

Village of Croton-on-Hudson

1 Van Wyck Street
Croton-on-Hudson, NY 10520

FINAL

Refuse Collection Route Study

August 2011

4695-004

Report Prepared By

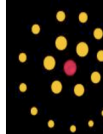
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Executive Summary

Red Oak Consulting, a division of Malcolm Pirnie, Inc., (Malcolm Pirnie) has prepared this Refuse Collection Route Study on behalf of the Village of Croton-on-Hudson (Village) to assist the Village in evaluating the efficiency and effectiveness of the current solid waste collection program and the feasibility of creating collection routes for residential and commercial / institutional customers separately.

Malcolm Pirnie evaluated the Village's Department of Public Works (DPW) to determine if the following could be accomplished:

- The feasibility of changing the collection routes for more efficient collection of residential and commercial / institutional customers,
- The establishment of a separate route for the commercial / institutional customers, for the purposes of creating a fee based service,
- The feasibility of changing equipment and/or methodology of collection for the purposes of improving efficiency and reducing labor costs, and
- The staffing needs for any changes in routes or collection equipment.

Based on Malcolm Pirnie's analysis, the Village should review and/or update its regulations and policies relating to sanitation. The Village should also revise their regulations regarding commercial customers, specifically the quantity of waste per pickup.

Based on Malcolm Pirnie's analyses, it was further determined that the Village currently operates an efficient and optimal collection of solid waste. The Village currently collects from residential and commercial / institutional customers once per week with front-yard pickup.¹ Therefore, the Village would find it difficult to further decrease the number of routes.

Based on our analyses of the tonnage collected during the Route Study, it was determined that the Village has the ability to create a separate route for commercial customers. Due to the optimum manner in which the Village collects its waste, it did not make sense to create a separate commercial route. However, it was also determined that a fee based system could be implemented for commercial / institutional customers the way it currently operates.

¹ Certain residential and commercial / institutional customers are assessed a fee if they require a second collection of MSW, rubbish, and bulky waste.

Based on our analyses, the Village should revise its dumpster inventory. Currently the Village has multiple lists of the commercial / institutional customers with dumpsters. Since the business name was different than the collection location name on the list, the updated list should include the business name and address, and the collection location name and address. The Village should require all dumpsters collected by the Village to include a number, asset tag, or bar code system. This system would allow the Village to track the dumpsters, so that it would be easier to make sure the dumpsters are maintained or even replaced, as necessary.

The Village should develop a system where the commercial establishments are reviewed on an annual basis to update any changes in operations or businesses. The information provided to the Village, such as the corporate name and address (or Doing-Business-As information), should match the building address and name.

Some additional recommendations include, but are not limited to: reviewing safety procedures and instituting a system where resident's complaints are logged and tracked. Section 4.2 provides further information regarding these additional and other recommendations.

1. Introduction

1.1 Background and Purpose of Report

The Village of Croton-on-Hudson (Village) Department of Public Works (DPW) is responsible for the collection and disposal or recycling of municipal solid waste (MSW) from residential and commercial / institutional customers located within the boundaries of the Village. The DPW currently provides once per week MSW, rubbish, and bulky waste collection at the curb; once per week recycling collection of commingled recyclables (e.g. glass, plastic, metal containers, etc.); and, once per week paper and cardboard recycling collection.

The DPW separates the Village into two areas: the northern part and the southern part. The DPW provides twice per month organic waste collection between April and October on the first and third Wednesday (northern part only) and the second and fourth Wednesday (southern part only) of these months. Bulky waste (e.g. furniture, toys, mattresses, etc.) are collected during regular MSW pickup, and no special collection is required. Bulk metal and E-waste are collected once per week (except holiday weeks) by appointment. Residential and commercial / institutional customers may also receive a second collection of MSW, rubbish, and bulky waste at a cost of \$100 per dumpster per month. However, some residential and institutional customers receive this benefit, of a second collection, at no additional cost.

Collected MSW, rubbish, and bulky waste are transported to the Westchester County Resco Facility (Resco Facility), a waste-to-energy facility at Charles Point in Peekskill, NY. Collected recyclables are transported to the Northern Tier (Recycling) Transfer Station located in the Town of Cortlandt, NY. Organic waste is transported to the Village transfer facility located at Municipal Place where it is stored until a sufficient bulk quantity is accumulated for removal through the Westchester County organic waste disposal program. Bulk metal is transported to the Brookfield Metal Facility in Elmsford, NY by DPW personnel. E-waste is transported by the DPW refuse collection vehicles to the DPW garage for placement into the E-waste container provided through the Westchester County E-waste program.

The Village selected Red Oak Consulting, a division of Malcolm Pirnie, Inc., (Malcolm Pirnie) to conduct an evaluation of the DPW's collection operations. Specifically, Malcolm Pirnie evaluated the following:

- The feasibility of changing the collection routes for more efficient collection of residential and commercial / institutional customers.

