

Final Report

**The City of Calgary
Residential Collection Services Review**

Prepared for
The City of Calgary

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Prepared by



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Executive Summary

ES1 Background and Approach

The City of Calgary (The City) is facing important transitions in its residential material collection programs. It is progressing towards implementation of a source separated, residential food and yard waste collection program, and The City's blue cart recyclables collection contract is coming to an end shortly. In response, The City's Waste & Recycling Services Department (WRS) engaged CH2M HILL Canada Limited (CH2M HILL) to conduct a review of its residential collection practices in order to inform upcoming decisions impacting Calgary's residential collection services. In conducting this study, CH2M HILL partnered with WIH Resource Group, who provided expertise in collection best practices and fleet management.

This report focuses mainly on black cart and blue cart collection because those services account for more than 75 percent of the cost of collection services provided by WRS.

The CH2M HILL team used a variety of different sources and methods to conduct the following comparisons and evaluations.

1. Comparing the services provided by The City to those provided by peer jurisdictions.
2. Evaluating different public sector and private sector service delivery models.
3. Comparing The City's collection cost and efficiency to select public and private sector operations.
4. Analyzing the effectiveness of The City's fleet management service.
5. Evaluating the operational performance of The City's black cart and blue cart operations.

A summary of the key findings and recommendations of these evaluations follows.

ES2 Comparing Services Provided to Those of Peer Jurisdictions

WRS provides the following collection services to The City's residential customers:

- Fully-automated weekly garbage (black cart and excess materials not oversized);
- Fully-automated weekly commingled recycling collection (blue cart);
- Cart delivery and repair of carts - including new delivery and replacement as required;
- Special collection of seasonal materials (Christmas trees, leaves, pumpkins);
- Contracted bin collection for some multi-family and commercial locations;
- Short-term collection for festivals and special events;
- Occasional community cleanups (92 in total during 2013);
- Community recycling depot (CRD) collection; and
- Selective lane sanding for accessibility in times of heavy weather events.

The scope and type of services provided by WRS were compared to those of nine peer jurisdictions: Edmonton, Halifax, Ottawa, Peel Region, San Francisco, Toronto, Vancouver, Victoria, and Winnipeg. Key findings from this comparison, reported in Section 2.7, include the following:

1. Compared to its peer jurisdictions, The City of Calgary provides similar services to its residents. Once Calgary implements the city-wide Green Cart program, it will resemble seven of the nine peer jurisdictions that provide kitchen waste collection service. Like Calgary, eight of the nine peer jurisdictions provide full-time or seasonal yard waste collection service to residential customers.
2. Calgary is similar to only two of the nine peer jurisdictions that allow unlimited material to be set out for garbage collection. Further, Calgary is the only jurisdiction using fully-automated collection that allows customers to set out "excess" material. CH2M HILL estimates that The City could save approximately \$600,000 annually not allowing unlimited material to be set-out for garbage collection, and instead directing residents to deliver those materials to a transfer station (i.e. Waste Management Facility).

3. Calgary has 49 community recycling depots (CRDs), which is more than double the amount of depots provided on a per-household basis than any of the other jurisdictions; four cities had no CRDs. Also, it is noteworthy that Calgary provides more than double the number of community recycling depots on a per-household basis than any of the other peer jurisdictions.

Key recommendations from the comparison, reported in Section 2.8, include the following:

1. CH2M HILL recommends that WRS consider no longer allowing residents to set out excess material beyond what fits in the black cart container provided, or implement a tag-based system where residents must pay to set out excess material. If The City does make this change, it should consider how to implement the change, make necessary changes to City bylaws, and accompany the change with multiple forms of communication and education to residents (e.g., flyers, on-line, media).
2. WRS should also consider implementing a pay-as-you-throw PAYT program (e.g., varying cart sizes) that would provide an incentive to residents to properly source separate their garbage and recycling into the proper carts, minimizing contamination to recyclables collected. If The City were to move toward PAYT pricing, it should institute a charge for excess material.

ES3 Service Delivery Models

The five most common ways that residential collection services are delivered to customers in North America:

1. Full Public Sector
2. Full Privatization with One Hauler
3. Full Privatization, Multiple Haulers in Exclusive Geographic Zones
4. Mixed Service-Managed Competition
5. Different Providers for Different Materials

