



pennsylvania

DEPARTMENT OF TRANSPORTATION

**WASTE AUDIT SUMMAY REPORT
PENNDOT ENGINEERING DISTRICT OFFICES
AND CENTRAL OFFICE:**

REPORTING PERIOD: 2013 - 2014

Prepared by

Strategic Recycling Program (SRP)

Strategic Environmental Management Program (SEMP) Section

Maintenance Technical Leadership Division (MTLD)

Bureau of Maintenance and Operations (BOMO)

September 2014

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1.0 INTRODUCTION

The Strategic Recycling Program (SRP), housed under the Strategic Environmental Management Program (SEMP) Section of the Maintenance Technical Leadership Division (MTLD), in the Bureau of Maintenance and Operations' (BOMO) conducts waste and recycling audits of PennDOT's Central Office (Commonwealth Keystone Building) and all Engineering District Administrative Offices. The audits are part of PennDOT's waste audit program that began in 2003 under the direction of the former SEMP Office. The intent of the audit program is to provide an evaluation of PennDOT's overall office waste management practices. The information derived through these studies also allows each District to benchmark its current recycling programs and, determine opportunities for improvement.

The waste audits are scheduled on a biennial basis; a questionnaire is sent to all District Offices and Central Office. The questionnaire assists PennDOT offices in tracking and calculating the recyclables, and municipal solid waste streams through an inventory of resources and office supplies that aid in their recycling process. A copy of the 2014 waste audit template is included as an attachment. Further detail on the variables is provided in Section 2.0. The information is collated and compared with previous years' results.

The information in this report describes the findings from the 2013 reporting period, and is compared to the audits findings of the 2011 reporting period; these findings are discussed in Section 3.0. Conclusions and recommendations are included in Section 4.0. The accompanying tables for all figures used in this report are included in Appendix A.

Note: The time spans for the waste audits are not fiscal years, but calendar years. Central Office and all District Offices reported information compiled from the 2011 (the comparison year) and 2013 calendar years. Therefore, the waste audit reporting periods are referred to as "2011" and "2013" throughout this document and, followed by the term "reporting period," as applicable. For trend evaluation, 2009 data points have been included in the figures. The significant spike in District 8 numbers is due to a more accurate representation of data in light of past submissions, furthermore, the recorded value was actually 50% of reported information because District 8-0 has shared waste stream with the county office- and District 8-0 covers all waste costs. Data gaps in the graphs are due to missing information not provided in the submitted questionnaires.

2.0 WASTE AUDIT QUESTIONNAIRE VARIABLE DESCRIPTIONS

This report describes the information that was requested and supplied by all PennDOT District Offices and Central Office. Brief descriptions of the variables included in this audit (which are also included in previous audits) are listed below:

- Number of Office Employees
 - This variable has been included to:
 1. Provide a control variable to help resolve inconsistencies based on office demographics (i.e.: size);

2. To determine if connections exist between the size of each Office and the quantities of solid wastes generated, disposed, and recycled.

- Solid Waste Quantities
 - This variable has been included to determine overall waste generation (figure includes both recyclables and trash) overall waste disposal and the amount of materials mitigated from the waste stream via recycling.
- Solid Waste Disposal and Recycling Rates;
- Monthly and Yearly Solid Waste Management Costs (disposal and recycling);
- Types and Quantities of Individual Materials Recycled Annually
 - This variable has been included to take into account different media that are captured as recyclables among the Districts. Media includes *office paper, mixed paper, newspaper, corrugated paper, aluminum, glass, plastics, commingled materials, leaf wastes* and *other miscellaneous wastes (i.e.: fluorescent bulbs)*.
- Waste and Recycling System
 - This variable was included to take into account available resources (i.e.: number of trash cans and recycling containers) and manpower (i.e.: how frequently waste cans are emptied) directly related to waste disposal.
- Office Equipment and Program
 - Review available office resources that assist in recycling (i.e.: duplex capable printers);
 - To determine any special needs that a PennDOT office may have that affect recycling.
 - A new element, availability of toner cartridge and battery recycling, was highlighted for the 2012 survey.

3.0 FINDINGS OF THE 2013 WASTE AUDIT

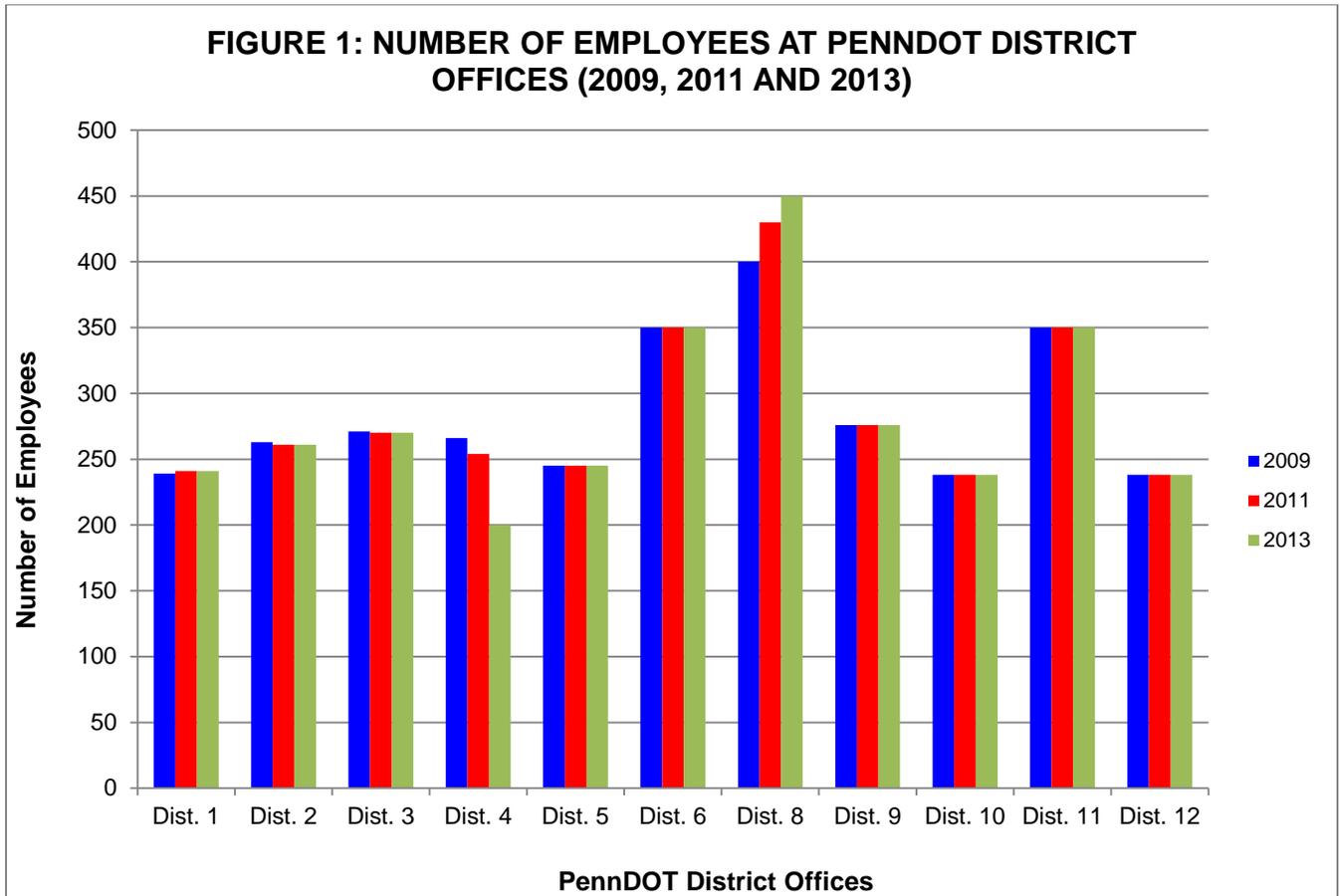
This waste audit report compiles information for PennDOT's Engineering District Administrative Offices and Central Office and all waste disposal and recycling activities. It should be noted that for the 2012 reporting period (as in the 2009 reporting period), PennDOT Central Office data was not included in the figures, nor in the calculations of totals or averages for any of the variables considered during any of the aforementioned reporting periods for the following reasons:

- The number of employees at PennDOT Central Office (i.e., Commonwealth Keystone Building) is larger than that of any one of the individual District Offices, and including Central Office in the calculations of averages and totals would skew the data, making it less representative;
- Much of the waste generation, disposal, and recycling activities that occur in the Commonwealth Keystone Building involve agencies besides PennDOT, specifically the Department of Community and Economic Development (PA DCED), Historical and

Museum Commission (PHMC), and the Public Utility Commission (PA PUC). Only wastes generated by PennDOT Central Office were considered in this report.

3.1 NUMBER OF OFFICE EMPLOYEES

Data collected during the 2013 survey indicated that the PennDOT District Offices employed between **200** and **450 persons**. This results in an average of approximately **284 employees** per District and an overall total number of **3,119 employees**. These figures represent a **slight increase** of **2.1 %** in total employees from the 2011 reporting period, when District Offices reported between **238** and **430** employees, with an average of **287** people and a total of **3,055** persons. These results are summarized in Figure 1.

