CITY OF KELOWNA

MEMORANDUM

Date: September 26, 2007

File No.: 5280-30

To: City Manager

From: Environment & Solid Waste Manager

Subject: **Curbside Garbage Contract and Automation**

RECOMMENDATION:

THAT Council receive for information the Environment & Solid Waste Manager's Report and the Business Case Study for automated curbside pick-up.

AND THAT Council endorse using curbside automated pick-up as the preferred option for curbside garbage and recycling services in the new contract.

AND THAT staff work with the Central Okanagan Regional District, member municipalities and Westbank First Nation to have them included as part of a master tender for the cart purchasing.

And THAT staff work with the Regional District and member municipalities in the development of a joint Request for Proposal for the new garbage, recycling and yard waste contract.

AND FURTHER THAT staff be authorized to negotiate interim contract(s) for garbage, recycling, and yard waste collection until the new service is in place.

Background:

The City currently has the curbside pick-up contract with Waste Management that expires on June 30, 2008. This current service is a manual labor, curbside pick-up requiring 2-man garbage trucks. The service provider has had a record of customer service complaints over the last two to three years largely due to the inability to retain staff.

The service and the entire industry has made a dramatic shift over the last several years to curbside automated service providers. The rational for this shift is due to the current labor market, WCB claims, fuel prices, and other factors as outlined in the CH2MHill Business Case dated Aug. 31, 2007(attach 1).

The advantages of automation are many and are noted in the WRO (Waste Reduction Office) report to the RDCO Engineering Committee dated Sept.14, 2007 (attach 2). The key advantage may be that the service is improved and costs (new contract costs) will not be significantly different except for the purchase of the carts required for curbside automation. The carts have a life of 10-20 years and have a warranty of 10 years.

A pilot program is currently underway using carts (Glenmore area) to assess impact of the new service. Based upon initial findings it is anticipated that there will be strong community support. Each community being piloted and other communities in the RDCO will have to make their own

decision to automate or try to stay with a manual collection system (WRO MEMO Sept. 18, attach 3).

Once a Request for Proposal for the new contract is completed and a successful contractor awarded the new garbage contract, it would take a service provider up to a year to purchase and have delivered a new fleet of trucks. Cart purchase by the City after tendering would be 6 months or more. Therefore there is a need to negotiate an interim contract to allow sufficient time for establishment of the new service.

City staff reviewed the business case document, the information provided by WRO, our existing contract and existing service. We recommend to Council this need to move to automation based on the information, the experience of other communities and the many advantages.

Financial Implications: The City will have to finance initial purchase of carts and then recover from users. The new service and carts could add $25 to $35 increase per household for Landfill and Solid Waste fees for 2009. The interim service contract could result in rate increases for 2008.

INTERNAL CIRCULATION TO:

Finance Dept.

Considerations not applicable to this report:

LEGAL/STATUTORY AUTHORITY: Essential Service
LEGAL/STATUTORY PROCEDURAL REQUIREMENTS: N/A
EXISTING POLICY: N/A
PERSONNEL IMPLICATIONS: N/A
TECHNICAL REQUIREMENTS: N/A
EXTERNAL AGENCY/PUBLIC COMMENTS: N/A
ALTERNATE RECOMMENDATION: N/A

Mark Watt
Environment & Solid Waste Manager

Approved for Inclusion:
John Vos
Director of Works & Utilities

Automated Curbside Collection Program Considerations

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DATE: August 31, 2007

VERSION FINAL

PROJECT NUMBER: 360749

1 Introduction

Curbside garbage and recyclables collection using fully automated vehicles (similar to that shown in Figure 1) has been adopted in at least five communities in British Columbia, and many more across Canada and the United States. This approach to collection offers many benefits over rear and side load manual collection methods currently used in the Central Okanagan area. Chief among these benefits is fewer injuries and reduced absenteeism amongst collections staff.

Figure 1: Automated Collection Truck (Source: Labrie Environmental Group)

The Regional District of Central Okanagan (RDCO), the City of Kelowna and Districts of Peachland and Lake Country, and the Westbank First Nation have expressed an interest in automating existing residential collection services for garbage, yard waste and recyclables during the next round of collections contracts which will commence in June of 2008. In addition to requiring a change in the fleet of collection vehicles used, automation would require that each household have specialized containers (see Figure 2) compatible with the lifting equipment on the collection trucks.

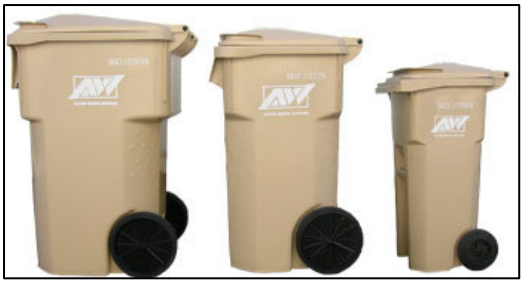

Figure 2: Curbside Waste Carts (Source: City of Santa Barbara)

Prior to moving forward with the capital investment in this type of system, the RDCO and its member municipalities have commissioned this independent business case analysis to further explore the required expenditures, the benefits, and the disadvantages involved with conversion. The study area for this evaluation includes the RDCO[1], the City of Kelowna and Districts of Peachland and Lake Country. There are approximately 49,000 households within this study area that receive curbside collection services. The majority of these (~32,000) are located within the City of Kelowna. Within the RDCO, curbside collection is provided to residents in Joe Rich, Ellison, and the Westside.

2 Existing Level of Service

Regular curbside collection of garbage and recyclables is provided to most single-family residences in the study area by private haulers under contract to the local municipal or regional government. Yard waste collection is also provided, but on a seasonal basis only. A summary of current contracts is provided in Table 1.

TABLE 1
RDCO Collection Contracts

Area	Garbage & Yard Waste	Recyclables
City of Kelowna	WMI[1]	One contract for all areas held by WMI
District of Peachland	OK[2]	
District of Lake County	OK	
RDCO – Westside	OK	
RDCO – Ellison	OK	
RDCO – Joe Rich	OK	

1 Waste Management Inc.
2 Okanagan Environmental Waste Systems

A further discussion of collection programs in each of the four jurisdictions is provided in the following sections. A summary of key information pertaining to collection services is provided in Table 2.

2.1 City of Kelowna

2.1.1 Garbage Collection

The City of Kelowna provides weekly garbage collection to 32,396 single-family and some multi-family strata residences. Currently, the service is provided by Waste Management Inc. (WMI), under contract to the City. Collection is done using four rear load trucks operated by two or three employees and three side-load trucks (right-hand drive) operated by a single person. Wastes are taken to the Glenmore Landfill.

The City is geographically divided into four collection zones and waste is collected from each zone one day each week. Currently, wastes are collected on Tuesdays, Wednesdays,

[1] During the course of this study, a plebiscite was held in the Westside area whereby residents voted to incorporate as a new municipality separate from RDCO. Any impacts on the automated waste collection services in the region resulting from the plebiscite are not considered in this evaluation.

Thursdays, and Fridays.

There is a two-bag or container limit for each household each week. Up to two additional bags/containers will be collected each week provided they are marked with a "Tag-a-Bag" sticker. Stickers can be purchased at various locations in the City for $1.50 each.

It is worth noting in the context of this study that the City of Kelowna has been informed by WMI that they can expect to see higher bid prices during the upcoming tendering process if manual collection is specified (Watt, 2007). This is due in part to rising fuel prices, but also due to the labour shortage in the region and the impact this shortage is having on wages.

2.1.2 Recyclables Collection

The City of Kelowna is a partner in a regional recycling program operated by RDCO which offers both depot and curbside blue bag collection throughout the study area. Curbside collection of mixed recyclables is provided to all City single-family residences and some strata complexes which receive garbage collection service. Recyclables placed in clear or translucent blue bags are collected on a biweekly basis, on the same day as (but separate from) regular garbage collection. There are no limits on the number of bags collected per household.

Collection and processing of recyclables is provided by WMI under contract to the RDCO. Collection zones and schedules for recyclables collection in Kelowna are the same as those for garbage collection. WMI uses three manual side-load trucks with single operator to provide this service.

WMI's contract also includes responsibility for processing of recyclables, which it has subcontracted to Metro Materials Recovery Inc. (MMRI). Recyclables collected in Kelowna are hauled directly to MMRI's processing facility, also located in Kelowna.

Four recycling depots have been established to accept extra materials from single-family residences, as well as provide service to multi-family customers and small businesses. Depot collection is also provided by WMI, and materials are taken to the MMRI processing facility.

2.1.3 Yard Waste Collection

Yard waste is currently collected at the curbside twice per year (spring and fall) from residences that receive garbage collection service. Acceptable materials include grass, leaves, pine needles and cones, and small prunings up to 1 cm in diameter. An unlimited amount of residential yard waste is picked up from each residence during these weeks provided it is in clear plastic bags, or in bundles no longer than 1 metre or weighing more than 25 kg. Yard waste is taken to the composting facility at the Glenmore Landfill.

Yard waste collection service is provided on the same day as garbage collection. Service is provided by WMI as part of the garbage collection contract, and is done as a separate pass using side-load trucks with a single operator. Service areas are the same as for waste collection.

Residents may also drop off yard waste and prunings (up to 20 cm in diameter) at the Glenmore Landfill any time of the year free of charge.

2.2 District of Peachland

2.2.1 Garbage Collection

Weekly garbage collection is provided to 2,450 single and multi-family residences and small businesses by Okanagan Environmental Waste Systems under contract to the District of Peachland[2]. The District is divided into three collection zones, each of which receives collection on a different day of the week. Currently, collection is provided in Mondays, Wednesdays and Fridays. Collection is done using side-load trucks (right-hand drive) crewed by a single person. Waste is taken to the Westside Landfill.

As in Kelowna, there is a two-bag or container limit for each household each week. Up to two additional bags/containers will be collected each week provided they are marked with a "Tag-a-Bag" sticker. Stickers can be purchased for $2.00 each.

2.2.2 Recyclables Collection

Peachland also participates in the RDCO's regional recycling program. Recyclables are collected biweekly on the same day as garbage, but collection is done by WMI using a separate fleet of trucks. Materials are taken directly to MMRI's processing facility in Kelowna.

2.2.3 Yard Waste Collection

Residential yard waste curbside collection services are identical those provided in other jurisdictions in the region: yard waste is collected twice per year (spring and fall) from single and multi-family family residences and businesses in clear bags or bundles. Acceptable materials include grass, leaves, pine needles and cones, and small prunings up to 1 cm in diameter. There are no limits on the amount of yard waste that is picked up from each residence.

Yard waste collection service is provided on the same day as garbage collection during the spring and fall periods using a separate manual side-load truck. Service is provided by Okanagan Environmental Waste Systems as part of the garbage collection contract, and the material collected is taken to the Peachland composting facility.

Residents may also drop off their yard waste at the Peachland Compost site any time of the year free of charge.

2.3 Lake County

2.3.1 Garbage Collection

Garbage collection is provided weekly to 3,627 single-family residences by Okanagan Environmental Waste Systems using side-load trucks (right-hand drive) with a single operator. Waste is taken directly to the Glenmore Landfill. The District is divided into four collection zones, with wastes being collected on Tuesdays, Wednesdays, Thursdays, and Fridays.

There is a two-bag or container limit for each household each week and up to two additional bags/containers will be collected each week provided they are marked with a "Tag-a-Bag" sticker. Stickers are available for $2.00 each.

[2] The number of households served also includes a small number of multi-family and multi-use facilities. However, this number is not considered significant in the context of this review, and will not affect the study outcomes

2.3.2 Recyclables Collection

Lake County participates in the RDCO's regional recycling program. Recyclables are collected biweekly by WMI and are taken directly to MMRI's processing facility in Kelowna. Collection is provided on the same day as garbage but using a separate fleet of trucks.

2.3.3 Yard Waste Collection

An unlimited amount of yard waste is collected twice during the year (spring and fall) at curbside from those Lake County residences which receive garbage collection. The service is provided by as part of the garbage collection contract held by Okanagan Environmental Waste Systems. Yard waste must be in clear plastic bags or in bundles. Collection is provided using manual side-load trucks, and is done separately from garbage collection. Materials are taken to the compost facility at Glenmore Landfill.

2.4 Regional District of Central Okanagan

2.4.1 Garbage Collection

Waste collection is provided weekly to 10,398 single-family residences in Westside, Joe Rich, and Ellison by Okanagan Environmental Waste Systems under contract to the RDCO. In all three areas, collection is done using side-load trucks (right-hand drive) which are crewed by a single operator. Westside is divided into four collection zones which receive service on Mondays, Tuesdays, Wednesdays, and Thursdays. Service in Joe Rich is provided once per week (Wednesdays) and service in Ellison is provided once per week (Wednesdays).

Waste from Westside is taken to the Westside Landfill while waste from Ellison and Joe Rich is taken to Glenmore Landfill.

There is a two-bag or container limit for each household in all three areas. Up to two additional bags/containers will be collected each week provided they are marked with a "Tag-a-Bag" sticker, which are available for $1.50 each.

2.4.2 Recyclables Collection

Westside, Joe Rich and Ellison participate in the RDCO's regional recycling program previously outlined. Recyclables from each of the three areas are collected biweekly by WMI on the same day as garbage pickup, and are hauled directly to the MMRI processing facility in Kelowna.

2.4.3 Yard Waste Collection

An unlimited amount of yard waste is currently collected at the curbside in each of the three RDCO collection areas twice per year (spring and fall) from single family residences which receive garbage collection service. Yard waste must be in clear plastic bags or in bundles (no longer than 1 metre or weighing more than 25 kg) and is collected in a separate manual side-load truck. Yard waste is taken to the composting facilities at the Westside Landfill and Glenmore Landfill. This service is provided as part of the garbage collection contract held by Okanagan Environmental Waste Systems.

3 General Discussion of Automated Collection

Automated collection of garbage and recyclables was introduced to North America over 30 years ago. While it initially became popular in the commercial collections business, in the past

ten years there has been an increasing trend towards providing automated service in residential sectors.