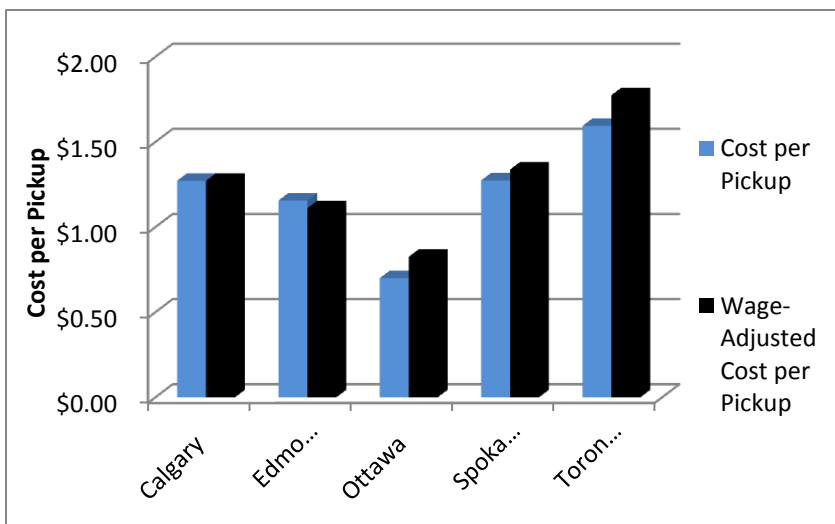
The results of the analysis of these service delivery models suggest that at least initially a competitive private sector procurement process would be likely to result in lower costs to residents than WRS' current collection operations (for an equivalent level of service). The extent of any initial savings would depend on many factors: it could be quite small, or perhaps substantial. It is also possible that the continuation of recent efficiency improvement trends within WRS could make the costs of public and private sector collection quite similar. In the long-run, cost savings from switching to private sector collection is less certain, experience in other jurisdictions has found initial savings can be difficult to sustain over many years. CH2M HILL's recommendations related to service delivery models, reported in Section 3.4, follow.

1. CH2M HILL does not have a particular opinion about whether The City should remain with public sector collection or change to private sector collection. Both models can perform well or perform poorly depending on how they are managed and implemented.
2. If The City wants to move toward some type of private sector collection, CH2M HILL recommends that it use a mixed service or managed competition model rather than going completely to private sector service delivery. This would help The City monitor private sector performance, retain knowledge about how waste management policies affect City residents, and retain the public sector as an additional competitor to private sector firms competing for contracts. Further, once a city changes to full private collection, it is difficult to switch back to public sector collection because of the loss of knowledgeable staff and facilities.
3. CH2M HILL recommends that The City change from the current service delivery model in which it recently used a managed competition process for recycling while retaining public sector provision of garbage. The City should avoid having multiple entities deliver different services to the same customer: for example, do not have one entity (private or public) providing garbage, and another entity or company providing recyclables or organics. Having each customer served by only one collector will minimize customer confusion about which entity provides which service, allow for more clear messaging to customers, and minimize service disputes.

ES4 Collection Cost and Efficiency

CH2M HILL compared performance metrics from W&RS's collection operations to that of four jurisdictions with many similarities to Calgary. As reported in Section 4.2, the key findings and recommendations from that comparison follow.

1. The cost of collection in the five cities was compared using the wage-adjusted cost per pickup. This is a metric that controls the differences in wage rates and the number of service pickups provided to each customer. In 2012 the wage-adjusted cost per pickup for each jurisdiction is as follows: Ottawa (\$0.83), Edmonton (\$0.98), Spokane (\$1.04), Calgary (\$1.27), and Toronto (\$1.77).



2. In all cities, maintenance is performed by a central fleet department, and the shifts used to perform maintenance vary among the cities. All cities use a swing shift or night shift; three of the six use a day shift as well. Edmonton, Ottawa, and Toronto perform maintenance seven days per week. Calgary is the only city that does not routinely perform some maintenance on Saturday, Sunday, or Monday.
3. WRS should continue aggressively acting to improve the efficiency of all aspects of its collection operations to lower the cost of providing its targeted type and quality of service. To further this objective, it is recommended that WRS monitor and track its costs by District for five to 10 key cost components (such as administration and overhead, collection labour, carts, training, fuel, vehicle maintenance, vehicle ownership), then develop efficiency plans for each cost component thus aligning efficiency initiatives to its major cost drivers.

ES5 Fleet Management

CH2M HILL evaluated The City's fleet management operations with extensive interviews of staff from WRS and Fleet Services, review of detailed statistics and comparisons to fleet management operations at other jurisdictions. As reported in Section 5.10, six key findings and recommendations include the following:

1. Compared to the four other public sector operations analyzed, WRS' maintenance costs are about average and lease costs are relatively high.
2. Historically, WRS has experienced substantial challenges with vehicle down time, and poor communications and transparency with Fleet Services about maintenance procedures and practices. These challenges have been expressed to Fleet Services, and Fleet Services has recently suggested a series of potential remedies.

CH2M HILL recommends that WRS work with Fleet Services to develop a Maintenance and Fleet Management Improvement Plan. The plan should evaluate the recommendations in this study and other ideas from WRS and Fleet Management staff, prioritize the recommendations and further study needed, and develop a timeline to implement process improvements. One year after initiation of the Plan, WRS should evaluate the extent to which Fleet Services is meeting the targeted outcomes requested. If those expectations are not being met to its satisfaction, WRS should request approval to either bring the maintenance function in-house within WRS or initiate a managed competition process that would allow Fleet Services to propose against private sector service providers on a multi-year contract for providing vehicle maintenance services.