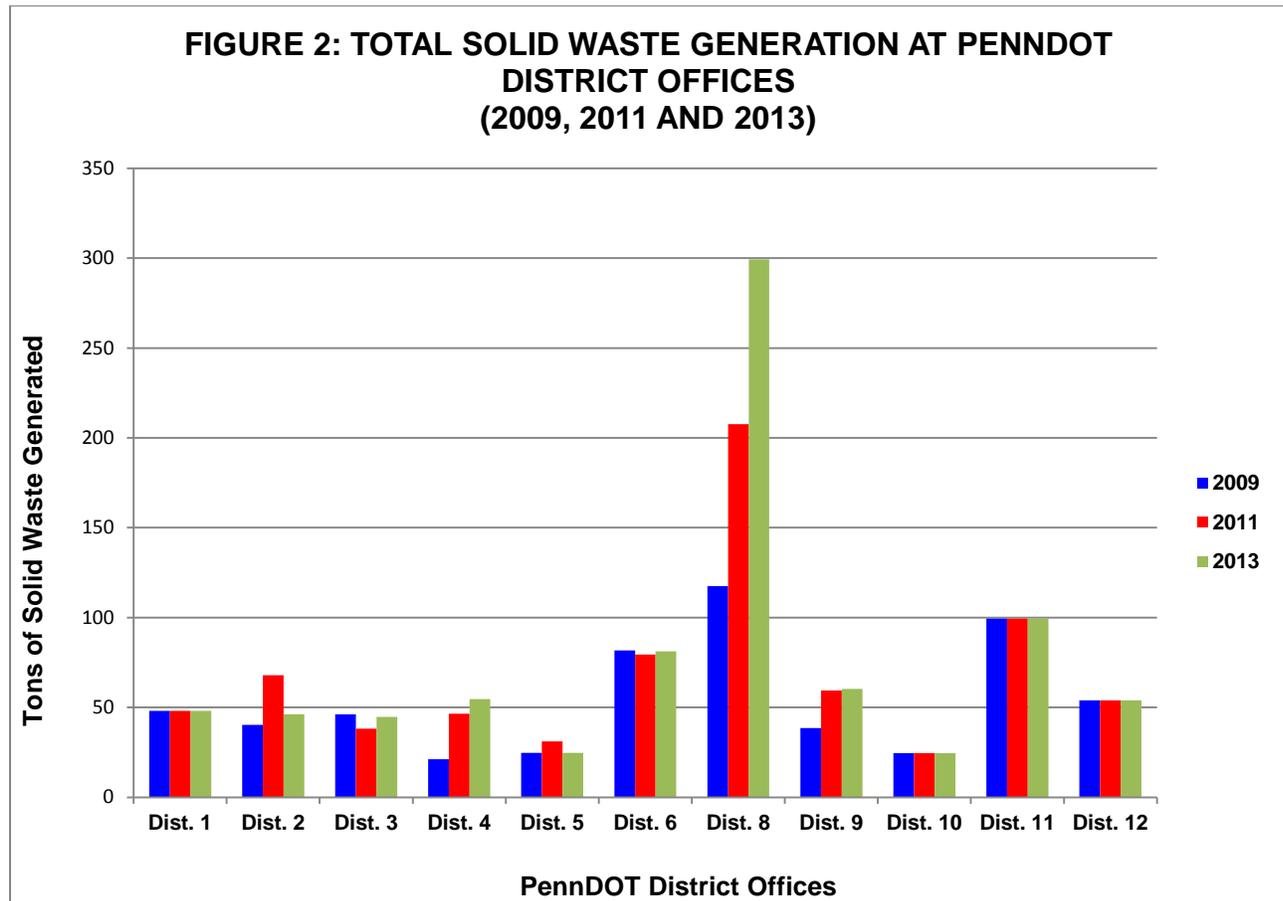


3.2 SOLID WASTE FINDINGS

3.2.1 TOTAL SOLID WASTE GENERATION (COMPARISON)

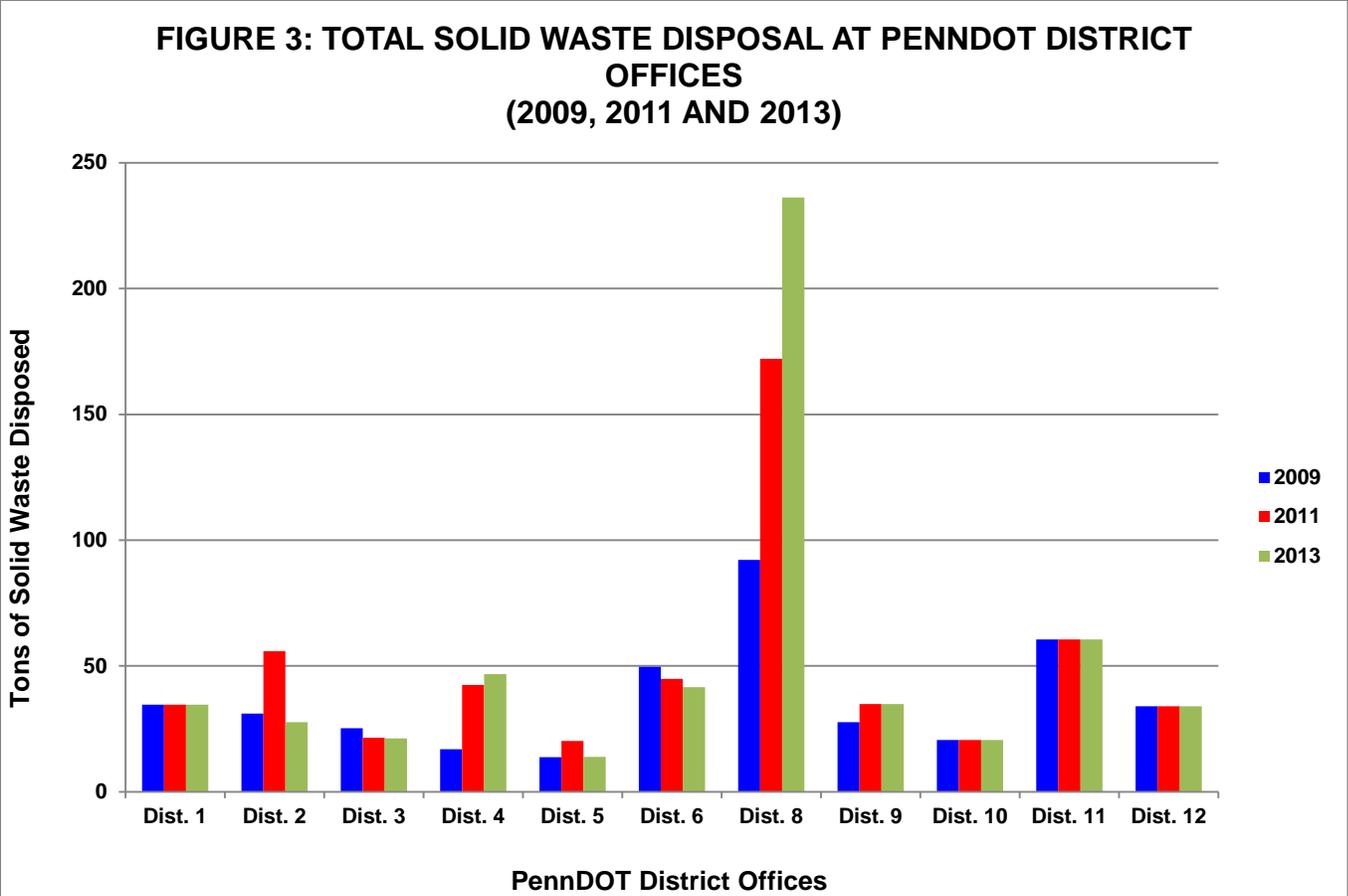
The **2013** reporting period showed an overall increasing trend in the amount of solid waste generated by PennDOT. Each District Office generated between **24.7** and **299.3 tons** of solid waste, which on average, equates to approximately **76.1 tons** per District. These figures indicate that the sum amount of solid waste generated by all District Offices equates to approximately

837.0 tons. Information derived from the 2011 reporting period indicated that each District Office generated between **24.5** and **207.6 tons** of solid waste. The average District Office generated approximately **68.8 tons** of solid waste, and the total amount of solid waste generated by District Offices was **756.4 tons**. When comparing the 2013 figures to the 2011 figures, the District Offices **increased** solid waste generation by approximately **80.6 tons**, or **10.7%**. A summary of the district solid waste generation trend is provided in Figure 2.



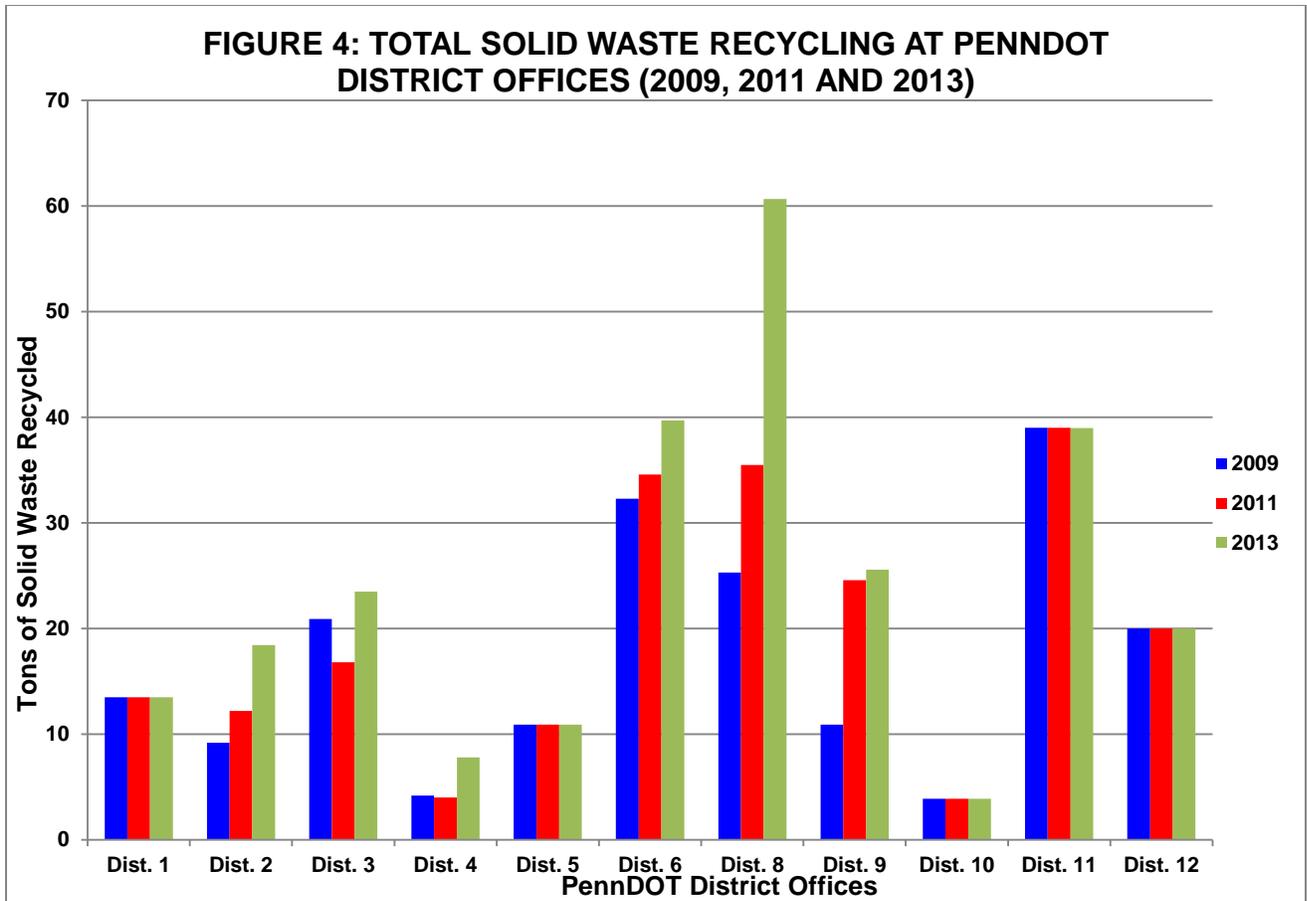
3.2.2 TOTAL SOLID WASTE DISPOSAL (COMPARISON)