In Central and Eastern Canada, many communities moved to automated collection in the mid-1990's, including Caledon (Region of Peel), Kingston, Markam, Halifax, and Ottawa. Automated collection is less prevalent in Western Canada where only a few communities have made the migration, and this has been more recent. In British Columbia, automated collection has been implemented in Squamish, Vancouver, Kamloops, Prince George, and Port Coquitlam.

TABLE 2
Collection Service Details

Area	Collection Days	Number of Households Serviced	Program Costs [1] (per household per year)	Funding Method
City of Kelowna				
• Zone 1 • Zone 2 • Zone 3 • Zone 4	Tuesday Wednesday Thursday Friday	32,396	Garbage: $37.35 [2] Recycling:$21.00 Yard Waste: $13.00	Tax Levy
District of Peachland				
• Zone 1 • Zone 2 • Zone 3	Monday Wednesday Friday	2,450	Garbage: $36.99 Recycling:$21.00 Yard Waste: $13.00	Tax Levy
District of Lake Country				
• Zone 1 • Zone 2 • Zone 3 • Zone 4	Tuesday Wednesday Thursday Friday	3,627	Garbage: $36.99 Recycling:$21.00 Yard Waste: $13.00	Tax Levy
RDCO				
• Ellison • Joe Rich • Westside Zone 1 • Westside Zone 2 • Westside Zone 3 • Westside Zone 4	Wednesday Wednesday Monday Tuesday Wednesday Thursday	10,398	Garbage: $36.99 Recycling:$21.00 Yard Waste: $13.00	Tax Levy (40%) and Utility (60%)

Notes:

1. Recycling program costs cover collection, sorting and marketing. Due to market fluctuations, program costs may vary from year to year.
2. City of Kelowna has recently been told by their waste collection contractor to expect a significant increase in costs during the upcoming contract tendering process if manual collection methods are specified.

A summary of the key advantages and disadvantages of this mode of collection are summarized in Table 3.

One of the most significant benefits of automated collection within the Central Okanagan region is with respect to the labour market. An ongoing labour shortage in the Central Okanagan area has created problems for existing curbside collection programs. It has been reported that private sector waste haulers have experienced difficulties recruiting and retaining employees, and that the strain caused by the high staff turnover and the limited pool of labor has lead to an

increase in missed collections, and a extremely high number of complaints by residents (Suhan, 2007).

With automated collection systems, there is little to no manual lifting involved. This allows system managers access to a much larger labour pool to staff their collections vehicles; no longer to staff have to fit the "traditional" profile of a young male capable of lifting large loads. With automated systems, drivers can include both younger and older workers of both genders.

TABLE 3
Automated Collection Advantages and Disadvantages

Advantages	Disadvantages
• Potential to reduced number of collections crews/vehicles • Heavy lifting eliminated resulting in reduced injuries, absenteeism and WCB claims • Better working environment for collections staff • Increases employment opportunities for female and older male collection workers • Allows collection staff to extend their careers • Smaller fleet size which translates to reduced fuel consumption and emissions • Increased participation in diversion/recycling programs • Higher customer satisfaction • Improved neighbourhood aesthetics on collection days • No debagging of yard waste required • Closed lids reduce amount of rain/snow that accumulates, reducing collection tonnages and improving routing efficiency • Carts allow plastic bags to be eliminated from yard waste program, saving debagging costs and improving compost product quality • Carts allow plastic bags to be eliminated from recycling collection, saving debagging costs and allowing for increased productivity (more automation and less labour) • Carts provide better containment and pest deterrence, reducing litter at curbside	• Initial capital costs for carts • Initial capital cost for changing collection fleet to automated units • Automated systems may not work as well in narrow back lanes and cul-de-sacs – typically some residences must still be collected by hand • Some households may not have sufficient storage space if collection program requires two or three large carts • Increased maintenance costs for collection vehicles • Increased training required for staff to become proficient with arm operation • Potential for wastes/organics to freeze in carts • Bulky materials may require manual loading or separate collection • Ergonomic issues associated with joystick operation

4 Collection Equipment Considerations

There are a number of important issues that must be considered when evaluating a potential change from manual to automated curbside collection within the Central Okanagan region. A discussion of key equipment issues is provided in the following sections.

4.1 Carts

Fully automated collection is not as flexible as manual or semi-automated when it comes to waste container placement and variation in container types. Automated collection vehicles can be adapted to work with a range of containers. However, in order to achieve the full

performance benefits of automation, container styles must be consistent, and placed in uniform and assessable locations by residents.

The most popular container option, and the one considered in this evaluation, is wheeled carts, also known a wheelies, or roll-out carts. Considerations relating to cart sizing, selection, ownership and maintenance are discussed in the following sections.

4.1.1 Sizing

Carts are available in a number of sizes ranging from 50 L (13 gallons) to 360 L (95 gallon). This allows for selection of a cart that will match collection frequency with typical material generator rates in a community, and the type of material being handled (e.g., garbage, recyclables, yard waste). Popular cart sizes used in North America programs are 110 L, 220 L and 320 L. Table 4 provides a comparison of cart capacities with standard garbage bags.

TABLE 4
Cart Sizes and Bag Equivalents

Cart Size	Bag Equivalent
120 L	1.5 bags
180 L	2.3 bags
245 L	3.2 bags
360 L	4.7 bags

Source: City of Kamloops

Cart sizing is often based on waste statistics, collection program pilot testing and resident surveys. Guidance from the experiences of other jurisdictions with similar socio-economic characteristics is also valuable.

In addition to material collection frequency (i.e., weekly or biweekly), a key consideration in selecting what size of cart(s) to provide is the physical capabilities of residents. A cart that is too large can be difficult to get rolling or to maneuver once it is moving. Furthermore, a large cart filled with a dense material (such as grass clippings), can be too heavy for some residents to manage, or could lead to injuries if dropped. In both Port Coquitlam and Prince George, a set-out/set-back service is provided (through an application and approval process) to residents who are not capable of managing the bins themselves. Approximately 30 of the roughly 32,000 households served by Port Coquitlam subscribe to this service (Port Coquitlam, 2006).

Large carts may also be difficult to store due to their dimensions, particularly if more than one cart is used in the program. Surveys of residents by the City of Toronto also highlighted that carts must also be sized to fit in laneways between adjacent houses (Toronto, 2006).

In multi-stream collection systems (where the quantities of each stream from a household vary and/or certain streams are collected bi-weekly), it is common to use different sized carts for different materials. This does require that a wider range of replacement parts be maintained in inventory.

4.1.2 Selection Criteria

There are a number of factors involved in the selection of carts for use in curbside programs. A summary of key criteria is provided below.

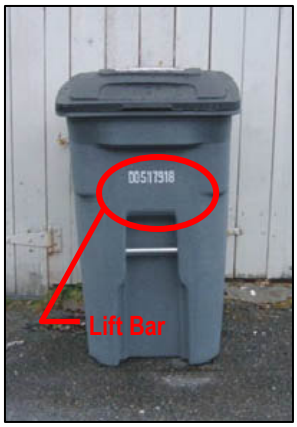

Figure 3: Cart with integrated lift bar. (Source: City of Moose Jaw)

- **Materials of Construction:** The main body of carts is generally made from polyethylene plastic. The grade of polyethylene used (e.g., HDPE, LMDPE) is dependent upon the manufacturing technique (injection molding, rotational molding). UV stabilizers can be added to the plastic resin to extend the service life of the cart. The plastic used in the cart should be flexible enough so that it does not crack when subjected to winter temperatures, and does not deform in summer temperatures.

- **Lift Bars:** Carts from most manufacturers are available in models with or without "lift bars". So-called "American style" carts with lift bars as shown in Figure 3 will work with collection vehicles equipped with either grabber arms or standard bar-lock lifters whereas "European style" carts (i.e., no lift bar) will work only with the grabber arms.

Figure 4: Colour Coding of Cart Lids (Source: City of Port Coquitlam

- **Colour:** Carts can be purchased in a range of colours with little to no impact on capital cost. In multi-stream collection programs, municipalities generally use standardized body colours for each stream (e.g., green for yard waste, blue for recyclables, brown for waste). In some cases, such as Port Coquitlam, a standard cart body colour is use for all streams and only the lid colour is varied (see Figure 4). In either case, this simplifies the job for collection vehicle drivers when multiple materials are picked up on a given day. Use of standardized colours also makes stocking of replacement cart parts easier since there is less range of inventory that must be carried.

  Standardized colours can be particularly important in a regional system. Where there is significant population movement between municipalities, the consistent colours minimize "re-education" of new residents. It also allows several municipalities within a region to join forces, leveraging a single combined cart orders to obtain better pricing.

> **Recommendation:** Municipalities and the RDCO should coordinate actions so that cart colours for various collections streams are consistent in all jurisdictions.

- **Wheel and Axle Design:** The diameter of the wheels will impact ergonomics and usability. Most carts are equipped with 8" or 10" wheels, while larger carts (e.g. 395 L) are generally fitted with 12" wheels. Axles must be of a sufficient diameter and/or made of a suitable material to provide enough strength for the application.

  The materials from which the wheels are constructed will also impact usability. Carts with rubber wheels are generally more comfortable to push or pull than those with plastic wheels, but can be more costly and can crack, chip or peel. Rubber wheels are also generally

quieter than plastic wheels. Similarly, hollow wheels are generally noisier than solid wheels.

The manner in which the wheels attach (i.e. cotter pin, snap-on, end-cap) is an important consideration during the initial program for distributing carts to residents, and during subsequent repair/maintenance.

- **Lid Design:** The design of the cart lid should allow for a reasonably tight seal that keeps pests and rain/snow out of the cart. The handles, which are typically integrated into the lid hinge, should be wide enough use by a person with large hands or someone wearing gloves. When the lid is open and hanging down, it should not be long enough such that it trips the user or otherwise interferes with pulling or pushing the cart.
- **Service Life and Warranty:** Manufacturers report that their carts have a service life of 10 to 20 years, and major manufacturers typically back this up with a 7 to 10 year limited warranty. However, as each manufacturer's warranty coverage differs slightly, specific terms need to be evaluated closely. In particular, the evaluation should review coverage for damage to wheels, axles, and handles.

Recommendation: Municipalities and the RDCO should coordinate actions such that a single cart specification is used within the Central Okanagan area. This allows for consistency of manufacturer, size and color. In addition to allowing the replacement cart/parts inventory to be minimized, and possibly shared across jurisdictions, this should result in better pricing.

4.1.3 Availability and Supply

While there are a large number of cart manufacturers, there are also a large number of municipalities that have switched over to cart-based collection programs, or who are in the process of switching. This increasing demand can lead to longer lead times for carts to be delivered, and can also affect the delivery of replacement carts and parts once a program is in operation. Generally, lead times in the range of four to eight months are required to fill large orders. Re-supply contracts, which are typically much smaller, have been known to take up to a year to fill. The ability of the cart manufacturer to meet supply schedules should be included in the selection criteria.

4.1.4 Cart Ownership

Two options for cart ownership have been presented for consideration in the Central Okanagan region: ownership by the regional/municipal governments or by the contractors that provide collection services.

Ownership of carts by the collection contractor has several advantages:

- The private sector is less limited on the length amortization period of borrowing agreements than the public sector. Thus, the capital costs associated with initial cart purchase can be spread out over a longer period (seven to ten years versus RDCO's five year limitation), allowing annual program costs to be reduced.

- Cart purchase costs can be recouped as part of monthly service charges to the municipality. In jurisdictions where capital spending is tightly controlled, this allows the carts to be budgeted for as an operating expense rather than as a capital expenditure.
- Multi-national waste contractors may be able to leverage their size and purchasing power across North America and obtain better pricing on carts than would be available to the municipality.
- Experience suggests that collection contractors are likely to be more diligent about maintaining grabber equipment to prevent cart damage when they own the carts.

However, these advantages must be balanced against the reality that the private sector does not have access to the lower borrowing rates enjoyed by municipal governments. Also, when the contractor purchases the carts, there will also be a profit margin applied and passed along to the municipality. Both of these considerations generally result in higher program costs when carts area provided by the contractor. Other disadvantages include:

- Under the current collection contract structure, contractor ownership could result in ownership of the region's cart inventory being shared among up to five different companies.
- The capital costs involved with cart purchase could prevent smaller companies from bidding collection contract tenders.

The alternative to private contractor supply/ownership is for the municipality or regional government to purchase the carts. In the context of the Central Okanagan region, this expenditure would be in the order of $7 to 9 million (depending on cart sizes) for a three-stream collection system, with 65% of this cost being for City of Kelowna carts. As an alternative to purchasing the carts outright, municipalities can finance the cart purchase (subject to their borrowing limitations) through their normal borrowing channels. Also, at least one manufacturer offers their customers financing options with competitive borrowing rates, flexible payment options, and terms of up to ten years.

Despite the capital expenditure, the benefit to this scenario is that carts survive any collection contract changes, which provides the municipality with greater flexibility in awarding contracts or enforcing contract terms. This scenario also gives the municipality direct control over the cart supply specification, and sole discretion in determining when carts have reached the end of their life span and require replacement. Supplying additional carts to support higher or lower than expected growth rates in the region is also easier under this scenario, as any uncertainties are removed from the contractor's domain.

Recommendation: The cart inventory required for the automated system in the region should be owned by the RDCO and municipalities. Based on our understanding of the various constraints upon municipalities in the region, further consideration may need to be given to the RDCO purchasing and managing cart inventories on behalf of the Districts of Peachland and Lake County.

As part of a common specification, standardized logos could be affixed to each cart to assist with regional education/promotional efforts. Carts could be ordered without markings from individual municipalities further making them transferable between jurisdictions.

Alternatively, jurisdictional markings could be limited to the just the lids allowing inventory transfers to be made following lid replacement.

4.1.5 Cart Damage, Repair and Replacement

Regardless of who owns the carts, damage to individual units will be incurred and repairs or replacements will be necessary. Carts are generally reported as having a 15 to 20 year lifespan, but damage can arise from manufacturer defects, the resident's use of the cart (overfilling, neglect, modifications) and from pickup by collection vehicles.