- The establishment of a separate solid waste and recyclables collection route for the commercial / institutional customers, for the purposes of creating a fee based service.
- The feasibility of changing equipment and/or methodology of collection for the purposes of improving efficiency and reducing labor costs.
- The staffing needs for any changes in routes or collection equipment.

1.2 Evaluation Approach

This evaluation builds upon information compiled and supplied by the Village that will be used to evaluate options and provide recommendations to the Village regarding the separation of the commercial / institutional and residential routes. The evaluation approach includes:

- Review and evaluate available data and existing collection operations.
- Conduct field observations of existing routes and operations.
- Conduct a financial assessment of current solid waste collection services.
- Develop collection performance metrics.
- Evaluate solid waste collection routes and alternatives including:
 - Analyze the feasibility of establishing an exclusive route for commercial / institutional customers for the collection of solid waste and recyclables.
 - Analyze the feasibility of consolidating the remaining residential collection routes.

The subsequent sections of this report present an overview of the existing collection programs, our findings, and the resulting recommendations.

2. Overview of Existing Collection Program

2.1 Current and Historical Waste Generation and Disposal Quantities

In an effort to evaluate the Village's current collection operations and provide recommendations for possible modification of operations, it is necessary to obtain an understanding of the type and quantity of waste managed by the Village. This section provides a brief description of the types of waste currently managed by the Village and a summary of historical waste quantities.

The DPW provides solid waste collection services to essentially all of its residents, commercial, and institutional customers. The current population of the Village is approximately 8,070².

Collected MSW, rubbish, and bulky waste are transported to the Westchester County Resco Facility (Resco Facility), a waste-to-energy facility at Charles Point in Peekskill, NY. Collected recyclables are transported to the Northern Tier (Recycling) Transfer Station located in the Town of Cortlandt, NY. Organic waste is transported to the Village transfer facility located at Municipal Place where it is stored until a sufficient bulk quantity is accumulated for removal through the Westchester County organic waste disposal program. Bulk metal is transported to the Brookfield Metal Facility in Elmsford, NY by DPW personnel. E-waste is transported by the DPW refuse collection vehicles to the DPW garage for placement into the E-waste container provided through the Westchester County E-waste program.

The DPW provides collection and disposal services for the following items:

- Regular household MSW, rubbish, and bulky waste (non-metal furniture, such as recliners, tables, chairs, mattresses, box springs, carpet (rolled and tied; no longer than four feet long and two feet wide); couch (if sofaped, the metal frame must be removed); and, dried paint cans with the lid removed).
- Commingled recyclable material (including glass bottles and jars, and plastic and metal containers).
- Paper recyclable material including newspapers, cardboard, phone books, magazines, junk mail, brochures, catalogs, advertisements, letters, envelopes, and brown paper bags.
- Organic and yard waste (including leaves, brush and branches).

² Current population obtained from Westchester County for 2010 Census.

Table 2-1 provides a summary of current residential waste quantities.

Table 2-1: Current Residential and Commercial Waste Quantities

Village Collected Waste	2009
Resident Population (number of people) (1)	8,070
Total Number of Housing Units (1)	3,123
Total Number of Occupied Households (1)	2,956
Total Solid Waste Generated (tons per year) (2)	7,815
Total Municipal Solid Waste (MSW) Disposed (tons per year) (2)	3,820
Total Estimated Commercial / Institutional Waste (tons per year) (3)	1,070
Total Estimated Residential Only Solid Waste Generated (tons per year) (3)	2,750
Per Capita Generation (lbs/person/day) (5)	5.31
Per Capita Residential Generation (lbs/person/day) (5)	1.87
Household Generation (tons per year per household) (6)	2.64
Household Residential Generation (tons per year per household) (6)	0.93
Recyclables Quantities by Category	
Commingled Paper (tons per year) (4)	782
Commingled Containers (tons per year) (4)	422
Total Bulk Metals Recycled (tons per year) (4)	63
Total Yard Waste Recycled (tons per year) (4)	2,332
Additional Recycled Materials (tons per year) (7)	396
Total Waste Recycled (tons per year)	3,995
% Recycling	51%

