

**FINAL REPORT**  
**City of Toronto Recycling**  
**Container Pilot Project**  
**Summary**

**Stewardship Ontario**

**Project No. 1045190**

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## **PROJECT NO. 1045190**

PROPOSAL TO:                   **Technical Services  
Stewardship Ontario  
26 Wellington Street East, Suite 601  
Toronto, Ontario, M5E 1S2**

ATTN:                           **John Dixie**

RE:                               **City of Toronto Recycling Container Study  
Summary**

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**March 31, 2009**

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## EXECUTIVE SUMMARY

On May 14, 2007 the City of Toronto's Solid Waste Management Services Division reported on methods to fund the cost of the Solid Waste Management program, including proposed diversion initiatives. In the report, staff recommended the adoption of a new diversion rate of 70% by 2010 and provided Solid Waste Management program recommendations designed to achieve that target.

Since that time, the City has been implementing different diversion programs including:

- Accepting new materials for recycling;
- Pilot testing source separated organics collection in multi-residential buildings;
- Implementing a volume-based solid waste rate structure; and,
- Implementing a City-wide roll out of cart based recycling collection.

The decision to change from the traditional blue box collection container came after nearly three years of analyzing different recycling set out options. Stewardship Ontario provided funding through its Effectiveness and Efficiency Fund to the City to study the recycling options.

The studies that took place include:

- Two pilot studies;
  - Scarborough Pilot Study – assessed the use of four different recycling set out options
  - Downtown Pilot Study – studied the use of the Cart for recycling collection in high density residential areas
- A time and motion study of the four recycling set out options used in the Scarborough Pilot;
- A survey of households participating in the Scarborough and Downtown Pilots;
- Two focus groups with participants of the Scarborough Pilot;
- A waste audit of 160 households prior and during the Scarborough Pilot; and,
- An ergonomics study of collections during the Scarborough Pilot.

### Scarborough Pilot

The City of Toronto started their evaluation by assessing the set out of four collection container options in Scarborough. The four different setout alternatives which were tested in separate study areas within Scarborough included:

1. Bi-weekly (240L) Fully-Automated Cart Collection (Cart Area) – a large wheeled cart with lid, to store and set out recyclables every two weeks;
2. Weekly Blue Box Collection (Weekly Area) – switch to weekly recyclables collection with no additional containers provided;
3. Bi-Weekly Blue Bag System (Bag Area) – special transparent blue plastic recycling bags provided by the City; and,
4. Bi-weekly Blue Box Collection (Control Area) – maintain every two week recyclables collection.

The setout study revealed that the **Cart Area**, which used the 240L recycling containers, had the **highest average setout rate and participation rate** over all the other recycling programs for all Phases of data collection. Participation rates for the Cart Area were as high as 95%, while average setout rates were as high as 87%.

## Time and Motion Study

A Time and Motion Study was conducted once in each of the four pilot Scarborough Pilot areas. The purpose of the study was to assess the time difference between collecting recyclables placed in the cart and bag as well as recyclables placed in the blue box for weekly and bi-weekly collection.

Results of the study indicated that the Bag Area was the most efficient to collect because there were no containers to return to the curb after they were emptied. The Cart Area took marginally more time than Blue Box collection; however, this may have been due to the fact that the collection operator did not have extensive experience operating the automated arm. Table ES-1 compares the collection times.

**Table ES-1 Collection Time in Each of the Four Pilot Areas**

	Cart Area	Weekly Area	Bag Area	Control Area
No. of Seconds	1336	786	706	1235
Households set out	86	80	77	85
Seconds per Household	15.53	19.66 (9.83 x 2 wks)	9.17	14.53
Increase/(Decrease) per Route over Control	10 minutes	Not Comparable – would need to include second collection day	(54 minutes)	-

## Household Surveys

A household survey was conducted for participants in the Scarborough and Downtown Pilot Studies. Over 1,600 households responded to the survey out of approximately 3600 that were provided the questionnaires.

The Scarborough survey showed that overall the Cart Area had the highest satisfaction rate (93% of respondents rated the program as an 8 to 10). The Control Area was the least satisfied and, therefore, any of the pilot options were preferable to the current recycling containers. While all of the pilot groups reported an increase in the rate of recycling, the highest increase in recycling was from the Cart Group. Respondents preferred the cart over the current bi-weekly blue box collection for its convenience of use, ease of bringing it to the curb, storage capacity, ability to keep streets and sidewalks clean, durability and ease of storage.

The Downtown survey found that some residents experienced issues with the carts, but that the majority of residents preferred the carts to the current bi-weekly blue box system. The majority of survey respondents approved of the concept of using the cart for recycling and liked the cart provided by the City. Larger households were especially receptive to the cart.

The Downtown survey findings illustrated that some downtown households have concerns about the cart. Specifically that the cart is difficult to store, hard to move up stairs or on hills, and may be too heavy for some residents such as seniors or residents with mobility challenges. For example, the 240 litre cart did not always fit between houses or in laneways and some households had to store the cart in front of their house. Many residents who experienced difficulties with the cart said they'd like a smaller or narrower cart to make it easier to store and use.

## Focus Groups

The purpose of the focus groups was:

- To discuss the findings from the Scarborough Pilot study survey;
- To determine if the addition of two new materials into the recycling streams impacted the opinions of the respondents; and,
- To ask further questions on the pilot survey findings.

A total of 13 people attended the meetings (seven respondents were in the first group and six in the second). The groups were varied, containing a mix of age and genders as well as participants from each of the pilot areas (cart, bag, weekly, and control).

Participants in the focus groups were very supportive of recycling in general, but there was an indication that the currently bi-weekly collection of recycling was not adequate. Overall, the cart was the preferred container/method for collecting recyclables, prior to and during cost consideration. Participants felt very positively towards the cart because it was easy to use, required no separation of recyclables, had a large capacity resulting in fewer trips to the curb, it is easy to wheel around, there was a low risk of injury to the user, it was tidy and rodent proof, weather proof and easy to store. On the negative side, there were no liners for the cart and it was difficult to clean, the wheels may weaken and wear, it is difficult to move around for seniors or residents with mobility challenges, and it may be difficult to move in small spaces. Of the alternatives tested, the cart was the most strongly supported as it was considered both convenient and practical.

Respondents reacted favourably to the idea of the addition of polystyrene and plastic bags as new materials in the recycling stream, although some respondents thought these materials were already accepted in the recycling program. The cart was identified as the best option for handling these new items.

## Waste Audits

Two single-family waste audits were performed, one in the spring of 2005 and another in the spring of 2006. The 2005 waste audit provided waste composition data from homes participating in the “status quo” waste management system. The 2006 waste audit was conducted during the Scarborough Pilot Study and provided waste composition data from homes participating in the four pilot study areas.

The 2005 waste audit results indicated that on average, single-family homes were diverting approximately 58%<sup>1</sup> of waste from landfill through the blue box and green bin programs. The average home generated approximately 14.4 kg of waste per week of which 3.8 kg was placed in organics; 4.6 kg in recycling; and, 6.0 kg in the garbage. If all potentially divertible materials were captured in the green bin or blue box, a 79% waste diversion rate could be achieved.

Area A captured the largest amount of recyclable material with 5.15 kg/household/week, while Area C captured the least with 4.13 kg/household/week. Area A had the highest overall capture rate for recyclable material at 84.9% while Area D had the lowest at 75.8%. Recycling stream contamination was highest in Area B and lowest in Area C.

The 2006 waste audit indicated that on average, single-family homes were diverting approximately 72% of waste from landfill via the blue box and green bin programs. The average home generated approximately 12.5 kg of waste per week of which 3.91 kg was placed in organics; 5.08 kg in recycling;

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<sup>1</sup> Stewardship Ontario reports slightly different diversion rates as they incorporate additional diversion into their calculations such as diversion through the leaf and yard waste program. Data reported was taken from the actual waste audits which took into account diversion via curbside organics and recycling programs only.

**RECYCLING CONTAINER PILOT STUDY SUMMARY**

and, 3.5 kg in the garbage. If all potentially divertible materials were captured in the green bin or blue box, an 89% waste diversion rate could be achieved.

The Cart Area captured the largest amount of recyclable material with 5.64 kg/household/week, while the Weekly Area captured the least with 5.09 kg/household/week. The Weekly Area had the highest overall capture rate for recyclable material at 90.3% while the Bag Area had the lowest at 86.8%. Overall, the difference in capture rates between the groups was only 3.5%. Recycling stream contamination was highest in the Bag Area and lowest in the Weekly Area.

The quantity of materials placed at the curb for recycling increased in all four study areas from 2005 to 2006. Area A/Cart Area captured the most recycling in both 2005 and 2006. Recycling capture rates increased in all four study areas from 2005 to 2006. Contamination decreased in Area B/Weekly Area from 2005 to 2006, but increased in all three of the other study areas. Area C/Bag Area saw an increase in contamination by 0.6 kg/household/week; the largest increase in contamination of any of the four study areas.

**Downtown Pilot**

Five neighbourhoods in downtown areas were chosen with representative characteristics such as dense housing, narrow or no driveways, limited storage areas, hills, and on-street parking.

The pilot lasted four months. Cart set out rates and fullness were monitored on collection days. Carts were collected with a rear packer truck retrofitted with a semi-automated tipping arm to facilitate emptying on narrow streets with on-street parking.

Collections crews were able to pick up the recycling carts at the curb in the downtown areas. However, collection worked best when the trucks' access to the carts wasn't restricted by parked cars. Using a semi-automated system required the collections crews to manually roll the cart into position 100% of the time. The results suggested that a fully-automated system would not be able to access the cart set outs and that a semi-automated system would be required for downtown areas with on street parking.

**Ergonomics Assessment**

An ergonomics study of each of the four Scarborough Pilot Areas was carried out to determine which recycling container system would best ensure worker safety. The vehicles used to collect the waste during the study were one-person side loaders.

Results show the pilot methods (i.e.; Cart, Blue Bag, and Weekly Blue Box) were ergonomically preferable to the current bi-weekly collection (i.e.; Control).

The cart was ranked as the most ergonomically preferred option of the pilot program as there is little to no manual lifting required. This reduces the risk for injury to the back, shoulder, elbow, and wrist from lifting and physical fatigue. One drawback of the cart identified during the study was that along streets with parked cars, the collection vehicles often do not have direct access to the cart. In this case, the worker would be required to manually roll the cart into position, which can be a risk factor for an over-exertion injury. Collections crews rarely had to manually roll the cart into position however, because cars were not often parked on the street.

**City-Wide Implementation**

The results of these evaluations led the City to implement the new recycling program. In 2007-2008, the City implemented a City-wide cart system for the collection of recyclable materials for single-family households to support the achievement of their goal of 70% diversion by 2010. By July 2008, recycling carts had been provided free of charge to 450,000 residences. It was estimated that an additional 15,000 tonnes annually of recyclable material would be diverted through the program, once it was fully operational.

**RECYCLING CONTAINER PILOT STUDY SUMMARY**

Concurrent to the roll out of the City-wide cart based recycling system for single family households, the City implemented the cart based waste collection system. The cart based systems have enabled the City to implement a volume-based rate structure for funding the cost of the waste management program for single-family and multi-residential households. The cost of waste and recycling has been removed from the property tax base and instead has been added to a new household joint water and waste utility bill.

Despite the capital expenditure to purchase the recycling carts and operating costs to implement the program, the City determined that there would be no increase in operating costs within two years of the start of the program. Disposal avoidance costs, Waste Diversion Ontario (WDO) funding and revenue generated from the sale of the additional recyclable material offset the costs to operate the program.

# REPORT

## 1.0 INTRODUCTION

### 1.1 Overview of City of Toronto Waste Diversion Strategy

The City of Toronto converted its 2-stream recycling system to single stream in 2004. The following year, the City adopted a Multi-Year Solid Waste Business Plan, which recommended implementing programs to increase the City's waste diversion rate to 60% by 2008. It was estimated that the new programs required to achieve this waste diversion rate would increase the operating budget by 7% a year. In 2007, it was recommended that the City's Solid Waste Management Services Division report on a strategy to fund the diversion initiatives proposed in the Business Plan. On May 14, 2007 the City's Solid Waste Management Services Division reported on methods to fund the cost of the Solid Waste Management program, including the proposed diversion initiatives. In the report, staff recommended the adoption of a new diversion rate of 70% by 2010 and provided Solid Waste Management program recommendations designed to achieve that target.

Since that time, the City has implemented different diversion programs including:

- Pilot testing source separated organics collection in multi-residential buildings;
- Implementing a volume-based solid waste rate structure for both multi-unit dwellings and single family dwellings; and,
- Implementing a City-wide roll out of cart based recycling collection.

The decision to change from the traditional blue box collection container came after nearly three years of analyzing different recycling set out options. Stewardship Ontario provided funding through its Effectiveness and Efficiency Fund to analyze the recycling options.

The studies that took place included:

- Two pilot studies;
  - Scarborough Pilot Study – assessed the use of four different recycling set out options
  - Downtown Pilot Study – studied the use of the Cart for recycling collection in high density residential areas
- A time and motion study of the four recycling set out options used in the Scarborough Pilot;
- A survey of households participating in the Scarborough and Downtown Pilots;
- Two focus groups with participants of the Scarborough Pilot;
- A waste audit of 160 households prior and during the Scarborough Pilot; and,
- An ergonomics study of collections during the Scarborough Pilot.

The results of these studies, and what led the City to implement the new recycling collection program, are described in the following sections.

## 2.0 RESULTS OF THE SCARBOROUGH PILOT STUDY

### 2.1 Scarborough Pilot - Set Out Study Overview

The City examined four different curbside setout alternatives, in order to find a system that could manage the City's current single stream of recycling materials and provide opportunities for achieving increased recycling capture rates. The four different setout alternatives were tested in Scarborough:

**RECYCLING CONTAINER PILOT STUDY SUMMARY**

1. Bi-weekly (240L) Fully-Automated Cart Collection (Cart Area) – a large wheeled cart with lid, to store and set out recyclables every two weeks;
2. Weekly Blue Box Collection (Weekly Area) – switch to weekly recyclables collection with no additional containers provided;
3. Bi-Weekly Blue Bag System (Bag Area) – special transparent blue plastic recycling bags provided by the City; and,
4. Bi-weekly Blue Box Collection (Control Area) – maintain every two week recyclables collection.



**Cart Area Set Out**



**Bag Area Set Out**

The City retained a consultant to monitor each of the four pilot program study areas by collecting both quantitative and qualitative set out information. The monitoring took place once every season (i.e. Autumn, Winter, Spring and Summer) over a period of four consecutive collection weeks, in four distinct pilot areas. The four phases of monitoring took place on the following dates:

Phase 1:	Phase 3:
• October 6, 2005	• March 30, 2006
• October 13, 2005	• April 6, 2006
• October 20, 2005	• April 13, 2006
• October 27, 2005	• April 20, 2006
Phase 2:	Phase 4:
• January 12, 2006	▪ June 1, 2006
• January 19, 2006	▪ June 8, 2006
• January 26, 2006	▪ June 15, 2006
• February 2, 2006	▪ June 22, 2006

The pilot areas are bordered by Victoria Park Avenue in the West, Midland Avenue in the East, Eglinton Avenue in the South and Lawrence Avenue in the North (see **Appendix A** for a map of each pilot area). These routes were identified by the City as having similar housing, participation and recycling trends. Each route has approximately 620 households. Data was collected for each of the single-family dwelling units located along the set collection route. Data collected included information

on the recycling, organics and garbage materials placed at the curb. Once all field data was collected, data sheets were entered into Microsoft Excel spreadsheets. The spreadsheets were used to generate summary statistics for each of the routes.

