*	**0.8%**		
Other Non-Ferrous	0.4%	0.1%	0.6%	Leaves and Grass	0.3%	0.0%	0.6%
Remainder/Composite Metal	0.2%	0.0%	0.3%	Branches and Stumps	0.2%	0.0%	0.3%
Plastic	**1.0%**			Remainder/Composite Organics	0.4%	0.1%	0.7%
Clean Plastic Sheeting and Agricultural Film	0.1%	0.0%	0.1%	*E-Waste*	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	0.0%	0.0%	0.0%	Small Consumer Electronics	0.0%	0.0%	0.0%
Plastic Piping	0.7%	0.2%	1.2%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.0%	0.0%	0.0%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.1%	Remainder/Composite Electronics	0.0%	0.0%	0.1%
Plastic Lumber	0.0%	0.0%	0.0%	*Hazardous Waste*	**0.7%**		
Durable Plastic Items	0.0%	0.0%	0.1%	Paint	0.0%	0.0%	0.0%
Other Plastic	0.1%	0.1%	0.1%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.1%	0.0%	0.1%	Asbestos Containing Items	0.7%	0.0%	1.9%
Aggregates	**16.8%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	4.4%	1.0%	7.8%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.0%	0.0%	0.1%	*Bulky Items and Textiles*	**0.2%**		
Brick	1.9%	0.0%	3.8%	Furniture	0.1%	0.0%	0.3%
Rock and Gravel	1.0%	0.0%	2.5%	Mattresses	0.0%	0.0%	0.0%
Dirt and Sand	8.7%	3.3%	14.1%	Textiles	0.1%	0.0%	0.1%
Ceramics	0.4%	0.0%	0.9%	Tires	0.0%	0.0%	0.0%
Other Aggregates	0.5%	0.0%	1.0%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.0%
Roofing	**10.4%**			*Mixed Residue/MSW*	**1.5%**		
Composition Roofing	6.6%	2.3%	10.8%	Other MSW	1.3%	0.5%	2.1%
Single Ply Roofing Membrane	1.3%	0.0%	3.3%	Fines	0.2%	0.0%	0.4%
Other Asphalt Roofing	2.6%	0.0%	5.8%				
Wood	**44.2%**						
Clean Dimensional Lumber	6.7%	4.8%	8.7%				
Clean Engineered Wood	7.2%	4.8%	9.7%				
Pallets and Crates	1.3%	0.6%	1.9%				
Other Recyclable Wood	0.3%	0.0%	0.5%				
Painted/Stained Wood	28.4%	19.2%	37.6%				
Creosote-treated Wood	0.4%	0.0%	1.0%	**Total Percentage**	**100%**		
Other Treated Wood	0.0%	0.0%	0.0%	**Sample Count**	**97**		

Calculated at a 90% confidence level

Table 3-49: Composition by Weight – Fall
(September, October, and November 2013)

	Mean	Low	High		Mean	Low	High
Paper	**1.1%**			*Gypsum Wallboard*	**13.0%**		
OCC	0.6%	0.3%	0.8%	Clean Gypsum Board	3.8%	1.4%	6.2%
Other Recyclable Paper	0.5%	0.2%	0.7%	Painted/Demolition Gypsum Board	9.2%	5.5%	12.9%
Remainder/Composite Paper	0.1%	0.0%	0.2%	*Insulation*	**0.6%**		
Glass	**2.0%**			Cellulose Insulation	0.0%	0.0%	0.1%
Flat Window Glass	1.7%	0.0%	3.5%	Fiberglass Insulation	0.2%	0.1%	0.2%
Other Glass	0.0%	0.0%	0.0%	Rigid Foam Wall Insulation	0.4%	0.0%	0.8%
Remainder/Composite Glass	0.2%	0.0%	0.6%	*Other C&D*	**7.3%**		
Metal	**1.4%**			Carpet/Carpet Tiles	0.5%	0.2%	0.9%
Major Appliances	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0.2%	0.1%	0.3%
HVAC Ducting	0.1%	0.0%	0.2%	Ceiling Tiles	0.0%	0.0%	0.1%
Rebar	0.0%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	0.1%	0.0%	0.2%
Studs (Steel Framing)	0.3%	0.0%	0.5%	Remainder/Composite Building Materials	6.4%	3.2%	9.6%
Other Ferrous Metals	0.3%	0.2%	0.5%	*Organics*	**1.8%**		
Other Non-Ferrous	0.1%	0.1%	0.2%	Leaves and Grass	0.8%	0.2%	1.4%
Remainder/Composite Metal	0.6%	0.2%	0.9%	Branches and Stumps	0.9%	0.0%	2.0%
Plastic	**1.0%**			Remainder/Composite Organics	0.1%	0.0%	0.2%
Clean Plastic Sheeting and Agricultural Film	0.1%	0.1%	0.2%	*E-Waste*	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	0.1%	0.0%	0.1%	Small Consumer Electronics	0.1%	0.0%	0.2%
Plastic Piping	0.3%	0.1%	0.5%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.2%	0.1%	0.4%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.1%
Plastic Lumber	0.0%	0.0%	0.0%	*Hazardous Waste*	**0.0%**		
Durable Plastic Items	0.0%	0.0%	0.1%	Paint	0.0%	0.0%	0.1%
Other Plastic	0.1%	0.0%	0.1%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.1%	0.0%	0.1%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**18.6%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	6.0%	1.0%	10.9%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.6%	0.0%	1.3%	*Bulky Items and Textiles*	**0.8%**		
Brick	5.7%	0.0%	11.5%	Furniture	0.5%	0.2%	0.9%
Rock and Gravel	1.4%	0.0%	3.1%	Mattresses	0.1%	0.0%	0.1%
Dirt and Sand	1.3%	0.0%	2.8%	Textiles	0.2%	0.0%	0.4%
Ceramics	0.7%	0.2%	1.3%	Tires	0.0%	0.0%	0.0%
Other Aggregates	3.1%	0.0%	7.7%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.1%
Roofing	**10.7%**			*Mixed Residue/MSW*	**2.6%**		
Composition Roofing	8.8%	4.2%	13.4%	Other MSW	2.0%	1.0%	2.9%
Single Ply Roofing Membrane	0.3%	0.0%	0.7%	Fines	0.6%	0.0%	1.6%
Other Asphalt Roofing	1.5%	0.2%	2.9%				
Wood	**38.9%**						
Clean Dimensional Lumber	6.8%	4.5%	9.1%				
Clean Engineered Wood	4.9%	2.9%	6.8%				
Pallets and Crates	2.8%	1.4%	4.3%				
Other Recyclable Wood	10.7%	5.7%	15.8%				
Painted/Stained Wood	12.6%	7.4%	17.8%				
Creosote-treated Wood	0.1%	0.0%	0.3%	**Total Percentage**	**100%**		
Other Treated Wood	1.0%	0.0%	2.3%	**Sample Count**	**124**		

Calculated at a 90% confidence level

Table 3-50: Composition by Weight – Winter
(December and January 2014 and February 2014)

	Mean	Low	High		Mean	Low	High
Paper	**3.2%**			**Gypsum Wallboard**	**19.4%**		
OCC	2.2%	1.4%	3.0%	Clean Gypsum Board	6.6%	3.1%	10.0%
Other Recyclable Paper	1.0%	0.6%	1.3%	Painted/Demolition Gypsum Board	12.8%	7.0%	18.7%
Remainder/Composite Paper	0.0%	0.0%	0.0%	**Insulation**	**1.1%**		
Glass	**1.3%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	0.7%	0.0%	1.7%	Fiberglass Insulation	0.3%	0.0%	0.5%
Other Glass	0.3%	0.0%	0.7%	Rigid Foam Wall Insulation	0.8%	0.0%	1.6%
Remainder/Composite Glass	0.2%	0.0%	0.5%	**Other C&D**	**8.6%**		
Metal	**6.1%**			Carpet/Carpet Tiles	2.3%	0.0%	4.8%
Major Appliances	0.2%	0.0%	0.6%	Carpet Pad (Foam and Felt)	0.7%	0.0%	1.4%
HVAC Ducting	0.1%	0.0%	0.2%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.1%	0.0%	0.2%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	1.4%	0.0%	2.7%	Remainder/Composite Building Materials	5.6%	3.3%	7.8%
Other Ferrous Metals	1.4%	0.0%	2.8%	**Organics**	**0.6%**		
Other Non-Ferrous	1.5%	0.3%	2.7%	Leaves and Grass	0.3%	0.0%	0.6%
Remainder/Composite Metal	1.4%	0.7%	2.2%	Branches and Stumps	0.3%	0.0%	0.6%
Plastic	**2.9%**			Remainder/Composite Organics	0.1%	0.0%	0.2%
Clean Plastic Sheeting and Agricultural Film	0.7%	0.4%	1.1%	**E-Waste**	**0.0%**		
Dirty Plastic Sheeting and Agricultural Film	0.4%	0.2%	0.5%	Small Consumer Electronics	0.0%	0.0%	0.0%
Plastic Piping	0.9%	0.0%	1.9%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.2%	0.1%	0.3%	Televisions/Other Items with CRT's	0.0%	0.0%	0.0%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.0%
Plastic Lumber	0.1%	0.0%	0.2%	**Hazardous Waste**	**0.1%**		
Durable Plastic Items	0.3%	0.1%	0.4%	Paint	0.1%	0.0%	0.2%
Other Plastic	0.3%	0.0%	0.5%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.1%	0.1%	0.2%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**8.9%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	0.4%	0.0%	0.9%	Remainder/Composite Household Hazardous	0.1%	0.0%	0.2%
Asphalt Paving	0.0%	0.0%	0.0%	**Bulky Items and Textiles**	**2.0%**		
Brick	2.9%	0.0%	7.3%	Furniture	0.3%	0.1%	0.6%
Rock and Gravel	0.1%	0.0%	0.4%	Mattresses	0.0%	0.0%	0.1%
Dirt and Sand	2.5%	0.0%	5.2%	Textiles	1.6%	0.5%	2.7%
Ceramics	0.4%	0.0%	0.9%	Tires	0.0%	0.0%	0.0%
Other Aggregates	2.5%	0.0%	5.0%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.0%
Roofing	**1.9%**			**Mixed Residue/MSW**	**3.6%**		
Composition Roofing	0.9%	0.0%	2.5%	Other MSW	3.6%	2.2%	5.0%
Single Ply Roofing Membrane	0.1%	0.0%	0.1%	Fines	0.0%	0.0%	0.0%
Other Asphalt Roofing	0.9%	0.0%	1.8%				
Wood	**40.4%**						
Clean Dimensional Lumber	7.1%	4.2%	10.1%				
Clean Engineered Wood	8.3%	5.4%	11.2%				
Pallets and Crates	12.3%	7.1%	17.4%				
Other Recyclable Wood	9.8%	5.5%	14.2%				
Painted/Stained Wood	2.9%	1.1%	4.7%				
Creosote-treated Wood	0.0%	0.0%	0.0%	**Total Percentage**	**100%**		
Other Treated Wood	0.0%	0.0%	0.1%	**Sample Count**	**80**		

Calculated at a 90% confidence level

Table 3-51: Composition by Weight – Spring
(March, April, and May 2014)