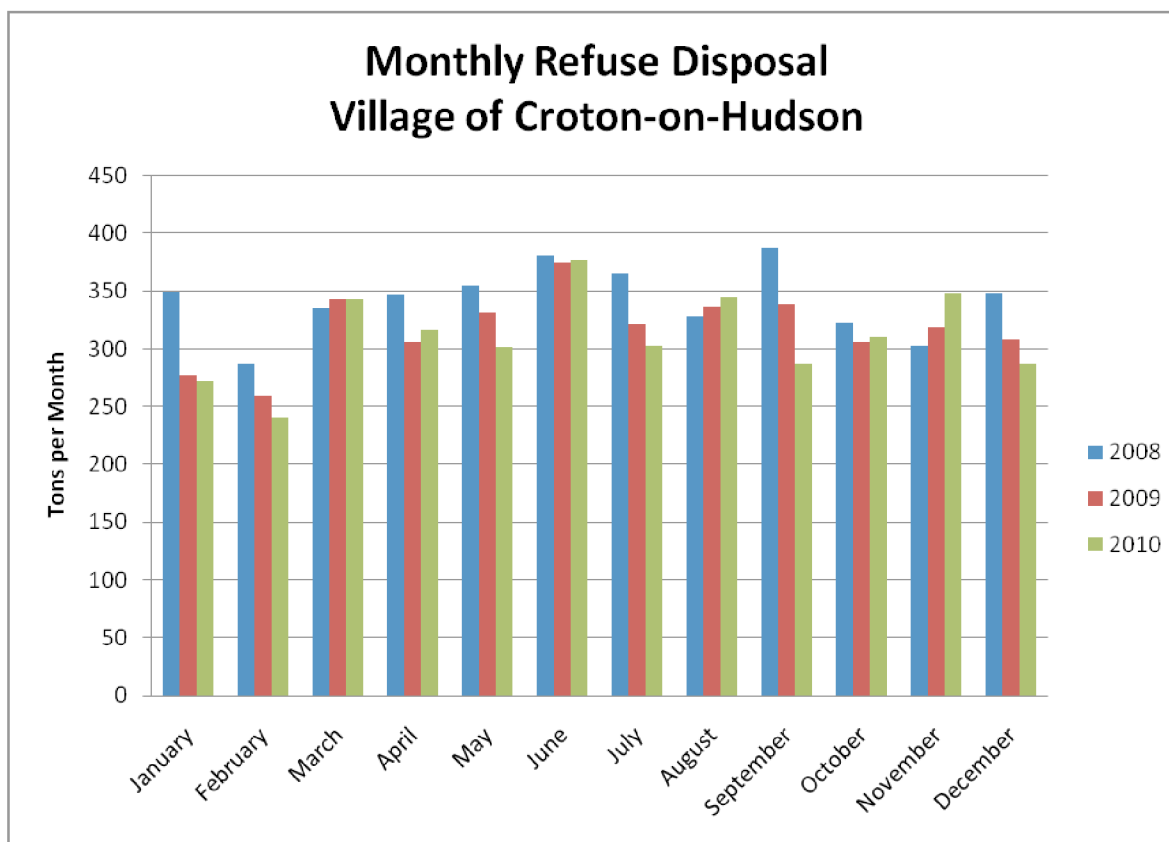
Notes:

1. The Resident Population and Total Number of Housing Units and Occupied Households are from the 2010 Census for Westchester County prepared by the U.S. Census Bureau.
2. The Total Solid Waste Generated and the Total MSW Disposed are from information provided by Westchester County and for the period January to December 2009.
3. Malcolm Pirnie assumed commercial waste was 28% of the Village's waste based upon information provided by the Village (refer to Section 3.2.3 of this report).
4. Recycling Quantities by Category were provided by Westchester County from their report, entitled the Municipally Collected Waste in Westchester County for the Year 2009.
5. The Per Capita Generation and the Per Capita Residential Generation are calculated from the Total Solid Waste Generated or the Residential Solid Waste Generated divided by the Resident Population.
6. The Household Generation and the Household Residential Generation are calculated from the Total Solid Waste Generated or the Residential Solid Waste Generated divided by the Total Number of Occupied Households.
7. Additional materials recycled by the Village include tires, electronic waste, motor oil, construction and demolition, and miscellaneous waste (antifreeze, vehicle batteries, etc.).

Monthly waste data was available from Westchester County for Calendar Years 2008, 2009 and 2010. The monthly data was reviewed to identify if there are any significant seasonal fluctuations in waste disposal and recycling.

Figure 2-1 provides the monthly quantities of refuse collected by the DPW. As illustrated in Figure 2-1, there appears to be some seasonal fluctuations in the Village's waste generation data (i.e., summertime refuse disposal peaks).

Figure 2-1: Monthly Refuse Collection



Notes:

1. Monthly refuse disposal information for 2008 through 2010 was provided by Westchester County. The total MSW disposed for the Village in 2008, 2009, and 2010 was 4,105; 3,820; 3,729 tons per year, respectively.

The Village divides itself in half using Route 129 for its sanitation and recycling routes. The Village established five routes for sanitation: two routes north of Route 129 on Mondays, two routes south of the Route 129 on Tuesdays, and one route for second collection on Fridays. The Village established five routes for recycling: two routes north of Route 129 on Thursdays, two routes south of the Route 129 on Fridays, and one route for commercial cardboard on Thursdays.

Malcolm Pirnie followed all three trucks on all their routes, and the total daily collection is illustrated in Table 2-2. This data was gathered during the weeks of November 1, 2010; November 18, 2010; and November 29, 2010. For the purposes of this report, the quantities are assumed to be average daily refuse disposal.