## 2.2 Scarborough Pilot - Set Out Study Results

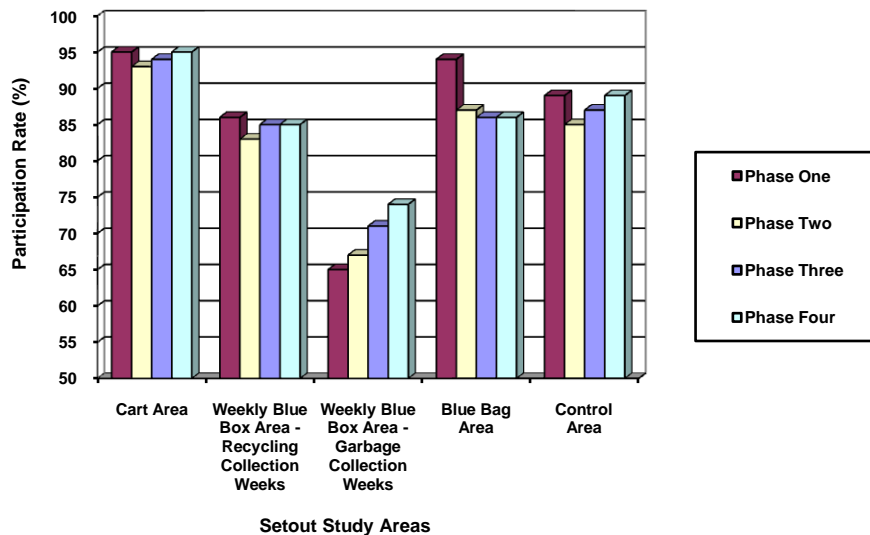
### 2.2.1 Recycling Material

The setout study revealed that the **Cart Area**, which used the 240L recycling containers, had the **highest average setout rate<sup>2</sup> and participation rate<sup>3</sup>** over all the other recycling programs for all Phases of data collection. Participation rates for the Cart Area were as high as 95%, while average setout rates were as high as 87%.

The results also showed that the **Weekly Blue Box Area**, which set out the traditional blue box every week, had the **lowest average setout rate (which was to be expected due to the increased frequency of collection) and the lowest average participation rate** over all the other recycling programs for all Phases of data collection. The participation rates and average setout rates for the Weekly Blue Box Area were as low as 65%.

Figure 2.1 below illustrates the recycling program participation rates for each phase of the setout study, for each Pilot Area.

**Figure 2-1 Recycling Participation Rates for Each Phase**



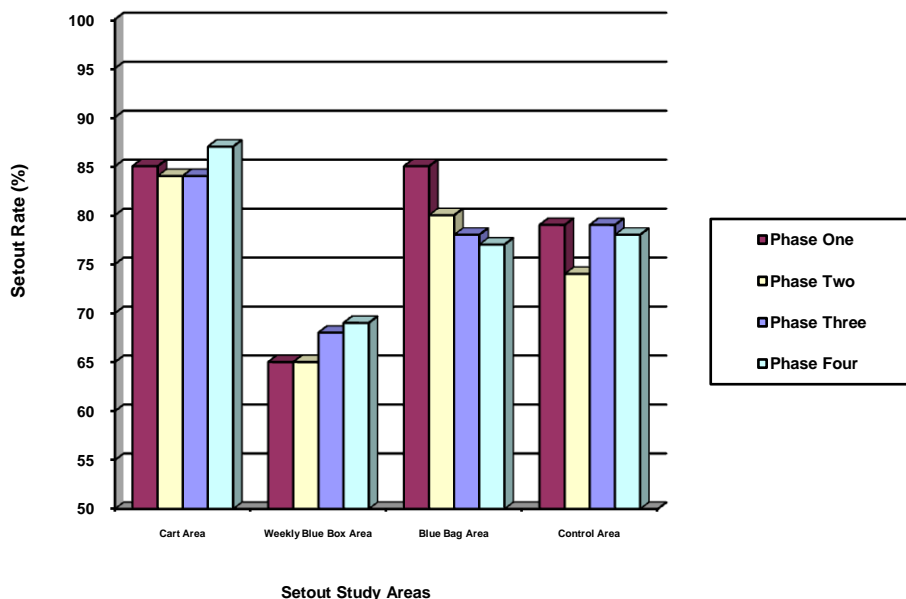
\*Note that the Weekly Blue Box Area is broken down to show the participation rate for weeks one and two separately from weeks three and four. This is because the Weekly Blue Box Area is the only setout study area that collected information regarding recycling during each week of the data collection.

<sup>2</sup> Setout rates were calculated by counting the number of households in a study area that set out recycling on each collection day divided by the total number of households in that study area.

<sup>3</sup> Participation rates were calculated by counting the number of households in a study area who set out recycling at least once over the four week period of each Phase, divided by the number of households in that study area.

Figure 2.2 illustrates the recycling program average set out rates for each phase of the setout study, for each Pilot Area.

**Figure 2-2 Recycling Set Out Rates for Each Phase**



**2.2.2 Source Separated Organics (SSO)**

The **Weekly Blue Box Area** had the **highest average setout rate for Green Bins** over any other setout study area for all Phases of data collection, with rates as high as 75%. The **Control Area**, which set out the traditional blue box every other week, however, had the **lowest average setout rate and the lowest average participation rate for Green Bins** over any other setout study area for all Phases of data collection. Participation rates were as low as 75%, while average setout rates were as low as 66%.

The **Weekly Blue Box Area** also had the **most occurrences of the highest participation rates for Green Bins** over the other setout study areas for all Phases of data collection, with rates as high as 85%.

**2.2.3 Residual Waste**

While it was not requested that the project calculate the setout rates for garbage, the consultant also collected residual waste setout and participation rates to allow for the analysis of all wastes being managed at curbside. The results showed that the **garbage setout rates ranged from between 74% to 87%** over the course of the setout study.

It was noted that **similar contamination trends of the recycling stream were observed for all of the Pilot Areas**. These contaminants included: polystyrene, bakery packaging, plastics (i.e. bags, wrap, film, fruit boxes, pails, water bottle packaging), fast food containers (i.e. coffee/drink cups), metal (i.e. hangers, frames, brackets), textiles, and electronics.



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## 2.3 Scarborough Pilot - Time and Motion Study

A Time and Motion Study was conducted once in each of the four Scarborough pilot areas. The purpose of the study was to assess the time difference between collecting recyclables placed in the cart and blue bags as well as recyclables placed in the blue box for weekly and bi-weekly collection.

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### 2.3.1 Time and Motion Data Collection

A route within each pilot study area was selected for the time and motion study. A City staff member rode in the collection vehicle with collection staff and documented the time it took for them to complete tasks while collecting curbside material. The following information was collected by the City staff member.

#### Collection Overview:

- Date
- Truck Number
- Truck Type (side loader, rear packer, etc.)
- Pilot Area
- Collection type
- Streams collected
- Collection Frequency
- Arrival on Route (time and odometer reading)
- Depart on Route (time and odometer reading)
- Total on route collection time (in hours)
- Time interval
- Weather
- Notes (e.g., a lot of material at the curb.)
- Street address
- Odometer
- Start time

#### Timed Activities:

- Drive time to route
- Walk without load
- Carrying (organics, recycling, garbage)
- Loading (organics, recycling, garbage)
- Returning container (organics, recycling, garbage)
- Material rejection
- Break(s)
- Cycle

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### 2.3.2 Time and Motion Results

Results of the study indicated that the Bag Area was the most efficient to collect because there were no containers to return to the curb after they were emptied. The Cart Area took marginally more time than Blue Box collection; however, this may have been due to the fact that the collection operator did not have extensive experience operating the automated arm. Table 2-1 compares the collection times.

**Table 2-1 Collection Time in Each of the Four Pilot Areas**

	<b>Cart Area</b>	<b>Weekly Area</b>	<b>Bag Area</b>	<b>Control Area</b>
No. of Seconds	1336	786	706	1235
Households set out	86	80	77	85
Seconds per Household	15.53	19.66 (9.83 x 2 wks)	9.17	14.53
Increase/(Decrease) per Route over Control	10 minutes	Not Comparable – would need to include second collection day	(54 minutes)	-

## 2.4 Scarborough Pilot - Public Input

Two methods were used to solicit feedback from the public regarding the Scarborough Pilot Study: a Household Survey; and, Focus Groups. The Household Survey was provided to 2,400 households. Over 1,100 questionnaires were completed, resulting in a 47% response rate. Two Focus Groups were formed, comprised of a total of 13 participants. Details for the survey and the groups are outlined below in Sections 2.4.1 and 2.4.2.

### 2.4.1 Household Survey Results

#### 2.4.1.1 Methodology

Northstar Research Partners, with the City, developed a four-page questionnaire that was mailed to a representative sample of individuals from each of the four recycling pilot areas (Carts, Bags, Weekly, Control). Each respondent received a package containing a cover letter, questionnaire, and stamped return envelope. Respondents were given approximately one month to complete and return the questionnaire. Approximately 600 questionnaires were sent to each area (2400 in total). Approximately half (300) of the questionnaires sent to each area were returned. Care was taken to ensure that demographics were well represented by the questionnaire. The number of respondents in each area was:

- Cart Area = 364
- Weekly Area = 256
- Bag Area = 254
- Control Area = 255

#### 2.4.1.2 Results

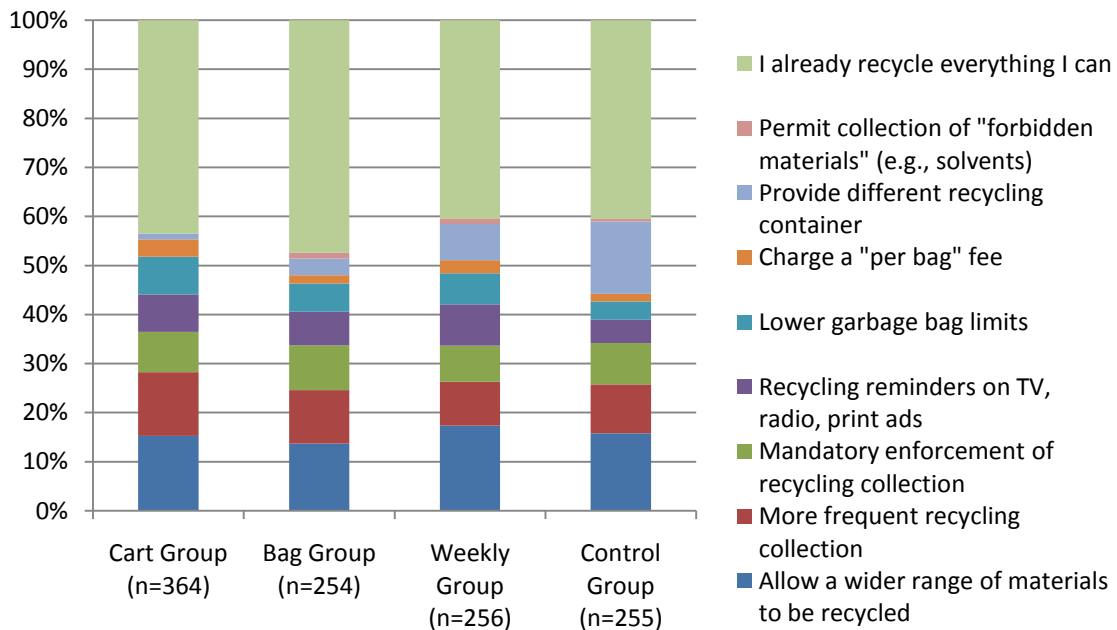
##### ***Recycling Practices***

The survey results regarding recycling practices in general indicate most respondents in each area are committed to recycling; at least 88% of respondents in each area say they always recycle. The majority of those that recycle do so because they feel it is the right thing to do and, for the most part, respondents are aware of what is accepted in the recycling program. The survey did reveal that additional education may be needed to explain how to recycle drink boxes, aluminum trays, and paint and aerosol cans.

Only a small number of respondents admitted to not recycling. The most cited reason was that the respondent was not sure what is recyclable.

Although a large number of respondents already recycle ( $\geq 88\%$ ), respondents had suggestions on how to increase the rate of recycling. Figure 2-3 illustrates most respondents believe the way to increase recycling rates is to allow a wider range of materials to be recycled. It was also thought that more frequent recycling collection would increase recycling as well. The majority of survey respondents already recycle everything permitted in the recycling program. Of interest is the fact that, for the Control Group, one out of five respondents (19%) would like more frequent collection, but one in four (28%) would like a different recycling container.

**Figure 2-3 Suggestions to Encourage Recycling - Top Mentions**

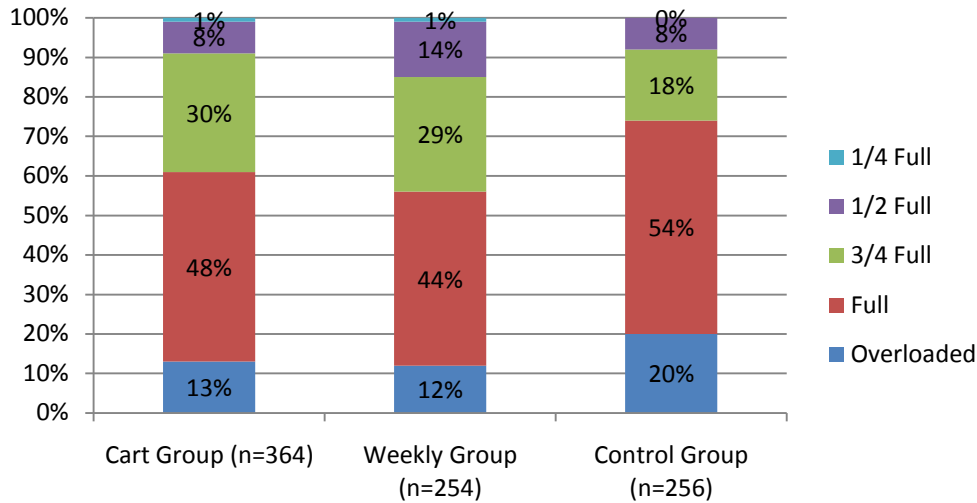


Behaviour of the respondents during the pilot program was also evaluated by the respondents themselves. The majority of respondents ( $\geq 80\%$ ) report they put their recyclable materials out on every collection day. Those respondents who were part of the Control Area and the Bag Area were most likely to put their recyclables out for every collection opportunity (89% and 94%, respectively). One explanation for this behaviour is that both the Control and Bag Area had limited sized containers and therefore could not hold as much as the larger cart or be placed out for collection as frequently as the Weekly Area.