	Mean	Low	High		Mean	Low	High
Paper	**1.8%**			*Gypsum Wallboard*	**16.8%**		
OCC	0.8%	0.4%	1.2%	Clean Gypsum Board	1.5%	0.4%	2.6%
Other Recyclable Paper	0.4%	0.2%	0.6%	Painted/Demolition Gypsum Board	15.3%	10.5%	20.1%
Remainder/Composite Paper	0.6%	0.2%	1.0%	*Insulation*	**0.1%**		
Glass	**0.8%**			Cellulose Insulation	0.0%	0.0%	0.0%
Flat Window Glass	0.2%	0.0%	0.4%	Fiberglass Insulation	0.1%	0.1%	0.2%
Other Glass	0.0%	0.0%	0.1%	Rigid Foam Wall Insulation	0.0%	0.0%	0.0%
Remainder/Composite Glass	0.5%	0.0%	1.3%	*Other C&D*	**5.6%**		
Metal	**2.5%**			Carpet/Carpet Tiles	0.9%	0.2%	1.6%
Major Appliances	0.0%	0.0%	0.0%	Carpet Pad (Foam and Felt)	0.1%	0.0%	0.2%
HVAC Ducting	0.0%	0.0%	0.1%	Ceiling Tiles	0.0%	0.0%	0.0%
Rebar	0.0%	0.0%	0.1%	Cement Fiber Board Siding (Exterior)	0.0%	0.0%	0.0%
Studs (Steel Framing)	1.0%	0.2%	1.7%	Remainder/Composite Building Materials	4.6%	2.0%	7.2%
Other Ferrous Metals	0.4%	0.2%	0.7%	*Organics*	**0.6%**		
Other Non-Ferrous	0.6%	0.3%	0.9%	Leaves and Grass	0.3%	0.0%	0.6%
Remainder/Composite Metal	0.4%	0.1%	0.7%	Branches and Stumps	0.2%	0.1%	0.4%
Plastic	**1.7%**			Remainder/Composite Organics	0.0%	0.0%	0.1%
Clean Plastic Sheeting and Agricultural Film	0.2%	0.1%	0.2%	*E-Waste*	**0.1%**		
Dirty Plastic Sheeting and Agricultural Film	0.3%	0.1%	0.5%	Small Consumer Electronics	0.0%	0.0%	0.0%
Plastic Piping	0.7%	0.3%	1.1%	Computer Related Electronics	0.0%	0.0%	0.0%
Expanded Polystyrene Block Packaging	0.1%	0.0%	0.2%	Televisions/Other Items with CRT's	0.0%	0.0%	0.1%
Vinyl Exterior Siding	0.0%	0.0%	0.0%	Remainder/Composite Electronics	0.0%	0.0%	0.1%
Plastic Lumber	0.0%	0.0%	0.1%	*Hazardous Waste*	**0.0%**		
Durable Plastic Items	0.1%	0.1%	0.2%	Paint	0.0%	0.0%	0.0%
Other Plastic	0.1%	0.1%	0.2%	Solvents and Paint Thinners	0.0%	0.0%	0.0%
Remainder/Composite Plastic	0.2%	0.1%	0.3%	Asbestos Containing Items	0.0%	0.0%	0.0%
Aggregates	**9.3%**			Mercury Containing Items	0.0%	0.0%	0.0%
Concrete	2.3%	0.4%	4.1%	Remainder/Composite Household Hazardous	0.0%	0.0%	0.0%
Asphalt Paving	0.0%	0.0%	0.0%	*Bulky Items and Textiles*	**0.3%**		
Brick	0.9%	0.0%	1.9%	Furniture	0.2%	0.0%	0.4%
Rock and Gravel	0.6%	0.0%	1.3%	Mattresses	0.0%	0.0%	0.0%
Dirt and Sand	2.9%	0.0%	6.8%	Textiles	0.1%	0.0%	0.2%
Ceramics	0.7%	0.2%	1.2%	Tires	0.0%	0.0%	0.0%
Other Aggregates	1.9%	0.7%	3.0%	Remainder/Composite Bulky Items and Textiles	0.0%	0.0%	0.1%
Roofing	**8.6%**			*Mixed Residue/MSW*	**1.6%**		
Composition Roofing	4.8%	2.1%	7.6%	Other MSW	1.5%	0.9%	2.1%
Single Ply Roofing Membrane	0.1%	0.0%	0.1%	Fines	0.1%	0.0%	0.3%
Other Asphalt Roofing	3.7%	0.7%	6.6%				
Wood	**50.1%**						
Clean Dimensional Lumber	4.2%	2.5%	6.0%				
Clean Engineered Wood	5.8%	3.4%	8.2%				
Pallets and Crates	3.4%	1.8%	5.0%				
Other Recyclable Wood	8.6%	4.9%	12.4%				
Painted/Stained Wood	18.2%	2.6%	33.8%				
Creosote-treated Wood	0.8%	0.0%	2.2%	**Total Percentage**	**100%**		
Other Treated Wood	9.0%	0.0%	18.0%	**Sample Count**	**127**		

Calculated at a 90% confidence level

4. Seattle Construction & Demolition Permit Data

From July 2013 through June 2014, the Seattle Department of Planning and Development issued 7,413 permits.[10] Of these permits, 580 were issued for large projects (greater than $500,000), which had a combined estimated value of about $2,946,000,000. The remaining 6,833 projects were valued at nearly $638,000,000 for a total of approximately $3,584,000,000.

Using the total number and value of permits, it is possible to calculate C&D generated per permit and per dollar of permit value during the 2013/2014 study period. Of the 167,010 tons C&D included in the study universe, 22.53 tons, or 45,059 pounds, of waste was generated per permit issued and 0.09 pounds of waste was delivered for each estimated dollar of permit value.[11]

Compared to 2007, large projects made up a larger percentage of the total permits: 0.3% in 2007 and 8% in 2013/2014. The C&D waste per permit dollar was much less in 2013/2014 (0.05 pounds/dollar permitted) than in 2007 (0.14 pounds/dollar permitted). Total permit value in 2013/2014 ($3,583,582,425) was about 20% higher than in 2007 ($2,917,771,823). C&D waste per number of permits in 2013/2014 is nearly half of that in 2007: 12.3 compared to 22.7 tons per permit issued.

Table 4-1. Seattle C&D Permit Data

	2007		2013/2014	
	# of Permits	Permit Value	# of Permits	Permit Value
Greater than $500,000	**29**	**$108,971,731**	**580**	**$2,946,054,916**
Construction			579	$2,945,379,916
Demolition			-	$0
Site Development			1	$675,000
All Projects Less than $500,000	**8,836**	**$2,808,800,092**	**6,833**	**$637,527,509**
Construction			6,108	$636,958,293
Demolition			655	$0
Site Development			70	$569,216
Projects Between $100,000 and $500,000			*2,080*	*$520,856,182*
Construction			*2,078*	*$520,448,066*
Demolition			*-*	*$0*
Site Development			*2*	*$408,116*
Projects Between $10,000 and $100,000			*2,913*	*$112,119,942*
Construction			*2,909*	*$111,971,942*
Demolition			*-*	*$0*
Site Development			*4*	*$148,000*
Projects Less than $10,000			*1,840*	*$4,551,385*
Construction			*1,121*	*$4,538,285*
Demolition			*655*	*$0*
Site Development			*64*	*$13,100*
Total	**8,865**	**$2,917,771,823**	**7,413**	**$3,583,582,425**
Tons C&D Waste per Permit and per Dollar	22.69		12.34	
Pounds C&D Waste per Dollar	0.14		0.05	

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[10] Permitting data obtained from the City of Seattle's website https://data.seattle.gov.

[11] This tonnage includes the three transfer stations plus CDL Recycle.

Appendix A: Waste Component Categories

Waste samples were characterized according to the following 67 component categories.

PAPER

UNCOATED CORRUGATED CARDBOARD: corrugated boxes without any wax coating on the inside or outside. Examples include entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This category does not include chipboard.

PAPER BAGS: bags and sheets made from Kraft paper. Examples include paper grocery bags, fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.

OTHER RECYCLABLE PAPER: recyclable items made mostly of paper that do not fit into the above category. Paper may be combined with minor amounts of other materials such as wax or glues. This category includes items made of bond paper, newsprint, glossy coated paper, chipboard, groundwood paper, and deep-toned or fluorescent dyed paper. Examples include ledger, newspaper, manila folders, cereal and cracker boxes, unused paper plates and cups, goldenrod colored paper, school construction paper/butcher paper, milk cartons, ice cream cartons and other frozen food boxes, junk mail, colored envelopes for greeting cards, pulp paper egg cartons, unused pulp paper plant pots, magazines and catalogues, phone books and directories, and softcover books.

CELLULOSE INSULATION: pulped paper, usually newsprint, installed as insulation in walls using a dense-packing or spraying technique. These items are typically treated with fire retardants.

REMAINDER/COMPOSITE PAPER: items made mostly of paper but combined with large amounts of other materials such as wax, plastic, glues, foil, food, and moisture. Examples include waxed corrugated cardboard, aseptic packages, waxed paper, tissue, paper towels, blueprints, sepia, onion skin, fast food wrappers, carbon paper, self-adhesive notes, hardcover books, and photographs.

GLASS

GLASS BOTTLES AND CONTAINERS: glass beverage and food containers. Examples include whole or broken soda and beer bottles, fruit juice bottles, peanut butter jars, whole or broken wine bottles, and mayonnaise jars.

FLAT GLASS: clear or tinted glass that is flat. Examples include glass window panes, doors, and table tops, flat automotive window glass (side windows), safety glass, and architectural glass. This category does not include windshields, laminated glass, or any curved glass.

REMAINDER/COMPOSITE GLASS: glass that cannot be put in any other category, including items made mostly of glass but combined with other materials. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, and auto windshields.

METAL

TIN/STEEL CANS: rigid containers made mainly of steel. These items will stick to a magnet and may be tin-coated. This category is used to store food, beverages, paint, and a variety of other household and consumer products. Examples include canned food and beverage containers, empty metal paint cans, empty spray paint and other aerosol containers, and bimetal containers with steel sides and aluminum ends.

MAJOR APPLIANCES: discarded major appliances of any color. These items are often enamel-coated. Examples include washing machines, clothes dryers, hot water heaters, stoves, refrigerators, furnaces, and heating and cooling equipment. This category does not include electronics, such as televisions and stereos.

USED OIL FILTERS: metal oil filters used in motor vehicles and other engines, which contain a residue of used oil.

HVAC DUCTING: sheet metal tubing, typically galvanized, used for conveying ventilation air.

OTHER FERROUS: any iron or steel that is magnetic or any stainless steel item. This category does not include "tin/steel cans." Examples include structural steel beams, boilers, metal clothes hangers, metal pipes, stainless steel cookware, security bars, scrap ferrous items, and galvanized items such as nails and flashing.

ALUMINUM CANS: any food or beverage container made mainly of aluminum. Examples include aluminum soda or beer cans, and some pet food cans. This category does not include bimetal containers with steel sides and aluminum ends.

OTHER NON-FERROUS: any metal item, other than aluminum cans, that is not stainless steel and that is not magnetic. These items may be made of aluminum, copper, brass, bronze, lead, zinc, or other metals. Examples include aluminum window frames, aluminum siding, uninsulated copper wire, shell casings, brass pipe, and aluminum foil.

REMAINDER/COMPOSITE METAL: metal that cannot be put in any other category. This category includes items made mostly of metal but combined with other materials and items made of both ferrous metals and non-ferrous metal combined. Examples include small non-electronic appliances such as toasters and hair dryers, motors, insulated wire, and finished products that contain a mixture of metals, or metals and other materials, whose weight is derived significantly from the metal portion of its construction.

ELECTRONICS

BROWN GOODS AND OTHER SMALL CONSUMER ELECTRONICS: non-computer-related electronic goods that have some circuitry. Examples include microwaves, stereos, VCRs, DVD players, radios, audio/visual equipment, non-CRT televisions (such as LCD televisions), personal digital assistants (PDAs), cell phones, phone systems, phone answering machines, computer games and other electronic toys, portable CD players, camcorders, and digital cameras.

COMPUTER-RELATED ELECTRONICS: electronics with large circuitry that is computer-related. Examples include processors, mice, keyboards, laptops, disk drives, printers, modems, and fax machines.

TELEVISIONS AND OTHER ITEMS WITH CRTS: televisions, computer monitors, and other items containing a cathode ray tube (CRT).

PLASTIC

PLASTIC BOTTLES AND TUBS: clear or colored bottles or tubs. When marked for identification, these items may bear numbers 1 through 7 in the triangular recycling symbol. Examples include soft drink and water bottles, some liquor bottles, cooking oil containers, aspirin bottles, milk jugs, water jugs, detergent bottles, some dairy tubs, some hair-care bottles, salad dressings, vegetable oils, syrup bottles, and margarine tubs. This category does not include toxic product containers, such as for oil or antifreeze.

OTHER RIGID PACKAGING: rigid plastic packaging made of types of plastic numbers 1 through 7 and unmarked rigid plastic packaging (excluding expanded polystyrene), such as clamshells, salad trays, lids, cookie tray inserts, plastic spools, plastic frozen food trays, plastic plant pots, and plastic toothpaste tubes. This category also includes toxic product containers, such as for oil or antifreeze.

EXPANDED POLYSTYRENE PACKAGING AND INSULATION: items marked with "PS" or "6." Examples include packaging peanuts, meat and vegetable packaging trays, and clamshell containers. This category also includes expanded polystyrene packaging blocks and insulation.

TRASH BAGS: plastic bags sold for use as trash bags, for both residential and commercial use. This category does not include other plastic bags like shopping bags that might have been used to contain trash.

GROCERY AND OTHER MERCHANDISE BAGS: plastic shopping bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Includes dry-cleaning plastic bags intended for 1-time use.

NON-BAG COMMERCIAL AND INDUSTRIAL PACKAGING FILM: film plastic used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.

PLASTIC SHEETING AND AGRICULTURAL FILM: plastic film used for purposes other than packaging. Examples include agricultural film (films used in various farming and growing applications, such as silage greenhouse films, mulch films, and wrap for hay bales), plastic sheeting used as drop cloths, and building wrap/Tyvek packaging.

OTHER FILM: all other plastic film that does not fit into any other category. Examples include other types of plastic bags (sandwich bags, zipper-recloseable bags, newspaper bags, produce bags, frozen vegetable bags, bread bags), food wrappers such as candy-bar wrappers, mailing pouches, bank bags, X-ray film, metalized film (wine containers and balloons), and plastic food wrap.

DURABLE PLASTIC ITEMS: plastic objects other than containers and film plastic. This category also includes plastic objects other than containers or film that bear the numbers 1 through 7 in the triangular recycling symbol. These items are usually made to last for more than one use. Examples include plastic outdoor furniture, plastic toys, sporting goods, CDs, and plastic house wares, such as mop buckets, dishes, cups, and cutlery. This category also includes building materials (house siding, window sashes, and frames) and housings for electronics such as computers, televisions, and stereos.

PLASTIC PIPING: pipes and fittings made of PVC (polyvinyl chloride), ABS (acrylonitrile butadiene styrene), or other rigid plastics.

REMAINDER/COMPOSITE PLASTIC: plastics that cannot be put in any other category and usually recognized by their optical opacity. This category includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, foam packing blocks (not including expanded polystyrene blocks), plastic strapping, new plastic laminate (e.g., Formica), vinyl, linoleum, plastic lumber, imitation ceramics, handles and knobs, plastic lids, some kitchen wares, toys, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications).

