

Preface

Stewardship Ontario E&E project #104
Niagara–Co-Collection Time and Motion Studies
Fall 2004

In October 2004, a Request for Proposal (RFP) was issued by Niagara Region for the completion of an Organics Co-Collection Study, to determine the most efficient co-collection method of organics. The consulting firm of Jacques Whitford was awarded the RFP and the attached final report was submitted to Niagara Region.

The consultant's report recommended the co-collection of recycling with organics. Currently in Niagara Region, waste and organics are co-collected. There were several reasons why the Region made this decision, contrary to the recommendations contained in the consultant's report. The basis for this decision is outlined below:

Geographic location of disposal facilities

In Niagara Region, the organics and waste disposal facilities are located within a very short distance of each other. On the other hand, the recycling facility is located approximately 25 kilometres away from the organics facility. If recycling and organics material are co-collected, the truck would be required to off-load each material stream at a different facility, therefore adding additional fuel and labour costs, as well as the need for extra time. This would result in higher collection contract costs to do so.

Contamination of recyclables from organics in collection vehicle during unloading

When the recyclables and organics were collected together, the recyclables became contaminated with the organics, when offloading, because the collection vehicle did not have a split tailgate. As a result, the resale value of the recyclables was reduced and more residual waste was being sent to landfill from the recycling facility.

Unstable load distribution in collection vehicle with recycling/organics

When the recyclables and organics were co-collected, the collection vehicle was disproportionately balanced, therefore causing a possible safety risk of the truck flipping over, when turning a corner, or offloading.

Based on the above reasons, an assessment was made by Niagara Region and the decision was made to co-collect organics with waste.



REPORT

**Niagara Region
Public Works Department**

**Organic Co-collection
Studies – Fall 2004 Time
and Motion Report
Final Report**

Project No. ONW37004



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January 24, 2007

ONW37004

Ms. Cheryl Crawley
Waste Management Services Division
Niagara Region
Public Works Department
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Dear Cheryl:

**Re: Organic Co-collection Studies – Fall 2004 Time and Motion Report
Final Report**

Jacques Whitford Limited is pleased to submit the following Draft Organic Co-Collection Studies – Fall 2004 Time and Motion Report. The report presents the data collected during the six week period initiated on November 15, 2004 and continued to December 16, 2004. This report also provides an analysis of the data collected and a determination of setout rates, participation rates, and an analysis of co-collection vehicle efficiency. Also included in this report are the results of the additional setout data collection activities completed in Welland, Port Colborne, and Niagara Falls.

Should you have any questions, or would like to discuss the enclosed report further, please contact me at 905-631-3910, 905-467-9897 (cell) or by email at jim.mckay@jacqueswhitford.com.

Yours truly,

JACQUES WHITFORD LIMITED

- Original Signed by Jim McKay -

Jim McKay, B.A.
Group Leader, Central Canada Waste Services

Enclosure (s)

cc:

ã JACQUES WHITFORD 2007

EXECUTIVE SUMMARY

In November 2004, the Region of Niagara, through the issuance of Request for Proposal #RN 04-25, retained the services of Jacques Whitford Limited to complete Organics Co-Collection Studies. These studies included two components as follows:

1. **Waste Audit Study Data Collection** – Waste audits were to be completed in three study areas to assess the performance of the new curbside organics collection program and to identify the composition of the residual waste remaining for disposal; and,
2. **Time and Motion Data Collection** – Time and motion and corresponding route setout data were to be collected on several different collection vehicles including:
 - ✓ single-stream compacted collection of recyclables;
 - ✓ two-stream (co-collection) compacted collection of garbage and organics; and,
 - ✓ two-stream (co-collection) compacted collection of recyclables and organics.

Time and motion data was to be collected by following the collection vehicle each day and recording driver/vehicle activities, based on a set (60 second) time interval. The following report documents the results of the time and motion study data collection. A second report under a separate cover has been prepared to document the results of the waste audit study.¹

CURRENT METHODS OF CURBSIDE WASTE COLLECTION

Currently in the Region, there are two forms of co-collection being utilized:

1. **Garbage and Organics Co-Collection** - utilizing rear-packing vertical split curbside collection vehicles. Each vehicle has a 2 person compliment with one being a dedicated vehicle driver and one being a dedicated “thrower” responsible for loading waste into the vehicle. All waste is collected manually. In this system, recycling is collected by a single-stream rear-packing waste collection vehicle.
2. **Organics and Recycling Co-Collection** – utilizing a side-loading vertical split curbside collection vehicles. Each vehicle has one operator who is responsible for both driving and “throwing” or loading the waste into the vehicle. All waste is collected manually. In this system, garbage is collected by a single-stream rear-packing waste collection vehicle.

DATA COLLECTION OVERVIEW

In order to compare the different methods of co-collection and measure the participation in current curbside waste collection programs, the following study areas were identified as representative of

¹ Jacques Whitford Limited, Region of Niagara Organics Co-Collection Studies – Fall 2004 Waste Audit Study, January 2005.

the different types of locations, housing and demographics that can be found throughout the Region.

Time and Motion and Setout Data Collection

St. Catharines Study Area – Garbage/Organics Co-Collection - approx. 650 single family residential units and was studied as part of the original organics collection pilot program in 2000/2001.

Pelham/Fonthill Study Area –Recycling/Organics Co-Collection – approx. 560 single family residential units with similar demographics, lot sizes, etc. to the St. Catharines study area.