Table 2-2: Total MSW & Recycling Collected During 2010 Route Study

Date	Day of the Week	Truck Number	Crew Size (drivers; crew)	Type of Waste	Trip to Resco Facility	Waste Disposed (Tons)	Approx. Volume Collected (cy)	Compacted Waste Density (pounds/cy) ²
11/1/2010	Monday	16	1; 2	MSW	1	8.07	128	646
11/1/2010	Monday	16	1; 2	MSW	2	5.58	94.3	446
11/2/2010	Tuesday	16	1; 2	MSW	1	7.64	115	611
11/2/2010	Tuesday	16	1; 2	MSW	2	7.65	104	612
11/29/2010	Monday	3	1; 2	MSW	1	9.61	114	769
11/29/2010	Monday	3	1; 2	MSW	2	7.78	90.0	622
11/30/2010	Tuesday	3	1; 2	MSW	1	10.61	132.0	849
11/30/2010	Tuesday	3	1; 2	MSW	2	6.79	89.7	543
12/3/2010	Friday	3	1; 2	2 nd Collection MSW ³	1	8.08	113	646
12/3/2010	Friday	3	1; 2	2 nd Collection MSW ³	2	5.38	74.2	430
Average MSW						7.72	105	618
11/4/2010	Thursday	16	1; 2	Paper	1	5.60	63.2	448
11/18/2010	Thursday	15	1; 1	Commercial Paper	1	6.43	101	514
11/19/2010	Friday	15	1; 2	Paper	1	6.44	52.0	515
Average Paper Recycling						6.16	72.0	493
11/5/2010	Friday	16	1; 2	Commingled	1	2.75	50.2	220
12/2/2010	Thursday	3	1; 2	Commingled		5.03	71.3	402
Average Commingled Recycling						3.89	60.7	311

Notes:

1. The waste disposed information was collected during the 2010 Route Study.
2. Compacted waste density was calculated by dividing the Waste Disposed by 25 cubic yards (CY), which is the compacted volume of all the Village sanitation trucks.
3. The second collection of MSW is available to residential and commercial / institutional customers at a cost of \$100 per dumpster per month.

As shown in Table 2-2, the quantities of garbage collected on each Monday and Tuesday varied between five (5) and ten (10) tons for both residential and commercial waste.³ Both routes on Mondays and Tuesdays collect both residential and commercial waste. One route on Fridays collect a second collection for residential and commercial / institutional waste.

All Village sanitation trucks have a capacity of 25 cubic yards (cy). It is assumed that a waste density in a fully loaded 25-cubic yard truck varies from approximately 750 to 1,000 lbs/cubic yard. Therefore, the Village sanitation trucks could hold between 10 and 12 tons of solid waste (20,000 to 25,000 pounds).⁴

2.2 Existing Ordinances

The Village's existing solid waste collection and disposal services are governed by the Village regulations (Chapter 135. Garbage, Rubbish and Littering). The following are the major Village requirements regarding refuse collection:

- The maximum quantities per collection are three (3) 32-gallon barrels.
- The containers may not weight more than 70 pounds each.
- All household garbage and bulky waste must be placed at the curb before 6:00 am on the scheduled day of collection.
- Large items (Example: furniture, toys, mattresses, etc.) should be set out on regular trash days. No special pick-up is necessary.
- Metal must be removed from all municipal solid waste.
- Commingled recyclable materials must be placed in the red bin and be rinsed out and free of food and soil.
- Paper recyclable materials must be placed in the blue bin.
- Organic waste must be placed in biodegradable brown paper bags or garbage cans and be no more than 60 pounds. Leaves in plastic bags will not be taken.
- Residents must call DPW to schedule pickup of bulky metal, white goods, TVs, monitors, and electronics.
- Refrigerators, freezers, air conditioning (AC) units and dehumidifiers contain chlorofluorocarbons (CFCs). In order to dispose of these items, a CFC removal sticker must be purchased from the Village office at a cost of \$30.00 Residents must call the DPW to make an appointment to have the item(s) picked up. Each item requires one sticker.⁵

³ Based on Malcolm Pirnie's observations, the Village's sanitation trucks dispose of an average weight of 7.72 tons. See Appendix A for full summary of Refuse Collection Study.

⁴ Based on Malcolm Pirnie's observations, the Village's refuse has an average compacted waste density of 618 pounds/cy. See Appendix A for full summary of Refuse Collection Study.

⁵ The Village no longer charges for this sticker or pickup.

- Unacceptable items for MSW, rubbish, and bulky waste disposal include construction debris, firewood, tree trunks or tires and all non-burnable materials, extra large items, metal frame windows and screens, and hazardous household waste (acids, alcohols, pesticides, solvents, etc).
- No hazardous chemicals will be picked up.
- Latex and oil based paint may be set out with the regular garbage provided all remaining paint is completely dried out and the lid is removed. The dried out paint cans with lids removed are placed adjacent to the customers regular garbage container.