ORGANICS

FOOD: food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food. This category includes material from industrial, commercial, or residential sources. Examples include discarded meat scraps, dairy products, egg shells, fruit or vegetable peels, and other food items from homes, stores, and restaurants. This category includes grape pomace and other processed residues or material from canneries, wineries, or other industrial sources.

LEAVES AND GRASS: plant material, except woody material, from any public or private landscapes. Examples include leaves, grass clippings, sea weed, and plants. This category does not include woody material or material from agricultural sources.

PRUNINGS AND TRIMMINGS: woody plant material up to 4 inches in diameter from any public or private landscape. Examples include prunings, shrubs, and small branches with branch diameters that do not exceed 4 inches. This category does not include stumps, tree trunks, or branches exceeding 4 inches in diameter and does not include material from agricultural sources.

BRANCHES AND STUMPS: woody plant material, branches, and stumps that exceed four inches in diameter from any public or private landscape.

REMAINDER/COMPOSITE ORGANICS: organic material that cannot be put in any other category. Examples include wood chips, sawdust, agricultural residues, and animal feces.

CONSTRUCTION & DEMOLITION

CONCRETE: a hard material made from sand, gravel, aggregate, cement mix, and water. This category includes concrete containing steel mesh and/or reinforcement bars, or "rebar". Examples include pieces of building foundations, concrete paving, and cinder blocks.

ASPHALT PAVING: a black or brown, tar-like material mixed with aggregate used as a paving material. This category includes asphalt paving containing steel mesh and/or reinforcement bars, or "rebar."

COMPOSITION ROOFING: composite shingles composed of fiberglass or organic felts saturated with asphalt and covered with inert aggregates as well as attached roofing tar and tar paper. This category is commonly known as three tab roofing and does not include built-up roofing. Examples include asphalt shingles and attached roofing tar and tar paper.

OTHER ASPHALT ROOFING (Built-up Roofing): other roofing material made with layers of felt, asphalt, aggregates, and attached roofing tar and tar paper normally used on flat/low pitched roofs usually on commercial buildings.

OTHER AGGREGATES: aggregates other than concrete and asphalt paving such as bricks, masonry tile, ceramics, porcelain toilets, and clay roofing tiles.

CLEAN DIMENSIONAL LUMBER: unpainted new or demolition dimensional lumber. Examples include materials such as 2 x 4s, 2 x 6s, 2 x 12s, and other residual materials from framing and related construction activities. May contain nails or other <u>trace</u> contaminants.

CLEAN ENGINEERED WOOD: unpainted new or demolition scrap from sheeted goods such as plywood, particleboard, wafer board, oriented strand board, and other residual materials used for sheathing and related construction uses. May contain nails or other <u>trace</u> contaminants.

PALLETS AND CRATES: unpainted wood pallets, crates, and packaging made of lumber/engineered wood.

OTHER RECYCLABLE WOOD: recyclable wood not included in any other category. This may include scrap from production of prefabricated wood products such as wood furniture or cabinets that have not been treated with paint, stain, or other chemical finish. This category also includes recyclable demolition wood and untreated or unpainted wood roofing and siding as long as the wood material is not contaminated with another material (i.e. tar). May be recycled into ethanol, adhesives, or other engineered wood products.

PAINTED/STAINED WOOD: wood that has had an external coating applied, such as paint, stain, or varnish. Examples include handrails and finished furniture.

CREOSOTE-TREATED WOOD: wood that has been treated with creosote. Examples include railroad ties, marine timbers and pilings, landscape timbers, and telephone poles.

OTHER TREATED WOOD: wood that has been treated with a chemical preservative not included in any other category, such as chromated copper arsenate (CCA), also called "pressure-treated wood." This type of wood may have a greenish tint or be perforated. Examples include some cedar shakes and shingles and most wood from playgrounds, decks, and other outdoor structures.

CLEAN GYPSUM BOARD: <u>unpainted</u> gypsum wallboard or interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples include used or unused, broken or whole sheets. Gypsum board may also be called sheetrock, drywall, plasterboard, gypboard, gyproc, or wallboard.

PAINTED/DEMOLITION GYPSUM BOARD: <u>painted</u> gypsum wallboard or interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples: This category includes used or unused, broken or whole sheets. Gypsum board may also be called sheetrock, drywall, plasterboard, gypboard, gyproc, or wallboard.

ROCK AND GRAVEL: pieces of mineral matter or rock. Examples include landscaping rock, paving stones, pathway gravel, and other natural or mechanically crushed materials.

DIRT AND SAND: nutrient rich decayed organic matter and fine pieces of mineral matter, often left over from land clearing activities. This category also includes non-hazardous contaminated soil.

FIBERGLASS INSULATION: various types of synthetic fiber insulation including both faced and unfaced batts and rigid board types. Used in ceilings, walls, and around ducting for both thermal insulation and sound attenuation.

REMAINDER/COMPOSITE CONSTRUCTION AND DEMOLITION: construction and demolition material that cannot be put in any other category. This category may include items from different categories combined, which would be very hard to separate. This category may

also include demolition debris that is a mixture of materials such as non-porcelain sinks, synthetic counter tops, fiber or composite acoustic ceiling tiles, plate glass, wood, tiles, gypsum board, and aluminum scrap.

HOUSEHOLD HAZARDOUS WASTE

PAINT: containers with paint in them. Examples include latex paint, oil based paint, aerosol cans containing paint, and tubes of pigment or fine art paint. This category does not include dried paint, empty paint cans, or empty aerosol containers.

VEHICLE AND EQUIPMENT FLUIDS: containers with fluids used in vehicles or engines, except used oil. Examples include used antifreeze and brake fluid. This category does not include empty vehicle and equipment fluid containers.

USED OIL: means the same as defined in Health and Safety Code section 25250.1(a). Examples include spent lubricating oil such as crankcase and transmission oil, gear oil, and hydraulic oil.

BATTERIES: any type of battery including both dry cell and lead acid. Examples include car, flashlight, small appliance, watch, and hearing aid batteries.

REMAINDER/COMPOSITE HOUSEHOLD HAZARDOUS: household hazardous material that cannot be put in any other category. This category also includes household hazardous material that is mixed. Examples include household hazardous waste which, if improperly put in the solid waste stream, may present handling problems or other hazards, such as fluorescent light bulbs, pesticides, and caustic cleaners.

OTHER MATERIALS

TEXTILES: items made of thread, yarn, fabric, or cloth. Examples include clothes, fabric trimmings, draperies, and all natural and synthetic cloth fibers. This category does not include cloth-covered furniture, mattresses, leather shoes, leather bags, or leather belts.

CARPET: flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. This category does not include carpet padding.

CARPET PADDING: plastic, foam, felt, and other materials used under carpet to provide insulation and padding.

ASH: a residue from the combustion of any solid or liquid material. Examples include ash from structure fires, fireplaces, incinerators, biomass facilities, waste-to-energy facilities, and barbecues.

BULKY ITEMS: large hard to handle items that are not defined separately, including furniture, mattresses, and other large items. Examples include all sizes and types of furniture, mattresses, box springs, and base components.

TIRES: vehicle tires. Examples include tires from trucks, automobiles, motorcycles, heavy equipments, and bicycles.

REMAINDER/COMPOSITE OTHER MATERIALS: special waste that cannot be put in any other category. Examples include asbestos-containing materials, such as certain types of pipe insulation and floor tiles, auto fluff, auto-bodies, trucks, trailers, truck cabs, untreated medical waste/pills/hypodermic needles, and artificial fireplace logs.

MIXED RESIDUE/MSW

MIXED RESIDUE: material that cannot be put in any other category. This category includes mixed residue that cannot be further sorted. Examples include residual material from a materials recovery facility or other sorting process that cannot be put in any of the previous remainder/composite categories. This category also includes clay and other fines.

MSW: mixed household garbage, including leather items, cork, hemp rope, garden hoses, rubber items, hair, cigarette butts, diapers, feminine hygiene products, and wood products (Popsicle sticks and toothpicks).

Appendix B: Sampling Methodology

Overview

The objectives of the 2007 Seattle C&D Waste Composition Study were as follows:

- To provide statistically significant data on the composition of waste generated via construction and demolition (C&D) activities within the City of Seattle,

- To identify materials in the disposed waste C&D stream that are potentially recyclable,

- To understand seasonal and substream differences so that targeted waste diversion programs can be designed, and

- To provide a comparison to the previous C&D study and a benchmark for continued long-term measurement of the C&D waste stream.

The Seattle C&D waste stream was last analyzed in 1994/95. While the results of the 2007 study can be compared with the 1994/95 study, the methodology for the 2007 study was substantially different than that used in the 1994/95 study. This document outlines the sampling methodology for the current study.

Sampling Populations

This study examined C&D waste that is generated exclusively in the City of Seattle, by both residential and commercial sources. C&D waste was defined as waste generated from new construction, remodeling, demolition, roofing, and other/mixed activities, such as public infrastructure projects and remodeling. Loads that contained at least 80% C&D were eligible for inclusion in the study.

Beginning in February 2007, C&D waste was collected from three hauler types: the city's two contracted haulers (Waste Management and Allied), C&D haulers, and self haulers. These types are defined as follows.

- **Contracted haulers**: The two haulers, Waste Management and Allied, that the City contracts with to collect and dispose of commercial waste.

- **C&D haulers**: Companies whose principal business includes demolition and/or hauling of construction and demolition materials, such as large construction or demolition contractors Bobby Wolford Trucking & Demolition, Democon, and Renu.

- **Self-haulers**: Any party other than a certificated or C&D hauler whose primary business is an activity other than waste hauling. This includes contractors, residents, and small business owners and is divided into business self-haulers and homeowner self-haulers.

Waste samples were collected from the three transfer stations that accept Seattle C&D waste: Eastmont, Third & Lander, and Black River. In addition, samples were collected from construction sites where C&D waste is placed directly into shipping, or intermodal, containers so that it can be transferred onto a train.

Sample Allocation

Sampling targets were based on construction activity types. C&D waste was categorized according to activity types as follows.

- **New Construction**: Construction materials generated from the construction of new structures.

- **Remodeling**: Construction or demolition materials generated from the remodeling of buildings.

- **Demolition**: Materials generated from the tearing down of any facility, structure, or building, whether interior or exterior.

- **Roofing**: Construction or demolition materials generated from the new construction, remodeling, and/or demolition of residential or non-residential roofs.

- **Mixed/Other C&D**: Construction or demolition materials generated from activities not otherwise classified, such as the building, repair, and/or demolition of roads, bridges, and other public infrastructure.

Approximately 786 samples of C&D waste were characterized during 46 days of sampling.

The samples were allocated to construction activity types as detailed in Table B-1.

Table B-1: Targets vs. Actual Samples Completed, by Activity Type

Activity Type	Number of Samples	
	Actual	**Target**
New Construction	171	170-200
Remodeling	232	170-200
Demolition	151	120-160
Roofing	100	85-105
Other/Mixed	48	85-105
Residuals	52	50
Intermodal	32	32
Total	**786**	**782**

Sampling days were distributed across the four quarters of the year on randomly selected days and apportioned to the three facilities that receive C&D waste from Seattle: Eastmont, Third & Lander, and Black River. Sampling of intermodal containers at construction sites were initially scheduled to coincide with sampling at the facilities, although it frequently occurred on separate days due to limited intermodal projects. Additionally, to characterize waste from C&D sorting operations, samples were allocated to residual materials at Eastmont. Eastmont is the only one of the three facilities currently sorting C&D materials for recoverable material. Including the residuals in the study allows for the entire disposed C&D waste stream to be characterized.

Sampling at Disposal Sites

Sampling Calendar

Sampling at disposal sites was scheduled quarterly: winter (February), spring (May), summer (August), and fall (September, October, and November). As shown in Table B-2 below,

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sampling occurred every quarter with additional days scheduled for the fourth quarter to make up for previous shortages. Eastmont was visited during all four seasons, while Third & Lander and Black River were visited during three seasons. Third & Lander was only visited in winter and fall due to sampling conflicts, including construction, at the facility. Black River was visited in spring, summer, and fall. Sampling across all four seasons ensured that seasonally-influenced differences were adequately represented in the overall results and that comparable data were obtained for each sector.