**Fullness**

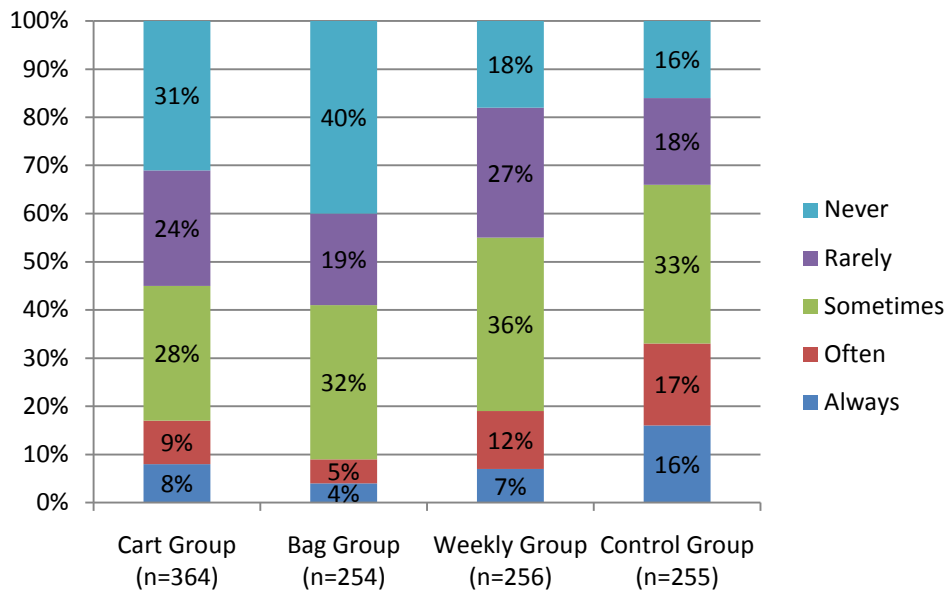
The fullness of the containers and number of bags set out for collection was evaluated. Respondents from the Cart Area and Weekly Area reported less incidence of overflow, while at least 7% more respondents in the Control Area reported an overloaded container (Figure 2-4). For respondents using the bags, 74% of them used two or more bags per collection.

**Figure 2-4 Fullness of Container at Time of Collection**



Respondents were also asked how often their recycling containers were overflowing. The highest incidence of container overflow was identified by the Control Group (16%). The Cart Group and Weekly Group also had some overflow issues (8% and 7%, respectively), while the Bag Group had the least problem with overflow (4%). The Bag Group was permitted to have an unlimited number of bags on collection day. Figure 2-5 illustrates the results.

**Figure 2-5 Frequency of Recycling Overflow**



When a recycling container was considered to be overflowing by a respondent, very few respondents put their recyclables in the garbage (Table 2-2). Most often, excess recyclables were saved until the next collection day or put into a different container for recycling.

**Table 2-2 Solution to Overflow Issues**

	Cart Group (n=359) %	Bag Group (n=249) %	Weekly Group (n=254) %	Control Group (n=247) %
I wait until the next collection day	34	15	38	25
I leave the extra recyclables in a bag or cardboard box	28	12	43	60
My container doesn't run out of room/do not run out of bags	25	39	22	14
I use my blue box for the extra recyclables	24	30	n/a	n/a
I put the recyclables in the garbage	3	2	1	3
I do something else (unspecified)	3	3	-	2
I use the neighbour's/extra box	3	-	7	6
I call for more bags	n/a	17	n/a	n/a
I buy recycling bags	n/a	3	n/a	n/a

The pilot program itself was also evaluated by the respondents. Each group had a slightly different satisfaction rate with the program. Overall the Cart Area had the highest satisfaction rate (93% of respondents rated the program as an 8 to 10). The average ratings for each group were as follows:

- Cart Area - 9.3
- Weekly Area - 9.1
- Bag Area - 8.2
- Control Area - 7.6

Results show the Control Area is the least satisfied and, therefore, any of the pilot options are preferable to the current recycling containers.

### Satisfaction with Recycling Containers

Satisfaction with the pilot program was also categorized according to subgroup. Overall, carts were given the highest satisfaction rating across all groups. Weekly collection was not satisfactory to those respondents in a mid-level income household (Table 2-3).

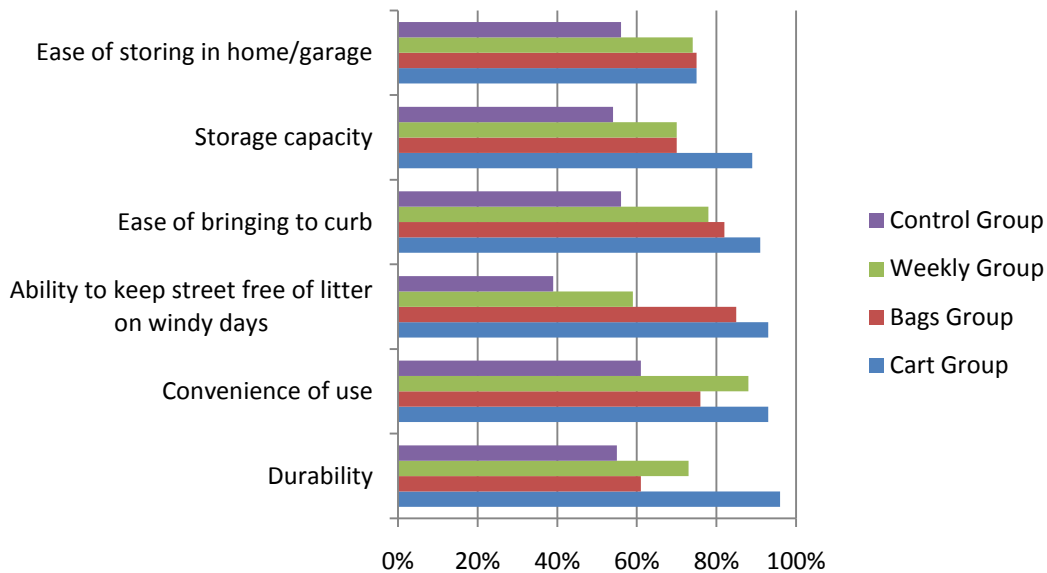
**Table 2-3 Overall Satisfaction with Pilot - By Subgroup**

	Cart Group (n=359) %	Bag Group (n=249) %	Weekly Group (n=254) %	Control Group (n=247) %
<b>Gender</b>				
Male	94	73	88	62
Female	92	77	89	69
<b>Household Income</b>				
Under \$50,000	92	85	91	68
\$50,000 to \$99,999	94	74	84	71
\$100,000 or more	94*	73*	90*	58*

\*Result based on a small base size.

Respondents were asked to assess specific attributes of the system they were testing, including; durability, convenience of use, ability to keep street free of litter on windy days, ease of bringing to curb, storage capacity, and ease of storing in home/garage. The cart was favoured in all attributes. The Control Area found it difficult to keep streets free of litter. Figure 2-6 illustrates the findings.

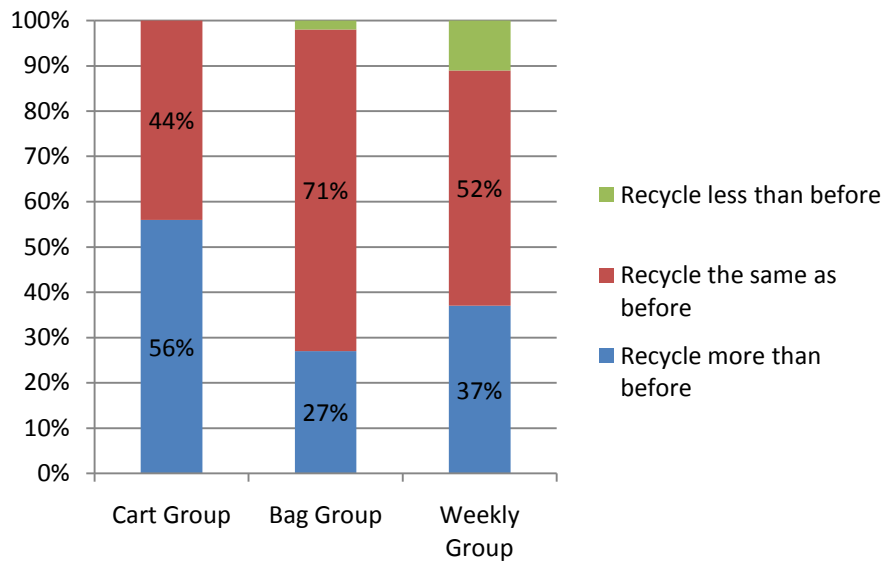
**Figure 2-6 Rating of Specific Pilot Attributes**



**Comparative Performance**

Lastly, the respondents were asked to compare the Pilot Program to the existing bi-weekly blue box system. While all of the pilot groups reported an increase in the rate of recycling, the highest increase in recycling was from the Cart Area (Figure 2-7). The change in recycling rate did not vary among gender and household income subgroups. For the Bag Area, respondents in lower income households are more likely to recycle more with bags than under the current recycling system.

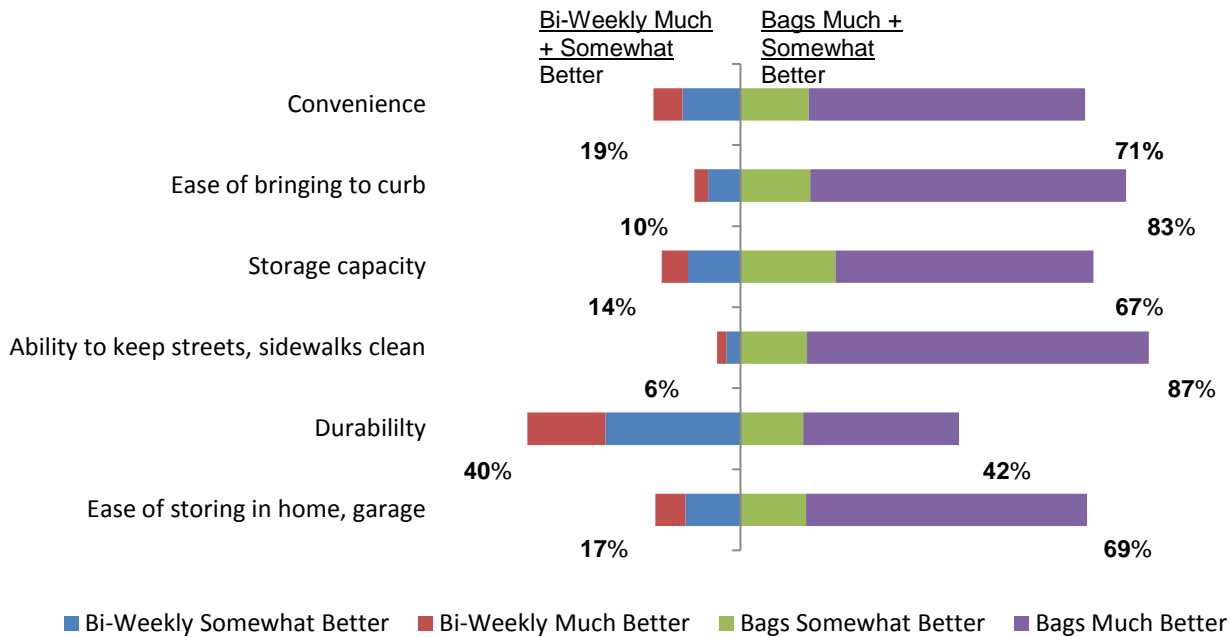
**Figure 2-7 Rate of Recycling – Comparison to Existing Bi-Weekly Collection System**



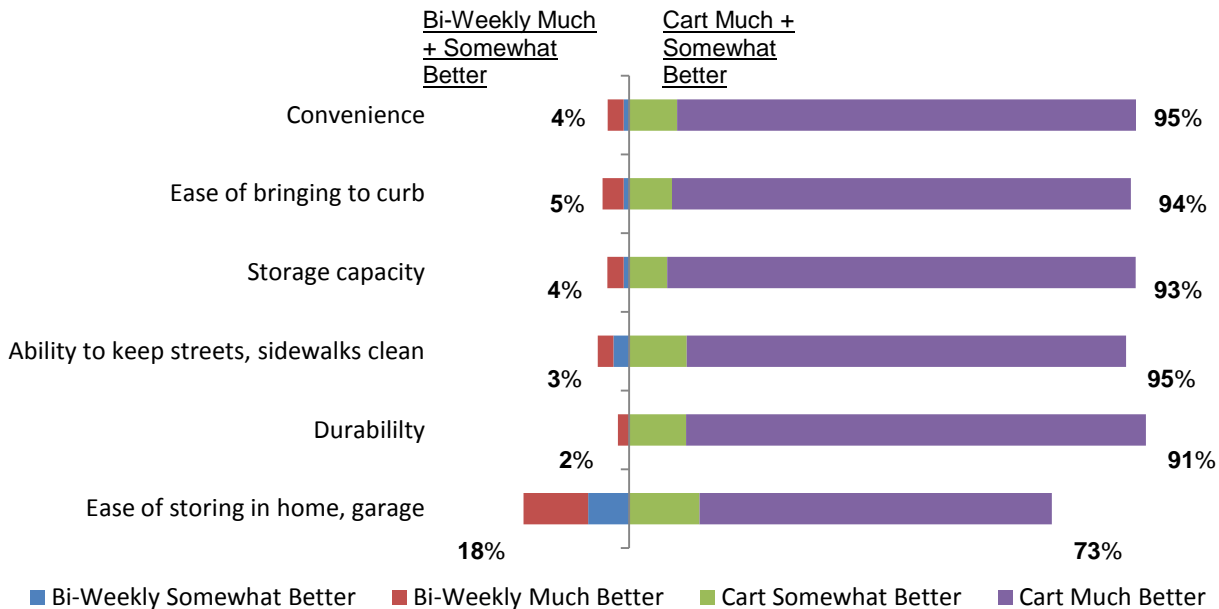
Almost all respondents in the Cart Area (97%) preferred the cart over the bi-weekly system. Respondents in the Bag and Weekly Areas also favoured their method of collection over the bi-weekly collection (79% and 86%, respectively).

A comparison of each of the pilot programs to the existing bi-weekly collection system was conducted according to the specific attributes outlined in Figure 2-6. The results are shown in Figures 2-8, 2-9 and 2-10.