Setout Data Collection Only

Port Colborne Study Area - approx. 600 single family residential units representative of an established, middle-income, lower density urban residential neighbourhood and was studied as part of the original organics collection pilot program in 2000/2001.

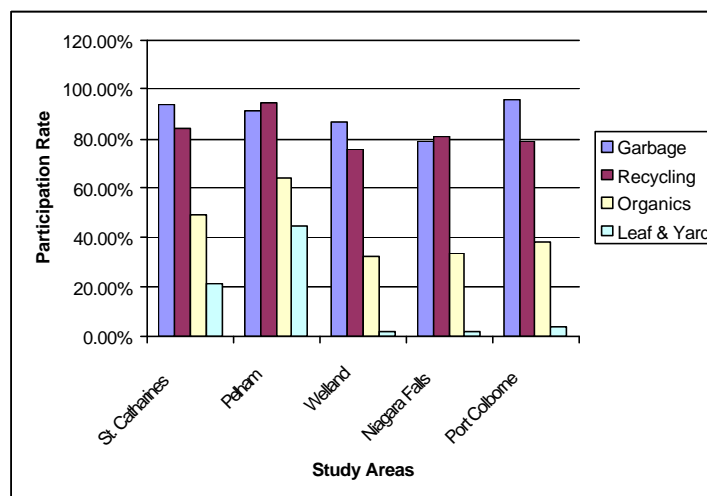
Welland Study Area - approx. 800 residential units representing a mix of single family and semi-detached housing.

Niagara Falls Study Area - approx. 700 residential units representing primarily single family housing.

PARTICIPATION IN CURBSIDE WASTE COLLECTION PROGRAMS

To be considered participating in a waste management program, a household had to setout a stream of waste at least once during the data collection period (either 2 or 4 weeks depending on the study area). For example, in St. Catharines, 49.61% of the households in the study area participated in the curbside organics collection program at least once over the four week study period.

Participation in Curbside Waste Collection Programs



AVERAGE NUMBER OF GARBAGE CONTAINERS SETOUT EACH WEEK

With the implementation of a Region-wide Organics Collection program, the Region also implemented a two-container limit for single family residential household receiving curbside garbage collection. Based on the setout data collected at curbside, it appears this container limit is being adhered to by the majority of the households examined as part of this study. The table below, outlines the percentage of the population by study area and the number of containers they setout on an average weekly basis.

Percentage of Households Setting out 1 or More Garbage Containers each Week for Collection

Containers /Week	St. Catharines	Pelham	Welland	Niagara Falls	Port Colborne
1 Container	71.4%	72.7%	67.9%	57.8%	59.8%
2 Containers	26.9%	24.8%	28.3%	37.5%	27.9%
3 Containers	1.4%	1.7%	2.7%	3.5%	7.6%
4 Containers	0.3%	0.4%	0.6%	0.5%	2.0%
>4 Containers	0.0%	0.3%	0.5%	0.7%	2.7%

COMPARISON OF DIFFERENT METHODS OF CO-COLLECTION

The following provides a comparison of the 2004 time and motion data collected as part of this study with previous time and motion data collected by the Region in 2000/2001. In order to provide the most accurate comparison, the study area and collection route were kept consistent in order to measure differences between two methods of organics co-collection. The following table has been developed based on the collection of 100 participating households (i.e. 100 stops to collect material) and therefore the collection method which requires the least amount of time to collect the 100 participating households is the most efficient method of collection on this route.

Recycling/Organics vs. Garbage/Organics

Criteria	St. Catharines 2000/2001 (Recycling/Organics)		St. Catharines 2004 (Garbage/Organics)	
	Recycling	Organics	Garbage	Organics
Average Weekly Setout Rate	70.0%	28.9%	73.7%	33.0%
Average Weight Per 100 Setouts (kg)	691.1	855.1	1,175.2	788.0
Total Setouts	100.0	100.0	100.0	100.0
Average Weight/Setout (kg)	6.9	8.6	11.8	7.9
Program Participation Rate (%)	82.3%	44.6%	94.0%	49.6%

Activity Breakdown in Minutes	St. Catharines 2000/2001		St. Catharines 2004	
	(Recycling/Organics)		(Garbage/Organics)	
	Minutes	(% of Total)	Minutes	(% of Total)
Driving Between Stops	15.55	25.40%	13.77	21.62%
Loading Organics	5.00	8.17%	5.11	8.02%
Loading Recyclable or Garbage	13.49	22.03%	12.72	19.96%
Getting Out of Truck	6.09	9.95%	0.85	1.33%
Getting Into Truck	5.11	8.35%	0.96	1.51%
Picking up Setout	0.22	0.36%	4.88	7.67%
Setting Down Container	3.48	5.68%	5.59	8.78%
Decontamination	0.54	0.89%	0.00	0.00%
Cycling the Hopper	1.52	2.49%	9.05	14.20%
Speaking With Public	0.98	1.60%	1.14	1.79%
Coffee/Lunch Break	5.00	8.17%	5.00	6.89%
Oops Tags	0.44	0.71%	3.77	5.91%
Speaking With Management	0.98	1.60%	1.14	1.78%
Drive and Load	0.00	0.00%	0.23	0.36%
Other - Road Blocked/Stuck	2.50	4.09%	0.11	0.18%
Other - Truck Problems	0.33	0.53%	0.00	0.00%
Total Time Spent on-Route:	61.23	100.0%	64.31	100.0%

It is important to note that the co-collection of Recycling/Organics was completed utilizing a side-loading collection vehicle with an operator/loader, which was found to be slightly more efficient than a rear-packing collection vehicle with a driver and a “thrower”. The primary difference in time requirement appears to be the amount of time used to cycle the hopper. This could be explained by the difficulty of co-collection vehicles to manage large volume garbage setouts, due to the smaller capacity box configurations required to load two separated waste streams into one collection vehicle.