Table B-2: Waste Sampling Calendar – Disposal Sites

Date	Facility	Day of Week	Week of Month
2/21/2007	Third & Lander	Wednesday	3
2/22/2007	Third & Lander	Thursday	4
2/23/2007	Eastmont	Friday	4
2/26/2007	Eastmont	Monday	4
2/27/2007	Eastmont	Tuesday	4
5/15/2007	Black River	Tuesday	3
5/16/2007	Black River	Wednesday	3
5/17/2007	Eastmont	Thursday	3
5/18/2007	Eastmont	Friday	3
5/19/2007	Eastmont	Saturday	3
5/21/2007	Eastmont	Monday	3
5/22/2007	Third & Lander	Tuesday	4
5/23/2007	Black River	Wednesday	4
8/7/2007	Eastmont	Tuesday	1
8/9/2007	Eastmont	Thursday	2
8/10/2007	Eastmont	Friday	2
8/21/2007	Eastmont	Tuesday	3
8/22/2007	Eastmont	Wednesday	4
8/23/2007	Black River	Thursday	4
8/24/2007	Black River	Friday	4
9/25/2007	Third & Lander	Tuesday	4
9/26/2007	Third & Lander	Wednesday	4
10/11/2007	Eastmont	Thursday	2
10/12/2007	Eastmont	Friday	2
10/15/2007	Eastmont	Monday	3
10/16/2007	Third & Lander	Tuesday	3
10/17/2007	Third & Lander	Wednesday	3
10/25/2007	Black River	Thursday	4
10/25/2007	Eastmont	Thursday	4
10/26/2007	Black River	Friday	4
10/26/2007	Eastmont	Friday	4
11/5/2007	Third & Lander	Monday	1
11/9/2007	Third & Lander	Friday	2
11/8/2007	Eastmont	Thursday	2

Table B-3: Distribution of Waste Sampling Days – Disposal Sites

			Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Overall
					Number of Waste Sampling Days: Total				
Black River	Winter	Week 1							
		Week 2							
		Week 3							
		Week 4							
	Winter Total								
	Spring	Week 1							
		Week 2							
		Week 3		1	1				2
		Week 4			1				1
	Spring Total			*1*	*2*				*3*
	Summer	Week 1							
		Week 2							
		Week 3							
		Week 4				1	1		2
	Summer Total					*1*	*1*		*2*
	Fall	Week 1							
		Week 2							
		Week 3							
		Week 4				1	1		2
	Fall Total					*1*	*1*		*2*
Black River Total				**1**	**2**	**2**	**2**		**7**
Eastmont	Winter	Week 1							
		Week 2							
		Week 3							
		Week 4	1	1			1		3
	Winter Total		*1*	*1*			*1*		*3*
	Spring	Week 1							
		Week 2							
		Week 3	1			1	1	1	4
		Week 4							
	Spring Total		*1*			*1*	*1*	*1*	*4*
	Summer	Week 1		1					1
		Week 2				1	1		2
		Week 3		1					1
		Week 4			1				1
	Summer Total			*2*	*1*	*1*	*1*		*5*
	Fall	Week 1							
		Week 2				2	1		3
		Week 3	1						1
		Week 4				1	1		2
	Fall Total		*1*			*3*	*2*		*6*
Eastmont Total			**3**	**3**	**1**	**5**	**5**	**1**	**18**
Third & Lander	Winter	Week 1							
		Week 2							
		Week 3			1				1
		Week 4				1			1
	Winter Total				*1*	*1*			*2*
	Spring	Week 1							
		Week 2							
		Week 3							
		Week 4		1					1
	Spring Total			*1*					*1*
	Summer	Week 1							
		Week 2							
		Week 3							
		Week 4							
	Summer Total								
	Fall	Week 1	1						1
		Week 2					1		1
		Week 3		1	1				2
		Week 4		1	1				2
	Fall Total		*1*	*2*	*2*		*1*		*6*
Third & Lander Total			**1**	**3**	**3**	**1**	**1**		**9**
Grand Total			**4**	**7**	**6**	**8**	**8**	**1**	**34**

Hauler and Transfer Station Participation

For sampling at facilities (Eastmont, Third & Lander, and Black River), the Project Manager met with facility representatives during the study design phase to explain the details of the study and determine how the sampling and surveying would be conducted at each site. All affected personnel received a sampling schedule prior to the first sampling event. Additionally, they were contacted the week before and the day prior to each sampling event. The facilities were asked to notify their staff of each sampling event.

Vehicle Survey

In order to quantify the waste associated with each activity type, surveys were conducted at the entrance of each participating facility. The surveys were administered to the driver of each vehicle entering the facility through the gate at which the surveyor was posted. The surveys were conducted at each participating disposal facility on the same days that sampling occurred. On each survey day, the surveyor was on-site for an eight-hour period, inclusive of all necessary rest breaks and a meal break. The window for surveying was from 6am to 6pm and starting times were chosen between 6am and 10am.

The information collected on the Vehicle Survey Form corresponds to six main categories of information: vehicle type, hauler, load origin, construction activity type, and building. A copy of the Vehicle Survey Form is included in Appendix G. The net weights of each vehicle were also obtained. The survey process consists of six steps.

Step 1. Verify that the load is eligible. The surveyor must first confirm that the load contains at least 80 percent C&D waste, originated in Seattle, and will be disposed, not recycled. The survey excluded loads that contained C&D that is recycled or those that contained more than 20 percent MSW.[1]

Step 2. Record net weight. The procedure for obtaining vehicle net weights may have differed by facility. If the surveyor was positioned before the vehicle reaches the scale house, the driver was given a numbered card so that the surveyor could record the net weight for the load as the vehicle exits the facility. If the surveyor was positioned after the vehicles weigh, it was possible to look at the ticket and record the net weight if the vehicle had a tare weight in the system. If the vehicle did not have a tare weight, a numbered card was given to the driver. A second surveyor may have been needed at some sites to obtain net weights.

Step 3. Observe. Next, the surveyor observed and recorded the following:

1. **Vehicle type** – The surveyor recorded the vehicle type, according to the five categories: drop-box/roll-off, end-dump (includes flatbeds that dump), tractor/trailer (semi), other large vehicle, or pick-up (includes truck, van, auto, and other small vehicles).[2]

2. **Hauler** – The surveyor determined if the vehicle was a contracted hauler, C&D hauler, or self-hauler. Surveyors had a list of all certificated hauling companies and examples of C&D haulers. If it was a self-hauler, the driver was asked if the load was from a business or residence.

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[1] Loads generated by C&D activities generally contain more than 80% C&D waste. Having a cut-off of 80% C&D material will likely exclude small loads, such as residential self-haul, that contain a large portion of MSW.
[2] No tractor/trailer (semi) loads were sampled in the study.

Step 4. Ask all drivers for specified information. All surveyed drivers were then asked for the following information:

3. **Load origin** – The surveyor asked the driver the address, or cross streets, from which the load originated.

4. **Building type** – The surveyor asked the driver to choose the category that best describes the building: residential, non-residential, mixed (both residential and non-residential construction), or other structures.

5. **Construction activity type** – For the final question, the surveyor asked if the load contained waste from new construction, remodeling, demolition, roofing, or other/mixed C&D.

The surveyor recorded data from the interviews on a *Vehicle Survey Form*. Cascadia's project manager was on-site at the beginning of the sampling and survey phase of the project and trained the surveyor in the implementation of the survey and the use of the *Vehicle Survey Form*. Following each day of surveying, the completed *Vehicle Survey Forms* were delivered to Cascadia's office for entry into a customized Microsoft Access database.

Vehicle Selection

The staff member conducting the vehicle surveys had the additional duty of selecting vehicles for sampling. At the start of the survey day, every third new construction, remodeling, and demolition load was selected for sampling. Because roofing and other/mixed loads are less common, every load of those types was selected. These sampling intervals were adjusted as needed, based on traffic flows, in order to meet each day's sampling goals. Paper *Vehicle Selection Forms* were created for each day and each location of sampling activity. When a vehicle was selected, the staff member assigned a unique sample ID number to the load and recorded that sample ID number on the *Vehicle Survey Form*.

The surveyor placed the *Sample Placard* on the vehicle's windshield or dashboard to identify it as a vehicle intended for sampling and directed the driver to the sampling area. The entire load carried by each vehicle chosen for sampling constituted one sample.

Collection of C&D Visual Characterization Data at Disposal Sites

A visual volumetric measurement protocol was used to characterize loads of C&D waste. Visual sampling is more effective than the hand-sorting method due to the heavy, bulky and highly variable nature of the C&D load. This leads to a more representative characterization of each load and, therefore, the waste stream as a whole. A professional visual estimator used the field-tested, six-step process described below to estimate the composition of all C&D loads.

Step 1. Record the sample number and date. Record this information on the V*isual Sampling Form*.

Step 2. Measure load volume. Measure and record the length, width, and height of the load while it is still in the vehicle (if possible). Record measurements on the *Visual Sampling Form*.

Step 3. Note which broad material categories are present. After the driver has dumped the load onto the ground and it has been spread out, walk entirely around the load and indicate on the sampling form which broad material categories are present in the load. Broad material categories include paper, glass, metal, electronics, plastic, other organic, construction and demolition, household hazardous waste (HHW), special waste, and mixed residue/MSW.

Step 4. Estimate composition by volume for each broad material category. Beginning with the largest broad material category present by volume, estimate the percentage by volume of this broad material category and record it on the form. Repeat this process for the next most common broad material category, and so forth, until the volumetric percentage of every broad material category has been estimated. Then calculate the total for this step, ensuring that it totals 100 percent.

Step 5. Estimate composition by volume for each specific component. Consider each broad material category separately and estimate the percentage by volume of the major class that is made up of each specific component. An example of a specific component within the broad material category of metal would be *other ferrous metal*. While considering only the metal broad material category, estimate the volumetric percentage of metal each component comprises. The total of percentages for all of the components must equal 100 percent. Repeat this process for the other broad material categories, with all the components in each broad material category totaling 100 percent.

Step 6. Check and reconcile percentage data. Verify that the percentage estimates for the broad material categories add up to 100 percent. Also, the percentage estimates for the components within each major class must total 100 percent.

The visual estimator used a *Visual Sampling Form* to record the composition estimates and the information obtained from the *Sample Placard* for each sampled vehicle. The estimator also took a photograph of the sample featuring the *Sample Placard*. Appendix G: includes a copy of the *Visual Sampling Form* and *Sample Placard*. Copies of each completed form were made and the originals were sent to Cascadia's office for entry into a database.

Sampling of Residuals

At Eastmont, highly recoverable loads of C&D waste are diverted to the sorting line, where recyclable materials, such as untreated wood and cardboard, are separated for recycling. Fifty-two samples of residuals, or non-recyclable materials, from this operation were sampled while on the conveyor belt. A process for sampling this material was refined with facility personnel so that the safety of the sampling staff and that of the visual estimator were ensured. This conveyor belt was stopped for each sample so that the estimator characterized material on approximately 10 feet of the conveyor belt at one time. Since the sampling plan included 13 days of sampling at Eastmont, the target for residuals was 3 to 5 samples each day. On each sampling day, a sampling time was designated to coincide with the hours the estimator was on-site and the hours the sorting line was operational that day.

Sampling at Construction Sites

Waste collected in intermodal containers at construction sites is only visible as it is being transferred into the container and at the landfill when it is being dumped. For this reason, construction sites with intermodal container service were visited as part of the study.

Sampling Calendar

As with the disposal sites, sampling occurred quarterly at construction sites: spring (March-May), summer (June-August), fall (September-November), and winter (December). Sampling dates are listed in Table B-4.

Table B-4: Waste Sampling Calendar – Construction Sites

Date	Day of Week	Week of Month
3/23/2007	Friday	4
4/27/2007	Friday	4
5/18/2007	Friday	3
5/21/2007	Monday	3
6/5/2007	Tuesday	1
6/7/2007	Thursday	1
7/16/2007	Monday	3
7/19/2007	Thursday	3
7/20/2007	Friday	3
7/21/2007	Saturday	3
8/13/2007	Thursday	2
8/17/2007	Friday	3
8/20/2007	Monday	3
9/19/2007	Wednesday	3
10/2/2007	Tuesday	1
11/5/2007	Monday	1
12/19/2007	Wednesday	3

Table B-5: Distribution of Waste Sampling Days – Construction Sites

		Number of Waste Sampling Days: Total						Grand Total
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Winter	Week 1							
	Week 2							
	Week 3			1				1
	Week 4							
Winter Total				*1*				*1*
Spring	Week 1							
	Week 2							
	Week 3	1				1		2
	Week 4					2		2
Spring Total		*1*				*3*		*4*
Summer	Week 1		1		1			2
	Week 2				1			1
	Week 3	2			1	2	1	6
	Week 4							
Summer Total		*2*	*1*		*3*	*2*	*1*	*9*
Fall	Week 1	1	1					2
	Week 2							
	Week 3			1				1
	Week 4							
Fall Total		*1*	*1*	*1*				*3*
Grand Total		**4**	**2**	**2**	**3**	**5**	**1**	**17**

Hauler Participation

For sampling at construction sites, the Project Manager contacted the individuals at Waste Management and Allied who schedule intermodal service to explain the study and obtain any information that could have impacted the study design.

In addition to receiving a sampling schedule prior to the beginning of fieldwork, the appropriate hauler representatives were contacted the week before and the day prior to each sampling event. Sampling at the construction sites for intermodal container waste was coordinated with the intermodal scheduling staff.

Each hauler was contacted prior to each scheduled sampling event as to whether sites had requested intermodal service. When necessary, sampling was re-scheduled to accommodate intermodal service requests.

Collection of C&D Visual C*h*aracterization Data at Construction Sites

A visual estimator stood at a safe distance from the construction activity at each site. Using the visual sampling method, the estimator characterized waste as it was placed in the intermodal container. One sample was completed at each site. Each sample took up to 4 hours, including travel time.

Changes in Methodology from 1994/95 Study

The sampling methodology for this study differed from the 1994/95 study in the following ways:

- A visual sampling method was used in place of a hand-sorting method;

- The number of samples for the study period increased from 242 to 786;

- The number of sampling days increased from 27 to 46;

- The 2007 study did not characterize land clearing waste;

- The 1994/95 study included sampling at City-owned transfer stations while the current study focused on private stations and included waste disposed in intermodal containers; and

- The component categories were revised based on changes in materials and to more accurately reflect the types of waste found in the C&D waste stream. While the samples in the 1994/95 study were characterized according to 124 component categories, the 2007 waste component list consisted of 67 categories. Please refer to Table E-2 in Appendix E for a list of how material components were updated for the current study.