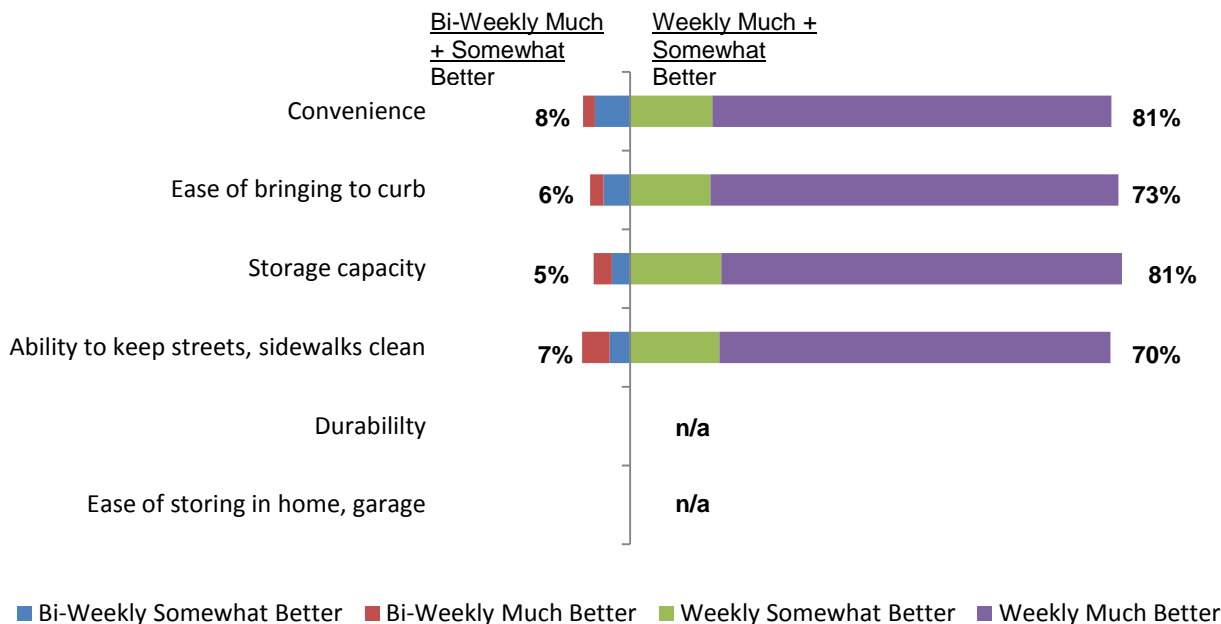
**Figure 2-8 Comparative Performance on Specific Attributes - Bags**



**Figure 2-9 Comparative Performance on Specific Attributes - Cart**



**Figure 2-10 Comparative Performance on Specific Attributes - Weekly**



**Willingness to Purchase Containers**

Respondents were asked about their willingness to purchase the pilot containers. From the Cart Group, only 37% would be willing to purchase the cart. But for those who would be willing, they would pay up to \$50/cart. From the Bag Group, 18% would regularly purchase bags, 20% would occasionally purchase bags, and 62% would not purchase bags. Respondents thought the cart was a better value, that the bags would cost more in the long term.

**2.4.2 Focus Group Results**

**2.4.2.1 Methodology**

The purpose of the focus groups were:

- To discuss the findings from the pilot study survey;
- To determine if the addition of two new materials into the recycling stream impacted the opinions of the respondents; and,
- To ask further questions on the pilot survey findings.

Two focus groups were held in April 2006. Each group met for 1.5 hours and a total of 13 people attended the meetings (seven respondents were in the first group and six in the second). The groups were varied, containing a mix of age and genders as well as participants from each of the pilot areas (cart, bag, weekly, and control).

**2.4.2.2 Results**

The following points summarize the general findings of the focus groups:

- Participants in the focus groups were very supportive of recycling in general.
- There was indication that the currently bi-weekly collection of recycling was not adequate.



**RECYCLING CONTAINER PILOT STUDY SUMMARY**

- While some respondents said they would pay a \$50 fee for the cart if necessary as opposed to \$0.40 per bag, others still preferred weekly pick-up in their existing containers. That being said, the cart was still preferred over weekly pickup.
- Respondents use City produced information on recycling.
- There was some confusion over separating recyclables – some didn't realize it was no longer required, while others are cynical about recycling since they no longer have to separate recyclables.
- Respondents would like to see the rate of recycling in apartments and business increase.
- The focus group also felt manufacturers/producers should be reducing packaging.
- Respondents reacted favourably to the idea of the addition of polystyrene and plastic film as new recycling streams, although some respondents thought these materials were already accepted in the recycling program. The cart was identified as the best option for handling these new items.

**Comments on the status quo Control Area include:**

- The program often results in overflowing containers, rodent infestation, damage to containers from the collection workers who throw them, and the cost of additional containers is prohibitive.
- Indirectly, the group felt the status quo encourages people to buy products with less packaging.

**Regarding the Cart, respondents stated:**

- They felt very positively towards the cart because it was easy to use, required no separation, had a large capacity resulting in fewer trips to the curb, it is easy to wheel around, there was a low risk of injury to the user, it was tidy and rodent proof, weather proof and easy to store.
- On the negative side, there were no liners for the cart and it was difficult to clean, the wheels may weaken and wear, it is difficult to move around for seniors and the disabled, and it may be difficult to move in small spaces.
- Of the alternatives tested, the cart was the most strongly supported as it was both convenient and practical.

**Respondents in the Bag Area felt that:**

- The bag was inconvenient, of poor quality, awkward and inefficient.
- The bags were easy to tear, flimsy, vulnerable to tampering, awkward to store, heavy when full, non-biodegradable, inefficient, resulted in more trips to the curb and it was time consuming to open each bag.
- On the positive side, the bags kept the recyclables dry and users did not have to worry about broken recycling containers.

**Those respondents who received weekly pickup noted:**

- They had less of a problem with the accumulation of recyclables.
- For some users, weekly pickup still did not eliminate overflow problems.
- They also felt, there was more waste regarding workers and equipment with weekly pickup and that moving recycling containers on a weekly basis was cumbersome and inconvenient.

Overall, the cart was the preferred container/method for collecting recyclables, prior to and during cost consideration. Some participants were willing to pay up to \$50 for the cart themselves if necessary.

Questions were also asked regarding the information resources utilized for recycling information. People generally rely on the information provided by the City, labels on products, and their own common sense. Most of the respondents were not aware of the City's waste diversion goals. Although people felt they recycle as much as possible, they noted additional opportunities for recycling exist if the curbside program were expanded to accept such items as electronic equipment, batteries, broken glass, and old pots and pans.

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## 2.5 Scarborough Pilot - Waste Audit Results

Two single-family waste audits were performed by Jacques Whitford Stantec Limited on behalf of the City of Toronto. One audit was conducted in the spring of 2005 and another in the spring of 2006. The 2005 waste audit provided waste composition data from homes participating in the "status quo" waste management system. The 2006 waste audit was conducted during the Scarborough Pilot project and provided waste composition data from homes participating in the four Pilot Areas.

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### 2.5.1 2005 Waste Audit

The 2005 audit was completed over a period of two weeks in March of 2005. It was funded by the 2005 Stewardship Ontario Waste Audit Program. The audit provided the baseline data for an understanding of the waste composition for a representative sample of 160 single-family homes in the Scarborough area. The 160 homes were divided into four subgroups of 40 homes. These samples were chosen to be a random and representative cross-section of homes in the Toronto area (i.e. size, demographics).

The waste audit included the curbside collection of three waste streams - organics (green bin), recycling (blue boxes), and garbage (bags). At the time of the audit, organics were collected weekly while garbage and recycling were collected bi-weekly on alternating weeks. The collected waste audit samples were taken to the City of Toronto's Ingram Transfer Station to be sorted into detailed categories and weighed. This provided the City with a thorough understanding of single-family home waste composition, including an estimate of waste diversion via the green bin and blue box.

Results showed that on average, single-family homes were diverting approximately 58%<sup>4</sup> of waste from landfill through the blue box and green bin programs. The average home generated approximately 14.4 kg of waste per week of which 3.8 kg was placed in organics; 4.6 kg in recycling; and, 6.0 kg in the garbage. If all potentially divertible materials were captured in the green bin or blue box, a 79% waste diversion rate could be achieved (2.9 kg of divertible materials were being misplaced in the garbage).

Table 2-4 illustrates the total amount of material found in the recycling stream in each of the four study areas. The highlighted sorting categories are those materials that were accepted in the City's recycling program. The results show that Area A captured the largest amount of recyclable material with 5.15 kg/household/week, while Area C captured the least with 4.13 kg/household/week.

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<sup>4</sup> Stewardship Ontario reports slightly different diversion rates as they incorporate additional diversion into their calculations such as diversion through the leaf and yard waste program. Data reported was taken from the actual waste audits which took into account diversion via curbside organics and recycling programs only.

**Table 2-4 Total Recycling Captured - 2005 Waste Audit**

2005 Sorting Category	Recycling Quantity Captured (kg/hh/week)			
	Area A	Area B	Area C	Area D
Newspaper - Dailys and Weeklys	2.22	1.79	1.23	1.65
Newspaper - Other	0.22	0.04	0.18	0.09
Telephone Books / Directories	0.09	0.02	0.15	0.12
Magazines & Catalogues	0.23	0.29	0.29	0.20
Mixed Fine Paper	0.19	0.42	0.41	0.22
Books	0.08	0.08	0.00	0.05
Other Paper	0.00	0.00	0.00	0.00
<b>TOTAL PAPER</b>	<b>3.03</b>	<b>2.65</b>	<b>2.26</b>	<b>2.31</b>
Corrugated	0.57	0.51	0.66	0.92
Kraft Paper	0.02	0.01	0.02	0.01
Boxboard / Cores	0.25	0.25	0.21	0.28
Molded Pulp	0.02	0.02	0.04	0.02
Paper Cups and Paper Ice-Cream Containers	0.00	0.01	0.00	0.01
Laminated Paper Packaging	0.00	0.00	0.00	0.00
Composite Cans	0.00	0.01	0.00	0.01
Gable Top Cartons	0.04	0.04	0.02	0.04
Aseptic Containers	0.00	0.00	0.00	0.00
Tissue/Toweling	0.00	0.00	0.00	0.00
<b>TOTAL PAPER PACKAGING</b>	<b>0.90</b>	<b>0.85</b>	<b>0.95</b>	<b>1.30</b>
PET Beverage Bottles	0.14	0.11	0.09	0.09
PET Other Bottles & Jars	0.02	0.02	0.02	0.02
PET Other Packaging	0.01	0.01	0.01	0.02
HDPE Beverage Bottles	0.00	0.01	0.02	0.01
HDPE Other Bottles & Jugs	0.06	0.08	0.07	0.04
PVC Bottles & Jars	0.01	0.01	0.01	0.00
Other Bottles, Jars & Jugs	0.01	0.01	0.01	0.01
Polystyrene Packaging	0.02	0.02	0.01	0.01
Wide Mouth Tubs & Lids	0.02	0.04	0.01	0.01
Large HDPE & PP Pails & Lids	0.02	0.00	0.00	0.00
Polyethylene PE Plastic Bags & Film - Packaging	0.02	0.03	0.01	0.03
Polyethylene Plastic Bags & Film - Non-Packaging	0.00	0.00	0.00	0.00
Laminated/Other Plastic Bags & Film	0.00	0.00	0.00	0.00
Other Rigid Plastic Packaging	0.01	0.01	0.01	0.02
Durable Plastic Products	0.07	0.07	0.01	0.02
<b>TOTAL PLASTICS</b>	<b>0.40</b>	<b>0.40</b>	<b>0.27</b>	<b>0.27</b>
Aluminum Food & Beverage Cans	0.08	0.09	0.07	0.07
Aluminum Foil & Foil Trays	0.00	0.00	0.00	0.00
Other Aluminum Containers	0.00	0.00	0.00	0.00
Steel Food & Beverage Cans	0.12	0.16	0.16	0.11
Steel Aerosol Cans	0.01	0.01	0.00	0.00
Steel Paint Cans	0.01	0.00	0.00	0.00
Other Metal	0.00	0.07	0.01	0.00
<b>TOTAL METALS</b>	<b>0.22</b>	<b>0.33</b>	<b>0.25</b>	<b>0.19</b>
LCBO Clear	0.08	0.08	0.07	0.11
LCBO Coloured	0.24	0.17	0.08	0.10
Clear	0.19	0.27	0.18	0.21
Coloured	0.02	0.07	0.05	0.04
Other Glass	0.03	0.00	0.00	0.00
<b>TOTAL GLASS</b>	<b>0.55</b>	<b>0.59</b>	<b>0.38</b>	<b>0.46</b>
Food Waste	0.02	0.00	0.00	0.01
Yard Waste	0.00	0.00	0.00	0.00
Pet waste	0.00	0.00	0.00	0.05
Diapers and Sanitary Products	0.00	0.00	0.00	0.00
<b>TOTAL ORGANICS</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>
Batteries	0.00	0.00	0.00	0.00
Paint & Stain	0.00	0.00	0.00	0.00
Motor Oil	0.00	0.00	0.00	0.00
Liquids	0.00	0.01	0.00	0.00
Other HSW	0.00	0.00	0.00	0.00
<b>TOTAL HSW</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>
Textiles	0.00	0.02	0.00	0.00
Carpeting	0.01	0.00	0.00	0.00
Construction & Renovation	0.00	0.00	0.00	0.02
Computer / IT Equipment	0.00	0.00	0.00	0.00
Telecom Equipment	0.00	0.00	0.00	0.00
TV & Audio Equipment	0.00	0.00	0.00	0.00
Small Kitchen Appliances	0.00	0.00	0.00	0.00
Other Electronics	0.00	0.00	0.00	0.00
Tires and Other Rubber	0.00	0.00	0.00	0.00
Ceramics	0.00	0.00	0.00	0.01
Furniture	0.00	0.00	0.00	0.00
Mattresses	0.00	0.00	0.00	0.00
Other Large Bulky Items	0.00	0.00	0.00	0.00
Other Waste	0.01	0.06	0.03	0.00
<b>TOTAL OTHER MATERIALS</b>	<b>0.02</b>	<b>0.08</b>	<b>0.03</b>	<b>0.03</b>
<b>TOTAL</b>	<b>5.15</b>	<b>4.90</b>	<b>4.13</b>	<b>4.63</b>



## RECYCLING CONTAINER PILOT STUDY SUMMARY

Table 2-5 illustrates capture rates for recyclables in each of the four study areas. Area A had the highest overall capture rate for recyclable material at 84.9% while Area D had the lowest at 75.8%. The difference in capture rates between the groups was significant with a gap of nearly 10% between the highest and lowest overall capture rate.

**Table 2-5 Capture Rates for Recyclables - 2005 Waste Audit**

2005 Sorting Category	Recycling Capture Rates			
	Area A	Area B	Area C	Area D
Newspaper - Dailys and Weeklys	95.5%	93.0%	90.2%	88.9%
Newspaper - Other	88.2%	50.4%	92.8%	92.3%
Telephone Books / Directories	100.0%	100.0%	100.0%	100.0%
Magazines & Catalogues	81.3%	70.7%	86.9%	77.4%
Mixed Fine Paper	57.4%	68.6%	72.7%	50.7%
Books	86.1%	60.8%	100.0%	47.3%
<b>TOTAL PAPER</b>	<b>89.9%</b>	<b>83.0%</b>	<b>86.8%</b>	<b>81.3%</b>
Corrugated	96.0%	82.5%	94.0%	90.4%
Kraft Paper	24.8%	10.4%	29.4%	7.7%
Boxboard / Cores	57.2%	52.1%	63.8%	61.0%
Molded Pulp	68.0%	54.1%	74.6%	31.3%
Gable Top Cartons	74.2%	85.0%	63.2%	71.5%
Aseptic Containers	8.6%	100.0%	26.9%	21.6%
<b>TOTAL PAPER PACKAGING</b>	<b>74.3%</b>	<b>63.5%</b>	<b>79.4%</b>	<b>73.2%</b>
PET Beverage Bottles	91.1%	93.7%	83.8%	66.4%
PET Other Bottles & Jars	66.8%	74.2%	82.2%	43.9%
HDPE Beverage Bottles	56.1%	100.0%	84.0%	44.1%
HDPE Other Bottles & Jugs	56.0%	80.0%	80.8%	57.2%
Wide Mouth Tubs & Lids	39.8%	70.5%	50.7%	56.4%
<b>TOTAL PLASTICS</b>	<b>71.0%</b>	<b>83.1%</b>	<b>79.2%</b>	<b>58.0%</b>
Aluminum Food & Beverage Cans	87.0%	81.5%	75.8%	74.1%
Aluminum Foil & Foil Trays	11.7%	6.4%	20.3%	1.9%
Other Aluminum Containers	0.0%	0.0%	0.0%	0.0%
Steel Food & Beverage Cans	91.2%	80.9%	90.3%	70.7%
Steel Aerosol Cans	61.3%	31.1%	8.1%	17.9%
Steel Paint Cans	40.8%	0.0%	100.0%	0.0%
<b>TOTAL METALS</b>	<b>74.9%</b>	<b>73.8%</b>	<b>77.7%</b>	<b>56.5%</b>
LCBO Clear	96.5%	100.0%	100.0%	92.8%
LCBO Coloured	99.1%	90.2%	92.1%	100.0%
Clear	80.8%	77.2%	88.1%	62.1%
Coloured	100.0%	94.6%	82.5%	88.8%
<b>TOTAL GLASS</b>	<b>91.2%</b>	<b>85.3%</b>	<b>90.2%</b>	<b>76.6%</b>
<b>TOTAL</b>	<b>84.9%</b>	<b>78.4%</b>	<b>84.2%</b>	<b>75.8%</b>

Table 2-6 illustrates contamination found within the recycling stream for each of the four study areas. Contamination was highest in Area B and lowest in Area C.