The 2013 reporting period indicated that PennDOT District Offices disposed of between **21.2 tons** and **236.2 tons** of solid waste. This equates to an average of **52.0 tons** of solid waste disposed per District office, and a total of **571.5 tons** for all District Offices. During the 2011 reporting period, District Offices recorded between **20.2** and **172.1 tons** of solid waste disposed, with an average of **49.2 tons** of solid waste disposed per District Office, and, a total of **541.2 tons** for all District Offices. When comparing the 2013 statistics to those of 2011, the findings for 2013 are representative of a **statistically significant increase** in solid waste disposal (**30.1 tons**, or about **5.6%**) from the 2011 reporting period. This information is summarized in Figure 3. The significant spike in District 8 numbers is due to a more accurate representation of data in light of past submissions, furthermore, the recorded value was actually 50% of reported information because District 8-0 has shared waste stream with the county office- and District 8-0 covers all waste costs.



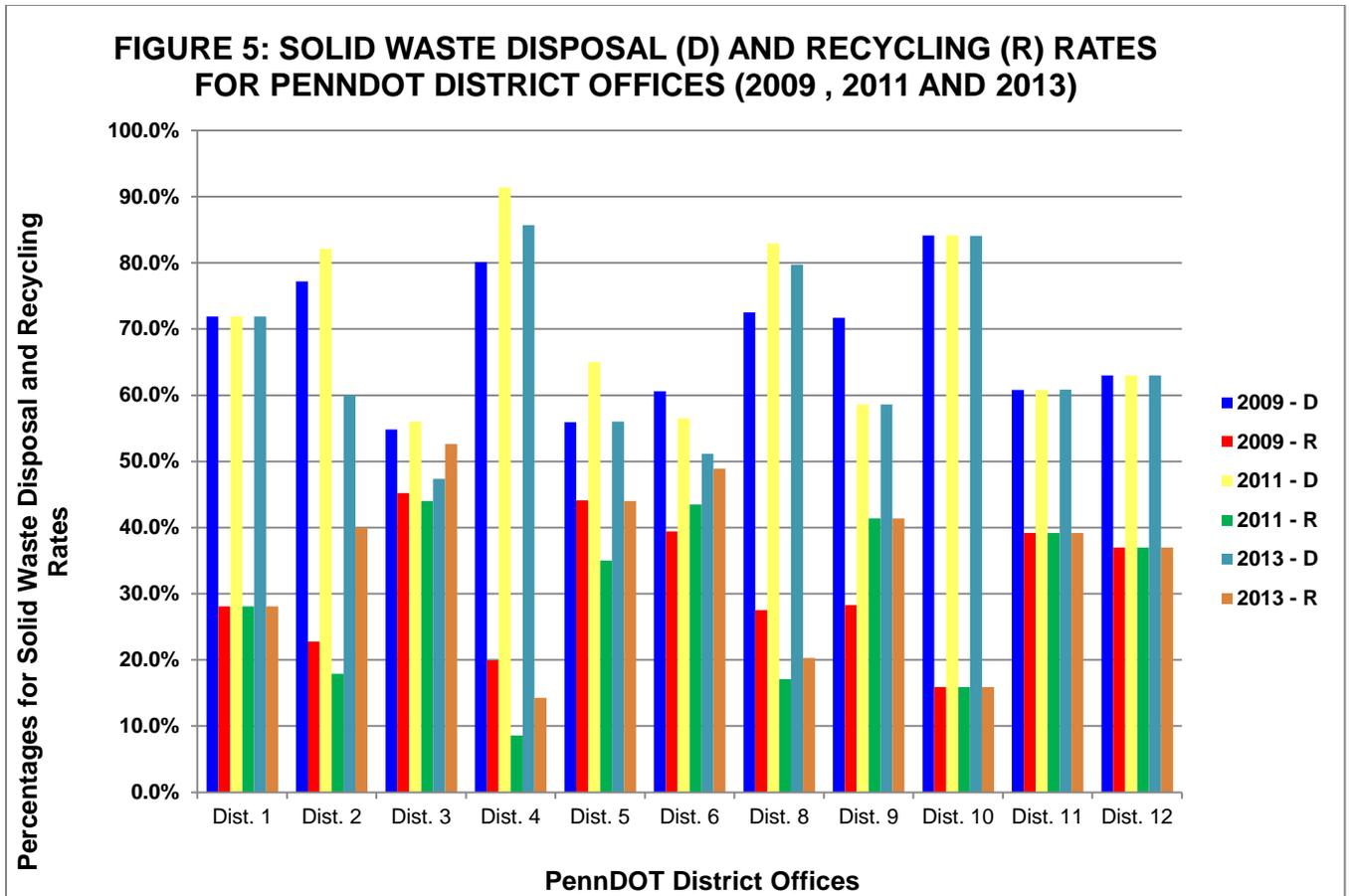
3.2.3 TOTAL SOLID WASTE RECYCLING (COMPARISON)

Data collected from the 2013 reporting period indicate that each District Office recycled between **7.8** and **60.7 tons** of solid waste. This equates to an average of approximately **23.9 tons** per District Office, and a total of **263.0 tons** for all District Offices. During the 2011 reporting period, the Districts recycled between **4** and **39 tons** of solid waste. This equates to an average of approximately **19.5 tons** per District Office and a total of **215 tons** for all District Offices. When comparing the 2013 report statistics to those of 2011, **an increase of 22.3%** in the amount of solid waste recycled was noted accounting for approximately **48.0 tons** of material. This information is summarized in Figure 4.



3.2.4 SOLID WASTE DISPOSAL RATES (COMPARISON)

During the 2013 reporting period, overall solid waste disposal rates among PennDOT District Offices ranged from **47.7%** to **85.7%**, with an average of **65.3%**. The solid waste disposal rate figures for the 2011 reporting period ranged from **56%** to **91.4%** with an average of **70.2%**. Comparing the average solid waste disposal rates for 2013 and 2011 reporting periods, the 2013 solid waste disposal rate represents a **slight decrease of 4.9 %** from the corresponding solid waste disposal rate for 2011. The solid waste disposal rate results are summarized in Figure 5.