Appendix C: Comments on Quarterly Sampling Events

Season One Sampling

The table below presents the numbers of completed samples for the spring sampling season. We were able to get one on-site/intermodal sample last week, although we are still 7 behind for the spring. We are actually seven samples ahead overall. Part of this is due to decreasing our daily target for 3rd & Lander from 50 to 37. We realized that there were not enough loads going to the lower, hand-unload area for a person stationed there to get 25 in a day, as we had originally planned. This change will likely require adding extra days at 3rd & Lander in subsequent seasons.

Table C-1. Season One Samples

Activity Type	Overall Study Target	3rd & Lander 2/21/2007	3rd & Lander & On-site 2/22/2007	Eastmont & On-site 2/23/2007	Eastmont & On-site 2/26/2007	Eastmont & On-site 2/27/2007	Make-up Day 3/23/2007	Total Samples	Current Target	Difference from Current
New Construction	170-200	8	10	5	8	8	0	39	40	(1)
Remodeling	170-200	19	10	10	7	8	0	54	40	14
Demolition	120-160	14	8	3	6	7	0	38	30	8
Roofing	85-105	2	8	6	3	4	0	23	21	2
Other/Mixed	85-105	1	4	1	2	1	0	9	21	(12)
Residuals	50	0	0	4	2	6	0	12	11	1
On-Site	32	0	0	0	0	0	1	1	6	(5)
Total	782	44	40	29	28	34	1	176	169	7
Daily Target*		37	39	31	31	31	0			
Difference from Daily Target		7	1	(2)	(3)	3	1			

*Note: Daily targets are 29 for Eastmont, which includes 4 residual samples, and 37 for Third & Lander. Two samples are added to each daily target when on-site sampling is scheduled.

Season Two Sampling

The table below presents the numbers of completed samples for Season 2. Sampling on 5/16 at Black River was impacted by an equipment replacement at the facility, so 5/23 was scheduled as a make-up day. For this reason, the daily target for 5/16 was set to 2 in the table, to reflect scheduled intermodal samples that day. On Saturday, 5/19, there were very few loads at Eastmont. We stayed at the site until eleven that day. Approximately 5 trucks entered the facility during that time; most of these were from outside Seattle.

Table C-2. Season Two Samples

Activity Type		New Construction	Remodeling	Demolition	Roofing	Other/Mixed	Residuals	On-Site	Total	Daily Target*	Difference from Daily Target
Overall Study Target		170-200	170-200	120-160	85-105	85-105	50	32	782		
Intermodal Only	4/27/2007	0	0	0	0	0	0	2	2	0	2
Black River	5/15/2007	4	11	3	3	0	0	0	21	27	-6
Black River	5/16/2007	1	1	0	2	4	0	0	8	2	6
Eastmont	5/17/2007	7	7	5	3	1	0	0	23	31	-8
Eastmont	5/18/2007	2	5	4	3	0	8	1	23	31	-8
Eastmont	5/19/2007	0	2	0	0	0	0	0	2	29	-27
Eastmont	5/21/2007	3	11	9	5	0	8	1	37	31	6
3rd & Lander	5/22/2007	10	16	9	2	2	0	0	39	37	2
Black River	5/23/2007	2	5	3	0	2	0	0	12	27	-15
Intermodal Only	6/5/2007	0	0	0	0	0	0	4	4	0	4
Intermodal Only	6/7/2007	0	0	0	0	0	0	3	3	0	3
Season 2 Total		29	58	33	18	9	16	11	174	215	-41
Current Total (incl. previous sampling)		68	112	71	41	18	28	12			
Current Target		90	91	68	47	47	25	16			
Difference from Current Target		-22	21	3	-6	-29	3	-4			-34

*Note: Daily targets are 29 for Eastmont, which includes 4 residual samples, 37 for Third & Lander, and 25 for Black River. Two samples are added to each daily target when on-site sampling is
Sampling on 5/16 at Black River was impacted by an equipment replacement at the facility, so 5/23 was scheduled as a make-up day. For this reason, the daily target for 5/16 was set to 2, to reflect scheduled intermodal samples that day.

Season Three Sampling

The table below presents the numbers of completed samples for Season 3. We did not sample at Third & Lander during this season as they were in the beginning stages of a construction project at the time. During the week of August 6th, sampling at Eastmont was interrupted due to issues with one of the compactors. Additionally, fewer Seattle loads arrived at Black River than we had targeted for sampling.

The number of demolition, roofing, and residual samples are approximately in line with sampling targets. More remodeling loads, and fewer new construction and other/mixed loads have been sampled than originally planned. We have been able to complete 26 intermodal, or on-site, samples. Following this sampling event, we were short 51 samples for the overall study.

Table C-3. Season Three Samples

Activity Type		New Construction	Remodeling	Demolition	Roofing	Other/Mixed	Residuals	On-Site	Total	Daily Target*	Difference from Daily Target
Overall Study Target		170-200	170-200	120-160	85-105	85-105	50	32	782		
Intermodal Only	7/16/2007	0	0	0	0	0	0	1	1	0	1
Intermodal Only	7/19/2007	0	0	0	0	0	0	4	4	0	4
Intermodal Only	7/20/2007	0	0	0	0	0	0	1	1	0	1
Intermodal Only	7/21/2007	0	0	0	0	0	0	1	1	0	1
Eastmont	8/7/2007	3	6	7	5	2	0	0	23	31	-8
Eastmont	8/9/2007	3	5	3	3	5	0	2	21	31	-10
Eastmont	8/10/2007	4	9	6	3	3	0	0	25	31	-6
Intermodal Only	8/13/2007	0	0	0	0	0	0	3	3	2	1
Intermodal Only	8/17/2007	0	0	0	0	0	0	1	1	0	1
Intermodal Only	8/20/2007	0	0	0	0	0	0	1	1	0	1
Eastmont (Residuals)	8/21/2007	0	0	0	0	0	6	0	6	0	6
Eastmont (Residuals)	8/22/2007	0	0	0	0	0	6	0	6	0	6
Black River	8/23/2007	3	10	2	2	2	0	0	19	27	-8
Black River	8/24/2007	5	10	0	4	1	0	0	20	27	-7
Season 3 Total		18	40	18	17	13	12	14	132	149	-17
Current Total (incl. previous sampling)		86	152	89	58	31	40	26			
Current Target		126	126	95	65	65	32	24			
Difference from Current Target		-40	26	-6	-7	-34	8	2			-51

*Note: Daily targets are 29 for Eastmont, which includes 4 residual samples, 37 for Third & Lander, and 25 for Black River. Two samples are added to each daily target when on-site sampling is scheduled.

Season Four Sampling

The table below presents the numbers of completed samples for Season 4. The closure of the lower tipping area at 3rd & Lander prevented us from having a second person sampling, as we

had planned in the study design. Because of this change, there is a gap of about 12 samples per day between the target and actual samples for this site. On 10/11 at Eastmont, the recycling line was shut down earlier than we expected, so all 12 residual samples were completed on 10/12 and 10/15.

At the end of the four planned sampling events, the number of remodeling, demolition, roofing, and residual samples are within, or very close, the upper and lower targets. Fewer new construction and other/mixed loads have been sampled than originally planned. We have been able to complete 29 intermodal, or on-site, samples. Following this sampling event, we are short 111 samples for the overall study. This shortfall is mainly due to construction at 3rd & Lander, and lower vehicle counts than anticipated at Eastmont on one Saturday and Black River in general.

Table C-4. Season Four Samples

Activity Type		New Construction	Remodeling	Demolition	Roofing	Other/Mixed	Residuals	On-Site	Total	Daily Target*	Difference from Daily Target
Overall Study Target		170-200	170-200	120-160	85-105	85-105	50	32	782		
Intermodal Only	9/19/2007	0	0	0	0	0	0	2	2	0	2
3rd & Lander	9/25/2007	5	6	8	3	3	0	0	25	37	-12
3rd & Lander	9/26/2007	7	7	5	2	4	0	0	25	37	-12
Intermodal Only	10/2/2007	0	0	0	0	0	0	1	1	0	1
Eastmont	10/11/2007	5	10	2	3	0	0	0	20	29	-9
Eastmont	10/12/2007	6	5	8	3	1	6	0	29	31	-2
Eastmont	10/15/2007	8	11	4	3	1	6	0	33	31	2
3rd & Lander	10/16/2007	6	4	7	7	2	0	0	26	39	-13
3rd & Lander	10/17/2007	10	7	6	4	1	0	0	28	39	-11
Season 4 Total		47	50	40	25	12	12	3	189	243	-54
Current Total (incl. previous sampling)		133	202	129	83	43	52	29			
Current Target		185	185	140	95	95	50	32			
Difference from Current Target		-52	17	-11	-12	-52	2	-3			-111
Difference from Overall Study Goals		-52	17	-11	-12	-52	2	-3			-111

*Note: Daily targets are 29 for Eastmont, which includes 4 residual samples, 25 for Third & Lander, and 25 for Black River. Two samples are added to each daily target when on-site sampling is scheduled.

Additional Sampling

The table below presents the numbers of completed samples for the make-up sampling conducted in October and November. As planned, we made up samples at Black River and Eastmont on October 25th & 26th since we had crews out at these sites on those days. We also made up 3 days at 3rd & Lander in the beginning of November.

At the completion of sampling, the number of new construction, demolition, and roofing samples are within the upper and lower targets. More remodeling and fewer other/mixed loads were sampled than originally planned. We completed 31 intermodal, or on-site, samples and 52 residual samples. Following this sampling event, we have exceeded the overall study goal of 782 samples by 3 samples.[3]

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[3] One final intermodal sample was completed after this summary was sent to the client, making the total number of samples 786.

Table C-5. Additional Samples

Activity Type		New Construction	Remodeling	Demolition	Roofing	Other/Mixed	Residuals	On-Site	Total
Overall Study Target		170-200	170-200	120-160	85-105	85-105	50	32	782
Eastmont	10/25/2007	3	3	0	4	0	0	0	10
Black River	10/25/2007	2	5	2	2	0	0	0	11
Eastmont	10/26/2007	4	1	2	3	1	0	0	11
Black River	10/26/2007	4	0	6	0	1	0	0	11
3rd & Lander	11/5/2007	7	8	4	4	2	0	0	25
Intermodal	11/5/2007	0	0	0	0	0	0	2	2
Eastmont	11/8/2007	11	6	6	2	0	0	0	25
3rd & Lander	11/9/2007	7	6	3	2	1	0	0	19
Season 4 Total		38	29	23	17	5	0	2	114
Current Total (incl. previous sampling)		171	232	151	100	48	52	31	
Current Target		185	185	140	95	95	50	32	
Difference from Current Target		-14	47	11	5	-47	2	-1	3
Within Target Range?		Yes	No (+32)	Yes	Yes	No (-37)	N/A	N/A	

Appendix D: Waste Composition Calculations

Estimating Waste Composition

Visual estimates from sampling, in the form of percentages, were converted first to volume estimates and second to weights using material-specific densities. Densities used for these calculations are presented in

Table D-12.

Converting Volumes to Weights

The composition calculations rely on the availability of individual material weights for each sample. As described above in the section "Visually Characterizing Loads," the data that were collected to characterize each sample in this study were volume estimates. Cascadia converted volume estimates to weights using accepted waste density conversion factors. These factors are listed in

Table D-12, and data sources accompany the table.

Using the volume-to-weight conversion factors and the volume estimates obtained during the characterization of each sample, individual material weights were calculated using the following formula:

$$c = m \times s \times v \times d$$

where:

c = the total weight of the specific material in the sample

m = percentage estimate of the material, as a portion of material class (e.g., the extent to which *newspaper* constitutes all of the *paper* in the sample)

s = percentage estimate of the material class, as a portion of all of the material in the sample (e.g., the extent to which *paper* constitutes all of the material in the sample)

v = total volume of the sample (in cubic yards)

d = density conversion of the material (in pounds/cubic yard)

Composition Calculations

The composition estimate, denoted by r_j, represents the ratio of the material's weight to the total sample weight for each noted group. It is derived by summing each material's weight across all of the selected samples and dividing by the sum of the total sample weight, as shown in the following equation:

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

where:

c = weight of particular material

---

w = sum of all material weights

for $i = 1$ to n, where n = number of selected samples

for $j = 1$ to m, where m = number of materials

The confidence interval for this estimate is derived in two steps. First, the variance around the estimate is calculated, accounting for the fact that the ratio includes two random variables (the material and total sample weights). [4] The variance of the ratio estimator equation follows:

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

where:

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

Second, precision levels at the 90 percent confidence interval are calculated for a component's mean as follows:

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

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

Weighted Averages

For the building and activity type substreams, composition data were combined in a weighted fashion, as described below. Tonnages calculated from the vehicle surveys conducted by Cascadia and facility disposal figures provided by the City of Seattle were used to create weighting factors. The composition estimates were applied to the relevant tonnages to estimate the amount of waste disposed for each component category for each building type and activity type, and for intermodals.

The **weighted average for an overall composition estimate** 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 substream

r = ratio of component weight to total waste weight in the noted substream

for   j   1 to m

where m = number of components

The variance of the weighted average will be calculated:

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[4] For more information regarding the variance calculation, please refer to William G. Cochran, *Sampling Techniques, 3rd Edition*, John Wiley & Sons, Inc., Indianapolis, Indiana, 1977

$$VarO_j = (p_1{}^2 * \hat{V}_{r_{j1}}) + (p_2{}^2 * \hat{V}_{r_{j2}}) + (p_3{}^2 * \hat{V}_{r_{j3}}) + \ldots$$

The following tables show the sets of weighting percentages that were used to produce the estimates for overall C&D waste, and then for each building type and activity type.