Manufacturer defects are generally covered by warranties. The industry standard for cart warranties is ten years.

Although the carts are generally very robust, damage by residents does occur. Carts are designed and rated to contain a specific maximum weight, and overloading with heavy material (e.g., engine parts, bricks from renovations) can lead to breakage of the cart body, or bending of axles (as well as risk injury to the resident while moving the cart). Dropping heavy materials into carts can also lead to breakage of cart bodies, and if the cart is tipped over the lid can be damaged or broken. Holes may develop in the cart body over years of normal use, or can be burned through if hot coals or bbq briquettes are put inside. Alternate use of carts around the residence (e.g., for wheel barrows) can also lead to damage.

Poorly maintained, or improperly specified collections equipment can also lead to damage. The most common problem appears to be if cart grabbers are not properly calibrated or maintained. Excessive pressure applied by the grabber can crush the cart, leading to damage or shorter lifespan. Whether unintentional or intentional (fleet managers and individual operators have been known to increase grabber pressure which allows them to speed up the unloading cycle time), this can be controlled through routine preventative maintenance, and random, unannounced checks of system pressures in the field.

Another cause of cart damage from collections vehicles is when carts that are overloaded or have long items sticking out the top (e.g. lumber) are tipped. Also common is damage caused when an operator tries to pick up a cart that is incorrectly positioned. Both these situations can be prevented by the operator leaving the truck cab to remove and manually load large items or reposition the cart.

When carts are damaged, whether by residents or collection crews, it is generally recommended that they be quickly repaired or replaced in order to maintain confidence in the program. Quick replacement is further desirable in the Central Okanagan area due to the "premium" that is placed on aesthetics due to the tourism industry.

In San Bernardino, CA, repairs to the City's inventory of 150,000 carts are handled onsite at the residence by two part-time employees with a service truck (Tilton, 2002). These employees also make the determination as to whether a cart is beyond repair, and issue a replacement as necessary. If and how costs for cart repairs and replacement are charged varies among municipalities, and generally involves assessing each resident's situation individually. In municipalities which outsource collection, the choice of whether to have the collection contractor undertake cart replacement/maintenance also varies.

Recommendation: The responsibility for physically maintaining and replacing carts in the Central Okanagan area should lay with contractors as part of the collections contracts. The contractors should be held financially responsible for cart damage caused by their crews and equipment, but not for damage caused by residents. This approach eases administration and workload for the municipalities. Also, based upon the experiences in Spokane where breakage rates for blue bins by contractors was twice that for City collection crews, this provides a built-in cost incentive for contractors to maintain grabber arms at the proper pressures and have collections staff properly position carts (manually if required) prior to unloading.

Recommendation: In the Central Okanagan region where multiple collection contracts are awarded, there should be consistency in the maintenance standards and replacement standards among jurisdictions.

If repairs and replacement are the responsibility of the private contractor who provides collection service (either because they supply the carts or provide maintenance to municipally owned carts as part of the collection contract), there needs to be mechanisms in place to ensure that maintenance standards are being met, which generally means routine inspections by municipal staff and responding to resident concerns/complaints. Municipal staff can also expect to "referee" disputes between collectors and residents over who was responsible for cart damage.

Regardless of who provides maintenance, an inventory of replacement carts and spare parts (lids, axles, wheels) will need to be maintained to account for damage. The cart inventory will also have to be sufficient to accommodate new housing growth in the area, and carts that go missing when residents move. As part of the Region of Peel's green cart program rollout, 7,000 of the 300,000 carts ordered were kept in reserve for growth and replacement. This is slightly higher than the 1% to 2% replacement rate that is normally suggested, but experience elsewhere has indicated that during the first year of a program, cart damage is higher as residents and collectors adjust to the program. The need to carry an inventory or parts and spare carts speaks to the need for use of standardized carts. The City of Los Angeles' inventory of over 2 million carts contained models from five different manufacturers (O'Malley, 2001). This required them to keep five types of replacement parts on hand, and staff had to know how to fix five different carts. It also caused difficulties in that there were five different warranties in place through which claims were negotiated.

Once carts have been in the field for many years, it will be necessary to account for end-of-lifecycle replacements. With 10 year warranties and 15 to 20 year lifecycles, these costs don't impact budgets in the near term, but they must be considered in evaluating the long-term costs of automation. In the City of Los Angeles where automation was implemented in 1991, budgets are based on replacing 10% of the carts in service every year with new carts (O'Malley, 2001). Los Angeles' replacement plan is also being used to standardize on fewer cart models. In Port Coquitlam, a reserve fund has been established to allow for future cart replacement (Port Coquitlam, 2006).

4.2 Collection Trucks

A variety of manufacturers provide trucks for automated collection systems. In the Central Okanagan region where collections are outsourced, specifying the features of the collection vehicle would be the responsibility of the contractors, as would be maintaining appropriate maintenance facilities and staff, part inventories, and backup collection vehicles.

4.2.1 Selection Criteria

Some of the key considerations in selecting an automated collection truck include:

- **Arm Design:** The distance out from the truck that an arm can reach, and the articulation design of the arm, will impact how versatile the system in when working in and around parked vehicles and on slopes. The "smoothness" of the arm's motion during the cart unloading sequence will also affect whether the amount of garbage spillage on the ground.

- **Load cycle time:** The amount of time that it takes to lift, unload and replace the cart at the curb. A fast cycle time can increase overall productivity, but can also result in more maintenance due to component fatigue. Load cycle times of 10 to 30 seconds are typical.

  Faster unloading times typically allow automated collection vehicles to service 1,000 to 1,200 households per day (depending on route density and distance to disposal facilities). This generally represents a 25 to 50% increase over manual side load performance.

- **Ergonomics:** A cab that is well laid out, and that can be adjusted to each operator, will provide benefits in terms of increased job satisfaction and reduce repetitive strain injuries. Use of camera systems to align grabber arms, rather than having the operator turn there head to visually line up the arm, can avoid neck strain.

- **Visibility:** Many side-load collection trucks are equipped with right hand drives, which can be daunting both for collections staff and other drivers on the road. A cab with good all around visibility and mirrors (including convex mirrors on front bumpers) will help avoid accidents. Installation of video cameras on the rear of collection trucks to assist with backing up is now commonplace. Installing cameras on the off-side mirror bracket instead of convex mirrors should also be considered.

Figure 5: Semi-automated Split Compartment Truck (Source: City of Hamilton)

- **Single vs. Split Compartment:** Collection trucks can be manufactured with either a single compartment, or the compartment can be split as shown in Figure 5. This allows for collection of two separate materials in a single vehicle pass. Forward and rear split compartments are available, but are less common and side-by-side splits. Common configurations for side-by-side split compartment trucks with compaction are 70%:30%, 60%:40% and 50%:50%. The specific configuration used is determined by the materials being collected, their density and generation rates. Once selected, the split ratio generally remains static as the ratio can only be changed with considerable effort or remanufacturing.

While split compartment trucks have the advantage of reducing the number of passes down each street, and thereby reducing traffic loads, they do have a number of disadvantages. Included among these disadvantages is higher per truck maintenance cost (due to the additional hydraulic components), and specialized parts inventory that must be maintained. Also, if waste generation rates change or new materials are added to diversion programs, then the split ratio may not be ideal and use of the trucks overall capacity will not be optimized. Finally, all commodities carried in a split compartment truck need to be delivered to a single facility or significant added route time and cost will be incurred.

Mixing split compartment trucks into a fleet that also includes single compartment truck also reduces the flexibility of that fleet. This is due to the complications of substituting a single compartment truck into a route that is designed for split compartment truck when the latter becomes unavailable (i.e. due to breakdown, maintenance, or operator unavailability).

Finally, split compartment trucks are less common in existing fleets of private waste haulers. Specifying their use may remove any tender price reductions that might be gained by a hauler transferring existing equipment around within a larger region (e.g. Lower Mainland, Western Canada).

Recommendation: Split compartment trucks are not recommended for use in the Central Okanagan region. This is primarily due to the distance between collection zones and disposal/processing facilities.

- **Number of Axles:** Collection vehicles can be purchased on both single and tandem axle chassis. Single-axle configurations provide more maneuverability which is valuable in cul-de-sacs and tight laneways. But this maneuverability generally comes with the cost of lower net payload.

4.2.2 Truck Capacity

Truck capacity is defined in terms of payload weight (gross vehicle weight minus tare weight) and volume of the compartment.

The payload weight of a collection truck is a function of several factors including chassis and engine selection, materials of construction, and number of axles. The tare weight of a vehicle is an important consideration since one tonne of additional capacity translates to servicing an additional 40 to 50 houses before having to unload. This impacts routing and program efficiencies (and costs).

Automated trucks can be specified with compartments ranging from less than 10 yd^3 to 30 yd^3. Selection of the appropriate compartment size must take into consideration the density of material(s) being collected. If a truck is collecting light weight materials, and the compartment is sized too small, the truck might to pull off the route to unload more frequently (thus reducing performance) because they have reached the volume capacity of the compartment, but not the weight capacity. This can be compensated by specifying larger compartments, but this generally increases the length and/or height of the vehicle which in turn can affect maneuverability and prevent its use in tight alleyways.

Truck capacity must be balanced with vehicle power; the benefits of having a higher payload are negated if the truck does not have the power to get around the landfill site, or is slow going

up hills along the collection route. A high capacity truck can also cause greater damage to road surfaces, particularly in alleyways which are not generally designed for truck traffic.

4.2.3 Bulky Item Handling

As previously outlined, the performance benefits of automation are realized with use of standardized containers placed at the curbside or alleyway in a manner that collections staff don't have to leave the cab of the truck. However, depending upon the content and enforcement of local solid waste bylaws and collection program guidelines, bulky items such as small appliances, bicycles, tires, or extra bags of garbage will be encountered. In the Central Okanagan region, the various yard waste collection programs allow residents to set out bundled brush and prunings at the curb.

When collection of these items is within the scope of the collection program, allowance must be made to get them into the hopper of collection vehicles. Some grabber arms are designed in a manner that allows lifting of such items, but more often operators will resort to manual loading. If the opening to the collection truck's hopper is high off the ground, the operator may have to throw the item, risking injury.

To avoid these issues, some municipalities have banned the placement of bulky material at the curb outright, and/or or offer "spring cleanup days" where residents can bring bulky waste to landfills free of charge. Others have implemented a separate spring collection service (e.g. one day per year) where bulky items are collected a curb using non-automated trucks.

Another alternative is to use a flexible truck design. Some manufacturers provide side-load trucks with a "drop-frame" configuration. This configuration places the loading hopper at a height that still allows collection staff to manually load material into the hopper, and provides flexibility to handle bulky items. However, these drop-frame trucks are generally more expensive than an automated truck with a regular chassis.

Automation of existing yard waste collection programs in the Central Okanagan region will drive the use of drop frame trucks (which increases truck prices) or altering the program to discontinue the collection of bundled material. This will be a greater issue if the current yard waste collection period (3 weeks in spring and 3 weeks in fall) is expanded to include summer collection. Alternatively, the yard waste program collection could be continued as is, and collection during the spring and fall periods could be done using semi-automated or manual collection methods.

4.2.4 Operator Training

As part of the migration to automated collection, collections staff must be trained in what is essentially a new skill. While driving from stop to stop does not change (unless right-hand drive configuration is being introduced), staff must learn how to line up the truck and arm with waste containers at the curb, and control the arm to handle the various situations they will be faced with (carts on slopes, carts turned sideways, carts situated behind other carts or object). They must also gain proficiency in the new system so that the overall performance gains in automated collection can be achieved, and claims by residents for damages (e.g. from scratched cars and damaged garage siding or fences) are avoided.

Generally, equipment vendors will supply operator training as part of the vehicle procurement process. This is often supplemented with "practice areas" set up in parking lots or maintenance

yards. Here, drivers can maneuver the vehicles without worrying about accidents, and can practice grabbing up carts in various placements (e.g. between or next to obstacles, angled, sloped). In the City of Spokane, it was found that after six months, collections drivers had master the new skills.

The time and costs of operator training should be factored into the overall program roll-out costing and implementation schedule.

4.2.5 Load Contamination

Manual and semi-automated collection services require that collections staff exit the truck cab and physically lift or roll containers/bags during the loading process. This has an advantage in that staff can identify any visible contaminants in the containers/bags before they are loaded into the truck, and take the appropriate steps (e.g. leave material at the curb, issue warning notices, etc.). However, this benefit is negated when opaque bags are used, when contaminants are buried or intentionally "hidden" in containers by residents, or if collections staff don't take the time to inspect each load.

There is a perception that with automated systems, staff lose all ability to inspect the materials being collected since they don't come in contact with the containers. This problem has been addressed in part through the installation of camera systems on collections vehicles that allow staff to see inside the truck's hopper during and after unloading. Using the camera system, which is a proven and well developed technology, staff can spot contaminants in the hopper. Due to the physical layout of the collection vehicle (i.e. right hand drive, grabber arm located behind the cab) staff can also still spot contaminants that are sticking out of carts prior to their being unloaded. Camera systems can be programmed in a number of ways to make them more user friendly to operators, including use of mirror images (to match driver's perspective) and automatic switching of camera views during the arms lift and dump cycle.

Manual, semi-automated, and automated systems all suffer from the problem that once materials have been unloaded into the truck's receiving hopper, it is difficult or impossible for staff to safely retrieve any contaminants from the hopper.

4.2.6 Global Positioning Systems

Installation of global positioning systems (GPS) on vehicle fleets to provide real-time data on location and allow tracking has become a common practice in many industries. The technology used in fleet applications is well established.

In the context of solid waste collections, GPS capabilities can be used to create a log of a vehicle's route, stops, and speed. This means that a time-stamped record of stops along a route can be generated, and subsequently be used in missed-pickup complaint response and route efficiency studies. In the City of Port Coquitlam, the onboard GPS systems have been furthered refined so that with the touch of a button, the driver can record houses where no carts have been set out for collection (Port Coquitlam, 2006). Port Coquitlam's system also has an "accident reconstruction" feature that records the past two hours worth of driving details.