3.2.5 SOLID WASTE RECYCLING RATES (COMPARISON)

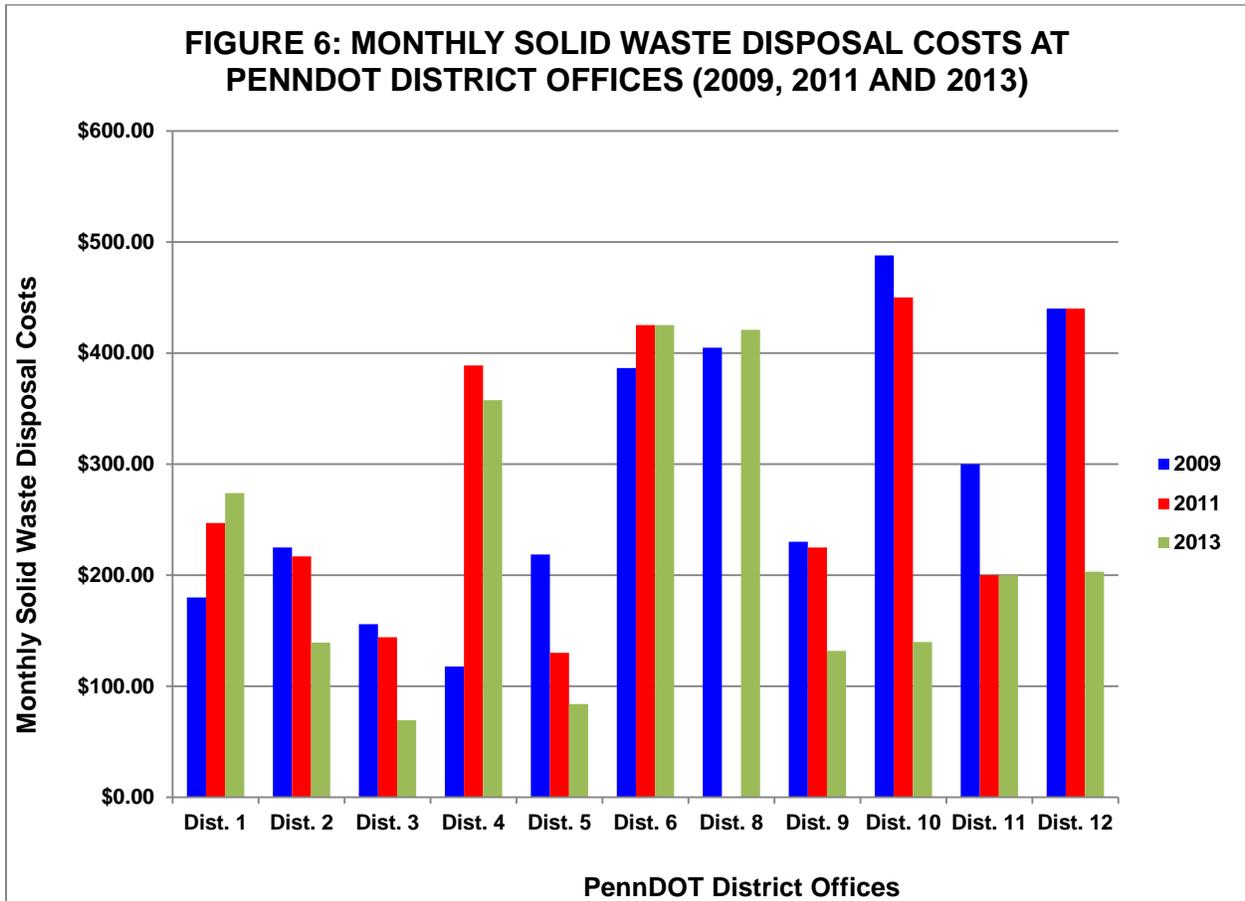
During the 2013 reporting period, the figures for PennDOT District Office’s overall solid waste recycling rates ranged from **14.3%** to **52.6%**, with an average of **34.7%**. The solid waste recycling rate figures for the 2011 reporting period ranged from **8.6%** to **44.0%**, with an average of **29.8%**. Comparing the average solid waste recycling rates for 2013 and 2011 reporting periods, the 2013 solid waste recycling rate represents an average **increase of 4.9 %** from the corresponding solid waste recycling rate for 2011. The solid waste recycling rate results are summarized in Figure 5.

3.3 MONTHLY AND ANNUAL SOLID WASTE COSTS (DISPOSAL AND RECYCLING)

Disposal (Monthly)

During the 2013 reporting period, the District Offices’ monthly solid waste disposal costs ranged from **\$69.28** to **\$425.04**, with an average cost of approximately **\$222.28** and a total cost of **\$2,445.07**. The Districts’ solid waste disposal costs for the 2009 reporting period ranged from **\$0.00** to **\$450.09**, with an average cost of approximately **\$226.08** and a total cost of **\$2,486.83**. Comparing the 2013 total results to those from 2011, the 2013 total monthly solid waste disposal

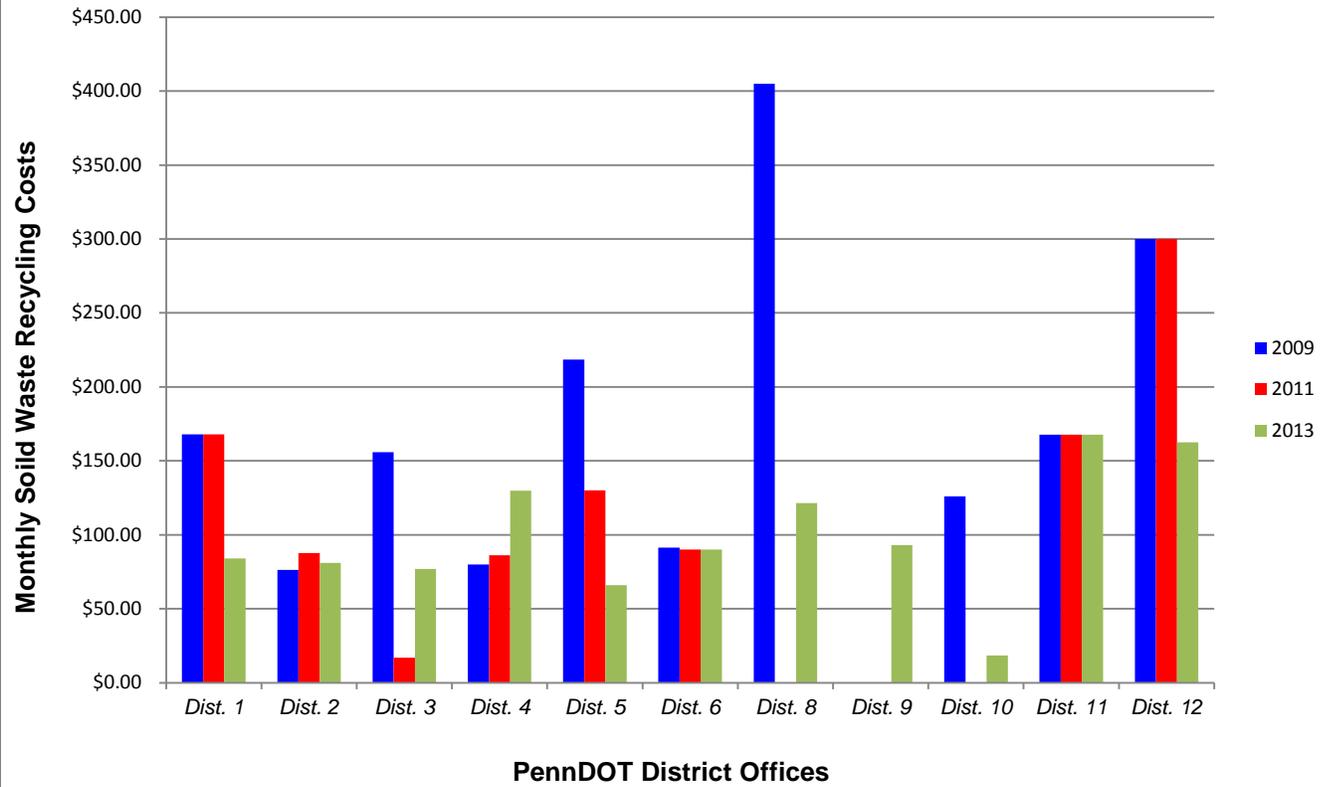
cost figures showed an **increase of about 1.7%** from the 2011 figures as shown in Figure 6 (excluding Central Office).



Recycling (Monthly)

During the 2013 reporting period, the District Offices’ monthly solid waste recycling costs ranged from **\$18.25** to **\$167.80**, with average costs of **\$99.18** and total costs of **\$1,090.98**. The Districts’ solid waste disposal costs for the 2009 reporting period ranged from **\$0.00** to **300.00**, with an average cost of approximately **\$95.16** and a total cost of **\$1,046.80**. Comparing the 2013 total cost results to those from 2011, the 2013 total monthly solid waste cost figures showed an **increase of about 4.23%** from the 2011 figures. This information is summarized in Figure 7 (excluding Central Office).

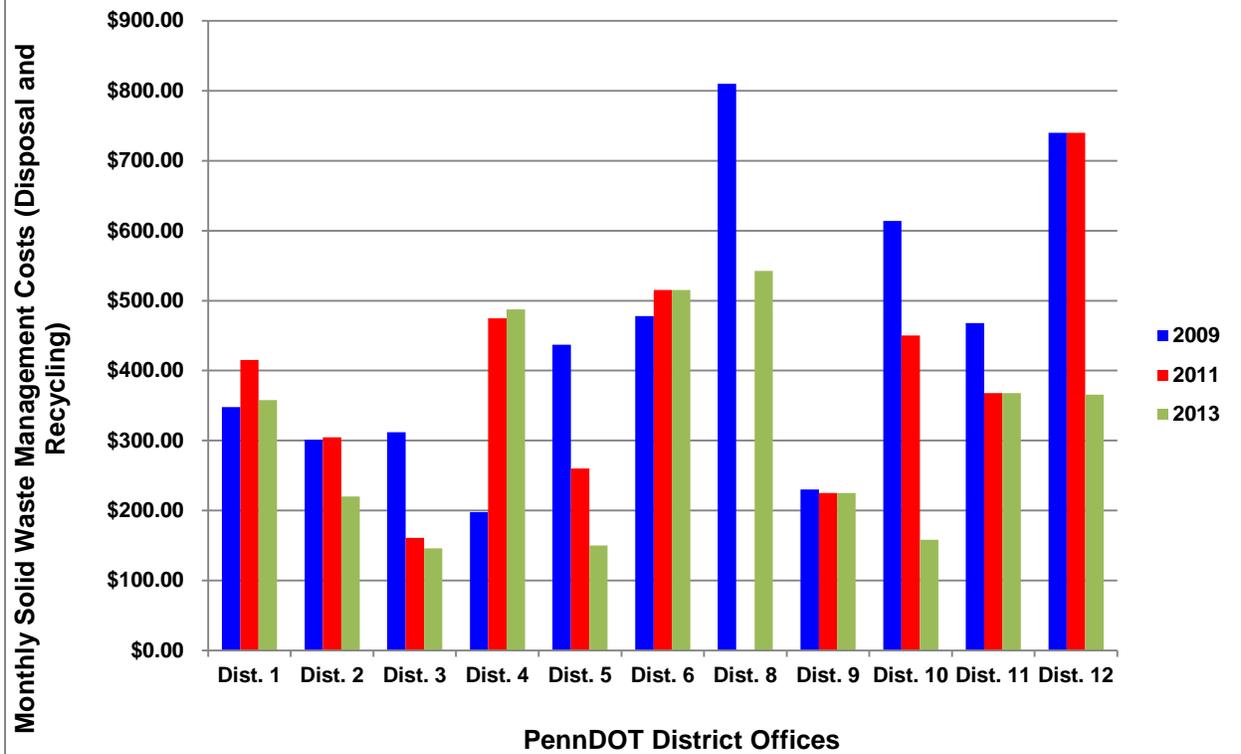
FIGURE 7: MONTHLY SOLID WASTE RECYCLING COSTS AT PENNDOT DISTRICT OFFICES (2009, 2011 AND 2013)