HIGHLIGHTS OF THE STUDY FINDINGS

The following are some of the key findings/highlights of the data collected in the fall 2004 studies:

1. Participation in the Organics Collection Program ranges from approx. 35% to 65% depending on the location in the Region. This means that anywhere from 65% to 35% of the residents of Niagara are not source separating their organic waste for collection. However, it is important to note that these numbers do not include estimations for at-home reuse initiatives such as backyard composting or grass-cycling.
2. Participation in the Recycling Collection Program ranges from approx. 75% to 95% depending on the location in the Region. This means that anywhere from 5% to 25% of the residents of Niagara are not source separating their recyclables for collection.

3. The majority of residents setout only one container of garbage each week for collection. In most cases, only 2% to 3% of the households surveyed setout in excess of 2 containers of garbage each week for collection.
4. Based on a comparison of time and motion data for different methods of co-collection on the same sample households, study results indicate that Recycling & Organics co-collection is a more efficient way of collecting curbside setouts than Garbage & Organics co-collection.
5. Participation in the Recycling Program in St. Catharines has increased by 2% over the past 4 years sampling the same households. Participation in the Organics program for the same households has increased by 5%.

STUDY RECOMMENDATIONS

Based on the results of time and motion and setout data collection studies, the following is recommended:

Recommendation No. 1 – Additional setout data collection

Future setout data collection studies should be conducted in the Region sampling households, and demographics that have not been sampled to date to ensure the accuracy of the setout data being collected, and its representativeness of the greater area/demographic.

Recommendation No. 2 – Additional time and motion data collection

Time and motion data should be collected on single-stream compacted garbage collection and single stream compacted organics collection so that the Region has a data set which will include Recycling/Organics Collection and Garbage/Organics co-collection, single stream compacted recyclables collection and single stream compacted organics collection and single stream compacted garbage collection. This will allow the Region to compare all methods of collection currently being utilized.

Recommendation No. 3 – Update data as changes are made to the way waste is managed

Time and motion data and setout data should be updated as new methods of waste collection are implemented and as new curbside waste collection programs or changes to the current level of service are implemented.

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1.0 INTRODUCTION

In November 2004, the Region of Niagara, through the issuance of Request for Proposal #RN 04-25, retained the services of Jacques Whitford Limited to complete Organics Co-Collection Studies. These studies included two components as follows:

1. **Waste Audit Study Data Collection** – Waste audits were to be completed in three study areas to assess the performance of the new curbside organics collection program and to identify the composition of the residual waste remaining for disposal; and,
2. **Time and Motion Data Collection** – Time and motion and corresponding route setout data were to be collected on several different collection vehicles including:
 - ✓ single-stream compacted collection of recyclables;
 - ✓ two-stream (co-collection) compacted collection of garbage and organics; and,
 - ✓ two-stream (co-collection) compacted collection of recyclables and organics.

Time and motion data was to be collected by following the collection vehicle each day and recording driver/vehicle activities, based on a set (60 second) time interval. The following report documents the results of the time and motion study data collection. A second report under a separate cover has been prepared to document the results of the waste audit study.²

2.0 BACKGROUND

In July 2000, the Region of Niagara began collecting time and motion and waste audit data to support the development of an Organics Diversion Strategy that would outline the preferred approach for managing household organic waste. Over a nine month period (July 2000 to March 2001) an organics co-collection pilot project was completed that consisted of 2 primary components:

1. **Time and Motion Data Collection** – Time and motion data was collected on a co-collection vehicle that was on-route two (2) days per week co-collecting recycling and organics in St. Catharines and garbage and organics in Port Colborne. Time and motion data was collected by following the collection vehicle each day and recording driver/vehicle activities, based on a set time interval.
2. **Waste Audit Study Data Collection** – Waste audits were completed throughout the nine month pilot duration, at the pre-project, mid-project and end-project stages to

² Jacques Whitford Limited, Region of Niagara Organics Co-Collection Studies – Fall 2004 Waste Audit Study, January 2005.

monitor the impact of organics diversion on the composition of the residential waste stream.

Since the completion of the pilot program, in 2003/2004 the Region has “rolled-out” a Region-wide source separated organics collection program serving the majority of the residents of Niagara. This program was in part designed on the results of the 2000/2001 pilot program. The Region-wide organics program has now been in operation for at least 8 months in all areas currently receiving this service.

Currently in the Region, there are two forms of co-collection being utilized:

1. **Garbage and Organics Co-Collection** - utilizing rear-packing vertical split curbside collection vehicles. Each vehicle has a 2 person compliment with one being a dedicated vehicle driver and one being a dedicated “thrower” responsible for loading waste into the vehicle. All waste is collected manually. In this system, recycling is collected by a single-stream rear-packing waste collection vehicle.
2. **Organics and Recycling Co-Collection** – utilizing a side-loading vertical split curbside collection vehicles. Each vehicle has one operator who is responsible for both driving and “throwing” or loading the waste into the vehicle. All waste is collected manually. In this system, garbage is collected by a single-stream rear-packing waste collection vehicle.