Overall Weightings

Table D-1: Weighting Percentages, Overall

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Residential Buildings	10,350	5.15%
New Construction	Non-residential Buildings	14,661	7.29%
New Construction	Mixed Load	1,459	0.73%
New Construction	Other Structures	246	0.12%
New Construction	Unidentified	367	0.18%
Remodel	Residential Buildings	21,846	10.86%
Remodel	Non-residential Buildings	17,322	8.61%
Remodel	Other Structures	0	0.00%
Demolition	Residential Buildings	34,480	17.14%
Demolition	Non-residential Buildings	18,908	9.40%
Demolition	Mixed Load	190	0.09%
Demolition	Unidentified	293	0.15%
Roof	Residential Buildings	18,045	8.97%
Roof	Non-residential Buildings	4,522	2.25%
Roof	Mixed Load	125	0.06%
Other C&D	Residential Buildings	764	0.38%
Other C&D	Non-residential Buildings	2,998	1.49%
Other C&D	Other Structures	8,661	4.31%
Intermodal	Intermodal	45,919	22.83%
Overall		**201,156**	**100.00%**

Weighting by Building Type

Table D-2: Weighting Percentages, Residential Buildings

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Residential Buildings	10,350	12.11%
Remodel	Residential Buildings	21,846	25.56%
Demolition	Residential Buildings	34,480	40.33%
Roof	Residential Buildings	18,045	21.11%
Other C&D	Residential Buildings	764	0.89%
Overall		**85,485**	**100.00%**

Table D-3: Weighting Percentages, Non-residential Buildings

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Non-residential Buildings	14,661	25.10%
Remodel	Non-residential Buildings	17,322	29.66%
Demolition	Non-residential Buildings	18,908	32.37%
Roof	Non-residential Buildings	4,522	7.74%
Other C&D	Non-residential Buildings	2,998	5.13%
Overall		**58,411**	**100.00%**

Table D-4: Weighting Percentages, Mixed Loads

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Mixed Load	1,459	82.23%
Demolition	Mixed Load	190	10.72%
Roof	Mixed Load	125	7.05%
Overall		**1,774**	**100.00%**

Table D-5: Weighting Percentages, Other Structures

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Other Structures	246	2.76%
Remodel	Other Structures	0	0.00%
Other C&D	Other Structures	8,661	97.24%
Overall		**8,907**	**100.00%**

Table D-6: Weighting Percentages, Unidentified Buildings

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Unidentified	367	55.58%
Demolition	Unidentified	293	44.42%
Overall		**660**	**100.00%**

Weighting by Activity Type

Table D-7: Weighting Percentages, New Construction

Activity	Building Type	Tons Disposed	Percent of Total
New Construction	Residential Buildings	10,350	38.22%
New Construction	Non-residential Buildings	14,661	54.13%
New Construction	Mixed Load	1,459	5.39%
New Construction	Other Structures	246	0.91%
New Construction	Unidentified	367	1.36%
Overall		**27,083**	**100.00%**

Table D-8: Weighting Percentages, Remodeling

Activity	Building Type	Tons Disposed	Percent of Total
Remodel	Residential Buildings	21,846	55.78%
Remodel	Non-residential Buildings	17,322	44.22%
Remodel	Other Structures	0	0.00%
Overall		**39,168**	**100.00%**

Table D-9: Weighting Percentages, Demolition

Activity	Building Type	Tons Disposed	Percent of Total
Demolition	Residential Buildings	34,480	64.00%
Demolition	Non-residential Buildings	18,908	35.10%
Demolition	Mixed Load	190	0.35%
Demolition	Unidentified	293	0.54%
Overall		**53,871**	**100.00%**

Table D-10: Weighting Percentages, Roofing

Activity	Building Type	Tons Disposed	Percent of Total
Roof	Residential Buildings	18,045	79.52%
Roof	Non-residential Buildings	4,522	19.93%
Roof	Mixed Load	125	0.55%
Overall		**22,692**	**100.00%**

Table D-11: Weighting Percentages, Other C&D Activity

Activity	Building Type	Tons Disposed	Percent of Total
Other C&D	Residential Buildings	764	6.15%
Other C&D	Non-residential Buildings	2,998	24.13%
Other C&D	Other Structures	8,661	69.72%
Overall		**12,423**	**100.00%**

The composition calculations rely on the availability of individual component weights for each sample. As described in the Sampling Methodology, the data that were collected to characterize each sample in this study are in the form of volume estimates. The volume estimates were converted to weights using accepted waste density conversion factors, as listed in Table D-12 with accompanying data sources.

Table D-12: Volume-to-weight Conversion Factors Used in Composition Calculations

Broad Material Category	Component Category	Density (lbs/cubic yard)	Source
Paper	Uncoated Corrugated Cardboard	53.00	CIWMB 2004
Paper	Paper Bags	108.00	San Diego - Kraft Paper

Broad Material Category	Component Category	Density (lbs/cubic yard)	Source
Paper	Other Recyclable Paper	295.00	U.S. EPA (Average of newspaper, office paper, and magazines)
Paper	Cellulose Insulation	17.00	U.S. EPA
Paper	R/C Paper	363.50	U.S. EPA
Glass	Glass Bottles and Containers	600.00	U.S. EPA
Glass	Flat Glass	1,400.00	U.S. EPA
Glass	R/C Glass	1,400.00	U.S. EPA
Metal	Tin/Steel Cans	150.00	U.S. EPA
Metal	Major Appliances	145.00	CIWMB 2004
Metal	Used Oil Filters	834.40	Tellus
Metal	HVAC Ducting	47.00	CIWMB 2004
Metal	Other Ferrous	225.00	CIWMB 2004
Metal	Aluminum Cans	65.00	U.S. EPA
Metal	Other Non-Ferrous	225.00	CIWMB 2004
Metal	R/C Metal	142.83	Average of "metals" without Used Oil Filters
Electronics	Brown Goods and Other Small Consumer Electronics	343.17	CIWMB Staff Measurement
Electronics	Computer-related Electronics	354.08	CIWMB
Electronics	TV's & Other CRTs	405.00	CIWMB
Plastic	Plastic Bottles and Tubs	29.50	Average of PETE Containers and HDPE Containers
Plastic	Other Rigid Packaging	21.76	Tellus
Plastic	Expanded #6/Polystyrene Packaging/Insulation	32.00	CIWMB 2004
Plastic	Trash Bags	35.00	CIWMB 2004
Plastic	Grocery/Merch. Bags	35.00	CIWMB 2004
Plastic	Non-Bag Packaging Film	35.00	CIWMB 2004
Plastic	Plastic Sheeting and Agricultural Film	35.00	CIWMB 2004 - non bag packaging film
Plastic	Other Film	22.55	Tellus
Plastic	Durable Plastic Items	50.00	U.S. EPA
Plastic	Plastic Piping	281.50	Tellus/Cascadia
Plastic	R/C Plastic	50.00	U.S. EPA
Organics	Food	486.00	FEECO, Tellus
Organics	Leaves & Grass	312.50	U.S. EPA
Organics	Prunings & Trimmings	127.00	CIWMB 2004
Organics	Branches & Stumps	127.00	CIWMB 2004
Organics	R/C Organics	263.13	Average of all "Organics"
C&D	Concrete	860.00	CIWMB 2004

Broad Material Category	Component Category	Density (lbs/cubic yard)	Source
C&D	Asphalt Paving	772.80	Tellus scaled down by factor from Florida C&D study
C&D	Composition Roofing	731.00	CIWMB 2004
C&D	Other Asphalt Roofing	731.00	CIWMB 2004
C&D	Other Aggregates	860.00	CIWMB 2004
C&D	Clean Dimensional Lumber	169.00	CIWMB 2004
C&D	Clean Engineered Wood	268.00	CIWMB 2004
C&D	Pallets and Crates	169.00	CIWMB 2004
C&D	Other Recyclable Wood	169.00	CIWMB 2004
C&D	Painted/Stained Wood	169.00	CIWMB 2004
C&D	Creosote-treated Wood	169.00	CIWMB 2004
C&D	Other Treated Wood	169.00	CIWMB 2004
C&D	Clean Gypsum Board	467.00	CIWMB 2004
C&D	Painted/Demolition Gypsum	467.00	CIWMB 2004
C&D	Rock and Gravel	999.00	CIWMB 2004
C&D	Dirt and Sand	929.00	CIWMB 2004
C&D	Fiberglass insulation	17.00	Tellus
C&D	R/C C&D	416.53	CIWMB 2004
HHW	Paint	1,836.00	Tellus
HHW	Vehicle & Equipment Fluids	1,653.00	Tellus
HHW	Used Oil	1,524.94	Tellus
HHW	Batteries	2,400.00	CIWMB
HHW	R/C HHW	1,671.31	Average of "HHW" liquids
Other Materials	Textiles	225.00	Tellus
Other Materials	Carpet	147.00	CIWMB 2004
Other Materials	Carpet Padding	62.00	CIWMB 2004
Other Materials	Ash	1,012.50	FEECO
Other Materials	Bulky Items	80.00	Tellus
Other Materials	Tires	200.00	CIWMB
Other Materials	R/C Other	142.80	Average of all "other materials," except ash
Mixed Residue/ MSW	Mixed Residue	999.00	FEECO
Mixed Residue/ MSW	MSW	225.00	U.S. EPA

Sources:

Cascadia refers to direct measurements of representative samples taken by Cascadia staff members for this and other studies.

CIWMB refers to measurements, estimates, or correspondence from California Integrated Waste Management Board staff during 2006.

CIWMB 2004 refers to *Targeted Statewide Waste Characterization Study: Detailed Characterization of Construction and Demolition Waste*, performed by Cascadia Consulting Group for California Integrated Waste Management Board, 2006.

FEECO refers to FEECO International, Complete Systems and Equipment Handbook, 9th printing.

Florida C&D Study refers to Converting C&D Debris from Volume to Weight: A Fact Sheet for C&D Debris Facility Operators, University of Florida, 2000.

San Diego refers to conversion factors that were used in the San Diego Waste Comp. Study, conducted by Cascadia Consulting Group in 2000.

Tellus refers to the Tellus Institute, Boston, Massachusetts.

U.S. EPA refers to the U.S. Environmental Protection Agency's "Measuring Recycling: A Guide for State and Local Governments," document no. EPA530-R-97-011, published September 1997.

Appendix E: Comparison Calculations

This appendix outlines the comparison methodology and calculations.

Background

In an ongoing effort to monitor the types and amounts of C&D materials disposed locally, Seattle has performed two C&D waste composition studies. In this appendix, detailed results from a comparison of the two project years are presented. The results of these comparisons can be used to indicate trends in the composition data.

In order to control for population changes and other factors that may influence the total amount of waste disposed from year to year, the tests described in this appendix measure waste <u>proportions</u>, not actual <u>tonnage</u>. For example, say that *mixed low-grade* paper accounts for 10% of a particular substream's disposed waste each year, and that a total of 1,000 tons of waste were disposed in one year and 2,000 tons of waste in the next. While the amount of newspaper 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 changes within the C&D waste stream, 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 1994/95 and 2007 study periods, in the percentage of paper disposed."

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.[5]

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. For example, a decrease in metal could be due to any combination of the following:

- Consumer Preferences—plastic building products, such as vinyl siding, might have captured some of the market previously held by metal products.

- Technology—manufacturers might use less metal than in the past, which would decrease the weight of metal products, even if the same number of items were disposed.

- Recycling—more metal may be recycled because the markets are stronger than in the past.

Future studies could be designed to test the influence of various potential factors on the increase/decrease of specific materials in the disposed C&D waste stream.

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[5] Please see the "Power Analysis" discussion on page E-3.

Statistical Considerations

The analyses were based on the component percentages, by weight. As described in Appendix D, these percentages are calculated by dividing the sum of the selected component weights by the sum of the corresponding sample weights. T-tests (modified for ratio estimation) were used to examine the variations between the two years.

Identifying statistically significant differences requires a two-step calculation. First, assuming that the two groups to be compared have the same variance, a **pooled sample variance** will be calculated:

$$S_{pool}^{2} = \frac{\left[(n1-1)\cdot\left(n1\cdot\hat{V}_{r_j 1}\right)\right] + \left[(n2-1)\cdot\left(n2\cdot\hat{V}_{r_j 2}\right)\right]}{n1+n2-2}$$

Next, the **t-statistic** will be constructed:

$$t = \frac{(r1-r2)}{\sqrt{\dfrac{S_{pool}^{2}}{n1} + \dfrac{S_{pool}^{2}}{n2}}}$$

The **p-value** of the t-statistic will be calculated based on (n1+n2 -2) degrees of freedom.

Normality

The distributions of some of the waste categories (particularly the hazardous materials) are 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, most of the selected categories are sums of several individual waste components, which improve our ability to meet the assumptions of normality.

Dependence

There may be dependence between waste types (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, 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 waste category) **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 $\dfrac{0.10}{w}$ (w = the number of t-tests).