2.3 Collection Operations

The Village provides weekly curbside collection of garbage, rubbish, and recyclables to its residential, commercial, and institutional customers. Collected MSW, rubbish, and bulky waste are transported to the Westchester County Resco Facility, a waste-to-energy facility at Charles Point in Peekskill, NY.

Recyclables are transported to the Northern Tier (Recycling) Transfer Station located in the Town of Cortlandt, NY. Organic waste is transported to the Village transfer facility located at Municipal Place where it is stored until a sufficient bulk quantity is accumulated for removal through the Westchester County organic waste disposal program. Bulk metal is transported to the Brookfield Metal Facility in Elmsford, NY by DPW personnel. E-waste is transported by the DPW refuse collection vehicles to the DPW garage for placement into the E-waste container provided through the Westchester County E-waste program.

Malcolm Pirnie conducted a refuse route collection study in November and December 2010. Table 2-3 provides a summary of collection performance metrics of the current operations, based on available information provided by the Village and as observed during the refuse route collection observations.

Table 2-3: Refuse Collection Productivity Parameters

Productivity Measure	Refuse	Recyclables
Number of routes (1) (2)	2 routes/day at a rate of 2 days/week	5 routes/week at a rate of 2 day/week
Number of trucks per route per day	1 truck	1 truck
Crew size per route (3)	1 driver + 2 crew members	1 driver + 1 or 2 crew members
Average loads per day per truck	2 loads	1 load
Average weight per truckload (2010 data) (tons/truckload) (4)	7.72	6.16 (Commingled Paper)
		3.89 (Commingled Containers)

Notes:

1. Mondays the Village has two routes north of Route 129; Tuesdays the Village has two routes south of Route 129; and Fridays the Village has one collection route for commercial customers charged for a second weekly collection.
2. Thursdays the Village has two routes north of Route 129; Fridays the Village has two routes south of Route 129; and Thursdays the Village has one route for commercial paper.
3. The crew size per route varies by truck.
4. The average weight per truckload is based on the 2010 Refuse Collection Study. See Appendix A for 2010 Route Collection Study.

As illustrated in the above table, the quantity of waste collected per truck (7.72 tons) is generally less than the typical load size capable of the refuse trucks used. However, due to the volume of garbage and bulky waste collected on Mondays, Tuesdays, and Fridays; the trucks make two trips to the Resco Facility.

In addition, typical crew sizes are one to two crew members and the driver. However, the commercial dumpsters require typically one to two crew members to push the dumpsters into position behind the truck for connection and disposal.

2.3.1 Types of Equipment

The Village owns the trucks listed in Tables 2-4 that are used for sanitation service. All the Village trucks have a volume of 25 cubic yards. Typical waste density for municipal solid waste compacted in trucks was found to be from 750 to over 1,000 pounds per cubic yard.

Table 2-4: List of Vehicles for the Village Sanitation Services

Truck No.	Village Vehicle No.	Year	Vehicle Type	Purchase Price	Gross Vehicle Weight (lbs)	Size (cubic yards)	Total Mileage	Mileage per year
3	03-10	2010	International Packer	\$168,486	62,000	25	16,201	9,000
13	13-02	2000	International Packer	\$107,724	60,000	25	49,489	N/A
14	14-05	2002	International Packer	\$132,273	60,000	25	44,999	N/A
15	15-05	2005	International Packer	\$132,273	60,000	25	42,965	N/A
16	16-10	2010	International Packer	\$168,486	62,000	25	9,207	9,000
N/A	16-98 ⁵	1998	Volvo Packer	N/A	60,400	25	N/A	N/A

Notes:

1. Trucks 3 and 16 are used four days per week; Truck 15 is used two days per week.
2. Trucks 13, 14, and 16-98 are currently used when the standard trucks are unavailable.
3. The mileage of the trucks was given to Malcolm Pirnie on March 10, 2011.
4. Information not provided by the Village is denoted with an N/A.
5. Vehicle 16-98 was surplus in June of 2010.

2.3.2 Solid Waste Collection

The Village's solid waste collection services provide residential, commercial, and institutional customers with weekly curbside garbage and bulky waste collection. The Village does not provide collection service on holidays. The Village uses rear loading packer trucks to collect the refuse.