4.2.7 Radio Frequency Identification (RFID) Systems

Radio frequency identification (RFID) is a subset of a group of technologies that are used by machines to identify objects. Other technologies in this group include barcode scanners,

proximity cards, and smart cards. An RFID system consists of three parts: the RFID tag, the reader, and the hardware/software system that interprets and acts upon the data. RFID systems are gaining popularity in many applications due to the low cost for passive tags (i.e. tags that require no onboard power) and the fact that they do not require a direct "line of sight" for reading. Common applications include passports, transit and toll cards, cattle and pet ID tags, and public libraries.

While the use of RFID systems in solid waste collection is not a mainstream application, there are examples of its use in the waste industry to track cart inventories (Halifax, NS), identify commercial collection vehicles at scales, and track special waste shipments. Wastetech Services of Vancouver uses RFID technology to track its inventory of waste transfer trailers as they shuttle between multiple transfer and disposal sites in the Lower Mainland area of BC.

In concept, an RFID system allows municipalities to track collection services and investigate and respond to complaints about missed collections. It can also be used to monitor performance, be combined with truck scale technology and used in billing applications, and be used to enhance operational planning. In the case of the latter, data mining of the RFID data in combination with scale information, traffic counts and transit times to disposal/processing facilities can help optimize route planning.

Some municipalities in Europe are using the technology to monitor curbside waste pickup. This includes Aspropyrgos Municipality in the greater Athens metropolitan area of Greece where garbage trucks are equipped with RFID readers and the waste containers are marked with RFID tags. This allows the municipality to maintain a listing of all waste containers emptied along with the exact time and date of the service. The City of Pasadena, CA is in the process of implementing a similar system on its residential collection fleet, and Philadelphia's "Recycle Bank" program tracks used RDIF technology to track program participation by individual residents and rewards them with credits that can be redeemed at participating retailers.

The City of Regina incorporated RDIF's into their cart supply tender, and opted to purchase adhesive backed tags along with the carts and apply them themselves. This RFID tags were installed on the basis that they would be utilized in the future if the City moved to a utility based billing system, and that retrofitting the carts with RFID tags at a later date would be cost-prohibitive. City of Hamilton considered installing RFID tags, but declined due to cost considerations and other program priorities.

A downside to RFID system use is the infrastructure installation requirements for hardware and tags, particularly if tags are to be installed on carts after they are delivered to residents. Tags have a finite life and must eventually be replaced. Also, the initial logging or registering of RFID tags to specific households, and the subsequent data management, would require additional resources. The use of the technology can also raise public concerns: RFID tags on carts in the UK has lead to media articles touting "James Bond-like" spying on consumer habits.

Costs of installation of RFID systems are not well reported. The tags themselves can range in price from $0.05 for adhesive backed units with short life spans, to $5 for units with 10 year plus life spans that can be imbedded right in a collection carts during the molding process. Costs for readers can range from $2,500 to $5,000 for handheld units to $30,000 to $40,000 for permanent units installed on collection vehicles.

5 Program Implementation and Management Considerations

5.1 Implementation

The change to an automated collection system will require significant changes to existing set-out practices by residents. Thus, a successful transition will require the initiation of aggressive educational and promotional activities well in advance of the transition. In addition to promoting the reasons for and benefits of the new systems, residents may also need to be taught which materials go into which containers (if the number of collection streams is being altered) and informed about new "rules" for cart set-out locations (away from vehicles and buildings, facing a certain direction, etc). In the Region of Peel, promotion of the pending green cart program started four months in advance of actual service startup.

The actual delivery of carts to residents is an involved process that must be done in very short order, and has been likened to a "military campaign". Final assembly of the carts must be completed, and the units delivered to each household. To avoid service interruptions, cart delivery must be done in advance of the transition to automation, or coordinated with weekly collection schedules if it is being done "on the fly". Associated with the delivery is also maintenance of records to confirm that each household received the appropriate number and size of containers, and possibly serials numbers of the delivered container(s). Capturing this information is particularly important if the program implemented offers residents a choice in cart size (e.g., as part of a pay-as-you-throw program).

Depending upon the magnitude of overall program changes (e.g., adding collection streams), there may also be a need for one-on-one education of residents on cart use and program details. To supplement information packages that are normally distributed with the new carts, additional education can be done either at the time of delivery, during follow-up neighbourhood canvassing or via telephone hotlines.

In many locations, the delivery of carts and startup of automated collection has been done in a staged manner to make the logistics more manageable. In many instances, cart delivery is either contracted out to a company that regularly provides the service, or included in the tender for cart supply. Personnel from the Region of Peel and the Cities of Port Coquitlam and Regina all strongly recommended that this approach be used, rather than relying upon municipal personnel to distribute carts. In Spokane, WA, cart assembly and delivery was contracted out, but was done under the direction and supervision of the City's Collection Route Coordinator.

Recommendation: The scope of cart supply tenders should include cart delivery services that include confirmation records (by household) and the delivery of any necessary homeowner information packages on the new service.

Changes to local bylaws governing collection services will be necessary to reflect changes in fee structures, as well as duties of residents and program logistics (e.g., mandatory use of carts, cart sizes and specifications, cleaning and repairs, set-out locations).

The magnitude of the costs involved with implementation of automation will vary depending upon whether other changes are being implemented at the same time (e.g., collection frequency, adding new streams or new materials to diversion programs). In general, experiences described in the literature and discussions with personnel indicate that there is a temporary increase in workload for municipal solid waste department staff during the roll-out period, but that this is

short lived and can be handled through overtime rather than adding staff. Volumes of calls handled by hotlines or central call centres can also be expected to increase, but again this is generally short lived.

5.2 Program Administration

The unique aspects to administering cart-based programs and automated collection post-rollout revolve primarily around maintaining the inventory of carts. There is mixed opinion on how this should be done, and to what degree of detail. For example, in the Region of Peel, there is very little administration of the green cart inventory; carts are not tied to specific addresses, and little monitoring of replacement frequency by household in done (Barton, 2007). On the other hand, Halifax maintained a detailed inventory of their carts following roll-out, with the specific serial number of the cart tied to the address. City of Regina uses their system (including RFID tags) to maintain cart serial numbers and year of deployment (Latoski, 2007).

The need for administration will be somewhat dictated by the collection program type and whether the program is funded as a utility or from the tax base. If there is little flexibility for residents in the collection program (e.g., no choice if cart size or opting in or out of certain streams) then the administrative requirements can be kept low. On the other hand, if residents are given the choice of cart sizes, and certain diversion program (e.g., yard waste) are optional, this will drive administration costs as the service level at each household will need to be tracked for billing purposes.

5.3 Subscription-based Collection Rates

While curbside bag limits have been implemented, there are no firm plans at the present time to pursue subscription-based collection programs (e.g., varying monthly rates based on cart size) in the Central Okanagan region. The move to automated collection with standardized carts will not limit the future implementation of such a program. In fact, the use of standardized carts might aid in future development and roll-out of a subscription-based service.

5.4 Worker Health and Safety

The implementation of automated collection in jurisdictions throughout North America has been demonstrated to have a positive impact on the safety and well being of collections crews. The types of injuries common amongst crews involved with manual collection (back and shoulder strain, cuts and abrasion, repetitive strain injuries) are significantly reduced or eliminated with the implementation of automation. The working environment for crews is also cleaner since there is little to no need to handle waste containers, and morale generally increases.

From a management perspective, the cost reductions resulting from reduced injuries and lost time that accompanies automation are significant. Prince George's solid waste division was averaging 150 lost-time days per year prior to implementing automation (Government Buyer, 2007). Following automation, this was reduced to nearly zero resulting in wage savings of $35,000 to $40,000 per year and WCB premiums reductions in the order of 17%. When evaluating the advantages of automation, the City of Vancouver projected that they incur a decrease in WCB claims and levies in the range of $200,000 to $300,000 per year. The actual reduction was reported as $230,000 and was accompanied by a 61% reduction in sick time

among crews (Vancouver Sun, December 27, 2006). Similarly, City of Moose Jaw has projected that their WCB claim would decrease from $85,000 to $3,000 per year (Johnson, 2007)

In the Central Okanagan region where collection services are outsourced to the private sector, municipalities and the RDCO will not realize the benefits of these cost reductions directly. However, the reductions in staff lost-time experienced by private sector haulers will be evident in increased service levels (i.e., less missed or late collections due to staff shortages). Similarly, WCB premiums, reduced injury costs and associated overtime needed to make up for staff shortages will be reflected in tender pricing.

5.5 Collection Contracts

Discussions with RDCO and City of Kelowna personnel have indicated there is a preference to continue the outsourcing of collection services within the region using a competitive tendering process. At the same time, there is a desire to structure contracts in a manner that provides the lowest overall costs. However, there is no clear consensus on how tenders should be structured in the future with respect to service areas and scope of services to achieve this goal.

5.5.1 Recyclables Collection and Processing

Under the current structure, the contract scope of work for the regional recyclables program includes both collection and processing of materials. As discussed previously, the overall contract is currently held by WMI. WMI has elected to undertake the collections aspect of the contract, but have subcontracted the processing of materials to Metro Materials Recovery Inc..

Consolidation of the collection and processing aspects of a recycling or diversion program can be beneficial from a contract administration perspective in jurisdictions where recycling programs are garbage collection programs are managed by separate functional groups within the solid waste department. Consolidation can also be beneficial in that it eliminates disputes between collectors and processors over material quality and contaminant levels, and the need for municipalities to provide oversight staff to directly monitor contaminant levels in processing facilities.

Consolidated contracts often lead to subcontracting arrangements since few firms have all the expertise and regional capabilities required offer both collection and processing services. In situations where one of the services is subcontracted out by the prime contractor, we have observed that the municipality generally has less direct interaction and input into the operation of the subcontracted service. The municipality may also find itself unwillingly "refereeing" or arbitrating disputes between the prime and subcontractor in order to avoid work disruption and maintain services levels to its residents.

Consolidation of collection and processing may also lead to less competition in some situations as some contractors may not wish to be subservient to others (due to proposed contract terms and remedies, concerns over access to proprietary operating information, experiences from past associations, or competitive positions in other regions) and will therefore not provide bids.

Processing contracts can require a significant outlay in capital to establish or retrofit facilities. To recoup these investments, and still provide a reasonable annual contract price, generally requires a longer period of time (i.e., five to ten years) whereas collection contracts are generally awarded for three to five years. Consolidation of collection and processing on short contract durations drive annual service costs upwards.

Recommendation: The existing contract for the RDCO's regional recycling program be revised so that collection and processing are contracted separately, but the processing aspect continue to be based on serving the regional population. This will increase the flexibility available to the RDCO on evaluating alternative processing options (e.g., cooperation with other Regional Districts, Public-private partnerships, and design-build- operate arrangements to support facility redevelopment).

5.5.2 Consolidation of Collection Streams

Currently within the Central Okanagan region, collection services are consolidated under two separate programs: garbage and yard waste collection, and recyclables collection. In addition to discussions about collection construct structures, there has also been informal discussion about the merits of consolidating all collection services within each zone under one contract.

Under the current scenario, there is some opportunity for optimization of truck fleets in certain areas, but this is coincidental, not planned. For example, within the City of Kelowna, WMI is able to plan and optimize routes for all three collection passes (garbage, yard waste, recyclables) as they have the contracts for all three. This allows WMI much greater flexibility in responding to absenteeism and truck breakdowns than is the case on the Westside, where it provides only one portion of the service.

Recommendation: Garbage, yard waste and recyclables collection services within each area should be consolidated under the same contract(s) to allow private sector operators an opportunity to optimize staff and fleets, resulting in better overall service to residents.

5.5.3 Contract Zones

Currently, the RDCO and the four municipalities each tender out their garbage/yard waste collection contracts independent of each other. Due to highly coordinated effort amongst the jurisdictions, all of the contracts come due at the same time and the contract terms and conditions all use identical or very similar wording. However, because award of each contract is still independent of the others, bidders can not bid based on any savings (e.g., reduced overheads, optimization of truck fleet utilization, common maintenance and parking facilities) that might arise from being awarded multiple contract areas.

There has been some informal discussion during the course of this study as to the merits of combining garbage collection contracts together in a manner similar to the regional recycling program. The rationale is that by consolidating contracts together into one single contract, or into contract zones that cross political boundaries, the overall cost of service might be reduced. The regional recycling program provides both a precedent and structure for consolidating garbage collection services.

While our experience elsewhere indicates that there is no formula or "correct" number of collection zones for a collection system, there are several factors that should be considered. These include:

- Economies of scale in collection
- Administrative resources
- Ensuring long-term competition
- Geographic features

- Distance to Waste Facilities
- Housing density

Economies of Scale in Collection

Use of the term economies of scale in the context of collection services means that certain efficiencies drive unit collection costs down as the number of customers increases. Clearly, it's not efficient to have many small firms each serving a small portion of the region. But is there some threshold size at which unit costs no longer fall or potentially increase? Based on the results of an extensive review of available literature, there is some evidence that economies of scale in refuse collection systems exists, but that there are also ways that very small zones can be served effectively by a small firm.

Early research on collection issues supported by an in-depth national survey was conducted by Columbia University researchers in the 1970's (Savas, 1977). Their survey results found that collection costs per household tend to fall up to a level of about 20,000 households, all other things being constant. Above that number, unit costs did not rise or fall. In other words, as size of a collection system increases from 0 to 20,000 households, unit collection costs fall; once systems approach 20,000 households, increasing the number of customers is not likely to result in collection cost savings. In quoting these findings, it must also be noted that the research occurred almost 20 years ago. Few communities offered curbside recycling and yard waste services at that time. Delivery of multiple services lowers the minimum number of customers necessary for an efficient collection zone.

Once the number of households reaches 2,000 to 4,000 households (the number of households that can be served by a single truck each week), it is possible for a relatively small firm to overcome some of the diseconomies of scale and provide service that is as cost-effective as that provided by a firm serving a larger number of households. However, even this size is not a minimum if the truck can operate in an adjacent area on other days of the week.