Total Cost (Monthly and Yearly: Disposal and Recycling)

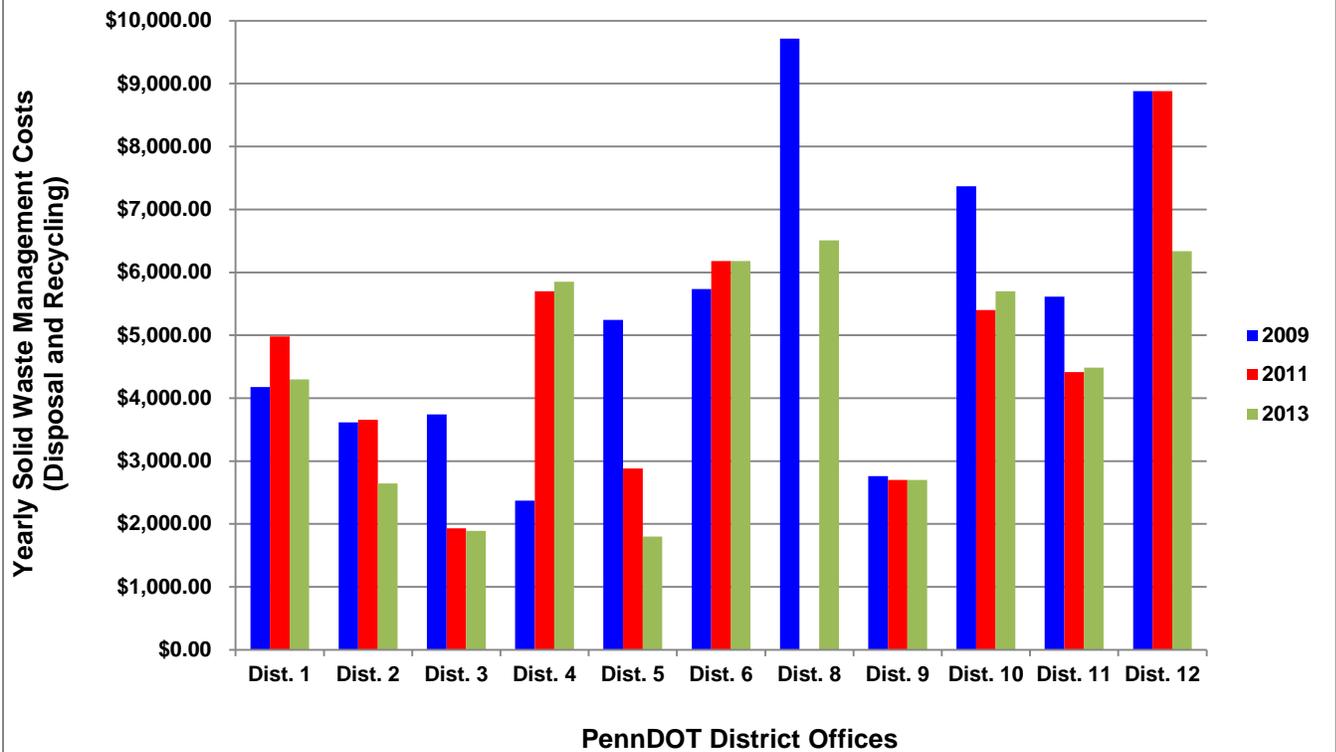
During the 2013 reporting period, the Districts’ total monthly solid waste management costs (disposal and recycling) ranged from **\$146.28** to **\$740.00**, with an average cost of **\$321.46** and a total cost of **\$3,536.05**. The total monthly costs for all solid waste management activities for the District Offices in 2011 ranged from **\$0.00** to **\$740.00**, with an average cost of **\$355.78** and a total cost of **\$3,913.53**. Comparing the total monthly solid waste management cost figures from 2013 to those of 2011, the 2013 figures showed a **decrease of approximately 9.6%**, from the 2011 figures. This information is summarized in Figure 8 (excluding Central Office).

**FIGURE 8: MONTHLY SOLID WASTE MANAGEMENT COSTS
(DISPOSAL AND RECYCLING) AT PENNDOT DISTRICT OFFICES
(2009, 2011 AND 2013)**



Lastly, during the 2013 reporting period, the total yearly solid waste management costs for the District Offices ranged from **\$1,800.00** to **\$6,508.08**, with an average cost of approximately **\$4,399.03** and a total cost of **\$48,389.33**. The total yearly solid waste management costs for the District Offices in 2011 ranged from **\$0.00** to **\$8,880.00**, with an average cost of approximately **\$4,269.31** and a total cost of **\$46,962.36**. Comparing the 2013 total yearly solid waste management costs to those of 2011, the 2013 reporting period cost figures represent an **increase of approximately 3.0%** from similar figures from 2011 reporting period. This information is summarized in Figure 9 (excluding Central Office).

**FIGURE 9: YEARLY SOLID WASTE MANAGEMENT COSTS
(DISPOSAL AND RECYCLING) FOR PENNDOT DISTRICT OFFICES
(2009, 2011 AND 2013)**



Central Office

During the 2013 and 2011 reporting periods, monthly and yearly solid waste management costs were not compiled for PennDOT Central Office for the following reasons:

- **The Pennsylvania Department of General Services (PA DGS) has a Commonwealth Recycling Center that handles recyclable materials from all Commonwealth offices. This makes it difficult to separate the individual costs of these services to building tenants, as well as to weigh the overall market value of the services to persons using the Recycling Center.**

3.4 YEARLY QUANTITIES OF INDIVIDUAL MATERIALS RECYCLED

This section details information on different media recycled by the PennDOT District Offices. **The quantities of all recyclable materials were averaged and totaled among all 11 District Offices, as applicable, regardless of whether any of the Districts reported the actual quantities of specific recyclable materials (e.g., aluminum, glass) or not (this was highly variable).** The 2013 data shows frequency of recycled materials are in the following order (highest to lowest): office paper, mixed paper, corrugated paper, commingled materials, newspapers, leaf waste, aluminum, plastics, and glass. The findings, displayed in Figure 10 (excluding Central Office statistics), are noted as follows:

3.4.1 OFFICE PAPER

During the **2013** reporting period, the recycling of office paper was reported by PennDOT Districts 3-0, 5-0, 8-0, 9-0, 10-0, 11-0, and 12-0. The data derived from this period indicated that between **4.0** and **17.28 tons** of office paper was recycled, with an average quantity of **15.8 tons** (when counted among all Districts' efforts) and a total quantity of **110.61 tons**. These figures represent an increase of approximately **34.1** (per average and total quantities) from the 2011 reporting period, when office paper recycling was reported by all of the aforementioned PennDOT Districts. The data derived from the 2011 survey indicated that between **2.6** and **34 tons** of office paper was recycled, with an average quantity of **7.9 tons**, and a total quantity of **82.5 tons**. **In terms of average and total quantities, office paper was the most frequently recycled material at the PennDOT District Offices during the 2009 reporting period, and, the most frequently recycled material at these offices during the 2012 reporting period.** It should be noted that some Districts included office paper in the "*commingled materials*" category of recyclables.

3.4.2 MIXED PAPER

Results from the 2013 reporting period indicated that mixed paper recycling was recorded in Districts 1-0, 2-0, 8-0, 9-0 and 10-0. These Districts reported that between **5.5** and **18.43 tons** of mixed paper was recycled, with an average quantity of **18.19 tons** (when counted among all Districts' efforts) and a total quantity of **90.96 tons**. These figures represent **increases** of approximately **243%** from the 2011 reporting period, when mixed paper recycling was documented in PennDOT Districts 1-0, 2-0, 9-0 and 10-0 only. During the 2011 reporting period, these Districts reported that between **1.3** and **13.5 tons** of mixed paper was recycled, with an average quantity of **2.4 tons**. It should be noted that some Districts included mixed paper in the "*commingled materials*" category of recyclables.

3.4.3 NEWSPAPER

The 2013 reporting period indicated that Districts 3-0, 5-0, 9-0 and 12-0 were recycling newspaper. These Districts recycled between **0.15** and **1.2 tons** of newspaper, with an average quantity of **0.97 ton** (when counted among all Districts' efforts) and a total quantity of **3.15 tons**. These figures represents an **increase of 103.2%** in total quantities from the 2011 reporting period, when it was indicated that the same three aforementioned Districts were actively recycling newspaper. During the 2011 period, Districts 3-0, 5-0, and 9-0 recycled between **0.15** and **1.3 tons** of newspaper, with an average quantity of **.14 tons**, and a total of **1.6 tons**. It should be noted that some Districts included newspaper in the "*commingled materials*" category of recyclables.

3.4.4 CORRUGATED PAPER

During the 2013 reporting period, Districts 3-0, 4-0, 5-0, 8-0, 9-0, 11-0, and 12-0 documented the recycling of corrugated paper. These Districts recycled between **0.8** and **44.5 tons** of corrugated paper, with an average quantity of **12.1 tons** (when counted among all Districts' efforts) and a total quantity of **84.1 tons**. These figures represent an **increase of 130.5%** in total quantities from the 2011 reporting period. The results from the 2011 reporting period indicated that between **0.8** and **15 tons** of corrugated paper was recycled in the participating District Offices, with an average quantity of **3.3 tons**, and a total quantity of **36.5 tons**. It should be noted

that some Districts included corrugated paper in the “*commingled materials*” category of recyclables.

3.4.5 ALUMINUM

During the 2013 reporting period, Districts 3-0, 5-0, 9-0 and 12-0 documented the recycling of aluminum. The quantities of aluminum recycled ranged from **0.0025 ton** to **1 ton**, with an average quantity of **0.336 ton** and a total quantity of **1.47 tons**. These figures represent a **decrease of 20.8%** total quantities from the 2011 reporting period, when Districts 2-0, 3-0, 5-0, and 12-0 documented the recycling of aluminum. During that period, these Districts recycled between **0.25** and **1 ton** of aluminum, with an average quantity of **0.18 ton** and a total quantity of **1.95 tons**. It should be noted that some Districts included aluminum in the “*commingled materials*” category of recyclables.