2.3.3 Recyclables Collection

The Village provides curbside recyclables collection to its residential, commercial, and institutional customers on Thursdays and Fridays. Customers are required by law to participate in recycling practices. Acceptable items for recycling include:

- Glass bottles and jars (clear, green or brown)
- Plastic containers (recycling #1 and #2) such as milk jugs and 2-liter soda jugs [Note: Village began collecting plastic codes 3 through 7, effective June 1, 2011]
- Metal containers such as aerosol cans, food and beverage cans, and clean aluminum foil and trays
- Newspapers, magazines, catalogues, junk mail, office papers, telephone books, brochures, advertisements, letters, and paper envelopes
- Brown paper bags
- Organic waste such as leaves, grass clippings, plant trimmings, branches, and twigs

The Village uses their compartment rear-loading packer trucks to collect paper and commingled materials separately on Thursdays and Fridays. The collected recyclables are transported to the Northern Tier (Recycling) Transfer Station located in the Town of Cortlandt, NY.

2.3.4 Metal and Additional Items Collection

Residents must call the DPW to schedule pick-up of metal items, washers, dryers, microwaves, refrigerators (doors must be removed), AC units, dehumidifiers, TVs, computer monitors, and all electronics. Refrigerators, freezers, AC units, and dehumidifiers contain CFCs, and in order to dispose of these items a CFC removal sticker must be purchased from the Village office at a cost of \$30.⁶

The collection of these items and all bulky metal items takes place by appointment only on Wednesdays, except during Holiday weeks.

2.3.5 Yard Waste Collection

Yard waste is collected curbside by the Village DPW weekly from April through October. All yard waste must be placed in biodegradable leaf bags or open top garbage cans. Yard waste in plastic bags will not be collected.

Yard waste may not be mixed with municipal solid waste. The following yard waste can be set out for collection: leaves, raked up yard waste, small twigs, flowers, hedge trimmings. Small branches will be collected provided they meet the following criteria:

- Cut into lengths not to exceed 4 feet.
- Tied into bundles not exceeding 18-inches in diameter.
- Not more than two bundles of small branches per collection.

2.3.6 Fall Leaves Collection

Fall leaves are collected from the first week of November through the end of December, January if needed. Leaves may be placed in biodegradable leaf bags or loose behind the curb.⁷ Leaves will be collected with the following schedule:

- On the first and third Wednesday of the month, leaves will be collected from north of Route 129.
- On the second and fourth Wednesday of the month, leaves will be collected from south of Route 129.

Loose leaves should not be placed in the street or on the sidewalk. No twigs, branches, or other yard waste should be mixed in with the loose leaves. The Village publishes a list of streets where loose leaves will be vacuumed and it is placed on the Village web page beginning in early November.

⁶ The Village no longer charges for CFC stickers.

⁷ Effective October 2011, the Village will no longer use leaf bags for collection of fall leaves.

2.3.7 Unacceptable Waste

The following items will not be collected by the Village or accepted at the DPW Facility:

- Tree trunks, stumps, large limbs over 4-inches in diameter, dirt, sod, stones, concrete and bricks.
- Construction debris, building materials.
- Hazardous chemicals (acids, alcohols, pesticides, solvents, etc.).

2.3.8 Fee Based Service

The Village also provides a second collection for all customers for a fee of \$100 per month per dumpster.

Currently, both the Village Hall and the DPW office maintain lists of dumpsters / second collections that should be made each week. After review of both lists, there appears to be some discrepancies between the lists and the information appears outdated and unclear.

3. Evaluation of Collection System

3.1 Financial Assessment of Current Solid Waste Services

3.1.1 Review of Existing Costs

The Village of Croton-on-Hudson provided the adopted annual budget for Fiscal Year June 1, 2009 to May 31, 2010 and Fiscal Year June 1, 2010 to May 31, 2011. These annual budgets included the budget for the Department of Public Work's solid waste collection operations. This information is presented in the following section regarding review of the Village's operating budget.

3.1.2 Projected Costs

Table 3-1 below summarizes the breakdown of the estimated cost of service of providing solid waste collection and disposal services based on the Village's actual annual budget (June 1, 2009 – May 31, 2010) found in Appendix B.

Table 3-1: Estimated Cost of Services (June 1, 2009 - May 31, 2010)¹

Cost Item Description	Total Budget
Annual Sub-Total Cost for Service (\$000s per year)	\$936 K
Total Waste Generation (tons per year (tpy)) ³	7,815 tpy
Annual Average Cost Per ton	\$119.82/ton
Annual Avg. Cost Per Household (HH) Per Month ²	\$24.99/HH/mo
Annual Refuse and Garbage Revenues (\$000s per year)	\$89 K
Annual Scrap Metal Recovery Revenues (\$000s per year)	\$9 K
Annual Recycling Reimbursements (\$000s/year) ⁴	\$0
Annual Total Revenues (\$000s/year)	\$98K
Total Revenue Adjusted Annual Average Cost Per Ton (\$/ton)	\$107.30/ton
Revenue Adjusted Annual Avg. Cost Per HH Per Month ²	\$22.38/HH/mo

Notes:

1. Refer to Appendix B for a detailed cost of services summary.
2. The Annual Avg. Cost per Household and the Revenue Adjusted Annual Avg. Cost per HH per month are calculated based on the total number of occupied and unoccupied housing units in the Village.
3. The Total Waste Generation includes MSW, recyclables, yard waste, bulk metals, etc. and is for the period January 1, 2009 through December 31, 2009.
4. Annual Recycling Reimbursements is a line item in the Village's budget, but was \$0 for the Fiscal Year from June 1, 2009 to May 31, 2010.