Small firms often use less specialized labor as a way to keep costs down. The owner may also be the driver, collector, supervisor or mechanic. Family members often assist in aspects of the operation. In such instances, the small firm competes by accepting lower profit margins or hourly wages than comparable owners and workers at larger firms.

Administrative Resources

As the number of collection zones and contracts with haulers increases, so to do the combined costs to administer contracts and perform such functions as undertaking annual rate reviews and audits, monitoring contract compliance, and resolving potential disputes.

There is the potential for the five jurisdictions in the region to realize an overall reduction in administrative costs by consolidating collection services under regional contracts, and limiting the number of collection zones to an amount that is adequate to ensure long-term competition.

Ensuring Long-Term Competition

Maintaining a minimum number of firms in the region that provide collection services can help protect against future cost increases in subsequent tender processes. For example, if a contract was signed with one firm for service throughout the entire regional district, other firms may bid the next time the contract is re-bid, but they would be at a disadvantage by having no local knowledge and no collection fleet yard in the regional district

Geographic Features

Geographic boundaries within a region such as major rivers, lakes, or large hills will influence both the number and location of zones. Within the study area, Okanagan Lake provides an obvious division of the Central Okanagan region into two geographic zones.

Distance to Waste Facilities

The distance from the collection area and supporting waste management facilities will directly impact "off-route" time and collection efficiency, and ultimately cost to service that particular area. In a regional system, it is not uncommon for disposal and recycling facilities to be located at separate sites, or for there to be multiple disposal locations.

Housing Density and Growth

On of the main factors that influence collection costs is the density of customers along a collection route: the longer the distance between stops, the higher the collection cost. Housing density can also influence the choice of collection equipment and crew size by a hauler. If the various collection zones have substantially different housing densities, the cost of service is also likely to differ substantially among the zones. In such instances, tenders should allow for different per-household payments to reflect the underlying cost differences associated with each collection zone.

While pinpointing future growth is an inexact science, it is still important to have a general understanding of the likely locations for future housing growth when establishing zones. This could have implications about the future size of individual zones and the possible market share of different haulers in the future.

Minimizing the number of haulers to ensure collection zone efficiency must be weighed against long-run competitive considerations. In the Central Okanagan region, the presence of 50,000 households divided unequally amongst four distinct local/regional governments must also be accounted for.

Recommendation: Central Okanagan would be best served by dividing the regional district into two (City of Kelowna, all others) or three (City of Kelowna, Lake County/Ellison/Joe Rich, Westside/Peachland) zones for garbage collection. The determination of number of zones would be based on contract tendering and administration factors.

Within the zone on the west size of Okanagan Lake, separate tender pricing should be obtained for Peachland and Westside to reflect the differences in hauling distances. Separate pricing should also be obtained based on use of the Westside or Glenmore Landfills. This can be factored into closure planning for the Westside Landfill over the next five to eight year period.

If possible, a single consolidated tender should be issued on behalf of all jurisdictions, with the intent that the successful bidder(s) will enter into individual contracts with each jurisdiction.

Combined with previous recommendations to consolidate garbage, recycling, and yard waste collection in each zone, we believe this approach will provide operational benefits to the private haulers, which will in turn allowing for more reliable and efficient service.

5.5.4 Contract Duration

Setting the duration of collections contracts is a balance between obtaining annual costs that are within budget reach, and anticipating growth. At present, garbage collection contracts in the Central Okanagan region are awarded for five year terms, with no options for extensions. This is consistent with general collections contracting practices in Western Canada.

In general, longer term contracts (e.g., five years) are likely to result in increase number of bidders as they present an opportunity for operational stability, and allow contractors to amortize new equipment purchases over a more reasonable time frame. Unexpected growth can be factored into contracts through preset unit rates and inflation escalation factors.

Recommendation: Collection contracts in the region should continue to be tendered on a minimum five year term, with consideration given to six and seven year terms.

5.5.5 Fuel Cost Increases

Multi-year waste collection and processing contracts in Western Canada generally include inflationary clauses tied to CPI or some other accepted index. While this approach is generally well accepted by both the public and private sectors, it tends to break down with respect to fuel pricing. This is particularly evident in the past few years where fuel prices have more than doubled. Many contracts being negotiated or renewed now separate fuel costs from inflation indexing, and provide some other method of adjusting contract rates to account for changes.

Recommendation: Specific clauses for fuel-cost escalations based on specific market indices should be incorporated into collection tenders and contracts.

5.6 Implementation Schedule

The current schedule for implementing automated collection in the Central Okanagan region involves completing a pilot program during the coming Fall and early Winter (September through December 2007). An RFP for collection services will be issued in October based on the initial pilot experiences, with the intent to award collection contracts in November. This would allow six to seven months for order, delivery and distribution of carts, and for ordering of new collection vehicles.

Based on the experiences in other municipalities and discussions with suppliers, it is our opinion that this implementation schedule is too aggressive and leaves too little room for schedule delays, which would have impacts on the success of the program roll-out. As mentioned previously, cart supply can take up to eight months depending upon the manufacturer selected and the timing of the order. Specifying, negotiating and supplying enough collection vehicles to service the Central Okanagan area is also likely to take longer than the time available in the current schedule.

Recommendation: The implementation of automated collection service be delayed by six months, with the planned startup of curbside service in January of 2009.

A planned six month delay will have several benefits:

- The RFP release could be delayed until November or December of 2007, allowing more findings and information from the pilot program to be incorporated.

- The successful hauling contractors will have a longer period to time to procure the required truck fleet, and train their operators in use of the new systems.
- Municipalities will have a longer period to time to size and procure the require inventory of carts.
- Educational and promotion programs will have an additional six months during which targeted messages can be delivered to residents.
- Carts could be distributed over a longer period (six to eight weeks rather than three to four) in the Fall of 2008, reducing temporary workloads of RDCO and municipal staff.
- Implementation of the curbside service would commence with only two streams (garbage and recyclables). There would be a two to three month lag before the first seasonal yard waste collection period, providing contractors and their crews the opportunity to become proficient with the new system.

The delay would trigger the necessity to negotiate and extension of the existing collection contracts in each jurisdiction. This is somewhat simplified by the fact that there are only two companies that would be involved with the negotiations.

Alternately, the contracts could be tendered and awarded with a caveat that the contractor must provide manual service for an initial period, and transition to automated service within a six to nine month timeframe. However, as this would involve provision of full vehicle fleet for a short term period, this might limit the competition in the tendering process as few firms have such redundant fleet capacity.

5.7 RDCO Solid Waste Management Plan

The RDCO is nearing the completion of an update to its existing Solid Waste Management Plan (SWMP). The process used by RDCO to update the plan followed standard practices used in British Columbia, including the incorporation of stakeholder and public consultation. The programs identified in the Plan were divided into those that would be pursued in the short term (i.e., next five years) and longer-term initiatives (six to fifteen years).

A draft copy of the revised SWMP was provided to CH2M HILL as background to the review of automated collection. A summary of recommended initiatives from the SWMP, and our assessment as to whether they will be impacted by the implementation of automated collection within the region is provided in Table 8.

5.8 Transfer Station at Westside Landfill

The Westside Landfill will reach capacity during the next five to eight year period, at which time it will be closed. When the Westside Landfill closes, wastes from communities and businesses on the west side of Lake Okanagan will be directed to the Glenmore Landfill. This represents an approximate increase of 25% in solid waste tonnages handled at the Glenmore site.

TABLE 8
RDCO SWMP Initiatives and Impact from Automated Collection

Initiative	Impacted	Nature of Impact
Short term initiatives		
A DLC waste diversion program will be established, with recycling facilities constructed at Glenmore Landfill. This initiative would be supported with changes to tipping fee schedules, and amendments to building permit systems that would require waste management plans.	✘	Does not target wastes that are handled through residential curbside collection services.
ICI paper ban enforcement	✘	Does not target wastes that are handled through residential curbside collection services.
Inclusion of types 1 and 2 plastic in recycling program, and increased education/promotion to target higher participation	✓	The inclusion of plastic will increase the volume of material collected at curbside, which will affect truck selection. Since material is currently collected in co-mingled state, inclusion of plastic will not affect truck design (e.g. split body sizing). Where implemented, automated collection has generally been found to result in greater participation in recycling programs and increased diversion.
Establishment of year-round drop-off facility for electronic and household hazardous wastes.	✘	Existing education/promotion activities and curbside bag limits generally result in low levels of e-waste being collected at curbside. Establishment of permanent depot. Household hazardous wastes are typically only a small component of the waste collected at curbside. Removal of all or a portion of this waste stream is not expected to impact assessment of automated collection.
ICI yard waste composting will be encouraged through the implementation of a yard waste disposal ban at landfills.	✘	
Diversion of residential yard waste to composting programs will be increased through provision of collection services. This will be encouraged through a yard waste ban at landfills and through reductions in existing curbside bag limits.	✓	Program will significantly increase curbside collection requirements for yard waste. At the same time, there should be a corresponding decrease in amount of waste collected.
Backyard composting will be encouraged through bin subsidization and education/promotion.	✓	Increased reliance on backyard composting will reduce amount of yard waste collected at the curbside.
The waste collection and recycling services currently provided to single-family dwellings by local governments will be extended to multi-family dwellings as gov't takes over responsibility for collection from these dwellings.	✘	Waste and recycling services at multi-family dwellings are typically provided using commercial waste equipment (e.g. front-end trucks). Automated side-load units are not appropriate for the volumes of materials collected.
Long-term Initiatives		
Increased participation in DLC recycling program.	✘	
Increased paper/cardboard diversion from ICI sector through compliance with disposal bans.	✘	
ICI composting initiative.	✘	
Inclusion of food waste in residential curbside organics collection program.	✓	Depends upon decision to implement "bioreactor" concept at Glenmore Landfill.

Past consideration has been given to the construction of a waste transfer station at the Westside landfill site following closure of the landfill. Conceptually, this would allow wastes from the west side of the Lake to continue to be brought to the Westside location, and then hauled to Glenmore in larger loads using more efficient transportation methods. The transfer station could be designed to handle solid wastes from any combination of residential curbside, commercial, and/or self-haul customers.

Previous analysis completed by CTQ Consultants Ltd. in 2004 compared the direct haul option (i.e., no transfer station) with the option of constructing and operating a transfer station that utilized roll-off bins. The assumed load weights were 5 tonnes in packer trucks and 6 tonnes in the transfer bins, with the latter being transferred one at a time. The analysis concluded that direct haul was the more cost-effective of the two options in light of the short distance (i.e., < 150 km round trip) from Westside to Glenmore landfill.

The previous analysis was limited to the evaluation of a transfer system that utilized roll-off bins. It did not consider use of larger transfer trailers (e.g., walking floors) or the use of high-density curbside collection trucks. Furthermore, since the analysis was completed in 2004, there has been a significant increase (close to 150%) in the amount of solid wastes generated in the Westside catchment area, and an even more significant increase in yard waste and land clearing debris.

Recommendation: The cost-benefit analysis of the transfer station option at Westside Landfill should be revisited in the context of new equipment capabilities.

6 Program Costs

The scope of work for the automated collection business case included the completion of a cost-benefit analysis. It was originally intended that the analysis would be completed for various scenarios using a pre-existing collection system model. In particular, a model prepared one of the collection cart manufacturers (SSI Schaefer) was identified for use during the initial project stages.

As part of the initial analysis for the business case, research was completed regarding the availability and applicability of other collection system models. In addition to the SSI Schaefer model, additional models from the Solid Waste Association of North America (SWANA), and the City of Seattle were identified as were in-house pricing models developed by BFI and WMI.

An assessment of each model's applicability was completed by CH2M HILL. The assessment results are summarized below.

- SSI Schaefer is a manufacturer of carts used in automated and semi-automated collection systems. They have developed a "high-level" model that compares the efficiencies of manual rear-load collection using a 3-man crew with fully automated collection with a single-person crew. Based on discussions with the company's regional sales representative, it was determined that not only is this model proprietary, but that it would be of limited applicability to RDCO since it only focuses on 3-man rear-load collection (as opposed to 1-man side-load which predominates in the RDCO area).
- The SWANA model was developed in the late 1990's by the US-based consulting firm of RW Beck and was promoted by the USEPA in several publications. However, this model is

no longer available, and discussions with SWANA personnel also indicated that it would be of limited applicability to the business case since the base assumptions are dated and the level of detail is limited.

- The City of Seattle, with support from the consulting firm Ecodata, has invested significant effort into the development of detailed models for the City's residential and commercial collection services. These models take into account housing information, material compositions, material densities, truck types, crew schedules and costs, as well as detailed route parameters (travel times, stop times, time on route). Much of the detailed inputs are based on actual operating data collected from the City of Seattle. While the model appears very thorough, it is of limited use without detailed operating information. No only is such information not readily available from collection contractors in the RDCO area, it would involve significant effort and cooperation with these companies to incorporate it into the model.
- In-house pricing models from BFI and WMI are considered proprietary and were not available for use in the business case analysis.

In the absence of a pre-existing system model, the development of a RDCO specific model was considered. However, it was quickly determined that regardless of the type of curbside service (manual, semi-automated, automated), arriving at reasonable cost models for the Central Okanagan region would require the completion of a preliminary routing study.

Routing studies take into account a number of factors including housing densities, terrain, distance of route from disposal/processing facilities, waste/recyclable set-out rates, and service location (front vs. alley). When this information is combined with truck characteristics (e.g., compartment size, compaction rates, GVW), time-motion analysis results (seconds per stop, seconds between stops), the performance along each route can be determined. The consolidated performance information from all routes is then combined to determine size of the required fleets and labour pool and associated costs.

Within the RDCO area, where all collection services are contracted, the ability to undertake a routing study is complicated by the fact that much of the detailed information needed (e.g., number of route, stops per route, stops per day, labour costs) is considered proprietary by the collection contractors who hold it. It is possible to estimate certain performance factors based on the experiences in other jurisdictions, however this introduces the potential for significant error in the model since local conditions are not accounted for. Constraints on the schedule for completion of the business case also limited the ability to complete a routing study.