## RECYCLING CONTAINER PILOT STUDY SUMMARY

Table 2-6 Contamination Found in the Recycling Stream - 2005 Waste Audit

2005 Sorting Category	Recycling Contamination (kg/hh/week)			
	Area A	Area B	Area C	Area D
Other Paper	0.00	0.00	0.00	0.00
<b>TOTAL PAPER</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Paper Cups and Paper Ice-Cream Containers	0.00	0.01	0.00	0.01
Laminated Paper Packaging	0.00	0.00	0.00	0.00
Composite Cans	0.00	0.01	0.00	0.01
Tissue/Toweling	0.00	0.00	0.00	0.00
<b>TOTAL PAPER PACKAGING</b>	<b>0.01</b>	<b>0.02</b>	<b>0.01</b>	<b>0.02</b>
PET Other Packaging	0.01	0.01	0.01	0.02
PVC Bottles & Jars	0.01	0.01	0.01	0.00
Other Bottles, Jars & Jugs	0.01	0.01	0.01	0.01
Polystyrene Packaging	0.02	0.02	0.01	0.01
Large HDPE & PP Pails & Lids	0.02	0.00	0.00	0.00
Polyethylene PE Plastic Bags & Film - Packaging	0.02	0.03	0.01	0.03
Polyethylene Plastic Bags & Film - Non-Packaging	0.00	0.00	0.00	0.00
Laminated/Other Plastic Bags & Film	0.00	0.00	0.00	0.00
Other Rigid Plastic Packaging	0.01	0.01	0.01	0.02
Durable Plastic Products	0.07	0.07	0.01	0.02
<b>TOTAL PLASTICS</b>	<b>0.17</b>	<b>0.15</b>	<b>0.06</b>	<b>0.11</b>
Other Metal	0.00	0.07	0.01	0.00
<b>TOTAL METALS</b>	<b>0.00</b>	<b>0.07</b>	<b>0.01</b>	<b>0.00</b>
Other Glass	0.03	0.00	0.00	0.00
<b>TOTAL GLASS</b>	<b>0.03</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Food Waste	0.02	0.00	0.00	0.01
Yard Waste	0.00	0.00	0.00	0.00
Pet waste	0.00	0.00	0.00	0.05
Diapers and Sanitary Products	0.00	0.00	0.00	0.00
<b>TOTAL ORGANICS</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>
Batteries	0.00	0.00	0.00	0.00
Paint & Stain	0.00	0.00	0.00	0.00
Motor Oil	0.00	0.00	0.00	0.00
Liquids	0.00	0.01	0.00	0.00
Other HSW	0.00	0.00	0.00	0.00
<b>TOTAL HSW</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>
Textiles	0.00	0.02	0.00	0.00
Carpeting	0.01	0.00	0.00	0.00
Construction & Renovation	0.00	0.00	0.00	0.02
Computer / IT Equipment	0.00	0.00	0.00	0.00
Telecom Equipment	0.00	0.00	0.00	0.00
TV & Audio Equipment	0.00	0.00	0.00	0.00
Small Kitchen Appliances	0.00	0.00	0.00	0.00
Other Electronics	0.00	0.00	0.00	0.00
Tires and Other Rubber	0.00	0.00	0.00	0.00
Ceramics	0.00	0.00	0.00	0.01
Furniture	0.00	0.00	0.00	0.00
Mattresses	0.00	0.00	0.00	0.00
Other Large Bulky Items	0.00	0.00	0.00	0.00
Other Waste	0.01	0.06	0.03	0.00
<b>TOTAL OTHER MATERIALS</b>	<b>0.02</b>	<b>0.08</b>	<b>0.03</b>	<b>0.03</b>
<b>TOTAL</b>	<b>0.25</b>	<b>0.33</b>	<b>0.11</b>	<b>0.22</b>

### 2.5.2 2006 Waste Audit

A follow-up waste audit funded by the City of Toronto was completed over two weeks in April of 2006. The same 160 homes that were audited in 2005 were audited again in 2006 for a direct comparison of results. The 2006 audits were completed as part of the Scarborough Recycling Pilot Study. Each of the four (4) sample areas of 40 homes, therefore, had different recycling collection scenarios. The four areas were named based on the type of recycling collection they received.

The four areas are listed below along with the corresponding name used during the 2005 waste audit.

Area Name – 2005	Area Name – 2006
Area A	Cart Area
Area B	Weekly Area
Area C	Bag Area
Area D	Control Area

Results showed that on average, single-family homes were diverting approximately 72% of waste from landfill via the blue box and green bin programs. The average home generated approximately 12.5 kg of waste per week of which 3.91 kg was placed in organics; 5.08 kg in recycling; and, 3.5 kg in the garbage. If all potentially divertible materials were captured in the green bin or blue box, an 89% waste diversion rate could be achieved (2.10 kg of divertible materials were being misplaced in the garbage).

Table 2-7 illustrates the total amount of material found in the recycling stream in each of the four study areas. The highlighted sorting categories are those materials that were acceptable in the City's recycling program. The results show that the Cart Area captured the largest amount of recyclable material with 5.64 kg/household/week, while the Weekly Area captured the least with 5.09 kg/household/week.

Table 2-7 Total Recycling Captured - 2006 Waste Audit

2006 Sorting Category	Recycling Quantity Captured (kg/hh/week)			
	Cart Area	Weekly Area	Bag Area	Control Area
<b>2005 Waste Audit Area Name</b>	<b>Area A</b>	<b>Area B</b>	<b>Area C</b>	<b>Area D</b>
Newspaper - Dailys and Weeklys	1.69	2.19	1.45	1.43
Newspaper - Other	0.30	0.02	0.23	0.19
Telephone Books / Directories	0.45	0.55	0.38	0.32
Magazines & Catalogues	0.19	0.11	0.15	0.18
Mixed Fine Paper	0.32	0.27	0.16	1.04
Books	0.04	0.02	0.00	0.00
Other Paper	0.01	0.00	0.00	0.01
<b>TOTAL PAPER</b>	<b>2.99</b>	<b>3.15</b>	<b>2.38</b>	<b>3.17</b>
Corrugated	0.84	0.53	0.66	0.36
Kraft Paper	0.03	0.02	0.05	0.02
Boxboard / Cores	0.28	0.27	0.71	0.27
Molded Pulp	0.02	0.01	0.02	0.02
Paper Cups and Paper Ice-Cream Containers	0.02	0.01	0.02	0.01
Laminated Paper Packaging	0.03	0.03	0.01	0.00
Composite Cans	0.01	0.01	0.01	0.01
Gable Top Cartons	0.07	0.04	0.02	0.04
Aseptic Containers	0.01	0.01	0.01	0.00
Tissue/Toweling	0.02	0.01	0.07	0.01
<b>TOTAL PAPER PACKAGING</b>	<b>1.32</b>	<b>0.93</b>	<b>1.55</b>	<b>0.74</b>
PET Beverage Bottles	0.14	0.12	0.11	0.11
PET Other Bottles & Jars	0.02	0.02	0.04	0.02
PET Other Packaging	0.01	0.02	0.01	0.01
HDPE Beverage Bottles	0.01	0.02	0.02	0.02
HDPE Other Bottles & Jugs	0.08	0.06	0.08	0.08
PVC Bottles & Jars	0.00	0.00	0.00	0.00
Other Bottles, Jars & Jugs	0.02	0.01	0.01	0.03
Polystyrene Packaging	0.02	0.00	0.03	0.01
Wide Mouth Tubs & Lids	0.02	0.01	0.01	0.02
Large HDPE & PP Pails & Lids	0.01	0.00	0.01	0.01
Polyethylene PE Plastic Bags & Film - Packaging	0.04	0.01	0.05	0.01
Polyethylene Plastic Bags & Film - Non-Packaging	0.00	0.00	0.04	0.00
Laminated/Other Plastic Bags & Film	0.00	0.00	0.01	0.00
Other Rigid Plastic Packaging	0.03	0.01	0.02	0.03
Durable Plastic Products	0.04	0.00	0.01	0.01
<b>TOTAL PLASTICS</b>	<b>0.44</b>	<b>0.30</b>	<b>0.45</b>	<b>0.35</b>
Aluminum Food & Beverage Cans	0.06	0.04	0.06	0.05
Aluminum Foil & Foil Trays	0.00	0.00	0.00	0.00
Other Aluminum Containers	0.00	0.00	0.00	0.00
Steel Food & Beverage Cans	0.12	0.13	0.22	0.11
Steel Aerosol Cans	0.03	0.01	0.00	0.00
Steel Paint Cans	0.00	0.00	0.00	0.00
Other Metal	0.02	0.01	0.01	0.02
<b>TOTAL METALS</b>	<b>0.23</b>	<b>0.20</b>	<b>0.30</b>	<b>0.19</b>
LCBO Clear	0.06	0.08	0.09	0.12
LCBO Coloured	0.12	0.09	0.05	0.16
Clear	0.22	0.28	0.17	0.17
Coloured	0.00	0.02	0.09	0.01
Other Glass	0.03	0.00	0.01	0.04
<b>TOTAL GLASS</b>	<b>0.43</b>	<b>0.48</b>	<b>0.42</b>	<b>0.50</b>
Food Waste	0.12	0.02	0.26	0.02
Yard Waste	0.00	0.00	0.00	0.00
Pet waste	0.00	0.00	0.00	0.00
Diapers and Sanitary Products	0.01	0.00	0.11	0.10
<b>TOTAL ORGANICS</b>	<b>0.13</b>	<b>0.02</b>	<b>0.37</b>	<b>0.12</b>
Batteries	0.00	0.00	0.00	0.00
Paint & Stain	0.00	0.00	0.00	0.00
Motor Oil	0.00	0.00	0.00	0.00
Liquids	0.00	0.00	0.00	0.00
Other HSW	0.00	0.00	0.00	0.00
<b>TOTAL HSW</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Textiles	0.00	0.01	0.02	0.00
Carpeting	0.03	0.00	0.00	0.00
Construction & Renovation	0.00	0.00	0.00	0.00
Computer / IT Equipment	0.00	0.00	0.00	0.00
Telecom Equipment	0.00	0.00	0.00	0.00
TV & Audio Equipment	0.00	0.00	0.01	0.00
Small Kitchen Appliances	0.01	0.00	0.00	0.01
Other Electronics	0.00	0.00	0.00	0.00
Tires and Other Rubber	0.01	0.00	0.00	0.00
Ceramics	0.00	0.00	0.00	0.00
Furniture	0.00	0.00	0.00	0.00
Mattresses	0.00	0.00	0.00	0.00
Other Large Bulky Items	0.00	0.00	0.00	0.00
Other Waste	0.04	0.00	0.00	0.12
<b>TOTAL OTHER MATERIALS</b>	<b>0.09</b>	<b>0.02</b>	<b>0.03</b>	<b>0.14</b>
<b>TOTAL</b>	<b>5.64</b>	<b>5.09</b>	<b>5.52</b>	<b>5.21</b>



## RECYCLING CONTAINER PILOT STUDY SUMMARY

Table 2-8 illustrates capture rates for recyclables in each of the four study areas. The Weekly Area had the highest overall capture rate for recyclable material at 90.3% while the Bag Area had the lowest at 86.8%. Overall, the difference in capture rates between the groups was only 3.5%.

**Table 2-8 Capture Rates for Recyclables - 2006 Waste Audit**

2006		Recycling Capture Rates			
Sorting Category	Cart Area	Weekly Area	Bag Area	Control Area	
2005 Waste Audit Area Name	Area A	Area B	Area C	Area D	
Newspaper - Dailys and Weeklys	95.6%	97.0%	94.8%	93.9%	
Newspaper - Other	98.9%	57.6%	77.2%	93.0%	
Telephone Books / Directories	100.0%	100.0%	99.2%	100.0%	
Magazines & Catalogues	78.2%	86.5%	90.7%	94.3%	
Mixed Fine Paper	64.8%	70.7%	53.7%	89.2%	
Books	76.2%	96.1%	29.9%	34.3%	
<b>TOTAL PAPER</b>	<b>90.3%</b>	<b>93.8%</b>	<b>88.4%</b>	<b>92.7%</b>	
Corrugated	96.0%	97.2%	89.8%	90.3%	
Kraft Paper	44.1%	31.7%	47.1%	43.4%	
Boxboard / Cores	70.9%	69.3%	84.5%	73.7%	
Molded Pulp	72.2%	63.6%	39.5%	94.8%	
Gable Top Cartons	95.6%	82.6%	58.6%	93.3%	
Aseptic Containers	54.2%	66.3%	35.2%	53.3%	
<b>TOTAL PAPER PACKAGING</b>	<b>86.2%</b>	<b>82.2%</b>	<b>82.4%</b>	<b>81.1%</b>	
PET Beverage Bottles	95.3%	92.1%	92.2%	89.9%	
PET Other Bottles & Jars	62.5%	76.1%	95.3%	80.3%	
HDPE Beverage Bottles	91.3%	86.3%	93.8%	87.9%	
HDPE Other Bottles & Jugs	87.7%	88.4%	78.5%	88.4%	
Wide Mouth Tubs & Lids	76.6%	74.0%	58.6%	83.3%	
<b>TOTAL PLASTICS</b>	<b>87.6%</b>	<b>87.6%</b>	<b>85.5%</b>	<b>87.9%</b>	
Aluminum Food & Beverage Cans	95.5%	93.7%	92.4%	94.3%	
Aluminum Foil & Foil Trays	25.7%	12.6%	12.2%	18.1%	
Other Aluminum Containers	63.6%	0.0%	0.0%	55.6%	
Steel Food & Beverage Cans	84.6%	89.5%	92.3%	89.1%	
Steel Aerosol Cans	81.7%	69.4%	35.5%	69.0%	
Steel Paint Cans	0.0%	0.0%	0.0%	0.0%	
<b>TOTAL METALS</b>	<b>82.9%</b>	<b>82.8%</b>	<b>84.4%</b>	<b>82.7%</b>	
LCBO Clear	100.0%	93.0%	100.0%	96.5%	
LCBO Coloured	95.1%	86.9%	100.0%	89.4%	
Clear	94.7%	90.2%	95.7%	92.9%	
Coloured	100.0%	80.5%	98.2%	100.0%	
<b>TOTAL GLASS</b>	<b>95.5%</b>	<b>89.5%</b>	<b>97.7%</b>	<b>92.6%</b>	
<b>TOTAL</b>	<b>89.2%</b>	<b>90.3%</b>	<b>86.8%</b>	<b>90.1%</b>	

Table 2-9 illustrates contamination found within the recycling streams for each of the four study areas. Contamination was highest in the Bag Area and lowest in the Weekly Area.