As shown in Table 3-1, the current estimated annual cost per household for the DPW's collection services as described in Section 2 of this report is approximately \$107.30 per ton or approximately \$22.40 per household per month, as adjusted for revenues received from DPW operations.

3.2 Development of Collection Performance Metrics

On November 15 and 16, 2010, the Village collected data to determine the total weight of commercial solid waste collected by the Village. The Village collected from all commercial customers using a spare truck, Truck 14. Table 3-2 summarizes the solid waste weight analysis, with the weights in tons.

Table 3-2: Quantity of Solid Waste Collected on November 15 and 16, 2010

Type of Waste	Truck	November 15th Weight (Tons)	November 16th Weight (Tons)
Commercial	14	6.98	9.66
Residential	3	9.06	8.68
Residential	3	2.96	2.05
Residential	16	9.71	9.49
	Total	28.71	29.88

	November 15th	November 16th	Total Percentage
Commercial Waste	24%	32%	28%
Residential Waste	76%	68%	72%

Notes:

- Information for this table was provided by the Village. The Village collected from commercial customers with a spare truck (Truck 14) on Monday, November 15, 2010 and Tuesday, November 16, 2010.

As shown in Table 3-2, the percent weight of the total waste collected representing the commercial waste collected on a given day was calculated to be 24% and 32% on November 15, 2010, and November 16, 2010, respectively. The percent weight of the total waste collected representing the commercial waste collected for the two day period was calculated to be 28%.

During the 2010 Route Study, Malcolm Pirnie recorded the volume of solid waste and garbage collected. Table 3-3 summarizes the total approximate weight of each route that was observed during the 2010 Route Study.

Table 3-3: Quantity of Solid Waste Collected During 2010 Route Study

Truck Number	Date	Type of Waste	Trip to Resco Facility	Waste Disposed (Tons)	Approx. Volume Collected (cy)	Compacted Waste Density (lbs/cy) ²	Uncompacted Waste Density (lbs/cy) ³
16	11/1/2010	Residential and Commercial Garbage	1	8.07	128	646	126
	11/1/2010	Residential and Commercial Garbage	2	5.58	94.3	446	118
16	11/2/2010	Residential and Commercial Garbage	1	7.64	115	611	133
	11/2/2010	Residential and Commercial Garbage	2	7.65	104	612	148
3	11/29/2010	Residential and Commercial Garbage	1	9.61	114	769	169
	11/29/2010	Residential and Commercial Garbage	2	7.78	90.0	622	173
3	11/30/2010	Residential and Commercial Garbage	1	10.61	132.0	849	161
	11/30/2010	Residential and Commercial Garbage	2	6.79	89.7	543	151
3	12/3/2010	Second Pickup Garbage	1	8.08	113	646	143
	12/3/2010	Second Pickup Garbage	2	5.38	74.3	430	145

Notes:

1. The waste disposed information was collected during the 2010 Route Study.
2. Compacted waste density was calculated by dividing the Waste Disposed by 25 cubic yards (CY), which is the compacted volume of all the Village sanitation trucks.
3. Uncompacted waste density was calculated by dividing the Waste Disposed by the Approximate Volume Collected.

During the 2010 Route Study, the largest quantity of waste collected in any given route is 10.61 tons (approximately 21,220 pounds) for Truck 3 on Tuesday, November 30, 2010. The truck that collects the second pickup customers, Truck 3, on Friday, December 3, 2010 collected approximately 13.46 tons (approximately 27,000 lbs) in two loads.

It is assumed that a waste density in a fully loaded 25-cubic yard truck varies from approximately 750 to over 1,000 lbs/cubic yard or that each truck typically is capable of collecting 18,750 to 25,000 pounds per truckload.

3.3 Evaluation of Solid Waste Collection Routes and Alternatives

In an effort to evaluate alternatives available to the Village and identify potential opportunities to increase efficiencies in the DPW's refuse collection program, we evaluated the following options:

- Establishment of a separate solid waste and recyclables collection route for commercial / institutional customers for the purposes of creating a fee based system.
- Consolidation of the remaining residential collection routes was feasible.

As shown on Table 3-2, the DPW altered the collection of solid waste on November 15 and 16, 2010 and had a spare truck (Truck 14) collect only from the Village's commercial customers. Based on the weight collected on those days, the Village has multiple options, as described below.

3.3.1 Exclusive Route for Commercial Customers

The Village requested that Malcolm Pirnie evaluate the possibility of having an exclusive route for commercial / institutional customers for the collection of solid waste and recyclables for a fee based system. Based on the data provided by the Village and collected by Malcolm Pirnie, we believe that having an exclusive route to handle all commercial customers serviced by the Village is not feasible without adding an additional truck.