Due to the size/available volume of the organics side of the co-collection vehicles, during seasonal peak yard waste generation periods, a separate single-stream rear-packing collection vehicle is brought into each route to collect large yard waste setouts that cannot be managed by the co-collection vehicles.

3.0 WASTE MANAGEMENT SYSTEM PROFILE

The Region of Niagara currently offers curbside collection of five different waste streams to all single family residences in Niagara as outlined below:

1. Garbage – Curbside collection service provided on a weekly basis 52 weeks per year.
2. Recyclables – Curbside collection service provided on a bi-weekly – Containers/Fibres rotation 52 weeks per year. In this rotation, Containers including glass, metals, and plastics are collected in Week 1 and fibres including newspaper, boxboard, and corrugated cardboard are collected in Week 2.
3. Organics – Curbside collection service provided on a weekly basis 52 weeks per year. Organics collection includes all household and yard waste organics products.
4. Bulk Waste – Curbside collection service provided on an “on-call” basis year round. Residents with bulk waste which may include things such as a washing machine or sofa can call the Regional Collection Contractor to notify them of the setout prior to their normal collection day and it will be picked-up by a separate vehicle on their collection day.

Depending on the collection contractor, methods of co-collection, either Garbage and Organics or Recycling and Organics are utilized for the curbside collection of waste streams.

4.0 TIME AND MOTION DATA COLLECTION METHODOLOGY

To “kick-off” the data collection process, two meetings were held as described below:

1. **Project Initiation Meeting** – A project initiation meeting was held at the outset of the process to develop project timelines, time and motion data collection methodology, confirm routes to be observed during the study, information and data to be collected and reporting requirements.
2. **Regional Collection Contractor Meeting** – A meeting was held with the Regional Collection Contractors responsible for waste collection in each of the study areas to inform them of the pending study, their purpose and objectives and to identify the process for data collection and how their collection crews will be involved, or will not be involved.

4.1 STUDY AREA SELECTION – TIME AND MOTION AND SETOUT DATA

One of the primary objectives of completing time and motion studies was to examine the two different methods of co-collection being utilized in the Region. In the majority of the Region, garbage is being co-collected with the organics stream which includes the original St. Catharines study area which was examined in 2000/2001. In the original study, the St. Catharines study area was collected using recycling/organics co-collection, which would allow for new data to be collected on a different method of collection on the same collection route. It was therefore determined that the St. Catharines study area should be examined again in 2004. In West Lincoln, the current regional collection contractor utilizes recycling/organics co-collection. Examining this method of collection would allow for comparison under similar geographic and demographic circumstances, in 2004 as its St. Catharines counterpart only utilizing a different method of co-collection. The following provides a brief overview of each study area and its demographics.

St. Catharines Study Area – Thursday Route #6 – Garbage/Organics Co-Collection

The neighbourhood selected in St. Catharines consists of approx. 650 single family residential units. Residents of this study area have access to the full range of waste management services described in Section 3.0. This route was last studied for time and motion and setout/participation in 2000/2001 as part of the Region’s Organics Collection Demonstration Project.

Pelham/Fonthill Study Area – Monday Route #1344 – Recycling/Organics Co-Collection

Residents of this study area have access to the full range of waste management services described in Section 3.0. This was the first time this route had been sampled for time and motion and setout/participation data. The Pelham/Fonthill area received curbside organic collection services in September 2003 and therefore has had the opportunity to participate longer in this program than its St. Catharines counterpart.

Similarities between these two routes include demographics, lot sizes, amount of vegetation, relevant affluence. The primary difference between these two routes is the method of waste collection currently being utilized.

Single Stream Time and Motion Data Collection

Time and Motion data was also collected in the St. Catharines Study area for the single stream, rear packing recyclables collection vehicle. This data was collected over a two week period and has been utilized to compare efficiencies between recycling/organics co-collection and single stream recyclables collection.

4.2 STUDY AREA SELECTION - SETOUT DATA ONLY

Additional setout information was also collected in three other study areas for a two week period. During these two weeks, garbage, recyclables, organics, yard waste and bulk waste setout data was collected from a standard waste collection route.

Port Colborne Study Area

The neighbourhood selected in Port Colborne consists of approx. 600 single family residential units. The Port Colborne route was felt to be representative of an established, middle-income, lower density urban residential neighbourhood that is typically found in smaller municipalities. Residents of this study area have access to the full range of waste management services described in Section 3.0. This route was last studied for time and motion and setout/participation in 2000/2001 as part of the Region's Organics Collection Demonstration Project.

Welland Study Area

The neighbourhood selected in the City of Welland consists of approx. 800 residential units representing a mix of single family and semi-detached housing. This neighbourhood was chosen as representative of a higher density, lower income urban neighbourhood. Residents of this study area have access to the full range of waste management services described in Section 3.0. This route contained the waste audit study area that was sampled as part of the Organic Co-Collection Studies. This was the first time this route, in entirety had been observed for setout and participation data by the Region.

Niagara Falls Study Area

The neighbourhood selected in the Niagara Falls consists of approx. 700 residential units representing primarily single family housing. This neighbourhood was chosen as representative of a lower density, middle income urban neighbourhood. Residents of this study area have access to the full range of waste management services described in Section 3.0. This was the first time this route, in entirety had been observed for setout and participation data by the Region.