Table 2-9 Contamination Found in the Recycling Stream - 2006 Waste Audit

2006		Recycling Contamination (kg/hh/week)			
Sorting Category		Cart Area	Weekly Area	Bag Area	Control Area
2005 Waste Audit Area Name		Area A	Area B	Area C	Area D
Other Paper		0.01	0.00	0.00	0.01
<b>TOTAL PAPER</b>		<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>
Paper Cups and Paper Ice-Cream Containers		0.02	0.01	0.02	0.01
Laminated Paper Packaging		0.03	0.03	0.01	0.00
Composite Cans		0.01	0.01	0.01	0.01
Tissue/Toweling		0.02	0.01	0.07	0.01
<b>TOTAL PAPER PACKAGING</b>		<b>0.07</b>	<b>0.05</b>	<b>0.10</b>	<b>0.02</b>
PET Other Packaging		0.01	0.02	0.01	0.01
PVC Bottles & Jars		0.00	0.00	0.00	0.00
Other Bottles, Jars & Jugs		0.02	0.01	0.01	0.03
Polystyrene Packaging		0.02	0.00	0.03	0.01
Large HDPE & PP Pails & Lids		0.01	0.00	0.01	0.01
Polyethylene PE Plastic Bags & Film - Packaging		0.04	0.01	0.05	0.01
Polyethylene Plastic Bags & Film - Non-Packaging		0.00	0.00	0.04	0.00
Laminated/Other Plastic Bags & Film		0.00	0.00	0.01	0.00
Other Rigid Plastic Packaging		0.03	0.01	0.02	0.03
Durable Plastic Products		0.04	0.00	0.01	0.01
<b>TOTAL PLASTICS</b>		<b>0.16</b>	<b>0.07</b>	<b>0.18</b>	<b>0.11</b>
Other Metal		0.02	0.01	0.01	0.02
<b>TOTAL METALS</b>		<b>0.02</b>	<b>0.01</b>	<b>0.01</b>	<b>0.02</b>
Other Glass		0.03	0.00	0.01	0.04
<b>TOTAL GLASS</b>		<b>0.03</b>	<b>0.00</b>	<b>0.01</b>	<b>0.04</b>
Food Waste		0.12	0.02	0.26	0.02
Yard Waste		0.00	0.00	0.00	0.00
Pet waste		0.00	0.00	0.00	0.00
Diapers and Sanitary Products		0.01	0.00	0.11	0.10
<b>TOTAL ORGANICS</b>		<b>0.13</b>	<b>0.02</b>	<b>0.37</b>	<b>0.12</b>
Batteries		0.00	0.00	0.00	0.00
Paint & Stain		0.00	0.00	0.00	0.00
Motor Oil		0.00	0.00	0.00	0.00
Liquids		0.00	0.00	0.00	0.00
Other HSW		0.00	0.00	0.00	0.00
<b>TOTAL HSW</b>		<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Textiles		0.00	0.01	0.02	0.00
Carpeting		0.03	0.00	0.00	0.00
Construction & Renovation		0.00	0.00	0.00	0.00
Computer / IT Equipment		0.00	0.00	0.00	0.00
Telecom Equipment		0.00	0.00	0.00	0.00
TV & Audio Equipment		0.00	0.00	0.01	0.00
Small Kitchen Appliances		0.01	0.00	0.00	0.01
Other Electronics		0.00	0.00	0.00	0.00
Tires and Other Rubber		0.01	0.00	0.00	0.00
Ceramics		0.00	0.00	0.00	0.00
Furniture		0.00	0.00	0.00	0.00
Mattresses		0.00	0.00	0.00	0.00
Other Large Bulky Items		0.00	0.00	0.00	0.00
Other Waste		0.04	0.00	0.00	0.12
<b>TOTAL OTHER MATERIALS</b>		<b>0.09</b>	<b>0.02</b>	<b>0.03</b>	<b>0.14</b>
<b>TOTAL</b>		<b>0.52</b>	<b>0.17</b>	<b>0.71</b>	<b>0.46</b>



## 2.5.3 Waste Audit Comparison

On average, the overall waste generation decreased from 2005 to 2006 (14.3 to 12.5 kg/household/week). In addition, curbside waste diversion increased on average from 58% to 72%.

Table 2-10 illustrates changes to material captured in the recycling stream in each of the four study areas between 2005 and 2006 (pre and post pilot). The quantity of materials placed at the curb for recycling increased in all four study areas from 2005 to 2006. Area A/Cart Area captured the most recycling in both 2005 and 2006.

**Table 2-10 Comparison of Total Recycling Produced - 2005 and 2006**

	Recycling Quantity Captured (kg/hh/week)							
	Area A/Cart Area		Area B/Weekly Area		Area C/Bag Area		Area D/Control Area	
	2005	2006	2005	2006	2005	2006	2005	2006
TOTAL PAPER	3.03	2.99	2.65	3.15	2.26	2.38	2.31	3.17
TOTAL PAPER PACKAGING	0.90	1.32	0.85	0.93	0.95	1.55	1.30	0.74
TOTAL PLASTICS	0.40	0.44	0.40	0.30	0.27	0.45	0.27	0.35
TOTAL METALS	0.22	0.23	0.33	0.20	0.25	0.30	0.19	0.19
TOTAL GLASS	0.55	0.43	0.59	0.48	0.38	0.42	0.46	0.50
TOTAL ORGANICS	0.02	0.13	0.00	0.02	0.00	0.37	0.06	0.12
TOTAL HSW	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
TOTAL OTHER MATERIALS	0.02	0.09	0.08	0.02	0.03	0.03	0.03	0.14
<b>GRAND TOTAL</b>	<b>5.15</b>	<b>5.64</b>	<b>4.90</b>	<b>5.09</b>	<b>4.13</b>	<b>5.52</b>	<b>4.63</b>	<b>5.21</b>
<b>Percent Change 2005 to 2006</b>	<b>9.5%</b>		<b>3.9%</b>		<b>33.7%</b>		<b>12.5%</b>	

Table 2-11 illustrates changes to recycling capture rates in each of the four study groups between 2005 and 2006 (pre and post pilot). Recycling capture rates increased in all four study areas from 2005 to 2006.

**Table 2-11 Comparison of Capture Rates for Recyclables - 2005 and 2006**

	Recycling Capture Rates (%)							
	Area A/Cart Area		Area B/Weekly Area		Area C/Bag Area		Area D/Control Area	
	2005	2006	2005	2006	2005	2006	2005	2006
TOTAL PAPER	89.9%	90.3%	83.0%	93.8%	86.8%	88.4%	81.3%	92.7%
TOTAL PAPER PACKAGING	74.3%	86.2%	63.5%	82.2%	79.4%	82.4%	73.2%	81.1%
TOTAL PLASTICS	71.0%	87.6%	83.1%	87.6%	79.2%	85.5%	58.0%	87.9%
TOTAL METALS	74.9%	82.9%	73.8%	82.8%	77.7%	84.4%	56.5%	82.7%
TOTAL GLASS	91.2%	95.5%	85.3%	89.5%	90.2%	97.7%	76.6%	92.6%
<b>GRAND TOTAL</b>	<b>84.9%</b>	<b>89.2%</b>	<b>78.4%</b>	<b>90.3%</b>	<b>84.2%</b>	<b>86.8%</b>	<b>75.8%</b>	<b>90.1%</b>
<b>Percent Change 2005 to 2006</b>	<b>4.3%</b>		<b>11.9%</b>		<b>2.6%</b>		<b>14.3%</b>	

Table 2-12 illustrates changes to recycling contamination amounts in each of the four study groups between 2005 and 2006 (pre and post pilot). Contamination decreased in Area B/Weekly Area, but

increased in all three of the other Areas. Area C/Bag Area saw an increase in contamination by 0.6 kg/household/week; the largest increase in contamination of any of the four study areas.

**Table 2-12 Comparison of Contamination Found in the Recycling Stream - 2005 and 2006**

	Recycling Contamination (kg/hh/week)							
	Area A/Cart Area		Area B/Weekly Area		Area C/Bag Area		Area D/Control Area	
	2005	2006	2005	2006	2005	2006	2005	2006
TOTAL PAPER	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
TOTAL PAPER PACKAGING	0.01	0.07	0.02	0.05	0.01	0.10	0.02	0.02
TOTAL PLASTICS	0.17	0.16	0.15	0.07	0.06	0.18	0.11	0.11
TOTAL METALS	0.00	0.02	0.07	0.01	0.01	0.01	0.00	0.02
TOTAL GLASS	0.03	0.03	0.00	0.00	0.00	0.01	0.00	0.04
TOTAL ORGANICS	0.02	0.13	0.00	0.02	0.00	0.37	0.06	0.12
TOTAL HSW	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
TOTAL OTHER MATERIALS	0.02	0.09	0.08	0.02	0.03	0.03	0.03	0.14
<b>GRAND TOTAL</b>	<b>0.25</b>	<b>0.52</b>	<b>0.33</b>	<b>0.17</b>	<b>0.11</b>	<b>0.71</b>	<b>0.22</b>	<b>0.46</b>
Recycling Quantity Captured (kg/hh/week)	5.15	5.64	4.90	5.09	4.13	5.52	4.63	5.21
<b>% Contamination</b>	<b>4.9%</b>	<b>9.2%</b>	<b>6.7%</b>	<b>3.3%</b>	<b>2.7%</b>	<b>12.9%</b>	<b>4.8%</b>	<b>8.8%</b>
% Change in Contamination 2005 to 2006	87.8%		-50.7%		377.8%		83.3%	

It was difficult to come to any definitive conclusions about the differences between groups due to the nature of the waste audit. The waste audit only took a snap shot of waste production over a two-week period. As such, the results of the waste audit were combined with other qualitative studies to get a better understanding of the value of each collection system and potential benefits/disadvantages of each.

### 3.0 Container/Collection Ergonomics Study

An ergonomics study of each of the four recycling pilot study areas in Scarborough was carried out to determine which recycling container system would best ensure worker safety. The vehicles used to collect the waste during the study were one-person side loaders with a fully-automated collection arm.

In a fully automated system, collection vehicles are operated by one individual who controls all aspects of waste collection and compacting from inside the vehicle. The driver/collector is only required to exit the vehicle when the collection container is not appropriately placed at the curb. These vehicles are equipped with a hoist/claw attachment that is controlled through the hydraulic system by the operator.



### 3.1 Methodology

On April 6, 2006, two ergonomic consultants from the City of Toronto observed the collection of recyclable materials in each of the study areas. In order to conduct the ergonomics study, the consultants observed the workers during the collection of recyclables, assessed the workers' postures and techniques for inputting the recyclables into the vehicles, measured the weights of the sample items set out for collection and lastly, analyzed the data. The data was analyzed using the following tools:

- The Michigan Energy Expenditure Prediction Program;
- 3-D Static Strength Program; and,
- NIOSH Lifting Equation (1991 version).

### 3.2 Ergonomics Study Results

Results show the pilot methods (i.e.; Cart, Blue Bag, and Weekly Blue Box) were ergonomically preferable to the current bi-weekly collection (i.e.; Control). The results are based on the comparison of collection efficiency and lifting demands (including average weight of each lift, the number of lifts per call, lifts per minute, required lifting style, strength demands placed on the back, shoulder and elbow while lifting, the mechanics of lifting, energy expenditure, and other factors such as spilling of recyclables).

The recycling bag is the method preferred in areas with parked cars. Compared to blue boxes, the bag has a number of benefits, including:

- It reduces the weight of the lift by the weight of the blue box.
- The workers would not have to return the blue box to the curb.
- The bags reduce the number of spilled and blowing items compared to blue boxes. The workers do not have to bend to ground level to pick up spilled/blown recyclables.
- Residents tend to overload blue boxes, making them heavy. Bags cannot be overloaded; residents will use more than one bag if needed.
- The bags keep the recyclables dry which prevents materials from becoming wet. This reduces load weight on rainy days.
- Workers can visually estimate the weight of the bag as it is clear.
- Workers can use an underhand motion to put the bag into the hopper, reducing the strain and extent of shoulder range of motion.

The bag system has a number of positive aspects as indicated above, however two potential negatives are the possibility of worker injury from sharp objects in the bag and for bag breakage. However, the clear bags should allow workers to spot any broken glass or other sharp materials and take the necessary precautions. Despite the fact that focus group residents said bags would tear easily, no bags were noted to have broken during the ergonomics study.

The cart was ranked as the most ergonomically preferred option of the pilot program as there is little to no manual lifting required. This reduces the risk for injury to the back, shoulder, elbow, and wrist from lifting and physical fatigue. One drawback of the cart identified during the study was that along streets with parked cars, the collection vehicles often do not have direct access to the cart. In this case, the worker would be required to manually roll the cart into position, which can be a risk factor for an over-exertion injury. Collections crews rarely had to manually roll the cart into position however, because cars were not often parked on the street in the Scarborough pilot study area.

### 3.3 Recommendation to City Council

Based on the results of the Scarborough Pilot Study, the General Manager of Solid Waste Management Services recommended to the Work Committee on August 23, 2006 that a semi-automated recycling cart pilot using a large wheeled cart be implemented in approximately 1000 single family households in the downtown core. A semi-automated system was recommended because a fully automated system would not be able to access the cart set outs due to on-street parking.

The purpose of the Downtown pilot would be to confirm the operational ability of the program in a higher density single family household area with on-street parking. If collections crews were able to effectively and efficiently collect the recycling carts during the Downtown Pilot study it was recommended that approval be granted for a City-wide roll-out of the cart based system for recycling collection for single family households between fall 2007 and fall 2008. The recommended system would use both semi-automated and fully-automated collection systems.

## 4.0 Results of the Downtown Pilot Study

### 4.1 Downtown Pilot - Overview



Five neighbourhoods in downtown areas were chosen with representative characteristics such as dense housing, narrow or no driveways, limited storage areas, hills, and on-street parking.

The streets selected within these neighbourhoods included: Amelia Street; Beresford Ave and Durie Street; Lappin Avenue; Briar Hill Ave; and Keewatin and Sherwood Avenues.

Residents were notified about the study and in November 2006, 64 gallon (240L) carts were delivered to 850 homes. Between 20-30 households refused delivery of the cart or requested it be taken back because they thought it was too large. Households that opted out of the Downtown Pilot were required to use transparent blue plastic bags (the same bags that were used in the Scarborough Pilot Study) to set out their recyclables since their traditional blue boxes would not be collected.