The adjustment can be explained as follows:

For each test, we set a $1 - \dfrac{0.10}{w}$ chance of not making a mistake, which results in a

$\left(1 - \dfrac{0.10}{w}\right)^w$ 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 $\left(1 - \left(1 - \dfrac{0.10}{w}\right)^w\right) = 0.10$.

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 within the residential substream 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, 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 Comparison Calculation Results

The following tables include detailed calculation results. An asterisk notes the statistically significant differences.

For the purposes of this study, only those calculation results with a p-value of less than 1.25% for the C&D substream 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.

The t-statistic is calculated from the data. According to statistical theory, the larger the absolute value of the t-statistic the less likely that the two populations 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. Table E-1 shows that the proportion of **Organics** increase between 1994/95 and 2007, while the proportion of **C&D: Other**, **Metal, Other Materials**, and **Paper** decreased. Changes in the proportions of **C&D: Aggregates**, **C&D: Wood**, **Plastic**, and **Special** were not significant.

Table E-1. Comparison of Residential Composition Results, 1994/95 vs. 2007

	Mean Ratio		t-Statistic	p-Value
	(Material Wt/Total Wt)			*(Cut-off for statistically*
	1997	*2007*		*valid difference = 0.0125)*
C&D:Aggregates	13.5%	19.4%	1.9929	0.0466
C&D:Other	22.6%	27.7%	1.6637	0.0965
C&D:Wood	29.8%	34.7%	1.6525	0.0988
Metal	9.7%	4.1%	6.1707	0.0000 *
Organics	3.6%	2.1%	1.9325	0.0536
Other Materials	8.7%	3.3%	1.8623	0.0629
Paper	5.2%	2.3%	4.5244	0.0000 *
Plastic	4.3%	2.2%	5.5906	0.0000 *
MSW/Residue	2.5%	4.3%	4.0391	0.0001 *
Number of Samples	*242*	*702*		

Material Groupings

Material components from 1994/94 and 2007 were compared and consolidated into the uniform material components and comparison classes listed in Table E-2.

Table E-2 . Material Components – 1994/94 and 2007

Material Component		Uniform Material Component	Comparison
1994/95	*2007*		**Class**
OCC/Kraft	Uncoated Corrugated Cardboard	Uncoated Corrugated Cardboard	Paper
Low Grade Recyclable	Paper Bags	Paper Bags	Paper
Newspaper	Other Recyclable Paper	Other Recyclable Paper	Paper
High Grade Printing	R/C Paper	R/C Paper	Paper
Computer Paper	R/C Paper	R/C Paper	Paper
Bleached Polycoats	R/C Paper	R/C Paper	Paper
Paper/Other Materials	R/C Paper	R/C Paper	Paper
	R/C Paper	R/C Paper	Paper
Other/NR Paper	Cellulose Insulation	R/C Paper	Paper
Clear Containers	Glass Bottles and Containers	Glass Bottles and Containers	Other Materials
Green Containers	Glass Bottles and Containers	Glass Bottles and Containers	Other Materials
Brown Containers	Glass Bottles and Containers	Glass Bottles and Containers	Other Materials
Refillable Beer	Glass Bottles and Containers	Glass Bottles and Containers	Other Materials
Window Glass	Flat Glass	Flat glass	Other Materials
Mirror Glass	Flat Glass	Flat glass	Other Materials
Other/NR Glass	R/C Glass	R/C Glass	Other Materials

Material Component		Uniform Material Component	Comparison
1994/95	*2007*		**Class**
Kitchen Ware	R/C Glass	R/C Glass	Other Materials
Tinned Food Cans	Tin/Steel Cans	Tin/Steel Cans	Metal
Other Tinned Cans	Tin/Steel Cans	Tin/Steel Cans	Metal
Large Appliances	Major Appliances	Major Appliances	Metal
	Other Ferrous	Other Ferrous	Metal
Other Ferrous	Used Oil Filters	Other Ferrous	Metal
Galvanized Steel	HVAC Ducting	Other Ferrous	Metal
Aluminum Cans	Aluminum Cans	Aluminum Cans	Metal
Other Aluminum	Other Non-Ferrous	Other Non-Ferrous	Metal
Other Nonferrous	Other Non-Ferrous	Other Non-Ferrous	Metal
Mixed Metals/Materials	R/C Metal	R/C Metal	Metal
Insulated Wire/Cable	R/C Metal	R/C Metal	Metal
Electric Motors	R/C Metal	R/C Metal	Metal
Aerosol Cans	R/C Metal	R/C Metal	Metal
CFC Compressors	R/C Metal	R/C Metal	Metal
Small Appliances	Brown Goods/Small Consumer Electronics	Small Appliances	Metal
PET #1 Bottles	Plastic Bottles and Tubs	Plastic Bottles and Tubs	Plastic
HDPE #2 Bottles	Plastic Bottles and Tubs	Plastic Bottles and Tubs	Plastic
Other Containers	Other Rigid Packaging	Other Rigid Packaging	Plastic
Other Packaging	Other Rigid Packaging	Other Rigid Packaging	Plastic
Polystyrene Foam	Polystyrene Packaging/Insulation	Polystyrene Packaging/Insulation	Plastic
Polystyrene Insulation	Polystyrene Packaging/Insulation	Polystyrene Packaging/Insulation	Plastic
Tyvek	Plastic Sheeting and Agricultural Film	Plastic Sheeting and Agricultural Film	Plastic
Film and Bags	Trash Bags	Other Film	Plastic
	Grocery/Merchandise Bags	Other Film	Plastic
	Other Film	Other Film	Plastic
	Non-Bag Packaging Film	Other Film	Plastic
	Plastic Sheeting and Agricultural Film	Other Film	Plastic
5 Gal. #2 with Handles	Durable Plastic Items	Durable Plastic Items	Plastic
5 Gal. #2 w/o Handles	Durable Plastic Items	Durable Plastic Items	Plastic
Plastic Products	Durable Plastic Items	Durable Plastic Items	Plastic
	Carpet Padding	Durable Plastic Items	Plastic
PVC Pipe	Plastic Piping	Plastic Piping	Plastic
ABS Pipe	Plastic Piping	Plastic Piping	Plastic
Polyurethane Foam	R/C Plastic	R/C Plastic	Plastic
Thermoset Products	R/C Plastic	R/C Plastic	Plastic
Plastic/Other Materials	R/C Plastic	R/C Plastic	Plastic
Laminate/Formica	R/C Plastic	R/C Plastic	Plastic
Linoleum	R/C Plastic	R/C Plastic	Plastic
Food Wastes	Food	Food	Organics
Leaves & Grass	Leaves & Grass	Leaves & Grass	Organics

Material Component		Uniform Material Component	Comparison
1994/95	*2007*		**Class**
Large Prunings	Prunings & Trimmings	Prunings & Trimmings	Organics
Small Prunings	Prunings & Trimmings	Prunings & Trimmings	Organics
Stumps	Branches & Stumps	Branches & Stumps	Organics
Bulky Yard Waste	Branches & Stumps	Branches & Stumps	Organics
Animal Carcasses	R/C Organic	R/C Organic	Organics
Animal Feces	R/C Organic	R/C Organic	Organics
Wax	R/C Organic	R/C Organic	Organics
Misc. Organics	R/C Organic	R/C Organic	Organics
Concrete with Rebar	Concrete	Concrete	C&D: Aggregates
Concrete w/o Rebar	Concrete	Concrete	C&D: Aggregates
Asphaltic Concrete	Asphalt Paving	Asphalt Paving	C&D: Aggregates
Composition Shingles	Composition Roofing	Composition Roofing	C&D: Aggregates
Tarpaper/Felt	Composition Roofing	Composition Roofing	C&D: Aggregates
Built-Up Roofing	Other Asphalt Roofing	Other Asphalt Roofing	C&D: Aggregates
Bricks	Other Aggregates	Other Aggregates	C&D: Aggregates
CMU	Other Aggregates	Other Aggregates	C&D: Aggregates
Masonry Tile	Other Aggregates	Other Aggregates	C&D: Aggregates
Mortar	Other Aggregates	Other Aggregates	C&D: Aggregates
Clay Roofing Tile	Other Aggregates	Other Aggregates	C&D: Aggregates
Slate/Quarry Tile	Other Aggregates	Other Aggregates	C&D: Aggregates
Ceramic Tile	Other Aggregates	Other Aggregates	C&D: Aggregates
Porcelain	Other Aggregates	Other Aggregates	C&D: Aggregates
New Lumber	Clean Dimensional Lumber	Clean Dimensional Lumber	C&D: Wood
New Panelboard	Clean Engineered Wood	Clean Engineered Wood	C&D: Wood
Pallets & Crates	Pallets and Crates	Pallets and Crates	C&D: Wood
Remanufacturing Scrap	Other Recyclable Wood	Other Recyclable Wood	C&D: Wood
Other Wood	Other Recyclable Wood	Other Recyclable Wood	C&D: Wood
Demo Panelboard	Painted/Stained Wood	Painted/Stained Wood	C&D: Wood
Painted/Stained Wood	Painted/Stained Wood	Painted/Stained Wood	C&D: Wood
Creosote Wood	Creosote-treated Wood	Creosote Wood	C&D: Wood
Demo Lumber	Other Treated Wood	Other Treated Wood	C&D: Wood
Roofing/Siding	Other Treated Wood	Other Treated Wood	C&D: Wood
Pressure Treated Wood	Other Treated Wood	Pressure Treated Wood	C&D: Wood
New Gypsum Scrap	Clean Gypsum Board	Clean Gypsum Board	C&D: Other
Mixed/Demo Gypsum Scrap	Painted/Demolition Gypsum	Painted/Demolition Gypsum	C&D: Other
Gravel	Rock and Gravel	Rock and Gravel	C&D: Other
Sand	Dirt and Sand	Dirt and Sand	C&D: Other
Topsoil	Dirt and Sand	Dirt and Sand	C&D: Other
Mineral Wool	Fiberglass insulation	Fiberglass insulation	C&D: Other
Fiberglass Insulation	Fiberglass insulation	Fiberglass insulation	C&D: Other
Contaminated Demo Wood	R/C C&D	R/C C&D	C&D: Other
Wood/Other Materials	R/C C&D	R/C C&D	C&D: Other
Sawdust	R/C C&D	R/C C&D	C&D: Other

Material Component		Uniform Material Component	Comparison
1994/95	*2007*		**Class**
Plaster	R/C C&D	R/C C&D	C&D: Other
Fiberglass Ceiling Panels	R/C C&D	R/C C&D	C&D: Other
Structural Fiberglass	R/C C&D	R/C C&D	C&D: Other
Latex Paint	Paint	Paint	Other Materials
Gas/Fuel Oil	Vehicle & Equip. Fluids	Vehicle & Equip. Fluids	Other Materials
Antifreeze	Vehicle & Equip. Fluids	Vehicle & Equip. Fluids	Other Materials
Used Oil	Used Oil	Used Oil	Other Materials
Vehicle Batteries	Batteries	Batteries	Other Materials
Household Batteries	Batteries	Batteries	Other Materials
Wood Preservatives	R/C HHW	R/C HHW	Other Materials
Varnishes & Finishes	R/C HHW	R/C HHW	Other Materials
Solvents/Thinners	R/C HHW	R/C HHW	Other Materials
Adhesives/Glues	R/C HHW	R/C HHW	Other Materials
Cleaners and Corrosives	R/C HHW	R/C HHW	Other Materials
Pesticides/Herbicides	R/C HHW	R/C HHW	Other Materials
Medical Waste	R/C HHW	R/C HHW	Other Materials
Asbestos	R/C HHW	R/C HHW	Other Materials
Other Hazardous	R/C HHW	R/C HHW	Other Materials
Textiles/Clothes	Textiles	Textiles	Other Materials
Upholstery	Textiles	Textiles	Other Materials
Textile Related Products	Textiles	Textiles	Other Materials
Carpet	Carpet	Carpet	Other Materials
Ashes	Ash	Ash	Other Materials
Unfinished Furnishings	Bulky Items	Bulky Items	Other Materials
Finished Furnishings	Bulky Items	Bulky Items	Other Materials
Furniture/Mattresses	Bulky Items	Bulky Items	Other Materials
Tires	Tires	Tires	Other Materials
Misc. Inorganics	R/C Other	R/C Other	Other Materials
	TV's & Other CRTs	R/C Other	Other Materials
	Computer-related Electronics	R/C Other	Other Materials
Non-distinct Fines	Mixed Residue	Mixed Residue	MSW/Residue
Disposable Diapers	MSW	MSW	MSW/Residue
Rubber Products	MSW	MSW	MSW/Residue

Appendix F: Analytical Database Description

Data were double entered into a Microsoft Access database specifically constructed for this project to minimize entry errors. In addition to the actual waste results, each record includes information about the building, construction activity, hauler, and vehicle. A description of the key data fields and structure of each record follows.

Analytical Database Structure

Each record consists of data stored in many fields of fixed size and type. The database file is compatible with the dBase III Plus file construct. A complete description of all fields is given below.

The field types used include AutoNumber, Number, Text, Date/Time, and Yes/No. Dates are carried as "mm/dd/yy." Each sample record can have an associated Memo to record additional comments or notes about the sample.

Data Tables

The basic relationships of the database are illustrated in Figure F-1. As shown, SvyKey is the unique identifier linking each sample to its composition while SchedID links the sample to the information about date of collection. In addition, the database contains "code" tables, linked to these key tables, which translate values into specific information about each sample.