Without the ability to develop a model, is was determined in consultation with the City of Kelowna and RDCO personnel that the best means of assessing of costs associated with automated collection in the region would be to base it upon the experiences of other similar communities. The communities of Prince George, Port Coquitlam, Kamloops, Regina, and Vancouver were selected based on population size and geographical considerations as well as the availability of data. Cost assessments for the various program components are outlined in the following sections.

6.1 Collection Vehicles

Automated collection trucks are available from a number of vendors (e.g. Labrie, Heil, Haul-All, Wayne) and as previously outlined there are many configurations and options available. Key considerations that affect pricing include:

- number of axles (singe or tandem)
- chassis configuration (regular versus drop-frame)
- compartment configuration (single versus split)
- compartment size

Budgetary pricing for various basic truck configurations were obtained from an equipment dealer located in the lower mainland area of BC, and are shown in the following table. These prices to do not take into account the difference in costs for different chassis manufacturers (e.g., Volvo, Peterbuilt, Mack). However, based on tender pricing received by the City of Vancouver (Vancouver, 2004), these differences are only expected to be slight; 1 to 2% of total vehicle cost.

Pricing for manual side-load collection vehicles, similar to those currently used in the Central Okanagan region are also included in the table. A comparison of manual versus automated trucks shows that the costs of the latter are generally 15% to 25% higher. This is consistent with findings in Prince George, which found a 15% increase in truck costs (Government Buyer, 2007).

TABLE 5
Collection Vehicle Budgetary Costs

Vehicle Type	Purchase Cost	Approx. Annual Cost (5 years @ 7.25%)	Approx. Annual Cost (7 years @ 7.25%)
Automated (single axle/straight frame)	$220,000	$52,600	$40,200
Automated (tandem axle/ straight frame)	$235,000	$56,200	$42,900
Automated (single axle/drop frame)	$240,000	$57,400	$43,800
Automated (tandem axle/ drop frame)	$255,000	$59,800	$45,600
Manual (side load, single axle/drop frame)	$190,000	$45,400	$34,700
Manual (side load, tandem axle/drop frame)	$205,000	$49,000	$37,400

The combined collection fleet currently used for waste and recyclables collection by contractors in the Central Okanagan area, not including spares, is in the order of 17 vehicles (13 side loads and 4 rear loads). Without completing a routing study, it is difficult to accurately estimate the number of collection vehicles that would be required to support an automated system in the Okanagan region. The fleet size would also be somewhat dependent on if and how collection schedules are revised, and whether contracts in the region are consolidated and/or re-structured.

However, based on the experience in other jurisdictions, it is reasonable to assume that the number of trucks required overall in the Central Okanagan could be significantly reduced if changes to collection schedules are implemented. Prince George was able to reduce its fleet from eight vehicles to five (Government Buyer, 2007), and Moose Jaw is projecting a reduction

from seven to five trucks (Johnson, 2007). If a reduction comparable to that encountered in Prince George and Moose Jaw were to occur, this would eliminate five to six vehicles, from the overall fleet, avoiding $245,000 to $300,000 per year in capital financing (based on financing over five years). The overall reduction, once the higher costs of automated trucks is factored in, would be in the range of $115,000 to $175,000 per year.

6.2 Carts

The other major capital cost associated with a transition to automated collection is carts. Cart pricing will vary based on manufacturer, cart size and the size of the order. Pricing will also vary based on changing market prices for plastic resins from which the carts are made. To put context to the magnitude of costs that would be incurred in the Central Okanagan region, budgetary cart pricing was obtained from one vendor in the lower mainland area of BC. The cart pricing and the cost for various ownership options are summarized in the following table. Cart sizes were based on forthcoming pilot program being conducted by RDCO, and quantities were based on current service levels plus a 2% allowance for inventory purposes. The pricing from the cart vendor was based on current resin market prices.

While the implementation of carts will add to the program costs, it will be partially offset at the homeowner level by a reduction in the need to purchase garbage bags. In Port Coquitlam, the average annual cost of garbage, recycling and yard waste bags was identified through resident surveys to be in excess of $60 per household (Port Coquitlam, 2003). Of course, this will vary from household to household based on household size and generation rates. It will also vary based on individual household practices (i.e., whether household uses bags or a container, and whether they line the container with a bag).

TABLE 6
Cart Budgetary Costs

Number of Streams/Carts	Price per Cart	Capital Cost of All Carts	Approx. Annual Cost (5 years @ 7.25%)
Scenario 1:		$2,750,000	$657,400
Garbage: 140L carts x 50,000	$55		
Scenario 2:		$6,000,000	$1,434,200
Garbage: 140L carts x 50,000	$55		
Recyclables: 240L x 50,000	$65		
Scenario 3:		$9,250,000	$2,211,100
Garbage: 140L carts x 50,000	$55		
Recyclables: 240L x 50,000	$65		
Yard Waste: 240L x 50,000	$65		

6.3 Implementation Costs

Costs associated with the implementation of an automated program include

- Promotion and advertising
- Cart delivery
- Changes to billing systems

- Driver and mechanic training
- Additional staffing for telephone hotlines
- Addition collection services during transition period
- Program coordination

Promotions and advertising in advance of implementation may involve a combination of print and radio ads as well as development of FAQ's, news releases and additional content for websites. There is also a requirement for educational material for residents on how to use the new system (e.g., cart set out guidelines, allowable and prohibited materials). Based on Vancouver's planned expenditures and discussions with RDCO personnel, a budget of $20,000 to $25,000 would be appropriate for the Central Okanagan area.

Several municipalities which have implemented cart-based collection have recommended that cart delivery to each household be included in the cart supply tender. Reported costs for these delivery services range from $1.50 to $4.00 per cart. These one-time costs are influenced by regional labour costs, overall number of carts to be delivered, number of carts delivered per household, and size of delivery area.

Collection services in Kelowna, Peachland and Lake County are funded through tax levies, while services for RDCO residents are funded by a combination of tax levy and utility. The implementation of an automated collection program that is not based on a subscription service is not expected to necessitate changes in billing practices. However, if a choice of container sizes is offered, then modifications to the billing practices and systems may be necessary. If municipalities are already billing residents on a variable rate basis for water and sewer service, the modifications are not anticipated to be significant. Nevertheless, an allowance in the order of $25,000 should be made for billing software reprogramming and monthly bill reformatting.

The degree and nature of driver training discussed in the literature varies from vendor supplied training to week-long classroom and field training courses. Maintenance staff also need to be trained on how to adjust and repair the grabber arms on the new trucks. Vancouver projected training costs for drivers and mechanics in the order of $70,000 (for a 29 vehicle fleet). A much smaller fleet would be required in the Central Okanagan region, and training costs (including instructor and staff time for one week) in the order of $20,000 to $30,000 would be expected.

Increased feedback from residents can be expected as part of program implementation. This would most likely occur whenever the program profile is raised (i.e., during political debates, initial program announcements, cart-delivery). During these periods, a staff can expect to respond to an increase in letters, emails, and phone calls. Currently, much of the public interaction in the region is handled by RDCO staff through the waste reduction hotline. RDCO staff is reportedly able to handle the volume of calls and correspondence incurred during "normal" periods of activity, but are overwhelmed when there is an increased public response to an issue. Based on this, and the expected increase in call volume, consideration should be given to a temporary (i.e., four month) increase in staffing of waste reduction hotline. Staffing and funding of this temporary position is expected to cost in the order of $15,000 to $20,000.

Despite promotion and educational activities, there was confusion amongst a small portion of residents over schedules and cart usage during the first weeks of automated collection in Port Coquitlam (Brown, 2007). As a result, the City provided a twice weekly "missed collection" service free of charge during the transition period using spare rear-load vehicles from the old

fleet. During discussion with Port Coquitlam personnel during the course of this evaluation, it was recommended that a similar service be provided for Central Okanagan residents for a short period of time (e.g. two to three weeks) during the transition period. No cost estimates for this service are available, but it is not expected to exceed $25,000.

Detailed coordination of the automated service implementation throughout the region would most likely fall to RDCO Waste Reduction Office or the City of Kelowna's Environment and Solid Waste Division. In either case, discussions have indicated that the additional work load involved with program coordination can not be handled by existing staff without work on other programs being deferred. Therefore, in order to maintain existing service levels it would be necessary to increase staffing for approximately a six month period. The costs of this increased staffing would be in the order of $35,000 to $45,000.

6.4 Operations Costs

Operations costs for the field component of the curbside collection program can be broken down into four main elements.

- Salary and benefits
- WCB premiums and injury claim costs
- Maintenance costs
- Fuel costs

With the transition from existing side-load manual service to automated service, there would be an overall increase in crew productivity which would allow fewer crews to service the same number of households. It is reasonable to expect as a result that there would be a reduction in the collection crew size used by private contractors in the region (currently 20 personnel for garbage/yard waste and 5 for recyclables). This staff reduction would translate to decreased salary and payroll burden (e.g., benefits, EI) costs for the program. Direct and indirect costs are estimated to be in the order of $45,000 to $55,000 per crew position[3].

The magnitude of the reduction for Central Okanagan would be dependent upon the results of route calculations and are thus difficult to quantify at this time. Also, since the majority of collection services in the region are completed using single-man crews (only Kelowna has a combination of single-man and 3-man crews) the reduction would not be as significant as that experienced in other jurisdiction such as Port Coquitlam and Prince George where 2-man and 3-man crews were used exclusively prior to automation. Estimates of direct and indirect cost reductions that would accompany a reduction in fleet size of 5 to 6 trucks and complete conversion to automated collection for all streams would be $645,000 to $720,000 per year. The largest reduction would be encountered in the City of Kelowna's waste and yard waste collection service where 3-man crews are used.

Other jurisdictions in BC where automated service has been implemented have realized significant reductions in WCB premiums, and in the direct/indirect costs associated with managing claims (including overtime and replacement staffing costs). As previously mentioned, Prince George 's wage savings were in the order of $35,000 to $40,000 per year and WCB premiums were reduced by approximately 17%. The City of Vancouver reported a

[3] Salary and benefit costs can be expected to vary from contractor to contractor based on level of experience, market conditions, provision of non-monetary benefits, and collective bargaining agreements. Staff at one of the three private haulers currently operating in the Central Okanagan region are unionized.

$230,000 savings following the implementation of automation, which and was accompanied by a 61% reduction in sick time among crews. The City of Moose Jaw has projected reductions in WCB claims of approximately $80,000 per year. WCB premiums and injury claim costs for the two private contractors in the Central Okanagan area were not available, so expected reductions can not be quantified. However, these cost reductions would be reflected in tender pricing.

Based on the literature, an increase in per-vehicle maintenance costs would be incurred with the use of fully automated systems. This increase is generally a result of the maintenance and calibration associated with grabber arms and associated hydraulic and electrical systems. Maintenance costs for the balance of the vehicle (engine, drive train, compartment compaction systems) should not increase significantly from existing costs. Based on discussions with equipment vendors and experience in Port Coquitlam, an allowance of $5,000 to $7,500 per vehicle per year would be suitable. However, maintenance costs overall would be reduced due to the smaller fleet size.

A cost to repair and replace carts would also be incurred. Based on the experiences in Regina, and San Bernardino where carts are maintained in-house, an increase in labour requirements across the Central Okanagan region equivalent to one extra position is expected with associated vehicle use. There would also be costs incurred for restocking damaged carts and parts inventories, but this would be on a cost recovery basis from manufacturer warranties, contract haulers or residents depending on the nature of the damage.

Subject to revisions to routes, and assuming similar vehicle payload capacities, the number of kilometers traveled by the automated vehicle fleet would be similar to the existing manual collection fleet. Therefore it follows that overall fuel consumption would be similar following implementation of automation. Some reduction might be achievable if private contractors purchase more fuel efficient trucks as part their fleet upgrades.

While fuel consumption may change slightly, it is reasonable to expect that upcoming tender prices will reflect increases in fuel pricing that has occurred over the past two to three years. This is independent of the type of collection program, and is beyond the control of the private contractors in the region.

6.5 Administrative Costs

Quantification of administrative costs is difficult since, under the current system, these costs are shared amongst many different parties. Comparison with other municipalities is also different due to differing organizational structures and cost-accounting methods.

A reduction in administrative time can be expected due to reduced WCB and injury claims management and simplified contract administration (assuming existing contracts are consolidated and restructured). However, these reductions will be offset by increases necessary to manage cart inventories, cart maintenance and warranty claims, cart size changes (if residents are provided with size options), and increased billing time if those jurisdictions which are funded on a tax levy basis switch to a utility basis.

Overall, it is reasonable to expect that slight increase in administration costs would be encountered in the Central Okanagan region. This increase, reflected in terms of increased staff time, is estimated to be in the order of one full time position.

A major administrative cost would be the funding of a cart replacement reserve. Cart lifespan is generally in the 15 to 20 year range, but manufacturer warranties are for 10 years. Staged replacement of the cart inventory at some point in the future will be necessary, as will addition to the inventory to account for population growth. In Port Coquitlam and Spokane, this was addressed through the establishment of a reserve fund with annual contributions. In the Central Okanagan region, and equivalent system that is based on a 10-year replacement schedule (to coincide with warranties) would require annual contributions in ranging from $275,000 to $925,000, depending on how many carts are supplied to each household. Annual contributions based on a 15 year replacement schedule would range from $184,000 to $617,000.

6.6 Summary of Program Costs

A summary of the expected magnitude of costs associated with the implementation of automated collection in the Central Okanogan region is provided in Table 7. For ease of comparison, the costs are expressed on a "per household per year basis".