4.3 DATA COLLECTION DATES

Table 4-1 provides relevant dates for completion of the time and motion collection studies.

TABLE 4-1: RELEVANT DATA COLLECTION DATES

Area	Time and Motion	Setout Data
St. Catharines		
November 18, 2004	Garbage/Organics	Garbage & Organics
November 18, 2004	Recycling	Recycling
November 25, 2004	Garbage/Organics	Garbage & Organics
November 25, 2004	Recycling	Recycling
December 02, 2004	Garbage/Organics	All Waste Streams
December 09, 2004	Garbage/Organics	All Waste Streams
Pelham/Fonthill		
November 18, 2004	No Data Collection	All Waste Streams
November 25, 2004	No Data Collection	All Waste Streams
December 06, 2004	Recycling/Organics	Recycling/Organics
December 13, 2004	Recycling/Organics	All Waste Streams
Welland		
December 06, 2004	No Data Collection	All Waste Streams
December 13, 2004	No Data Collection	All Waste Streams
Port Colborne		
December 07, 2004	No Data Collection	All Waste Streams
December 14, 2004	No Data Collection	All Waste Streams
Niagara Falls		
December 08, 2004	No Data Collection	All Waste Streams
December 15, 2004	No Data Collection	All Waste Streams

4.4 TIME AND MOTION DATA COLLECTION CATEGORIES

As described above, to maintain consistency with previous studies completed by the Region, the time and motion data categories were kept the same. Table 4-2 below outlines the collection categories and respective activity associated with each category. These categories can also be found, described in greater detail in Appendix "A".

TABLE 4-2: TIME AND MOTION DATA COLLECTION CATEGORIES

1. Urban, Rural, Medium or Low Density.
2. Route number (i.e. ____).
3. Weather during day of collection (include precipitation and temperature if possible).
4. Date of collections.
5. Put your name here.
6. Time when truck leaves yard in morning.
7. Time when truck arrives at route – this is when the 60 second intervals start.

8.	Time when truck stops collections and prepares to leave route – this is when you stop taking ____ second interval data.
9.	Time when truck arrives at MRF.
10.	Approximate time to dump the first compartment.
11.	Approximate time to dump the second compartment.
12.	Approximate time to dump the third compartment (if necessary).
13.	Approximate time to dump the fourth compartment (if necessary).
14.	Put in the total tonnes collected using weigh bills.
15.	Time when the truck is leaving MRF after it has already weighed out.
16.	Time when truck arrives back at route – this is when the 60 second intervals start.
17.	Time when truck returns to yard after all collections are complete.
18.	Total distance driven by the truck that day.
19.	Kilometre reading on the odometer when truck leaves yard in morning.
20.	Kilometre reading on the odometer when truck arrives of route for collections.
21.	Kilometre reading on the odometer when truck leaves route to dump materials collected.
22.	Kilometre reading on the odometer when truck arrives at MRF.
23.	Kilometre reading on the odometer when truck arrives back at route for second round of collections.
24.	Kilometre reading on the odometer when truck leaves route to dump materials collected.
25.	Kilometre reading on the odometer when truck arrives at MRF.
26.	Kilometre reading on the odometer when truck arrives back at route for third round of collections (if necessary).
27.	Kilometre reading on the odometer when truck leaves route to dump materials collected (if necessary).
28.	Kilometre reading on the odometer when truck arrives at MRF (if necessary).
29.	Kilometre reading on the odometer when truck returns to yard after all collections are completed.
30.	Operator is in truck and truck is in motion, moving from one stop to the next.
31.	Operator has container/material in hand or lift and is putting material into the truck. (Material Stream 1).
32.	Operator has container/material in hand or lift and is putting material into the truck. (Material Stream 2).
33.	Operator has container/material in hand or lift and is putting material into the truck. (Material Stream 3).
34.	Spike is thrown and operator is exiting vehicle.
35.	Container has been set down and operator is walking back to truck or stepping into truck.
36.	Operator is walking towards setout and picking it up.
37.	Operator has turned away from truck and is putting container back at curbside.
38.	Operator is sorting through contents of container to remove unacceptable materials.
39.	Operator is waiting for hopper to cycle to add more materials.
40.	Keep track on back of page and make specific notes as to what is happening.
41.	Operator is speaking with public advising of proper setouts, etc.

42.	Operator is taking a coffee break, lunch break or stopped to rest and eat and/or drink.
43.	Operator is talking with his supervisor or with co-workers either in person or on radio/phone.
44.	Operator is tagging waste that has been setout improperly, may include calling this into base by house number.
45.	Operator is in truck, truck is in motion, but is also collecting materials (operator may lean out of truck and grab single garbage bag without stopping)
46.	Operator may be injured and waiting for replacement or truck may be broken down.
47.	Total time on route – to be calculated at days end.
48.	Total Ticks – sum of all ticks collected in above boxes.