Figure F-1 . Basic Database Relationships
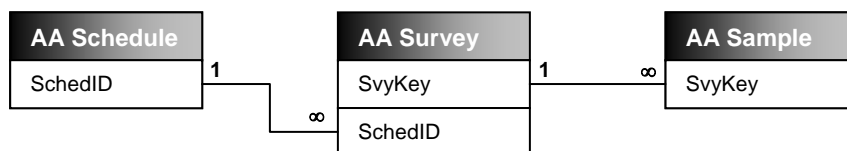
Figure F-2. AA Schedule

Field Name	Type	Description	Corresponding Code Table
ScheduleID	Number	Unique ID for each sampling field day.	☐
SiteID	Number	Links to SiteID field in [Code Site].	☑
Site	Text	Corresponding sample site.	☐
Date	Date/Time	Date during which sampling occurred.	☐
Season	Number	Links to SeasonID in [Code Season].	☑
Month	Text	Month during which sampling occurred.	☐
Day	Text	Day during which sampling occurred.	☐
StudyPeriod	Text	Study year during which sampling occurred.	☐
StudyPdAsNumber	Number	For use when screening by study period	☐
Week/End	Text	Designates weekday and weekend sampling.	☐

Figure F-3. AA Sample

Field Name	Type	Description	Corresponding Code Table
Samp ID	Number	Unique ID for each material component within each sample.	☐
SampKey	Number	Used to cross-check sample IDs.	☐
Uniform Subclass ID	Number	Corresponds to baseline set of material components.	☐
Original Subclass ID	Number	Corresponds to set of materials for most current study.	☐
Weight	Number	Net weight of material in given sample.	☐
SvyKey	Number	Links each material component to associated sample in [AA Survey].	☐

Figure F-4. AA Survey

Field Name	Type	Description	Corresponding Code Table
SvyKey	Number	Links to SvyKey field in [AASample].	☐
Sched ID	Number	Links to ScheduleID field in [AA Schedule].	☐
SampleID	Text	Unique field ID, assigned by field crew.	☐
Activity	Number	Links to Code Activity field in [Code Activity].	☑
Time	Date/Time	Time sample was completed in the field. Can also be time of entry into database.	☐
SortSample?	Yes/No	If yes, then associated weight data in [AA Sample].	☐
ActualSampleWeight	Number	Only used with intermodal samples.	☐
SampleComplete	Yes/No	Check when Sample is complete and needs no follow-up	☐
Scaled?	Yes/No	Automatically checked if sample has been scaled.	☐
ftDim1	Number	dimension 1 in feet	☐
inDim1	Number	dimension 1 in inches	☐
ftDim2	Number	dimension 2 in feet	☐
inDim2	Number	dimension 2 in inches	☐
ftDim3	Number	dimension 3 in feet	☐
inDim3	Number	dimension 3 in inches	☐
ccVolume	Number	Volume in cubic yards	☐
class_Paper	Number	% of total sample	☐
class_Glass	Number	% of total sample	☐
class_Metals	Number	% of total sample	☐
class_Special	Number	% of total sample	☐
class_Organics	Number	% of total sample	☐
class_Plastic	Number	% of total sample	☐
class_CD	Number	% of total sample	☐
class_HHW	Number	% of total sample	☐
class_Ewaste	Number	% of total sample	☐
class_Mixed	Number	% of total sample	☐
Check Class Totals	Number	sum of all classes, should equal 1 or 100%	☐
Comments	Memo	Additional notes regarding sample.	☐
Net Weight	Number	Net weight of vehicle	☐
Units_NetWeight	Text	Pounds or tons	☐
PoolAll	Text	Field used to exclude samples from analysis and sample counts.	☐
BuildingType	Number	Links to BuildingTypeID field in [CodeBuildingType].	☑
VehicleType	Number	Links to VehicleID field in [CodeVehicle].	☑
Hauler	Number	Links to HaulerID field in [CodeHauler].	☑
SurveyComments	Text	Notes from field crew.	☐
Origin/Zip	Text	Location of construction project.	☐
BuildingTypeWeighting	Number	Used for analysis.	☐

Code Tables

Code Subclass is linked to AA Sample. Please refer to Appendix A: for a complete listing of the field names of each waste component.

Figure F-5. Code Subclass

Field Name	Type	Description
UniKey	AutoNumber	Primary key for this table.
ClassID	Number	ID for broad material categories.
ClassName	Text	Name of broad material categories.
ClassOrder	Number	For reporting purposes, order of broad material categories.
TClass	Text	Category designations for t-tests
Uniform ID	Number	ID's to compare waste component weights across years (54 total)
Uniform_Name	Text	Names of baseline set of material components.
Report Order	Number	For reporting purposes, order of broad material categories.
Chart Order	Number	Order as shown in the Tracking Chart
OldClassName	Text	Field no longer used.
DE Subclass	Number	Data Entry code for current year subclass ID. Order in data entry form is based on this field.
DE Class	Text	Class name for current year.
Subclass	Text	Subclass name for current year.
2007_Class	Text	Names of broad material categories used for the 2007 study year.
2007_ClassOrder	Number	Associated ID for broad material categories used for the 2007 study year.
2007_ID	Number	67 subclasses
2007_Name	Text	Name of material components used for 2007 study year.

Code Site is linked to AA Schedule by the field "SiteID."

Figure F-6. Code Site

Field Name	Type	Description
SiteID	Number	Links to SiteID field in [AASchedule].
Site	Text	Name of facility.
SiteType	Text	Description of facility. (City, private, or intermodal.)

Code Activity is linked to AA Survey by the field "Code Activity."

Figure F-7. Code Activity

Field Name	Type	Description
Code Activity	Number	Links to SiteID field in [AASchedule].
Site	Text	Not used in current study. Designates C&D study.
Activity	Text	Designates type of activity.
ActivityID	Text	Text code corresponding to activity type. Corresponds to text in sample IDs.

Code Building Type is linked to AA Survey by the field "BuildingTypeID."

Figure F-8. Code Building Type

Field Name	Type	Description
BuildingTypeID	Number	Links to BuildingType in [AA Survey].
BuildingAbbrev	Text	Text code used on survey field forms.
Report Order	Number	For reporting purposes.
Type	Text	Description of building type (e.g., residential, non-residential, etc.).

Code Hauler is linked to AA Survey by the field "HaulerID."

Figure F-9. Code Hauler

Field Name	Type	Description
HaulerID	AutoNumber	Links to Hauler field in [AA Survey].
Hauler	Text	Designates hauler type (e.g., contracted hauler, business self-haul, etc.).
Report Order	Number	For reporting purposes.
Abbreviation	Text	From previous studies.

Code Season is linked to AA Schedule by the field "SeasonID."

Figure F-10. Code Season

Field Name	Type	Description
SeasonID	Number	Links to Season in [AA Schedule].
Season	Text	Designates season. (Spring, Summer, Autumn, Fall)
SeasonDescription	Text	Months included in season plus year, for multi-year studies (e.g. Fall (October - December 1992)).

Code Vehicle is linked to AA Survey by the field "VehicleID."

Figure F-11. Code Vehicle

Field Name	Type	Description
VehicleID	Number	Links to VehicleType in [AA Survey].
Vehicle	Text	Designates vehicle (e.g., Rear Loader, Loose Roll-off, etc.).
VehicleAbbrev	Text	Text code used on survey field forms.

Code Study Period is linked to AA Schedule by the field "StudyPeriod."

Figure F-12. Code Study Period

Field Name	Type	Description
StudyPdID	AutoNumber	Unique ID.
StudyPeriod	Text	Links to StudyPeriod in [AASchedule].
StudyPdAsNumber	Number	For use when screening by study period

Appendix G: Field Forms

The field forms are included in the following order:

- Vehicle Survey Form
- Vehicle Selection Sheet
- Sample Placard
- Visual Sampling Form

Vehicle Survey Form (front)

						Verify that the load contains at least 80% C&D waste, is from <u>Seattle</u>, AND is to be disposed (not recycled).				
SAMPLE ID	**ORIGIN**	**VEHICLE**				**HAULER**	**ACTIVITY**	**BUILDING TYPE**	**NET WT**	**NOTES**
	Ask Sampled Vehicles Only Address or cross streets the waste comes from	DB=drop-box ED=end dump SE=semi truck LG=other large vehicle PU=pick-up/passenger				COM=contracted haulers C&D=C&D haulers BSH=business self-haul HSH=homeowner self-haul	NC=new construction R=remodel DEMO=demolition RF=roofing OC=other c&d/mixed DK=don't know	R=residential buildings NR=non-residential buildings M=Mixed load OS=Other structures	Net weights only Record gross weights in NOTES	Record the following, if applicable: 1) Comments 2) Weigh Back Transaction #'s 3) Min. Vehicle Gross Weights 4) Min. Vehicle Make & Model 5) Weigh back card ID
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		
		DB ED SE LG PU				COM C&D BSH HSH	NC R DEMO RF OC DK	R NR M OS		

Vehicle Survey Form (back)

Complete this section for every page   Page _____ of _____

<u>Circle the site:</u>

Date   _____

Third & Lander

Gatekeeper _____   Eastmont

Black River

Complete this section for first page only

Inclement Weather? _____

Start Time _____   Stop Time _____

Other Notes about Today's Sampling:

If found, please call Cascadia Consulting Group at 206/343-9759. Reward offered.

2007 Seattle C&D Study
Recoverable Material Waste Characterization Study
Vehicle Selection Form

Site: Eastmont

Date: Wednesday, February 21, 2007   **Goal: 25 Samples Total**

When you reach the number circled, ask this vehicle to go to the sorting area.

New Construction   NEED 7 TOTAL

①	2	3	④	5	6	⑦	8	9	⑩	11	12	⑬	14	15	⑯	17	18	⑲	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Remodeling   NEED 7 TOTAL

①	2	3	④	5	6	⑦	8	9	⑩	11	12	⑬	14	15	⑯	17	18	⑲	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Demolition   NEED 5 TOTAL

①	2	3	④	5	6	⑦	8	9	⑩	11	12	⑬	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Roofing   NEED 3 TOTAL

①	②	③	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Other/Mixed   NEED 3 TOTAL

①	②	③	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Sample Placard

RF-1

Date ___/___

Visual Sampling Form

Step 1:
Site: 3rd & Lander   Black River

Eastmont   Intermodal_____

Date: _____

Numbered Card: _____

Step 2: Measure and record the load   volume.
(Include trailer dimensions if applicable.)

Dimensions:

_____ft x _____ft x _____ft

_____ft x _____ft x _____ft

Step 3: Identify and record all broad material categories (in bold) that appear in the load.

Step 4: Estimate composition of load by volume for each broad material category (in bold).

Step 5: For each broad materail category, estimate composition by volume of each specific material component.

Step 6: Make sure broad material category estimates AND material component estimates EACH total 100%.

☐ **Paper: _____%**

	OCC
	Kraft Paper Bags
	Other Recyclable Paper
	Cellulose Insulation
	R/C Paper
%	*Subtotal (must equal 100%)*

☐ **Glass: _____%**

	Glass Bottles and Containers
	Flat Glass
	R/C Glass
%	*Subtotal (must equal 100%)*

☐ **Metals: _____%**

	Tin/Steel Cans
	Major Appliances
	Used Oil Filters
	HVAC Ducting
	Other Ferrous Metals
	Aluminum Cans
	Other Non-Ferrous
	R/C Metal
%	*Subtotal (must equal 100%)*

☐ **Plastic: _____%**

	Plastic Bottles and Tubs
	Other Rigid Packaging
	Expanded Polystyrene Packaging and Insulation
	Trash Bags
	Grocery/Other Merchandise Bags
	Non-Bag Commercial and Industrial Packaging Film
	Plastic Sheeting/Agricultural Film
	Other Film
	Durable Plastic Items
	Plastic Piping
	R/C Plastic
%	*Subtotal (must equal 100%)*

☐ **Compostables: _____%**

	Food
	Leaves and Grass
	Prunings and Trimmings
	Branches and Stumps
	R/C Compostables
%	*Subtotal (must equal 100%)*

☐ **Electronics: _____%**

	Brown Goods/Other Small Consumer Electronics
	Computer Related Electronics
	Televisions/Other Items with CRT's
%	*Subtotal (must equal 100%)*

☐ **Construction & Demolition: _____%**

	Concrete
	Asphalt Paving
	Composting Roofing
	Other Asphalt Roofing
	Other Aggregates
	Clean Dimensional Lumber
	Clean Engineered Wood
	Pallets and Crates
	Other Recyclable Wood
	Painted/Stained Wood
	Creosote-treated Wood
	Other Treated Wood
	Clean Gypsum Board
	Painted/Demolition Gypsom Board
	Rock and Gravel
	Dirt and Sand
	Fiberglass Insulation
	R/C C&D
%	*Subtotal (must equal 100%)*

☐ **Other Materials: _____%**

	Textiles
	Carpet
	Carpet Padding
	Ash
	Bulky Items
	Tires
	R/C Other Materials
%	*Subtotal (must equal 100%)*

☐ **Household Hazardous Waste: _____%**

	Paint
	Vehicle and Equipment Fluids
	Used Oil
	Batteries
	R/C Household
%	*Subtotal (must equal 100%)*

☐ **Mixed Residue/MSW: _____%**

	Mixed Residue
	MSW
%	*Subtotal (must equal 100%)*

Grand Total:_____%
(Must equal 100%)

NOTES: _____