TABLE 7
Magnitude of Automated Collection Program Costs

Cost Component	Comments	Magnitude of Annual Cost Increase or (Decrease)	Household Annual Cost Increase or (Decrease) (based on 48,871 households)
Capital Costs			
Collection Trucks	Increase of 15 to 25% on a per vehicle basis. Overall decrease due to fleet size reduction if collection schedules revised.	($115,000 to $175,000)	($2.35 to $3.58)
Carts	Overall cost increase due to introduction of carts. Magnitude of increase depends on number of collection streams implemented. Direct cost savings to some residents through decrease in need for purchase of garbage bags.	Single stream: $660,000 Two stream $1,435,000 Three stream $2,210,000	$13.50 to $45.22
Implementation Costs			
Promotion and advertising	Print and radio ads, news releases, website content. Developed by RDCO staff.	$25,000	$0.51
Cart delivery	Included within scope of cart supply tender. Based on $4/cart.	$200,000 to $600,000	$4.00 to $12.00
Billing system changes	Minor revisions to existing software and bill formats.	$25,000	$0.51
Driver/mechanic Training	40 hour training for approximately 16 drivers and mechanics.	$20,000 to $30,000	$0.41 to $0.61
Additional staffing for Waste Reduction Hotline	Four month temporary position.	$15,000 to $20,000	$0.31 to $0.41
Missed collection service	Two to four week service following transition of service.	<$25,000	<$0.51
Temporary Program Coordinator	Six month position	$35,000 to $45,000	$0.72 to $0.92

TABLE 7
Magnitude of Automated Collection Program Costs

Cost Component	Comments	Magnitude of Annual Cost Increase or (Decrease)	Household Annual Cost Increase or (Decrease) (based on 48,871 households)
Operations Costs			
Crew salaries and benefits	Overall reduction in crew size due to increased productivity will reduce operations salary and benefit costs. Magnitude of reduction dependent on final route and schedule design.	Garbage/YW: ($575,000 to $625,000) Recyclable: ($70,000 to $95,000) All Streams: ($645,000 to $720,000)	($13.20 to $14.73)
WCB premiums and claim costs	Significant reduction in premiums and claim costs anticipated.	Unknown but significant reduction	
Fleet maintenance costs	Increase on per vehicle basis due to arm. Overall decrease due to fleet size reduction	$10,000 to $37,500	($0.20 to $0.77)
Cart maintenance	Equivalent of one position plus vehicle to maintain inventory in region. Cost of damage covered by cost recovery from warranties, collection contractor, or residents.	$55,000 to $65,000	$1.13 to $1.33
Fuel costs	On-route distances not expected to significantly change with automated system	No significant change	
Administrative Costs			
Incremental Administration	Equivalent to one full time position	$50,000 to $60,000	$1.02 to $1.23
Cart Replacement Reserve	Based on 15 year replacement schedule.	$184,000 to $617,000	$3.76 to $12.63

7 Conclusions and Recommendations

Curbside waste and recyclables collection using fully automated side load vehicles has been adopted in at least five communities in British Columbia, and many more across Canada and the US. This style of collection offers many benefits over rear and side load manual collection methods currently used in the Central Okanagan area. Chief among these benefits is fewer injuries and reduced absenteeism amongst collections staff. However, there are also some disadvantages to this approach, including the initial capital spending that is required for an inventory of carts.

The Regional District of Central Okanagan (RDCO), the City of Kelowna and Districts of Peachland and Lake Country and the Westbank First Nation have expressed an interest in automating existing residential collection services for garbage, yard waste and recyclables. This independent business case analysis was completed to further explore the required expenditures, the benefits, and the disadvantages involved with conversion.

There are a number of issues that must be evaluated when considering a change from manual to automated curbside collection. Some of the key considerations include:

- Worker health and safety
- Cart selection and sizing
- Cart ownership and maintenance
- Collection truck selection
- Operator training
- Bulky waste handling
- Program implementation and administrative costs

The experience in other BC municipalities where automated collection has been implemented provides excellent guidance on how to incorporate these considerations into collection program design in a cost-effective manner that does not affect residential service levels.

Automation will affect collection program operational and administrative costs as well as add to capital spending. There are also specific costs associated with the transition from one means of collection to another. The best means of assessing these cost implications is to use actual operational data to conduct routing studies that taking into account region-specific information (e.g., housing densities, terrain, waste facility locations, and waste/recyclable set-out rates) as well as collection truck specifications and time-motion analysis results. However, in the Central Okanagan region where collection services are outsourced, much of the information required to complete a routing study resides with the private contractors and is considered proprietary.

Therefore, the best available means of assessing of costs associated with automated collection would be to base them upon the experiences of other similar communities. In this case, information from the communities of Prince George, Port Coquitlam, Kamloops, Regina, and Vancouver were used in the assessment completed for the Central Okanagan region.

The most significant change in program costs would be related to capital spending on new carts for each household, with the actual costs being impacted by the number of carts supplied to each household. Financing costs associated with cart purchases would range from $660,000 per year for a single cart at each household, to $2,210,000 per year for three carts ($13.50 to $45.25 per household per year). Contributions to a "cart replacement" reserve fund would add an

additional $184,000 to $617,000 per year to the annual program budget ($3.76 to $12.63 per household per year), again depending on the number of carts provided.

Offsetting this would be reductions in capital costs and associated financing charges would be encountered as a result of fleet size reductions. The magnitude of the fleet reduction would be based on whether changes are made to collection schedules and collection contracts are restructured. Fleet size reductions are possible which would avoid in the order of $115,000 to $175,000 per year in vehicle financing costs.

The assessment further indicates that there would be several once-time implementation costs related to promotion, education, training and coordination. These costs are estimated to be in the range of $145,000 to $170,000, ($3.00 to $3.50 per household) and would not vary significantly based on the number of carts per household. There is also a one-time cost for initial delivery of carts to all households, which would be in the order of $4.00 per household per cart.

Operational and administrative costs can be expected to decrease, which is primarily a reflection of increased productivity of collection vehicles and resulting reduction in crew size. The reduction is expected to be in the order of $11.25 to $12.94 per household per year. A further unquantifiable reduction can be expected resulting from reduced WCB premiums and injury claim costs.

Overall, the costs of implementing automated collection in the region for all three waste streams (garbage, yard waste and recyclables) is expected to result in an average increase in costs in the range of $11 to $57 per household per year. The main reason for this cost increase is due to the carts and associated delivery and reserve funding (i.e., $22 to $70 per household per year). If the cart-related costs are excluded from consideration, there would be net decrease in costs. This average decrease across the region is expected to be in the range of $10 to $13 per household per year.

The RDCO is nearing completion of an update to its Solid Waste Management Plan. The draft plan contains a number of short and long term initiatives that would be used to increase waste diversion within the Central Okanagan region. A review of the proposed initiatives shows that the implementation of automated collection will not have any significant impacts. However, the RDCO's plans to not construct a transfer station at the Westside Landfill following its closure will impact the routing and costs of collection services (whether manual or automated) in the Peachland and Westside service areas.

7.1 Recommendations

A number of recommendations have been provided throughout this technical memorandum related to the implementation of automated collection in the Central Okanagan region. For convenience, these recommendations have been consolidated and repeated in this section.

Carts Specifications, Ownership and Maintenance

- Municipalities and the RDCO should coordinate actions so that cart colours for various collections streams are consistent in all jurisdictions.
- Municipalities and the RDCO should coordinate actions such that a single cart specification is used within the Central Okanagan area. This allows for consistency of manufacturer, size

and color. In addition to allowing the replacement cart/parts inventory to be minimized, and possibly shared across jurisdictions, this should result in better pricing.

- The cart inventory required for the automated system in the region should be owned by the RDCO and municipalities. Based on our understanding of the various constraints upon municipalities in the region, further consideration may need to be given to the RDCO purchasing and managing cart inventories on behalf of Districts of Peachland and Lake County.
- The responsibility for physically maintaining and replacing carts in the Central Okanagan area should lay with contractors as part of the collections contracts. The contractors should be held financially responsible for cart damage caused by their crews and equipment, but not for damage caused by residents. This approach eases administration and workload for the municipalities. Also, based upon the experiences in Spokane where breakage rates for blue bins by contractors was twice that for City collection crews, this provides a built-in cost incentive for contractors to maintain grabber arms at the proper pressures and have collections staff properly position carts (manually if required) prior to unloading.
- In the Central Okanagan region where multiple collection contracts are awarded, there should be consistency in the maintenance standards and replacement standards among jurisdictions.

Collection Vehicles

- Split compartment trucks are not recommended for use in the Central Okanagan region. This is primarily due to the distance between collection zones and disposal/processing facilities.

Program Implementation and Management

- The scope of cart supply tenders should include cart delivery services that include confirmation records (by household) and the delivery of any necessary homeowner information packages on the new service.
- The existing contract for the RDCO's regional recycling program should be revised so that collection and processing are contracted separately, but the processing aspect continue to be based on serving the regional population. This will increase the flexibility available to the RDCO on evaluating alternative processing options (e.g., cooperation with other Regional Districts, Public-private partnerships, and design-build-operate arrangements to support facility redevelopment).
- Garbage, yard waste and recyclables collection services within each area should be consolidated under the same contract(s) to allow private sector operators an opportunity to optimize staff and fleets, resulting in better overall service to residents.
- Central Okanagan would be best served by dividing the regional district into two (City of Kelowna, all others) or three (City of Kelowna, Lake County/Ellison/Joe Rich, Westside/Peachland) zones for garbage collection. The determination of number of zones would be based on contract tendering and administration factors.

- Within the zone on the west size of Okanagan Lake, separate tender pricing should be obtained for Peachland and Westside to reflect the differences in hauling distances. Separate pricing should also be obtained based on use of the Westside or Glenmore Landfills and this can be factored into closure planning for the Westside Landfill over the next five to eight year period.
- If possible, a single consolidated tender should be issued on behalf of all jurisdictions, with the intent that the successful bidder(s) will enter into individual contracts with each jurisdiction.
- Collection contracts in the region should continue to be tendered on a minimum five year term, with consideration given to six and seven year terms.
- Specific clauses for fuel-cost escalations based on specific market indices should be incorporated into collection tenders and contracts.
- The implementation of automated collection service be delayed by six months, with the planned startup of curbside service in January of 2009.
- The cost-benefit analysis of the transfer station option at Westside Landfill should be revisited in the context of new equipment capabilities.

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REGIONAL DISTRICT of CENTRAL OKANAGAN

REPORT TO THE ENGINEERING COMMITTEE

From: Carol Suhan, MBA PR

Date: September 14, 2007

Re: Summary or CH2MHill Report: Automated Curbside Collection Program Considerations; and

Comparison of Services and Costs of Recent Collection Systems in BC

Summary or CH2MHill Report: Automated Curbside Collection Program Considerations

The RDCO, Kelowna, Peachland, Lake Country and Westbank First Nation's current garbage, yard waste and recycling collection contracts end in June 2008. Therefore, local governments will soon be issuing an RFP(s) for collection service, providing an opportune time to analyze our current waste collection programs.

The greatest challenge to operating a successful collection program within the last several years has been the haulers' inability to attract and retain workers due to the tight labour market. This has resulted in frequently missed collections, frustrated residents and stressed workforces (haulers and staff)[1]. Although Waste Management had the biggest problems in dealing with this issue, OK Environmental Services, and virtually all the other contractors in the region, have experienced similar problems and have expressed their frustration.

As a result, solid waste management staffs have been researching other collection systems; specifically automated collection, which has shown to be less labour intensive, safer for employees, and more efficient. The research included contracting CH2MHill to prepare a business case analysis on automated collection, with the recommendations to inform the RFP[2].

The following highlights the findings and recommendations of the report:

- Automated collection has been around for more than 30 years and is used extensively in the United States and parts of Eastern Canada. It is only being introduced in Western Canada within the last several years.

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[1] The Regional Waste Reduction Office received thousands of complaints – many of them very angry – in the last two years. As the providers of waste collection, it is incumbent on us to provide the best service levels possible. Although we can "blame" the waste haulers, ultimately, it is we who provide the framework for excellent service delivery.

[2] Although not part of the initial draft report, CH2MHill is preparing a project timeline for RFP, contract award and program implementation with attendant rationale (i.e., alternative approval process and jurisdictional differences). As the issues are complex and the timelines fairly tight, it will be important to have to a detailed decision-point schedule.

- The most significant benefits of automated collection are in respect to the on-going labour market in the Central Okanagan. Automated collection requires no manual heavy lifting, which significantly decreases worker injury and sick leave. It lets workers make the job into a long-term career, and it allows managers access to a larger labour pool (younger and older employees of both genders). As well, automated systems generally require one third fewer employees.
- A summary of the key advantages and disadvantages of automation are:

Automated Collection Advantages and Disadvantages

Advantages	Disadvantages
• Potential to reduced number of collections crews/vehicles • Heavy lifting eliminated resulting in reduced injuries, absenteeism and WCB claims • Better working environment for collections staff • Increases employment opportunities for female and older male collection workers • Allows collection staff to extend their careers • Smaller fleet size which translates to reduced fuel consumption and emissions • Increased participation in diversion/recycling programs • Higher customer satisfaction • Improved neighbourhood aesthetics on collection days • No debagging of yard waste required • Closed lids reduce amount of rain/snow that accumulates, reducing collection tonnages and improving routing efficiency • Carts allow plastic bags to be eliminated from yard waste program, saving debagging costs and improving compost product quality • Carts allow plastic bags to be eliminated from recycling collection, saving debagging costs and allowing for increased productivity (more automation and less labour) • Carts provide better containment and pest deterrence, reducing litter at curbside	• Initial capital costs for carts • Initial capital cost for changing collection fleet to automated units • Automated systems may not work as well in narrow back lanes and cul-de-sacs – typically some residences must still be collected by hand • Some households may not have sufficient storage space if collection program requires two or three large carts • Increased maintenance costs for collection vehicles • Increased training required for staff to become proficient with arm operation • Potential for wastes/organics to freeze in carts • Bulky materials may require manual loading or separate collection • Ergonomic issues associated with joystick operation

- Wheeled carts are used to collect the waste types. These come in a number of sizes and are usually multi-coloured to help residents and haulers readily identify the type of refuse collected. When purchasing carts there are a number of issues to consider, including:
    - The choice of sizes and colour of containers. The report recommends:
        - Municipalities and the RDCO should coordinate actions so that cart colours for various collections streams are consistent in all jurisdictions.
        - Municipalities and the RDCO should coordinate actions such that a single cart specification is used within the Central Okanagan area. This allows for consistency of manufacturer, size and color. In addition to allowing the

replacement cart/parts inventory to be minimized, and possibly shared across jurisdictions, this should result in better pricing.