Carts were collected with a rear packer truck retrofitted with a semi-automated tipping arm to facilitate emptying on narrow streets with on-street parking. Semi-automated collection systems require the driver to exit and enter the vehicle as in a manual system to retrieve each waste setout, however, the primary difference is that once the setout has been retrieved, the container is emptied with an automated lifting mechanism.

The pilot lasted for four months. Cart set out rates and fullness were monitored on collection days. Midway through the pilot a questionnaire was delivered to homes to obtain feedback on the program.

### 4.2 Downtown Pilot - Collection Logistics

Collections crews were able to pick up the recycling carts at the curb in the downtown areas. However, collection worked best when the trucks' access to the carts wasn't restricted by parked cars.

Using a semi-automated system required the collections crews to manually roll the cart into position 100% of the time. The results suggested that a fully-automated system would



not be able to access the cart set outs and that a semi-automated system would be required for downtown areas with on street parking.

### 4.3 Downtown Pilot - Program Set Out and Container Fullness

The households that set out the cart for collection were monitored on December 15, 2006, December 30, 2006 and January 12, 2007. Setout rates were then calculated by taking the average number of households in each downtown pilot area that set out the cart divided by the total number of households in that same area. On average 71% of households who participated in the Downtown Pilot study set out the cart on their collection day. Approximately 60% of the carts set out were considered full.

Table 4-1 below shows the set out rate and percentage of full carts for the Downtown Pilot study in each neighbourhood area.

**Table 4-1 Set-Out Rates In Downtown Pilot Study**

Area	Set Out Rate	% of Full Carts
Amelia Street	63%	50%
Beresford Ave	67%	61%
Durie Street	71%	61%
Lappin Ave	68%	71%
Briar Hill Ave	77%	59%
Keewatin Ave	74%	62%
Sherwood Ave	77%	53%

### 4.4 Downtown Pilot - Household Survey Results

Northstar Research Partners, with the City of Toronto, developed a four-page questionnaire that was distributed to the households participating in the Downtown Pilot study. Approximately 1,000 English and 210 Portuguese questionnaires were distributed. A total of 481 English and 6 Portuguese questionnaires were returned, resulting in a 40% response rate.

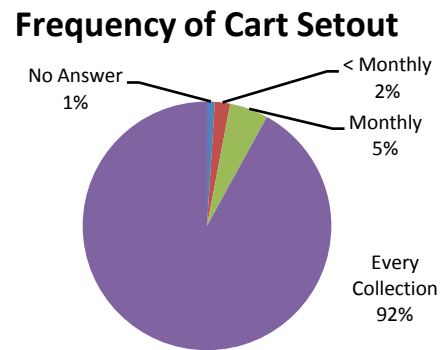
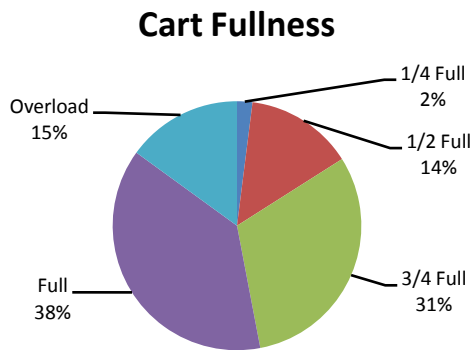
Although some residents experienced issues with the carts, the majority of residents preferred the carts to the blue box system. The majority of survey respondents approved of the concept of using the cart for recycling and liked the cart provided by the City. Larger households were especially receptive to the cart.

The survey findings illustrated that some downtown households have concerns about the cart. Specifically that the cart is difficult to store, hard to move up stairs or on hills, and may be too heavy for some residents such as seniors or the disabled. For example, the 240 litre cart did not always fit between houses or in laneways and some households had to store the cart in front of their house. Many residents who experienced difficulties with the cart said they'd like a smaller or narrower cart to make it easier to store and use.

Details of the survey results are provided in Sections 4.4.1 to 4.4.3.

#### 4.4.1 Reaction to the Cart

More than 90% of the cart users put their cart out for every collection. Those in larger households (3+ residents) were significantly more likely to put their cart out at every collection (97%).



Over one half of cart users reported their carts were full, if not overloaded, on collection day. Larger households and those who gave the cart high satisfaction scores were significantly more likely to have full or overloaded carts.

When asked “How often does your cart run out of room?”, 12% of respondents indicated that overflow was a constant issue, of these respondents, 22% lived in a household of more than three people.

62% replied that carts were rarely or never overflowing, suggesting cart capacity was adequate for most households.

Residents were asked “If your cart runs out of room, how do you deal with it?”. The most common methods of dealing with overflow was to use blue boxes or bags/cardboard boxes in addition to the cart.

The following unprompted comments were added by participants.

- The cart's too big.
- It's difficult to move the cart when it's full.
- It's hard to move the cart in the winter.
- I don't know what to do with my bins now.
- It's hard to find a place to store the cart.
- It's hard to squeeze the cart between my house and the neighbour.
- I can't get the cart up the stairs.
- The only place to store it is in front of the house.
- It's too big for women and older people to carry.
- It won't fit through the gate so I have to lift it over the fence.
- I have trouble finding space for it in the garage.
- I can't store it on the porch.

#### 4.4.2 Cart Satisfaction

Nearly 9 out of 10 respondents liked the concept of using a cart for storing recycling. 24% requested the cart be smaller or narrower, while 28% said the cart was fine the way it was. Other modifications suggested included improving the wheels, making it easier to turn.

72% of survey participants said they were satisfied with the cart issued by the City. It was significantly more popular among those living in larger households, as well among those who welcome the concept of a recycling cart. Only 10% of users gave the cart a low satisfaction score; generally those from smaller households and those not in favour of the cart concept.

Respondents were asked to assess different attributes of the cart, including durability, convenience of use, ability to keep street free of litter on windy days, ease of bringing to curb, storage capacity, and ease of storing in home/garage. The cart was well received for most attributes.

The attributes that received the highest ratings were:

- Durability;
- Ability to keep street free of litter on windy days;
- Convenience/ease of use;
- Storage Capacity; and,
- Ease of bringing to curb.

38% of users had concerns about storing the cart. Respondents considered the ease of storing the cart and size as its biggest weaknesses. Smaller households (1-2 residents) were significantly more likely to have experienced issues with storing the cart. Issues identified by respondents are included in Table 4 2.

**Table 4-2 Nature of Issues with Cart - Top Concerns**

	Among those citing difficulties (of 168 respondents)
The cart is too large/big/heavy	22%
The cart is difficult to move when heavy/full	13%
The cart is ugly	11%
The only space to store the cart is in front of the house	10%
The neighbourhood doesn't look nice/affects market value of house	9%
Confusion over where to store cart/uncertain of where to store	7%
The cart is difficult to fit between houses	7%
It's difficult to get the cart up the stairs	4%
It's difficult to store the cart in the back yard	4%
It's difficult for cars to enter and leave the driveway with the cart there	4%
The cart takes up too much space in the garage	4%

#### 4.4.3 Comparative Performance

23% of respondents said they recycled more with the cart, while 77% said they recycled the same amount. 81% of respondents preferred to use the cart over the traditional blue box system. Larger households (3+ people in household) were more likely to prefer the cart, while smaller households (1-2 people in household) were likely to want to keep their regular blue box.

The cart system outperformed the blue box on

- Ability to keep streets, sidewalks clean;
- Storage Capacity;
- Convenience/ease of use;
- Ease of bringing to curb; and,
- Durability.

48% of respondents preferred the blue box to the cart for ease of storage.

## 5.0 Comparison of Pilot Studies

The City compared the survey results from the Scarborough and Downtown Pilot studies. The results reflect the set out monitoring data collected during both pilots.

**Table 5-1 Comparison between Scarborough and Downtown Pilot Studies**

	Downtown Pilot	Scarborough Pilot
Overall Satisfaction with Cart (% 8-10 out of 10)	72%	93%
Overall Satisfaction with Cart (average out of 10)	7.9	9.3
Cart Durability (% 8-10)	86%	96%
Cart's Ability to Keep Street Free of Litter (% 8-10)	82%	83%
Cart Convenience / Ease of Use (% 8-10)	76%	83%
Cart's Storage Capacity (% 8-10)	75%	89%
Ease of Bringing Cart to Curb (% 8-10)	69%	91%
Ease of Storing Cart in Home / Garage (% 8-10)	54%	75%
Recycling More Material with Cart than with Boxes	23%	56%
Prefer Cart to Boxes	81%	97%

## 6.0 City Wide Implementation

Based on the results of the recycling container studies, the City of Toronto decided to implement a City-wide cart based recycling collection system for single family households.

Residents were notified by mail of the new collection system. An information brochure and bin order card indicated when and how to order their cart were sent to them. Residents were allowed to change their bin size by requesting an exchange through the City's waste management hotline (416-392-BINS). Residents were allowed one free exchange prior to November 1, 2008. After which a \$10 fee applied.

Free delivery of the carts to individual single-family households began in December 2007. By July 2008, recycling carts had been delivered to 450,000 households.

It is expected that the cart based system will increase diversion by an additional 15 000 tonnes per year (by providing additional recycling container capacity), reduce blowing litter, potentially reduce injury claims and allow for the addition of new materials into the recycling program.

Despite the capital expenditure to purchase the carts and operating costs to implement the program, the City determined that there would be no increase in operating costs within two years of the start of the program. Disposal avoidance costs, Waste Diversion Ontario (WDO) funding and revenue generated from the sale of the additional recyclable material offset the costs to operate the program.

### 6.1 Implementation/Operation Issues

#### Storage and Use of Carts

The Downtown Pilot study showed that some residents find the cart difficult to store, move and use. Over one quarter of the households who responded to the survey said they'd prefer a smaller narrower cart.

Council raised concerns about ensuring residents with mobility challenges are able to participate in the program.

**Contamination**

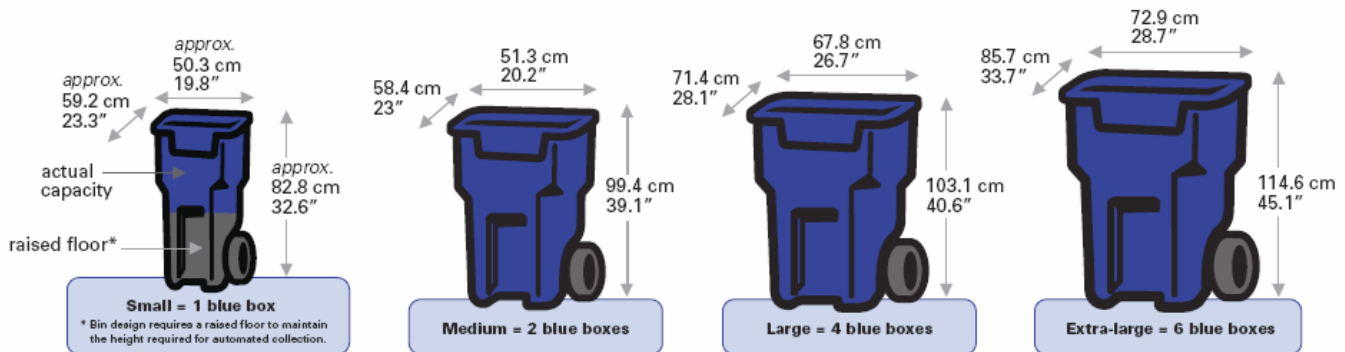
Similar contamination trends were observed in the recycling material setouts for all of the Scarborough Pilot Study areas. These contaminants included: polystyrene, bakery packaging, plastics (i.e. bags, wrap, film, fruit boxes, pails, water bottle packaging), fast food containers (i.e. coffee/drink cups), metal (i.e. hangers, frames, brackets), textiles, and electronics.

**Household Hazardous Waste**

Some residents set out household hazardous waste (HHW) at the curbside for regular garbage pick up or placed it in their recycling bins. Information could be sent to residents to remind them that their HHW should not be setout for regular garbage pick up or in recycling bins rather they should use the City’s designated HHW depots, “Toxic Taxi” service, or Community Environment Days.

**6.2 Overcoming Challenges**

The City offered residents the choice between four (4) different sizes of recycling carts to accommodate households that would prefer a smaller or larger cart. The four (4) sizes of carts are equivalent to 60 litres (equivalent to 1 blue box), 120 litres (equivalent to 2 blue boxes), 240 litres (equivalent to 4 blue boxes) and 360 litres (equivalent to 6 blue boxes). The smallest bin was reserved however for properties with recycling bin usage and storage issues.



The City has given special consideration to households that they determine do not have enough space to store even the smallest of carts. Approximately 300 households are exempt from using the carts and have been provided with transparent blue plastic bags (the same bags that were used in the Scarborough Pilot Study).

To assist residents with the transition, the City chose not to make any changes to collection days or to collection frequency. The City still collects recycling on a bi-weekly basis as per the recycling collection calendar for single family households.

Solid Waste Management Services provides what they call a ‘front and side door’ collection program for residents with mobility challenges. Residents apply for this service by filling out an application form from the City. The application form must be signed by a doctor. Collection supervisors visit the site to approve the application.

Fully automated collection vehicles are used throughout the City except for downtown areas with on-street parking. In these areas, semi-automated systems are used.

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### 6.3 Next Steps

Concurrent to the roll out of the City-wide cart based recycling system for single family households, the City implemented the cart based waste collection system. The cart based systems have enabled the City to implement a volume-based rate structure for funding the cost of the waste management program for single-family and multi-residential households. The cost of waste and recycling has been removed from the property tax base and instead has been added to a new household joint water and waste utility bill. The rate on the bill reflects the container size chosen by residents for their recycling and garbage container. Recycling carts were provided to residents for no charge, but waste carts vary in price depending on their size. All of the waste carts were delivered to single-family households by the end of October 2008. The joint water and waste utility bills started November 1, 2008.

The City also implemented the user-fee for multi-residential buildings on July 1, 2008. The levy is charged based on the volume of solid waste generated by each multi-residential building to encourage them to use the free recycling services provided to them by the City.

In early November 2008, the City notified multi-unit residents that they will be delivering in-unit recycling containers to their property managers. This initiative will make recycling more convenient for residents in multi-unit dwellings. New recycling containers will be delivered from January 2009 to January 2010.

The City introduced polystyrene and plastic film to the recycling program in December 2008. Only foam polystyrene will be collected. No unexpanded polystyrene will be collected: such as, clear clam shells or clear egg cartons, nor will packaging peanuts be collected. Residents are being advised that they can recycle plastic film. They can recycle plastic grocery and retail bags without drawstrings, metal detailing or hard plastic handles. They are advised to remove receipts, and to place all plastic bags in one grocery or retail bag and tie handles together.