Based upon the information collected during the 2010 Route Study (Table 3-3) and by the Village on November 15 and 16, 2010 (Table 3-2); the quantity of commercial waste varies by route and truck, as currently collected by the Village. The Village currently has five routes for MSW collection, two routes each on Mondays and Tuesdays and one route on Fridays. The Friday route collections from commercial customers are charged \$100 per dumpster per month for a second weekly collection.

As shown on Table 3-2, the Village used a third truck (Truck 14) to collect waste from commercial customers on November 15 and 16, 2010, however the Village collects MSW, rubbish, and bulky waste on Mondays and Tuesdays with two trucks. Based on the quantities collected November 15 and 16, 2010, approximately 28% of the Village's waste

is commercial and 72% is residential. However, this percentage does not take into consideration of the second collection provided to residential and commercial / institutional customers.

Based on our analyses of the tonnage collected during the Route Study, it was determined that the Village has the ability to create a separate route for commercial customers. Due to the optimum manner in which the Village collects its waste, it did not make sense to create a separate commercial route.

3.3.2 Consolidation of Routes

The Village currently operates an efficient and optimal collection of solid waste, with the use of two routes on Mondays and Tuesdays for once per week solid waste collection. The Village also has one route on Fridays for a second collection, which is provided to customers for a cost of \$100 per dumpster per month. Based upon the size of the Village, consolidation of the collection routes would not be possible.

4. Conclusions and Recommendations

4.1 Route Recommendations

Malcolm Pirnie prepared this report on behalf of the Village to assist the Village in evaluating the efficiency and effectiveness of the current solid waste collection program and the feasibility of creating a separate collection route for commercial / institutional customers. The purpose of creating a separate commercial route is for a fee based system. Malcolm Pirnie evaluated the Village's refuse collection routes to determine if the following could be accomplished:

- The feasibility of changing the collection routes for more efficient collection of residential and commercial / institutional customers.
- The establishment of a separate solid waste and recyclables collection route for the commercial / institutional customers, for the purposes of creating a fee based service.
- The feasibility of changing equipment and/or methodology of collection for the purposes of improving efficiency and reducing labor costs.
- The staffing needs for any changes in routes or collection equipment.

Based on Malcolm Pirnie's analyses, it was further determined that the Village currently operates an efficient and optimal collection of solid waste. The Village currently collects from residential and commercial / institutional customers once per week with front-yard collection. Therefore, the Village would find it difficult to further decrease the number of routes.

Based on our analyses of the tonnage collected during the Route Study, it was determined that the Village has the ability to create a separate route for commercial customers. Due to the optimum manner in which the Village collects its waste, it did not make sense to create a separate commercial route. However, it was also determined that a fee based system could be implemented for commercial / institutional customers the way it currently operates.

4.2 Additional Recommendations

Malcolm Pirnie evaluated additional recommendations for the Village's consideration to provide more efficient and cost effective solid waste management services. These additional recommendations are listed below:

- The Village should consider revising its collection of bulky items (i.e., couches, mattresses, etc.) to charge a fee of \$100 per pickup and schedule these pickups by appointment only. The Village should consider revising its collection of white goods (i.e., metal items, washers, dryers, etc.) to charge a fee of \$25 per pickup.
- The Village should revise its dumpster inventory. Currently, the Village has multiple lists of the commercial / institutional customers with dumpsters. The updated list should include the business name and address as well as the collection name and address. This list should be maintained by the Village, and updated on a yearly basis.
- The Village should update dumpsters that are collected by the Village to include a number, asset tag or bar code system so that the Village will be able to track the dumpsters from customers. This system will also make it easier for the Village to make sure the dumpsters are maintained or even replaced, as necessary.
- The Village should consider revising their regulations, specifically to contain the quantity of waste commercial / institutional customers are to dispose per collection. The Village Code (Chapter 135) contains the quantity of waste allowed for collection by residential customers but not for commercial / institutional customers.
- The Village should consider revising its second pickup since not all of its customers have dumpsters. The fee for the second pickup should be \$100 per month per one (1) 1.5 CY dumpster or three (3) 96-gallon containers.
- The Village should consider the placement of global positioning system (GPS) equipment in the sanitation trucks so that the Village will be able to further analyze the efficiency of the routes and trucks. For an example, refer to Appendix C that describes an automated vehicle location and mobile data system developed by Radio Satellite Integrators, Inc.
- The Village should consider reviewing safety procedures and on-going training for staff regarding garbage and recycling collection (i.e., avoid crossing over double yellow line).
- The Village should consider instituting a system whereby complaints by the citizens can be logged and identified and addressed to track overall performance and customer satisfaction. The Village should also maintain a list of driver complaints, and track how these complaints are responded to.