- There are several options for cart ownership for consideration. Private sector ownership would allow for greater amortization of the capital costs, possible operational costs budgeting, and potentially better pricing due to the large multi-national companies purchasing power. Alternatively, municipal ownership can provide lower borrowing rates and has no profit margins to build in. Municipal ownership also doesn't prevent smaller companies from bidding on tenders and ensures a more competitive playing field. The report recommends:
  - The cart inventory required for the automated system in the region should be owned by the RDCO and municipalities. Based on our understanding of the various constraints upon municipalities in the region, further consideration may need to be given to the RDCO purchasing and managing cart inventories on behalf of the Districts of Peachland and Lake Country.
- Although there is minimal maintenance issues due to the long warranties and durability of the carts, some cart maintenance and replacement is required. The report recommends:
  - The responsibility for physically maintaining and replacing carts in the Central Okanagan area should lay with contractors as part of the collections contracts. The contractors should be held financially responsible for cart damage caused by their crews and equipment, but not for damage caused by residents. This approach eases administration and workload for the municipalities. Also, based upon the experiences in Spokane where breakage rates for blue bins by contractors was twice that for City collection crews, this provides a built-in cost incentive for contractors to maintain grabber arms at the proper pressures and have collections staff properly position carts (manually if required) prior to unloading.
  - In the Central Okanagan region where multiple collection contracts are awarded, there should be consistency in the maintenance standards and replacement standards among jurisdictions.

- There are a number of different designs and makes of trucks and grabber arms. The primary concerns for selection criteria include the grabber arm design, the load cycle time, ergonomics of the cab and operating equipment, visibility, split vs. single compartments, axle radius, capacity, GIS tracking systems. Driver training and potential for load contamination are other considerations. Although the decisions for the kind of collection trucks, routing, driver training, etc. is the contractor's domain, the report recommends:
  - Split compartment trucks are not recommended for use in the Central Okanagan region. This is primarily due to the distance between collection zones and disposal/processing facilities.

- A change to an automated collection system would involve significant logistics and education challenges. To help ease the potential for problems, the report advises that implementation be phased in and specifically recommends:
  - The scope of cart supply tenders should include cart delivery services that include confirmation records (by household) and the delivery of any necessary homeowner information packages on the new service.

- There is a preference in the region to continue outsourcing collection services using a competitive tendering process. Although there is no clear consensus on how tenders should be structured with respect to service areas and scope of services, there is agreement that recycling collection should be included with garbage and yard waste collection contracts. It is also agreed that the recycling processing and marketing contracts should be separate from collection contract(s). The report recommends:
    - The existing contract for the RDCO's regional recycling program be revised so that collection and processing are contracted separately, but the processing aspect continue to be based on serving the regional population. This will increase the flexibility available to the RDCO on evaluating alternative processing options (e.g., cooperation with other Regional Districts, Public-private partnerships, and design-build- operate arrangements to support facility redevelopment).
    - Garbage, yard waste and recyclables collection services within each area should be consolidated under the same contract(s) to allow private sector operators an opportunity to optimize staff and fleets, resulting in better overall service to residents.

- Currently, the four municipalities tender and contract garbage and yard waste collection independent of one another; however, there has been significant effort made to coordinate efforts to keeps program delivery the same and to have contracts come due at the same time. There has been discussion about the merits of combining collection contracts similar to the regional recycling program, the rationale for which is the possible reduction of costs. If this direction is taken, there are a number of factors to be considered including: economies of scale in collection, administrative resources, ensuring a competitive marketplace, geography, and housing density. The report recommends:
    - Central Okanagan would be best served by dividing the regional district in two (City of Kelowna, all others) or three (City of Kelowna, Lake Country/Ellison/Joe Rich, Westside/Peachland) zones for garbage collection. The determination of zones would be based on contract tendering and administration factors.

      Within the zone on the west side of Okanagan Lake, separate tender pricing should be obtained for Peachland and the Westside to reflect the differences in hauling distances. Separate pricing should also be obtained based on use for the Westside landfill over the next five to eight year period.

      If possible, a single consolidated tender should be issued on behalf of all jurisdictions, with the intent that the successful bidder(s) will enter into individual contracts with each jurisdiction.

      Combined with previous recommendations to consolidate garbage, recycling, and yard waste collection in each zone, we believe this approach will provide operational benefits to the private haulers, will in turn allowing for more reliable and efficient.

- Currently, waste collection contracts are five years with no options for extension. Generally, longer term contracts are more likely attract more bidders as they provide greater operational stability and allow contractors to amortize new equipment over a longer time frame. The report recommends:
    - Collection contracts in the region should continue to be tendered on a minimum five year term, with consideration given to six and seven year terms.

- Multi-year collection and processing contracts generally include inflationary clauses tied to CPI or other accepted index. Many contracts are now being negotiated with separate fuel costs clauses separate from inflation indexing. The report recommends:
    - Specific clauses for fuel-cost escalations based on specific market indices should be incorporated into collection tenders and contracts.

- The current schedule for implementing automated collection is less than a year. Based on experience from other communities, it takes a minimum of eight months to secure equipment for collection. Based on the time required to issue an RFP, award a contract and implement a new program, the report recommends:
    - The implementation of automated collection service be delayed by six months, with the planned startup of curbside service in January of 2009.

- Although the Solid Waste Management Plan does not specifically recommend an automated collection system, automation does enhance a number of the Plan's recommendations. [Note: Other communities have seen a 35% increase in recycling when changing from a blue bag program to automation and a 20% decrease in waste disposed.]

- Past consideration has been given to the construction of a waste transfer station at the Westside Landfill following closure. Previous analysis compared the direct haul option with a transfer station and concluded that direct haul was the more cost-effective. However, new technology and collection equipment may now make a transfer station more efficient; therefore, the report recommends:
    - The cost-benefit analysis of the transfer station option at Westside Landfill should be revisited in the context of new equipment capabilities.

- Garbage collection systems vary dramatically across the country and the province, making cost comparisons difficult. Additionally, when service is provided by the private sector, such as it is in the Central Okanagan, the contractors will not release proprietary costing or routing information. Therefore, it is almost impossible to provide accurate analysis of costs and projected increases.

  The report however, does cover all the major costs: collection vehicles, carts, implementation, operations and administration. Table 7 summarizes the annual increases and decreases of automation's costs (attached).

  When comparisons of manual collection systems are made against automated collection, the operation costs appear very similar. There are expected decreases in operational costs (salaries and benefits, WCB claims and premiums), and in the overall costs to supply trucks. However, there are cost increases to provide the carts and to implement a new program. Overall, it appears the cost decreases cancel the implementation cost increases. However, the provision of the carts would be above what manual collection costs would most-likely be. Those costs could vary significantly depending whether yard waste collection is provided and how the carts are financed and amortized. If only garbage and recycling collection carts are provided, it appears that cost increases would be approximately $31/yr/hhld. If bi-weekly yard was included, potentially as an optional service, residents would be charged an additional $25-35 per year for the cart and service.

  (Note: Automated collection service does not require residents to buy black garbage bags, blue recycling bags or clear bags for yard waste. A study completed by the City of Port Coquitlam in 2005 concluded that residents in that community spent between $35 and $50 per year on waste bags.)

Comparison of Services and Costs of Recent Collection Systems in BC

As noted earlier, it is difficult to make costs comparisons between manual and automated collection systems because every community's service delivery is different, administrative costs vary and local governments use different methods to pay for services provided (tax levies, utility bills or combinations of both).

The following table shows the levels of service offered and the costs on a per household basis in four communities with manual collection contracts and six communities with automated collection.

Recent Contracts

MANUAL Collection	**Services Offered**	**Contract Start**	**Annual Cost per Household**
RDOS	• Weekly garbage collection (2 bag limit) • Bi-weekly blue bag recycling collection (all plastics) • 6 yard waste collections (clear bags) • 1 Bulky item collection	2006	$125
City of Richmond	• Weekly garbage collection (2 bag limit) • Weekly blue box recycling collection (some plastics) • Weekly yard waste collection (plastic bags, unlimited) • Garbage disposal voucher (1 per year)	2007	$188 (Note: Only two companies bid on tender. The company that was awarded the contract had no previous experience.)
City of Burnaby	• Weekly collection of garbage (2 bag limit) • Weekly blue box recycling collection (all plastics) • Weekly yard waste collection (unlimited bags) • 1 bulky item collection	2006	$197 (Noted: Experiencing poor collection service!)
Port Moody	• Weekly garbage collection (2 bag limit) • Bi-weekly blue box recycling collection (some plastics) • 1 bulky item collection • Weekly yard waste collection (clear bags, max. 6 week, Mar-Nov.)	2004	$129 yard waste optional: $41/year (Note: Seriously considering automation for next tender. Rumour that unionized companies will not bid on manual collection tenders.)

AUTOMATED Collection	**Services Offered**	**Contract Start**	**Annual Cost per Household**
City of Prince George	• Weekly garbage collection • Recycling depots (no plastics) • Yard waste drop-off	2006	$104-144, dependent on cart size
City of Kamloops	• Weekly garbage collection • Weekly recycling collection (all plastics) • Yard waste drop-off	2007	$116-156, dependent on garbage cart size (Note: full cost, does not include grant)
Port Coquitlam	• Weekly garbage collection • Bi-weekly recycling collection (all plastics) • Bi-weekly yard waste collection (Mar.-Nov.)	2006	$184, one-size carts (Note: automation $5/unit less than manual collection - 2005)
City of Vancouver	• Monthly garbage and weekly recycling collection • Weekly garbage and blue box recycling collection (all plastics) • Bi-weekly yard waste collection	2006	$109 $160-203, dependent on cart sizes Yard waste collection optional: $58.40
Kirkland, Washington	• Weekly garbage collection • Weekly recycling collection (all plastics) • Weekly yard and kitchen waste collection	2006	$135-293 US, dependent on garbage cart size
Redmond, Washington	• Weekly garbage collection • Weekly recycling collection (all plastics) • Weekly yard and kitchen waste collection	2006	$84-382 US, dependent on garbage cart size

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Memo

TO: Solid Waste Technical Advisory Committee

FROM: Carol Suhan

DATE: September 18, 2007

SUBJECT: Report – Education/Administration Program Implications if Waste Collection Systems Differ

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As requested in the September 12th meeting, I have prepared a brief report and cost assessment for education / administration if one or more of our partner municipalities opt to have differing service delivery for waste collection.

Presently, the WRO provides education and promotion for the solid waste collection programs for the entire region. Although many aspects of our program would not be affected if collection programs differ (school programs, illegal dumping, hazardous waste collection, construction and commercial waste diversion programs, etc.), others would be significantly impacted. The services that would be most affected include:

- Advertising on radio and in newspapers for recycling, yard waste and garbage collection programs
- "Living Greener" calendar direct mailed to all homes in the region
- Program posters distributed throughout region
- Program information on the Internet
- Information Hotline
- Media relations (press releases, PSAs, etc.)

Education and marketing services will have to be provided, regardless of which collection systems are decided upon. There are two options for the continuation of those services: 1) The WRO continues to deliver the education programs and administers the day-to-day collection contracts; or 2) the individual municipalities deliver the programs and administer all aspects of the contracts themselves.

A summary analysis suggests that costs would increase by about $50,000 regardless of whichever option is chosen.

If the WRO continued to provide the marketing services costs would increase. For example:

- Advertising rates would increase (less volume discounts);
- Different graphics would have to be designed for ads, posters and other informational pieces; and
- Different press releases, PSAs etc. would have to be crafted and distributed to media

Most importantly, special attention would have to be paid to ensure that messages are directed specifically to each community to ensure messages are not misinterpreted.

Conversely, if municipalities chose to offer their own services a person would have to be hired. This position, a minimum .5FTE, with specialized communications skills would be required to:

- Design graphics and create ad copy for advertising and other collateral pieces (i.e., annual calendar), and place the ads with appropriate media;
- Provide collection info on the Internet;
- Maintain excellent media relations; and
- Answer queries and address residents' complaints.

The costs of purchasing media ad space would also be increased as there would be lower or no discounts for volume purchasing.

#	Task Name	Duration
1	**Administrative**	**61 days**
1.1	*Municipality committments*	*31 days*
1.2	*Tendering/Financing Strategy*	*30 days*
1.3	*Westside Transfer Stn Evaluation*	*46 days*
2	Promotion and Education	404 days
3	**Curbside Collection Pilot**	**152 days**
3.1	*Field Component*	*124 days*
3.2	*Initial Evaluation/Report*	*21 days*
3.3	*Final Evaluation/Report*	*28 days*
4	**Cart Tender**	**425.5 days**
4.1	*Finalize cart requirements*	*30 days*
4.2	*Develop cart tender*	*45 days*
4.3	*Tender Period*	*30 days*
4.4	*Tender Evaluation/Award*	*30 days*
4.5	*Cart Delivery from Manufacturer*	*200 days*
4.6	*Cart Roll-out to Residents*	*35 days*
5	**Collection Tender**	**390 days**
5.1	*Extend existing contracts*	*215 days*
5.2	*Finalize Tender documents*	*35 days*
5.3	*Tender Period*	*45 days*
5.4	*Tender Evaluation/Award*	*45 days*
5.5	*Truck Order/Delivery*	*200 days*
5.6	*Operator Training*	*28 days*
6	**MRF Tender**	**195 days**
6.1	*Finalize Tender documents*	*45 days*
6.2	*Tender Period*	*45 days*
6.3	*Tender Evaluation/Award*	*45 days*
6.4	*Vendor Preperation*	*60 days*
7	**Service Commencement**	**274 days**
7.1	*Recyclables Processing*	*0 days*
7.2	*Garbage/Recyclables Collection*	*0 days*
7.3	*Yard Waste Collection*	*0 days*