4.5 CURBSIDE SETOUT DATA COLLECTION CATEGORIES

In order to further define the quantity and types of residential waste setouts being collected in the Region, the curbside collection of setout data including all waste streams and also included the form of waste setout as follows:

TABLE 4-3: DATA COLLECTED AT CURBSIDE FOR EACH STUDY AREA HOUSEHOLD

Garbage	Recycling	Organics	Leaf & Yard	Bulk Waste
- Total Setouts	- Total Setouts	- Total Setouts	- Total Setouts	- Total Setouts
- # of Bags	- # of Bags	- # of Organic Bins	- # of Cans	
- # of Cans	- # of Blue Boxes	- # of Cans	- # of Plastic Bags	
	- # of Bundles	- # of Plastic Bags	- # of Paper Bags	
		- # of Paper Bags	- # of Bundles	

4.6 ANOMALIES AND STUDY LIMITATIONS

The methods used for this study are the same where possible as those used in the past and appropriate for collecting setout and participation data and evaluating waste collection vehicle efficiency. However, the time and motion and audit data has been extrapolated from a two or four week period and therefore cannot take into consideration all intermittent/seasonal changes, including changes in leaf and yard generation.

5.0 WASTE SETOUT AND PROGRAM PARTICIPATION RESULTS

Detailed curbside setout data was collected, both on its own and as part of the time and motion studies including the type and number of containers for each waste stream for each household on a particular route. This has allowed for a detailed determination of the type and size of typical waste setouts in these particular study areas which can then be related to the time and motion data identifying the amount of time required to collect these setouts. The following sections provide a description of household setout and participation rates for the data collected in November/December 2004.

5.1 HOUSEHOLD SETOUT RATES

Household setout rates refer to the number of households which placed material at curbside for collection each week as a percentage of the total number of households. All five study areas receive weekly collection of garbage, recyclables (containers/fibres bi-weekly rotation) and organics and therefore setouts could be 100%. The following Table provides a summary of average weekly household setouts by Study Area.

TABLE 5-1: AVERAGE WEEKLY HOUSEHOLD SETOUTS

Study Area	Garbage	Organics	Recycling
St. Catharines (4 week study)	73.73%	32.97%	63.30%
Pelham (4 week study)	63.96%	43.74%	74.08%
Welland (2 week study)	84.87%	28.47%	72.37%
Niagara Falls (2 week study)	63.25%	27.33%	80.20%
Port Colborne (2 week study)	91.80%	29.19%	71.62%

5.2 PROGRAM PARTICIPATION RATES

To be considered participating in a waste management program, a household had to setout a stream of waste at least once during the data collection period (either 2 or 4 weeks depending on the study area). Separate participation rates were measured for each waste stream and have been outlined in Table 5-2 below. For example, in St. Catharines, 49.61% of the households in the study area participated in the curbside organics collection program at least once over the four week study period.

TABLE 5-2: ESTIMATED CURBSIDE PARTICIPATION RATES BY WASTE STREAM

Study Area	Garbage	Organics	Recycling
St. Catharines	94.00%	49.61%	84.20%
Pelham	91.25%	64.15%	95.03%
Welland	87.04%	32.50%	75.77%
Niagara Falls	78.89%	33.38%	80.91%
Port Colborne	95.91%	38.63%	78.89%

Additional data can be found in Appendix “B”.

5.3 GARBAGE STREAM CONTAINER SETOUTS

With the implementation of a Region-wide Organics Collection program, the Region also implemented a two-container limit for single family residential household receiving curbside garbage collection. Based on the setout data collected at curbside, it appears this container limit is being adhered to by the majority of the households examined as part of this study. Table 5-3 below, outlines the percentage of the population by study area and the number of containers they setout on an average weekly basis.

TABLE 5-3: PERCENTAGE OF HOUSEHOLDS SETTING OUT 1 OR MORE GARBAGE CONTAINERS EACH WEEK FOR COLLECTION

Containers /Week	St. Catharines	Pelham	Welland	Niagara Falls	Port Colborne
1 Container	71.4%	72.7%	67.9%	57.8%	59.8%
2 Containers	26.9%	24.8%	28.3%	37.5%	27.9%
3 Containers	1.4%	1.7%	2.7%	3.5%	7.6%
4 Containers	0.3%	0.4%	0.6%	0.5%	2.0%
>4 Containers	0.0%	0.3%	0.5%	0.7%	2.7%

A breakdown by container type (i.e. Plastic bag, rigid container, etc.) can also be found in Appendix “B”.

6.0 TIME AND MOTION DATA ANALYSIS RESULTS

The following sections provide a detailed account of time and motion data by collection vehicle as collected during the study. For additional detailed time and motion data, refer to Appendix "C".

6.1 SINGLE STREAM COMPACTED RECYCLABLES COLLECTION

Table 6-1 provides a breakdown of the time spent on-route to collect recyclables as with a standard rear packing waste collection vehicle. Additional detail can be found in Appendix "C".

TABLE 6-1: SINGLE STREAM RECYCLABLES COLLECTION

Criteria	Averages	% of Total
Weight		
Co-Mingle Recyclable:	3065 kg	n/a
Paper Recyclable:	4660 kg	n/a
Average Total:	3863 kg	n/a
Time		
Total Time on Route (min):	352 minutes	n/a
Distance		
Total Distance On-Route (km):	21 km	n/a
On Route Activities	Average time to complete each task (minutes)	% of Total
Driving Between Stops	97.87	27.82%
Loading Recyclable	75.25	21.36%
Getting Out of Truck	25.68	7.31%
Getting Into Truck	31.06	8.84%
Picking up Setout	54.04	15.35%
Setting Down Container	19.83	5.62%
Decontamination	6.05	1.72%
Cycling the Hopper	27.98	7.94%
Speaking With Public	6.63	1.88%
Coffee/Lunch Break	4.38	1.25%
Oops Tags	1.09	0.31%
Speaking With Management	2.50	0.71%
Drive and Load	0.00	0.00%
Other - Road Blocked/Stuck	0.00	0.00%
Other - Truck Problems	0.00	0.00%

6.2 GARBAGE/ORGANICS COMPACTED CO-COLLECTION

Table 6-2, provides a breakdown of the time spent on-route to co-collect garbage and organics with a vertical split (70/30) rear packing waste collection vehicle. Additional detail can be found in Appendix "C".