3.4.6 GLASS

District 5-0 continues to be the sole office that records glass as a separate recyclable. During the both the 2011 and 2013 reporting periods, this District recycled **0.55 ton** of glass, with an average quantity of **.05 ton** (when counted among all Districts’ efforts). These figures represent a **net 0%** change between the 2009 and 2012 reporting periods. All other Districts do not record individual quantities for glass recycling. It should be noted that in some cases, *glass* was mentioned as a material in the “*commingled materials*” category of recyclables; however, in both reporting periods, the amount of glass within this particular recyclable materials category could not be separated out.

3.4.7 PLASTICS

The 2013 reporting period indicated that Districts 3-0 and 5-0 recorded the amount of plastics recycled. The quantities ranged from **0.25 ton** to **0.75 ton**, with an average quantity of **0.5 ton** (when counted among all Districts’ efforts) and a total quantity of **1.0 ton**. These figures represent a **decrease of 41.2%** from the 2011 reporting period, when two Districts (3-0 and 9-0) recorded quantities of recycled plastics ranging between **0.65 ton** and **0.80 tons**, with an average quantity of **0.13 ton**, and a total quantity of **1.45 tons**. It should be noted that some Districts included plastics in the “*commingled materials*” category of recyclables.

3.4.8 COMMINGLED MATERIALS

Commingled materials refer to a combination of recyclable media including *glass, plastics, paper types* and *aluminum*. During the 2013 reporting period, Districts 8-0, 9-0, and 11-0 captured the amounts of commingled materials currently recycled. The quantities ranged from **0.5 ton** to **38.97 tons**, with an average quantity of **5.5 tons** (when counted among all Districts’ efforts) and a total quantity of **60.9 tons**. These figures represent a **decrease** of approximately **13.4%** from the 2011 reporting period, when Districts 4-0, 6-0, 8-0, and 11-0 recorded the recycling of commingled materials in quantities ranging from **0.4 ton** to **34.6 tons**, with an average quantity of **5.5 tons** and a total quantity of **60.9 tons**.

3.4.9 LEAF WASTES

The 2013 reporting period showed that Districts 3-0 and 8-0 recorded the quantities of leaf waste recycled. These quantities ranged from **0.5 ton** to **1 ton**, with an average quantity of **0.75 ton** (when counted among all Districts' efforts) and a total quantity of **1.5 tons**. These figures represent an **increase of 15.4%** from the 2011 reporting period, when Districts 2-0 and 3-0 were the only Offices that recorded leaf waste as a recyclable. The amount recorded during that reporting period ranged from **0.3 ton** to **1 ton**; the average quantity of leaf wastes recycled for all Districts was **.12 tons**, and a total quantity of **1.3 tons**.

3.4.10 OTHER WASTES

In addition to the preceding waste types, some of the District Offices continue to report the recycling of other wastes. Some examples of such wastes include *fluorescent light tubes*, *toner cartridges*, and *small appliance batteries*. During the 2013 reporting period, Districts 2-0, 3-0, and 8-0 documented the recycling of additional materials, with most of these materials accounting for **less than 1 ton** in quantity (mostly attributed to fluorescent bulbs).

3.4.11 CENTRAL OFFICE FIGURES

Central office values were not accounted for since DGS collects all waste data on the Capitol Complex buildings. Data collected by DGS does not designate individual buildings, and perhaps this could be an opportunity for change implementation in the data accounting processes.

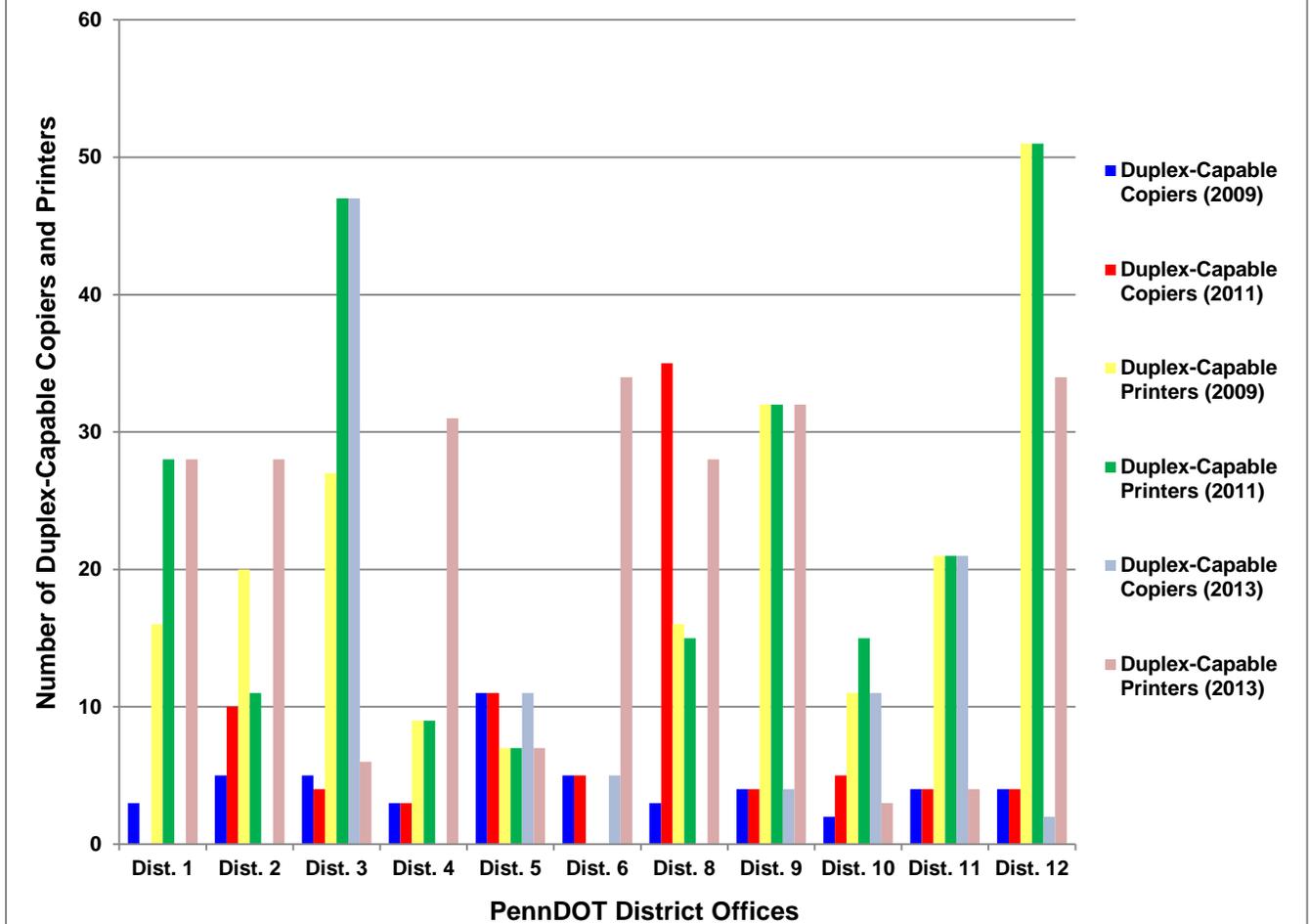
3.4.12 WASTE AND RECYCLING SYSTEMS

This variable accounts for the number of trash cans and recycling bins in each PennDOT District and Central Office location, and, how frequently these receptacles were emptied and/or picked up.

For the 2013 reporting period, the Districts' counts for trash cans ranged between **11** and **400**, with an average of **242.3** and a total of **2,665**; for recycling bins, the 2013 figures ranged from **8** to **350**, with an average **126.5** and a total of **1,391**. The 2013 figures represent an **increase** of approximately **0.4%** for **trash cans** and, an **increase** of approximately **1.7%** for **recycling bins**, when compared to the 2011 figures, when counts for **trash cans** ranged between **11** and **400**, with an average of **214.4**, and a total of **2,655**, and, when the counts for **recycling bins** the counts ranged between **6** and **350**, with an average of **124.4** and a total of **1,368**.

In 2013, the frequency at which all **trash cans** and recycling bins at the District Offices averaged **5 times per week**. The 2012 trash can pick-up total was 50, while the recycling bin pick-up total was **45**. In the 2011 reporting period, both trash cans and recycling bin pick-ups averaged **5 times per week**; this totaled **55 pickups per week** for all Districts. The results for the District Offices are provided in Figure 11.

FIGURE 12: NUMBER OF DUPLEX-CAPABLE COPIERS AND PRINTERS AT PENNDOT DISTRICT OFFICES (2009, 2011 AND 2013)



PennDOT Central Office’s portion of the Keystone Building (5th through 9th floors) has its trash and recyclables picked up each week by PA DGS personnel. A total of **1,964 individual trash cans** and **recycling bins** were recorded. This figure takes into account each employee’s work station. All containers are emptied **daily (5 times per week)**, by PA DGS personnel. Data derived from Central Office are not included in Figure 11.

3.4.13 OFFICE EQUIPMENT AND PROGRAMS

In 2013, the number of duplex-capable copiers at the District Offices ranged between **0** and **47**, with an average of **9.18** and a total of **101**. These figures represent an **increase** of approximately **18.8%** from the 2011 reporting period, when the number of **duplex-capable copiers** at the District Offices ranged between **0** and **35**, with an average of **7.73** and a total of **85**. In 2013, the number of **duplex-capable printers** ranged between **0** and **34**, with an average of **21.36** and a total of **235**. These figures represent a **decrease** of approximately **0.42%** from the 2011 reporting period, when the number of **duplex-capable printers** ranged between **0** and **47**, with

an average of **21.45**, and a total of **236**. The results for the District Offices are displayed in Figure 12.