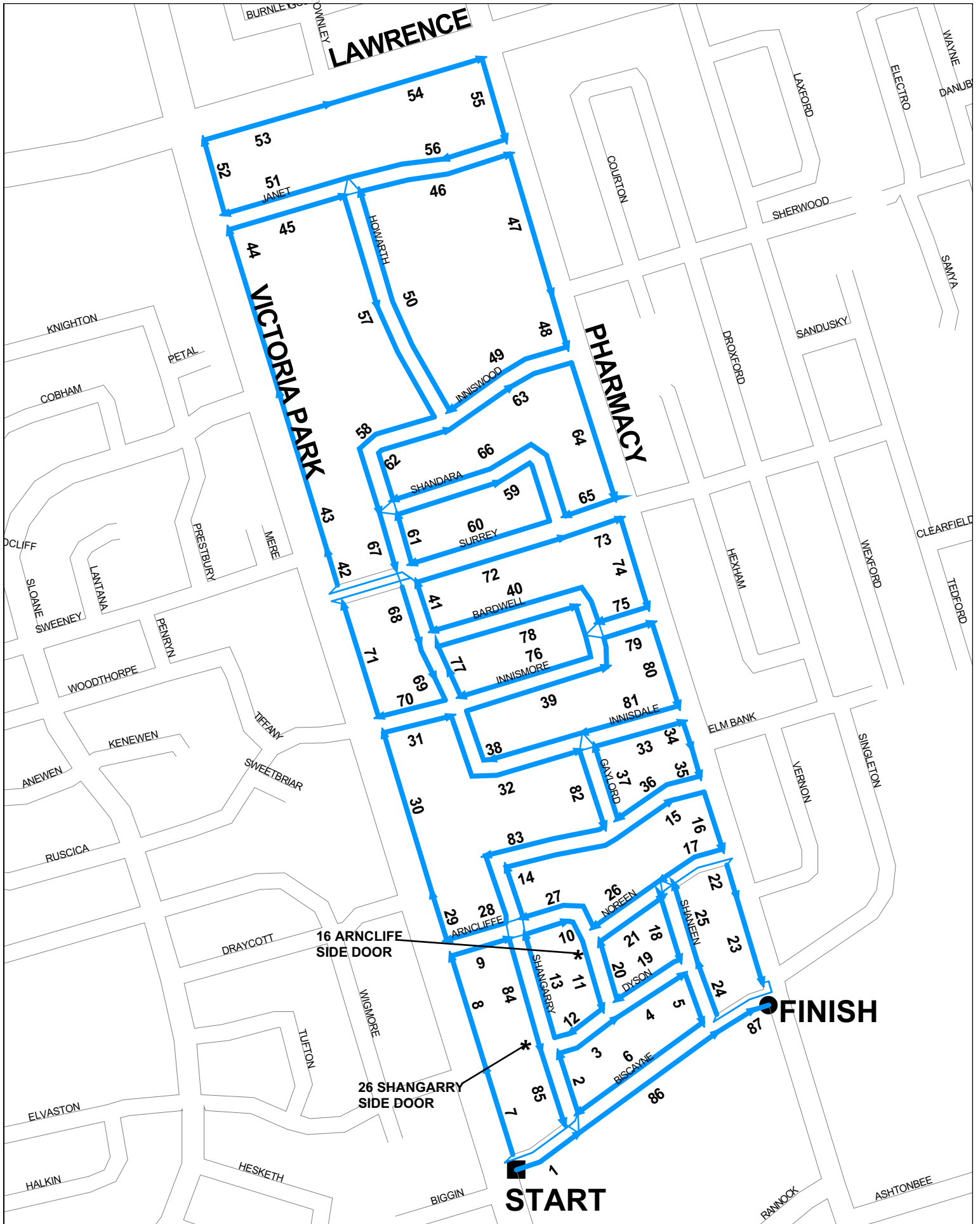
The City is looking into curbside collection for townhouse units currently serviced by central point collection. Approximately 30,000 units use central point or pile collection for the collection of waste and recyclables. Residents, property managers or a third party are required to bring the waste and recycling materials to the central location for collection. Providing door-to-door collection service will make diversion more convenient for residents. The City would need to purchase smaller and lighter waste collection vehicles to accommodate the narrow streets and tight corners traditionally found in townhouse complexes.

Other initiatives the City is reviewing to increase their diversion to 70% by 2010 are; source reduction initiatives, SSO collection in apartments and condominiums, enforcement of a mandatory diversion by-law, curbside collection of household goods for reuse, disassembly and recycling, and additional processing of mixed waste.

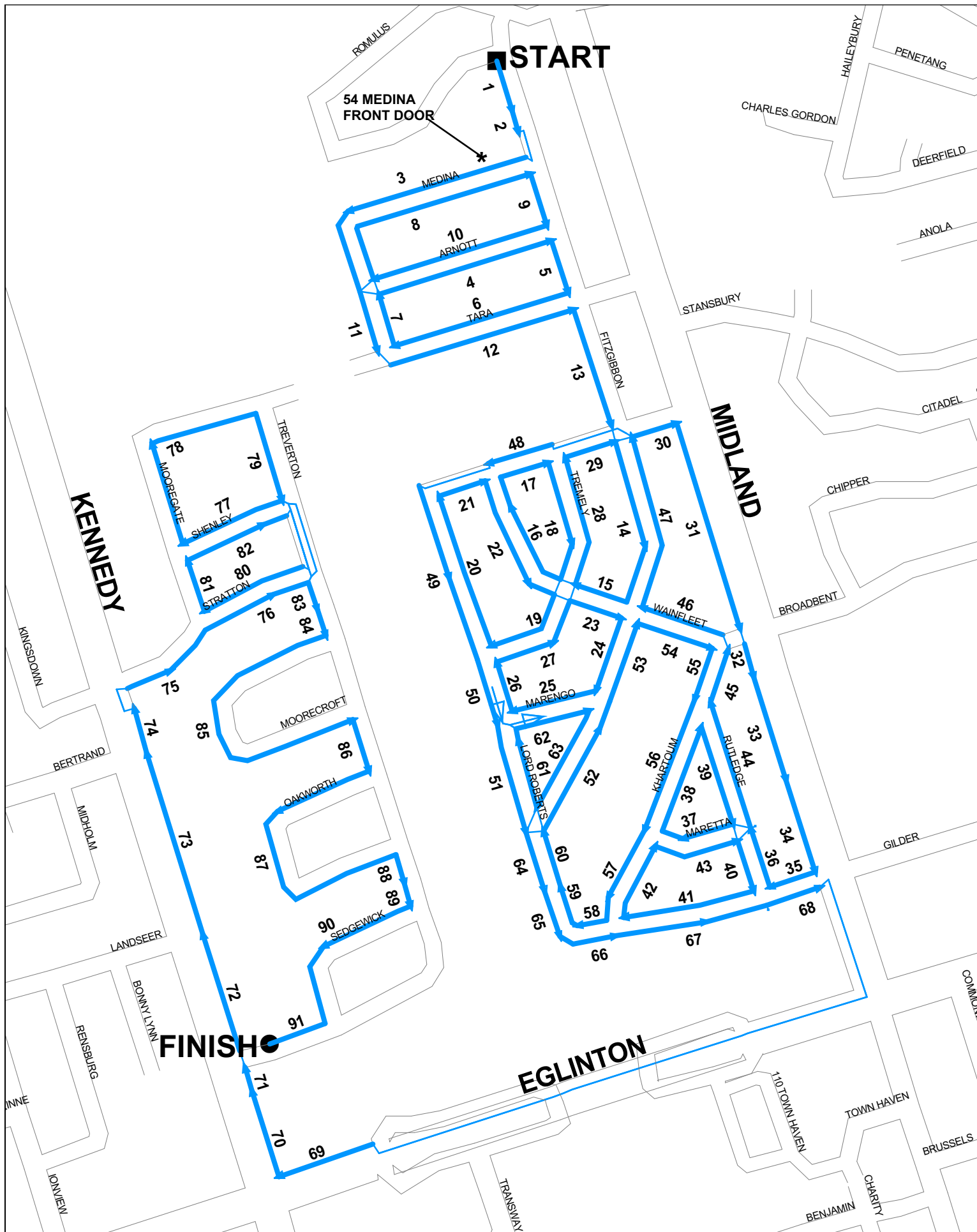
# **APPENDIX A**

Maps of Scarborough Pilot Areas

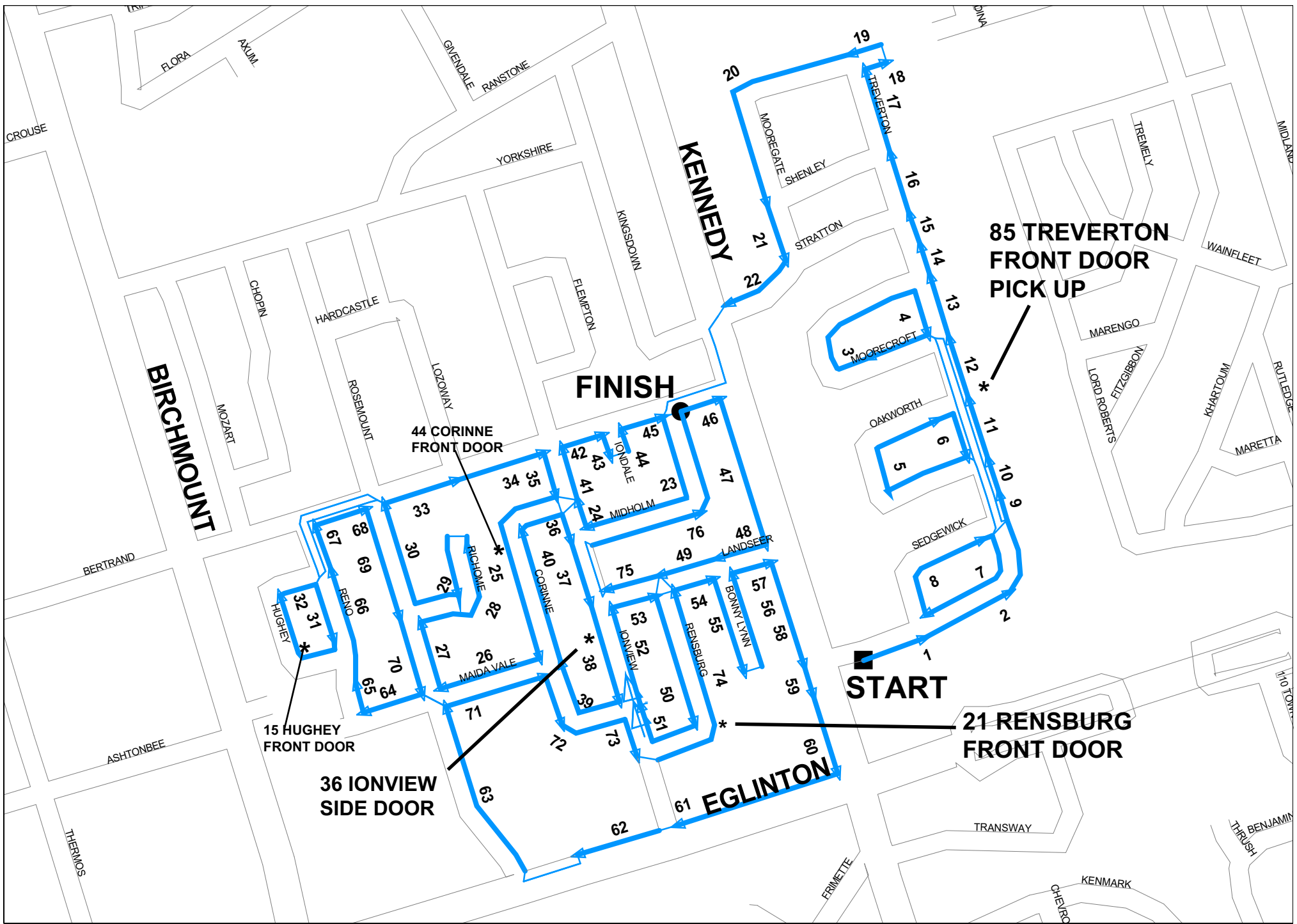
# Cart Area



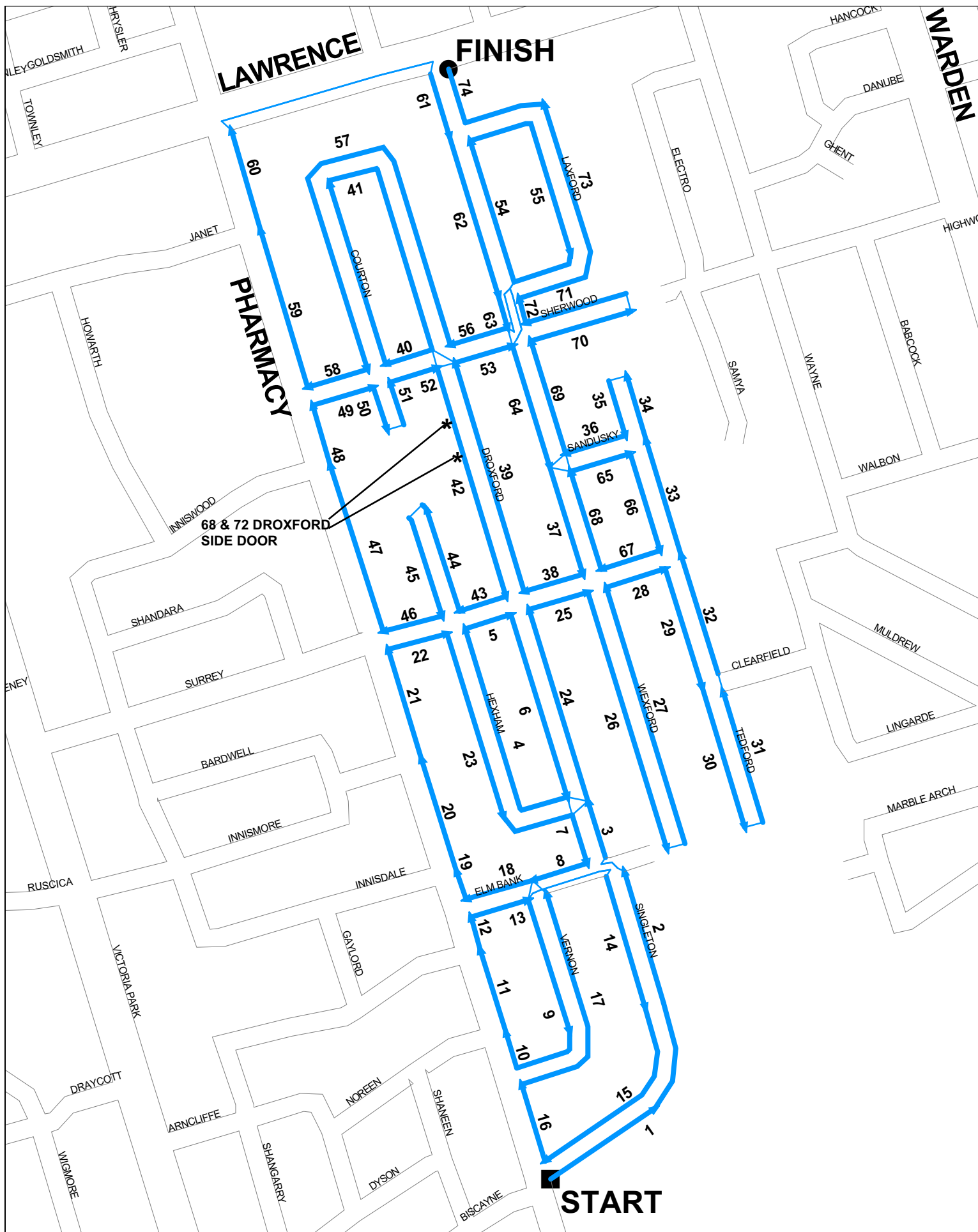
# Weekly Area



# Bag Area



# Control Area



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