TABLE 6-2: GARBAGE/ORGANICS COMPACTED CO-COLLECTION

Criteria	Averages	% of Total
Weight		
Organics:	1543 kg	n/a
Garbage:	5148 kg	n/a
Average Total:	6690 kg	n/a
Time		
Total Time on Route (min):	279 minutes	n/a
Distance		
Total Distance On-Route (km):	20 km	n/a
On Route Activities	Average time to complete each task (minutes)	% of Total
Driving Between Stops	60.33	21.70%
Loading Recyclable	22.37	8.35%
Getting Out of Truck	55.70	19.13%
Getting Into Truck	3.72	1.57%
Picking up Setout	4.21	1.77%
Setting Down Container	21.39	8.61%
Decontamination	24.50	8.39%
Cycling the Hopper	0.00	0.00%
Speaking With Public	39.62	13.72%
Coffee/Lunch Break	4.98	1.41%
Oops Tags	19.21	6.86%
Speaking With Management	16.50	5.93%
Drive and Load	4.97	1.91%
Other - Road Blocked/Stuck	1.00	0.42%
Other - Truck Problems	0.50	0.21%

6.3 RECYCLING/ORGANICS COMPACTED CO-COLLECTION

Table 6-3, provides a breakdown of the time spent on-route to co-collect recycling and organics with a vertical split (60/40) side-loading, compacting, waste collection vehicle. Additional detail can be found in Appendix "C".

TABLE 6-3: RECYCLING/ORGANICS COMPACTED CO-COLLECTION

Criteria	Averages	% of Total
Weight		
Organics:	2725 kg	n/a
Co-Mingle Recyclable:	1905 kg	n/a
Paper Recyclable:	5415 kg	
Average Total:	6385 kg	n/a
Time		
Total Time on Route (min):	242 minutes	n/a
Distance		
Total Distance On-Route (km):	18 km	n/a
On Route Activities	Average time to complete each task (minutes)	% of Total
Driving Between Stops	47.60	19.62%
Loading Recyclable	53.33	22.08%
Getting Out of Truck	27.89	11.61%
Getting Into Truck	7.48	3.08%
Picking up Setout	7.48	3.08%
Setting Down Container	13.76	5.66%
Decontamination	37.73	15.56%
Cycling the Hopper	0.00	0.00%
Speaking With Public	25.46	10.53%
Coffee/Lunch Break	4.78	1.96%
Oops Tags	14.98	6.20%
Speaking With Management	0.00	0.00%
Drive and Load	1.50	0.63%
Other - Road Blocked/Stuck	0.00	0.00%
Other - Truck Problems	0.00	0.00%

7.0 COMPARISON TO PREVIOUS YEARS DATA

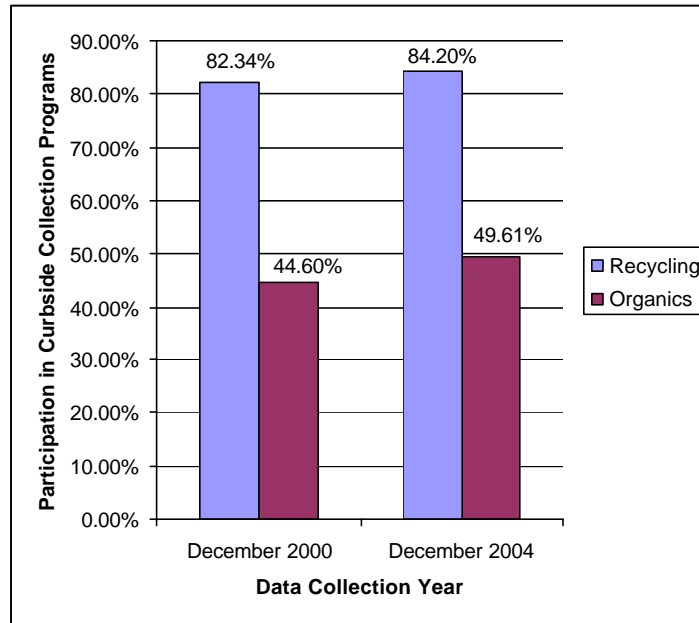
In 2000 and 2001, the Region completed extensive time and motion and setout data collection studies as part of its Organics Collection Demonstration Project. In April 2004, the Region completed its rollout of a Region-wide curbside organics collection program, and as such commissioned the completion of time and motion studies and setout data collection studies following the initial learning period to identify the level of participation in the new curbside organics collection program and to examine differences between the two methods of co-collection currently being utilized.

7.1 PARTICIPATION IN CURBSIDE WASTE COLLECTION PROGRAMS

In 2000/2001 setout and participation rate data was collected for Recycling and Organics and St. Catharines and Garbage and Organics in Port Colborne. In 2004, a greater level of detail was

collected which included all curbside collected waste streams and also included the form of setout (i.e. Bags, cans, etc.). The following figure provides a comparison of participation in recycling and organics programs in the St. Catharines study area from 2000 to 2004. As is evident in the figure, participation in both programs has increased over the past 4 years.