Additionally, Districts 3-0, 5-0, 6-0, 9-0, and 10-0 were found to have small appliance battery recycling available, while all Districts (except 8-0) were found to have toner cartridge recycling available.

The PennDOT Central Office portion of the Keystone Building (5th through 9th floors) indicates that all printers also function as **copiers**, and are **duplex-capable**, and the default setting is duplex black and white printing.

4.0 CONCLUSIONS/RECOMMENDATIONS

The purpose of this waste audit report summary is to serve as a means of measuring the progress of PennDOT Districts and Central Office solid waste management activities, as compared to the previous years' activities. The overall results of this waste audit effort will enable each of the District Offices to continue the following: *1) reviewing its individual solid waste generation, disposal, and recycling effort; 2) improving current disposal and recycling practices; and 3) implementing better collection systems to further increase future recycling rates.*

This is the first year PennDOT has rated the districts' performance based on: data reliability, improvement in cost savings, waste disposal or recycling rates, and cooperation of district personnel in data management and tracking of recycling efforts. The districts rating from the best to worst performance is as follows: District 2-0 and 5-0 tied for First place, Districts 3-0 (second), District 4-0 (third), District 6-0 (fourth), District 12-0 (fifth), and the following districts tied in the final (sixth) position: Districts 8-0, D 9-0, D 10-0, D 11-0, and D 12-0. Details on each district's metric are included in the attachment. Overall, PennDOT continues to perform well with its office-based recycling program. Solid waste generation, disposal, and recycling amounts have increased over the three reporting periods. Additionally, during the 2013 reporting period, annual solid waste management costs (disposal and recycling) have increased moderately from the 2011 reporting period, and ***office paper, mixed paper, corrugated paper, commingled materials, newspapers*** were the five most-frequently recycled materials at PennDOT offices. Some recommendations to consider for future waste audits are listed below:

- Continuously sharing the results of subsequent waste audits with PA DEP, to highlight PennDOT' s progress as one of the leading Commonwealth agencies in solid waste management reporting and practice improvements.
- Discussing with DGS on how to better track waste collection and data management for the keystone building (Central office).
- Including additional PennDOT Offices (e.g., the Riverfront Office Center (ROC), County Offices) in future waste audits, as feasible- this effort will be addressed with the current tracking agency, DGS.
- Working with PA DGS to expand that agency's ability to collect recyclable materials from State agency offices outside of the Harrisburg area and surrounding vicinities.

- Working with PA DGS to locate additional markets and, provide greater amounts of existing and potential materials for recycling, based upon: *1) solid waste collection schedules and service availability; 2) solid waste materials collected; 3) sizes of the recyclables containers; and 4) recycled materials content.*
- Emphasizing the recyclable material waste streams that have the highest potential for achieving higher recycling rates.
- Other variables: *1) recycling costs per person (District and overall); 2) individual material capture rates and strategies; 3) expanding upon the inclusion of non-traditional materials (e.g., tires, scrap metal, motor oil); 4) cost-benefit measurements (i.e., comparing the costs of recycling materials to those of disposal, in order to determine the savings over the longer term – also, evaluating the reasons behind any future cost decreases or increases); and 5) “**showcasing**” of any District that has consistently maintained a relatively high rate of recycling, in terms of quantities and materials recycled, and costs.* The strategies employed by any one specific District could be shared with other Districts.

ACKNOWLEDGEMENTS:

The following PennDOT District personnel and consultant personnel are mentioned here in appreciation for their assistance in performing the initial and subsequent waste audits for Central Office and each respective District:

- **Data Compilation and Coordination with Central Office (Commonwealth Keystone Building) and District Offices:** Winnie A. Okello, E.I.T (S.R.P Manager).
- **District 1-0:** Bree McDonald-Stewart (2011 and 2013)
- **District 2-0:** Sandra Snyder (2011 and 2013)
- **District 3-0:** Fred Stackhouse (2011 and 2013)
- **District 4-0:** Jeanne Peffer (2011), Christine Elder (2013)
- **District 5-0:** Mike McKinnon (2011 and 2013)
- **District 6-0:** James Fogel (2011 and 2013)
- **District 8-0:** Kirit Pandya (2011) and Mike Miller (2013)
- **District 9-0:** Todd Homan (2011 and 2013)
- **District 10-0:** Rebecca M. Etling (2011 and 2013)
- **District 11-0:** James Keys (2011 and 2013)
- **District 12-0:** Cristen Covert (2011, 2013) and Steve Marsinko (2013)

Appendix A

Tables

TABLE 1: NUMBER OF EMPLOYEES AT PENNDOT DISTRICT OFFICES (2011 AND 2013)¹

<i>PennDOT District Offices</i>	<i>Number of Employees (2011)</i>	<i>Number of Employees (2013)</i>
District 1-0	241	241
District 2-0	261	261
District 3-0	270	270
District 4-0	254	200
District 5-0	245	245
District 6-0	350	350
District 8-0	430	450
District 9-0	278	276
District 10-0	238	238
District 11-0	350	350
District 12-0	238	238
<i>Averages (District)</i>	277.7	283.5
<i>Totals (District)</i>	3,055	3,119

TABLE 2: TOTAL SOLID WASTE GENERATION, DISPOSAL, AND RECYCLING AT PENNDOT DISTRICT OFFICES (2011 AND 2013)²

<i>PennDOT District Offices</i>	<i>Total Solid Waste Generation, 2011 (Tons)</i>	<i>Total Solid Waste Generation, 2013 (Tons)</i>	<i>Total Solid Waste Disposal, 2011 (Tons)</i>	<i>Total Solid Waste Disposal, 2013 (Tons)</i>	<i>Total Solid Waste Recycling, 2011 (Tons)</i>	<i>Total Solid Waste Recycling, 2013 (Tons)</i>
District 1-0	48.1	48.06	34.6	34.56	13.5	13.5
District 2-0	68.0	46.07	55.8	27.648	9.2	18.43
District 3-0	38.2	44.67	21.4	21.16	20.9	23.51
District 4-0	46.5	54.6	42.5	46.8	4.2	7.8
District 5-0	31.1	24.718	20.2	13.824	10.9	10.89
District 6-0	79.5	81.22	44.9	41.52	32.3	39.7
District 8-0	207.6	299.305	172.1	236.16	25.3	60.69
District 9-0	59.4	60.38	34.8	34.8	10.9	25.58
District 10-0	24.5	24.492	20.6	20.592	3.9	3.9
District 11-0	99.5	99.45	60.5	60.48	39.0	38.97
District 12-0	54.0	54	34.0	34	20.0	20
<i>Averages (District)</i>	68.8	70.1	49.2	52.0	17.3	23.9
<i>Totals (District)</i>	756.4	837.0	541.4	571.4	190.1	263.0

¹ Data for PennDOT Central Office were not included in the table above (or any subsequent table), nor included the calculation of the average and total figures for employees (or other subsequent entities) at PennDOT Offices, for the reasons stated in the report.

² Refer to Footnote #1 (applicable to solid waste generation, disposal and recycling figures (individual, averages, and totals): no PennDOT Central Office data were included in the calculations.

TABLE 3: MONTHLY AND YEARLY SOLID WASTE MANAGEMENT COSTS (RECYCLING AND DISPOSAL) AT PENNDOT DISTRICT OFFICES (2011 AND 2013)³

<i>PennDOT District Offices</i>	<i>Monthly Solid Waste Disposal Costs (2011)</i>	<i>Monthly Solid Waste Disposal Costs (2013)</i>	<i>Monthly Solid Waste Recycling Costs (2011)</i>	<i>Monthly Solid Waste Recycling Costs (2013)</i>	<i>Total Monthly Solid Waste Management Costs (2011)</i>	<i>Total Monthly Solid Waste Management Costs (2013)</i>	<i>Total Yearly Solid Waste Management Costs (2011)</i>	<i>Total Yearly Solid Waste Management Costs (2013)</i>
District 1-0	\$247.00	\$274.00	\$168.00	\$84.00	\$415.00	\$358.00	\$4,980.00	\$4,296.00
District 2-0	\$217.00	\$139.38	\$87.67	\$80.92	\$304.67	\$220.30	\$3,656.04	\$2,643.60
District 3-0	\$144.00	\$69.28	\$17.00	\$76.97	\$161.00	\$146.25	\$1,932.00	\$1,889.00
District 4-0	\$388.70	\$357.50	\$86.23	\$129.90	\$474.93	\$487.40	\$5,699.16	\$5,848.80
District 5-0	\$130.00	\$84.00	\$130.00	\$66.00	\$260.00	\$150.00	\$3,120.00	\$1,800.00
District 6-0	\$425.04	\$425.04	\$90.00	\$90.00	\$515.04	\$515.04	\$6,180.48	\$6,180.48
District 8-0 ⁴	\$0.00	\$420.96	\$0.00	\$121.38	\$0.00	\$542.34	\$0.00	\$6,508.08
District 9-0 ⁵	\$225.00	\$131.85	\$0.00	\$93.15	\$225.00	\$225.00	\$2,700.00	\$2,700.00
District 10-0	\$450.09	\$139.99	\$0.00	\$18.35	\$450.09	\$158.34	\$5,401.08	\$5,700.24
District 11-0	\$200.00	\$200.00	\$167.80	\$167.80	\$367.80	\$367.80	\$4,413.60	\$4,486.17
District 12-0	\$440.00	\$203.08	\$300.00	\$162.50	\$740.00	\$365.58	\$8,880.00	\$6,336.96
<i>Averages (District)</i>	\$226.08	\$222.28	\$95.15	\$99.18	\$355.78	\$321.46	\$4,269.31	\$4,399.03
<i>Totals (District)</i>	\$2,486.83	\$2,445.07	\$1,046.70	\$1,090.98	\$3,913.53	\$3,536.05	\$46,962.36	\$48,389.33

³ Refer to Footnote #1 (applicable to monthly and yearly solid waste management disposal and recycling costs, along with total yearly solid waste management costs (individual, averages, and totals): no PennDOT Central Office data were included in the calculations.