FIGURE 7-1: PARTICIPATION IN CURBSIDE WASTE COLLECTION PROGRAMS



7.2 COMPARISON OF DIFFERENT METHODS OF CO-COLLECTION

The following provides a comparison of the 2004 time and motion data collected as part of this study with previous time and motion data collected by the Region in 2000/2001. In order to provide the most accurate comparison, the study area and collection route were kept consistent in order to measure differences between two methods of organics co-collection. The following table has been developed based on the collection of 100 setouts (i.e. 100 stops to collect material) and therefore the collection method which requires the least amount of time to collect the 100 setouts is the most efficient method of collection on this route.

TABLE 7-1: RECYCLING/ORGANICS VS. GARBAGE/ORGANICS

Criteria	St. Catharines 2000/2001		St. Catharines 2004	
	(Recycling/Organics)		(Garbage/Organics)	
	Recycling	Organics	Garbage	Organics
Average Weekly Setout Rate	70.0%	28.9%	73.7%	33.0%
Average Weight Per 100 Setouts (kg)	691.1	855.1	1,175.2	788.0
Total Setouts	100.0	100.0	100.0	100.0
Average Weight/Setout (kg)	6.9	8.6	11.8	7.9
Program Participation Rate (%)	82.3%	44.6%	94.0%	49.6%
Activity Breakdown in Minutes	Minutes	(% of Total)	Minutes	(% of Total)
Driving Between Stops	15.55	25.40%	13.77	21.62%
Loading Organics	5.00	8.17%	5.11	8.02%
Loading Recyclable or Garbage	13.49	22.03%	12.72	19.96%
Getting Out of Truck	6.09	9.95%	0.85	1.33%
Getting Into Truck	5.11	8.35%	0.96	1.51%
Picking up Setout	0.22	0.36%	4.88	7.67%
Setting Down Container	3.48	5.68%	5.59	8.78%
Decontamination	0.54	0.89%	0.00	0.00%
Cycling the Hopper	1.52	2.49%	9.05	14.20%
Speaking With Public	0.98	1.60%	1.14	1.79%
Coffee/Lunch Break	5.00	8.17%	5.00	6.89%
Oops Tags	0.44	0.71%	3.77	5.91%
Speaking With Management	0.98	1.60%	1.14	1.78%
Drive and Load	0.00	0.00%	0.23	0.36%
Other - Road Blocked/Stuck	2.50	4.09%	0.11	0.18%
Other - Truck Problems	0.33	0.53%	0.00	0.00%
Total Time Spent on-Route:	61.23	100.0%	64.31	100.0%

It is important to note that the co-collection of Recycling/Organics was completed utilizing a side-loading collection vehicle with an operator/"thrower", which was found to be slightly more efficient than a rear-packing collection vehicle with a driver and a "thrower". The primary difference in time requirement appears to be the amount of time used to cycle the hopper. This could be explained by the difficulty of co-collection vehicles to manage large volume garbage setouts, due to the smaller capacity box configurations required to load two separated waste streams into one collection vehicle.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The time and motion and setout data collection study completed by the Region in the fall of 2004 provides the Region with updated information on waste setouts and methods of collection currently being utilized in the Region. The following provides some of the key findings/results of the study as well as recommendations for future data collection exercises.

8.1 HIGHLIGHTS OF THE STUDY FINDINGS

The following are some of the key findings/highlights of the data collected in the fall 2004 studies:

1. Participation in the Organics Collection Program ranges from approx. 35% to 65% depending on the location in the Region. This means that anywhere from 65% to 35% of the residents of Niagara are not source separating their organic waste for collection. However, it is important to note that these numbers do not include estimations for at-home reuse initiatives such as backyard composting or grass-cycling.
2. Participation in the Recycling Collection Program ranges from approx. 75% to 95% depending on the location in the Region. This means that anywhere from 5% to 25% of the residents of Niagara are not source separating their recyclables for collection.
3. The majority of residents setout only one container of garbage each week for collection. In most cases, only 2% to 3% of the households surveyed setout in excess of 2 containers of garbage each week for collection.
4. Based on a comparison of time and motion data for different methods of co-collection on the same sample households, study results indicate that Recycling & Organics co-collection is a more efficient way of collecting curbside setouts than Garbage & Organics co-collection.
5. Participation in the Recycling Program in St. Catharines has increased by 2% over the past 4 years sampling the same households. Participation in the Organics program for the same households has increased by 5%.

8.2 STUDY RECOMMENDATIONS

Based on the results of time and motion and setout data collection studies, the following is recommended:

Recommendation No. 1 – Additional setout data collection

Future setout data collection studies should be conducted in the Region sampling households, and demographics that have not been sampled to date to ensure the accuracy of the setout data being collected, and its representativeness of the greater area/demographic.

Recommendation No. 2 – Additional time and motion data collection

Time and motion data should be collected on single-stream compacted garbage collection and single stream compacted organics collection so that the Region has a data set which will include Recycling/Organics Collection and Garbage/Organics co-collection, single stream compacted recyclables collection and single stream compacted organics collection and single stream compacted garbage collection. This will allow the Region to compare all methods of collection currently being utilized.

Recommendation No. 3 – Update data as changes are made to the way waste is managed

Time and motion data and setout data should be updated as new methods of waste collection are implemented and as new curbside waste collection programs or changes to the current level of service are implemented.