⁴ The 2011 District 8-0 monthly and yearly solid waste disposal and recycling costs are at zero because all materials are now picked up by PA DGS.

⁵ District 9-0 has its recycling costs included as part of its disposal costs.

TABLE 4: SOLID WASTE DISPOSAL AND RECYCLING RATES FOR PENNDOT DISTRICT OFFICES (2011 AND 2013)⁶

TABLE 5: YEARLY QUANTITIES (IN TONS) FOR INDIVIDUAL MATERIALS RECYCLED AT PENNDOT DISTRICT OFFICES (2011 AND 2013) ¹											
PennDOT District Offices	Office	Mixed Paper	Newspaper	Cardboard	Aluminum	Glass	Plastics	Commingled Materials	Lead	Other	
		Disposal Rate, 2011	Disposal Rate, 2013	Disposal Rate, 2011	Disposal Rate, 2013	Disposal Rate, 2011	Disposal Rate, 2013	Disposal Rate, 2011	Disposal Rate, 2013	Disposal Rate, 2013	
	District 1-0 (2011)	13.5			56.0%	71.9%		44.0%	28.1%		
	District 2-0 (2011)				82.1%	60.0%		17.9%	40.0%		
	District 3-0 (2011)				56.0%	47.4%		44.0%	52.6%		
	District 4-0 (2011)				91.4%	85.7%		8.6%	14.3%		
	District 5-0 (2011)				65.0%	56.0%		35.0%	44.0%		
	District 6-0 (2011)				56.5%	51.1%	0.25	43.5%	0.3	48.9% light tubes	
	District 8-0 (2011)				82.9%	79.7%		17.1%	20.2%		
	District 9-0 (2011)				58.6%	58.6%		41.4%	41.4%	< 1: batteries	
	District 10-0 (2011)				84.1%	84.1%		15.9%	15.9%		
	District 11-0 (2011)				60.8%	60.8%		39.2%	39.2%	light tubes	
	District 12-0 (2011)				63.0%	63.0%		37.0%	37.0%	< 1: magazines	
	Average PennDOT Office Solid Waste Disposal and Recycling Rates (District)	13.8	1.0	0.8	70.2%	65.3%	0.65	29.8%	1.0	34.7% < 1: light tubes	
	District 3-0 (2013)	18.91	1.2	3.4	0.0025	0.75					
	District 4-0 (2011)			2.7				1.3			
	District 4-0 (2013)			7.8							
	District 5-0 (2011)	8.7	0.15	1.1	0.6	0.55					
	District 5-0 (2013)	8.74	0.15	1.15	0.06	0.55	0.25				
	District 6-0 (2011)							34.6			
	District 6-0 (2013)										
	District 8-0 (2011)	34.0						0.4		1 (cardboard); < 1 (toner cartridges)	
	District 8-0 (2013)	35.0	18.43	44.5				0.5	0.5	< 1: light tubes	
	District 9-0 (2011)	17.3	5.5	0.4	0.4		0.8				
	District 9-0 (2013)	17.28	5.5	0.8	0.8	0.4		0.8			
	District 10-0 (2011)	2.6	1.3								
	District 10-0 (2013)	25.8	35.1								
	District 11-0 (2011)	2.9		11.5				24.6			
	District 11-0 (2013)	2.88		11.5				38.97			
	District 12-0 (2011)	4.0		15.0	1.0						
	District 12-0 (2013)	4.0		15.0	1.0						
	Material Averages (2011 and 2013)	7.9 (2011); 15.8 (2013)	1.2 (2011); 18.2 (2013)	0.14 (2011); 0.79 (2013)	3.3 (2011); 12.0 (2013)	0.18 (2011); 0.37 (2013)	0.05 (2011); 0.55 (2013)	0.13 (2011); 0.5 (2013)	5.5 (2011); 13.4 (2013)	0.12 (2011); 0.75 (2013)	Not Applicable (waste types vary)

⁶ Refer to Footnote #1 (applicable to solid waste disposal and recycling rates – individual, averages, and totals): no PennDOT Central Office data were included in the calculations.

<i>2013)</i>										
<i>Material Totals (2011 and 2013)</i>	<i>87.3 (2011); 110.6 (2013)</i>	<i>13.0 (2011); 91.0 (2013)</i>	<i>1.6 (2011); 3.1 (2013)</i>	<i>36.5 (2011); 84.1 (2013)</i>	<i>1.95 (2011); 1.5 (2013)</i>	<i>1.95 (2011) 0.5 (2013)</i>	<i>1.45 (2011); 1.0 (2013)</i>	<i>60.9 (2011); 40.3 (2013)</i>	<i>1.3 (2011); 1.5 (2013)</i>	<i>Not Applicable (waste types vary)</i>

TABLE 6: TRASH CANS AND RECYCLING BINS AND FREQUENCY OF PICK-UP AT PENNDOT DISTRICT OFFICES (2011 AND 2013)⁷

<u>PennDOT District Offices</u>	<u>Number of Trash Cans (2011)</u>	<u>Number of Trash Cans (2013)</u>	<u>Number of Recycling Bins (2011)</u>	<u>Number of Recycling Bins (2013)</u>	<u>Frequency of Pick-Up (Cans: 2009)</u>	<u>Frequency of Pick-Up (Cans: 2012)</u>	<u>Frequency of Pick-Up (Bins: 2009)</u>	<u>Frequency of Pick-Up (Bins: 2012)</u>
District 1-0	300	300	15	15	5	5	5	5
District 2-0	204	200	90	80	5	5	5	5
District 3-0	255	255	135	135	5	5	5	5
District 4-0	206	206	37	37	5	3	5	1
District 5-0	223	223	229	229	5	5	5	5
District 6-0	370	370	350	350	5	5	5	5
District 8-0 ⁸	280	292	280	286	5	5	5	5
District 9-0	11	11	8	8	5	2	5	2
District 10-0	148	150	23	50	5	5	5	5
District 11-0	400	400	175	175	5	5	5	5
District 12-0	258	258	26	26	5	5	5	2
<i>Averages (District)</i>	<i>241.4</i>	<i>242.7</i>	<i>124.4</i>	<i>126.5</i>	<i>4.5</i>	<i>4.5</i>	<i>4.2</i>	<i>4.0</i>
<i>Totals (District)</i>	<i>2,655</i>	<i>2,665</i>	<i>1,368</i>	<i>1,391</i>	<i>55</i>	<i>50</i>	<i>55</i>	<i>46</i>

TABLE 7: DUPLEX CAPABLE COPIERS AND PRINTERS AT PENNDOT DISTRICT OFFICES (2011 AND 2013)⁹

<u>PennDOT District Offices</u>	<u>Duplex-Capable Copiers (2011)</u>	<u>Duplex-Capable Copiers (2013)</u>	<u>Duplex-Capable Printers (2011)</u>	<u>Duplex-Capable Printers (2013)</u>
District 1-0	0	0	28	28
District 2-0	10	0	11	28
District 3-0	4	47	47	6
District 4-0	3	0	0	31
District 5-0	11	11	7	7

⁷ Refer to Footnote #1 (applicable to the number of trash cans and recycling bins and, their pick-up frequencies, including average and totals): no PennDOT Central Office data were included in the calculations.

⁸ In District 8-0, trash and recycling matters are handled by the PA DGS.

⁹ Refer to Footnote #1 (applicable to the number of duplex-capable copiers and printers, including averages and totals): no PennDOT Central Office data were included in the calculations.

District 6-0	5	5	0	34
District 8-0	15	0	35	28
District 9-0	32	4	4	32
District 10-0	5	11	15	3
District 11-0	4	21	21	4
District 12-0	4	2	51	34
<i>Averages (District)</i>	8.5	9.2	21.5	21.4
<i>Totals (District)</i>	93	101	236	235

TABLE 8: TONER CARTRIDGE AND SMALL APPLIANCE BATTERY RECYCLING AVAILABILITY AT PENNDOT DISTRICT OFFICES (2013)¹⁰

<u>PennDOT District Offices</u>	<u>Toner Cartridge Recycling</u>	<u>Small Appliance Battery Recycling</u>
District 1-0	Yes	No
District 2-0	Yes	Yes
District 3-0	Yes	Yes
District 4-0	Yes	No
District 5-0	Yes	No
District 6-0	Yes	Yes
District 8-0	No	No
District 9-0	Yes	Yes
District 10-0	Yes	Yes
District 11-0	Yes	No
District 12-0	Yes	No

TABLE 9: DISTRICT PERFORMANCE EVALUATION METRICS

District	recycling rate	cost savings	relevant data	district cooperation	Statistical evaluation of top performers ¹¹	Total	comments
D 1-0	3	5	1	3		12	recycling costs decreased disposal costs stagnated tonnage remained the same
D 2-0	5	5	3	5	7	25	beneficial information provided, reliable data and cooperative district personnel
D 3-0	5	5	3	5	4	22	beneficial information provided, reliable data and cooperative district personnel

¹⁰ Refer to Footnote #1 (applicable to cartridge and battery recycling availability): no PennDOT Central Office data were included in the listing.

¹¹ Data based on closer evaluation of associated waste management cost savings, and waste disposal and recycling rates.

D 4-0	5	5	3	5	2	20	increased recycling costs decreased disposal costs beneficial information provided
D 5-0	5	5	3	5	7	25	increased recycling costs decreased disposal costs beneficial information provided
D 6-0	5	5	1	3		14	cost data does not make sense, how could activity rates change without corresponding price difference?
D 8-0	5	3	2	0		10	cost savings unknown in 2011. district was very opposed to completing form
D 9-0	3	3	1	3		10	data was exactly the same from previous years- need more reliable data!
D 10-0	3	3	1	3		10	data was exactly the same from previous years- need more reliable data!
D 11-0	3	3	1	3		10	data was exactly the same from previous years- need more reliable data!
D 12-0	3	3	1	3		10	data was exactly the same from previous years- need more reliable data!