3. Currently, 23.7 percent of The City's residential collection fleet are spare vehicles (i.e., vehicles not used routinely). This spare ratio is not particularly high compared to the other cities analyzed. However, many high performing organizations have spare ratios well below 20 percent. For example five private collection operations contacted by the CH2M HILL team operate at spare ratios ranging from 7 percent to 20 percent, with an average of 14 percent. Interviews with WRS supervisors suggested that a spare ratio of 15-18 percent should be sufficient with a high functioning maintenance department. CH2M HILL estimates that lowering the spare ratio to 15 percent could save WRS \$1.35 million annually.
4. In 2012, WRS paid \$8.1 million to Fleet Services for leasing its collection vehicles: 21.2 per cent, or \$1.7 million, of that cost was for indirect charges. While there is some overhead associated with procuring and tracking fleet, this is one area where significant savings could be achieved if other arrangements were made for owning fleet. If WRS ran this function with assistance from procurement, legal and other city departments, it should be able to manage its collection fleet at an overhead rate of 5-10 per cent or less, resulting in annual savings of \$900,000 to \$1.3 million. WRS should consider owning its collection vehicles rather than leasing them from Fleet Services.
5. Preventive maintenance (PM) on collection vehicles is not being completed as frequently as it should. WRS and Fleet Services should jointly develop a preventive maintenance (PM) plan for vehicles, and then agree upon and implement that plan: PM should be performed routinely and should not be skipped to "get trucks on the road". In particular, PM on mechanical arms would help minimize down time and lower costs overall.
6. Currently, WRS' collection vehicles are procured along with other City equipment. Collection vehicle tenders should be specific only to WRS to ensure that best value is received for the specific needs of WRS. WRS should lead the development of specifications (with support from a procurement specialist who has expertise developing collection vehicle specifications), and at least one WRS representative should be present during evaluation of all fleet vehicle tenders.
7. It is recognized that there is a trade-off between having mechanics working nights, weekends, and/or overtime perhaps at higher hourly rates (depending on union agreements), but it appears that Fleet Services and WRS should jointly place more emphasis on keeping first line vehicles on the road at all times. Maintenance bays need to be fully utilized during non-collection times to ensure trucks are ready to perform their duties.

ES6 Operational Performance

During the course of our review of WRS' operational performance, CH2M HILL observed many improvement actions taken by WRS. One measure of the success of these improvements is an increase in the average number of stops per beat for automatic side loader garbage collection from 842 in 2012 to 895 in 2013, and an increase in the average number of stops per beat for blue cart collection from 1,177 in 2012 to 1,232 in 2013.

In 2012, Calgary averaged 825 stops per day for garbage whereas Edmonton, Ottawa, Spokane and Toronto ranged from 431 to 1,022 stops per day. The average number of stops per day for garbage collection in 2013 at five private operations surveyed ranged from a low of 665 to a high of 1,368 with an average of 990, which is about 10 per cent more than what is achieved in Calgary today.

For recycling, Calgary averaged 1,177 households per day in 2012 compared to a range of 988 to 1,310 for the four public sector communities: the two private sector operations that provided data about recycling collect from slightly fewer recycling stops per day than does Calgary.

Compared to the other jurisdictions surveyed, Calgary reports about 0.06 lost-time injuries per hundred thousand pickups compared to 0.09 for Toronto, 0.11 for Edmonton, 0.43 for Ottawa, and 1.16 for Spokane. Thus, it appears that Calgary has a lower rate of lost time injuries than the other cities.

As reported in Section 6.8, four key findings and recommendations related to WRS's operational performance include the following.

1. It is recommended that WRS explore the potential benefits of waste collection industry-specific routing software further by pilot testing some routing software packages and comparing route maps generated by those packages to route maps generated by The City's existing mapping software. WRS service should conduct a detailed

business case study about whether the potential benefits of improved long-term on-route efficiency and more balanced routes would be greater than the added cost of software and training associated with implementing a commercial routing software package.

2. CH2M HILL staff is aware of other jurisdictions that have successfully overcome labour union concerns about full use of GPS technology to improve collection productivity (e.g., Seattle). It is recommended that WRS pursue this issue further with its labour unions then consider implementing a robust GPS technology solution that would help provide real-time vehicle and driver performance information.
3. WRS places considerable emphasis on ensuring safety in the workplace. Workplace safety statistics are measured and reviewed by WRS management. A new training program is being developed that should improve safety performance further. To minimize “In the Zone” issues (where repeated container lifts can result in drivers becoming less aware of their surroundings), WRS should consider requiring that drivers switch positions in the cab partway through the day on the dual drive cabs.
4. Collection operations would run more smoothly if WRS improved public education and outreach to citizens to make sure they are setting out their carts properly and to ensure minimization of recycling contamination. More specifically, a good suggestion offered by a WRS driver to place large stickers on each cart showing what is and is not acceptable should be evaluated by WRS and considered for implementation.

Background and Approach

1.1 Background

The City of Calgary (The City) is facing some important transitions in its residential material collection programs. It is progressing towards implementation of a source separated, residential food and yard waste collection program, and the term for The City's blue cart recyclables collection expires in March 2014 (with potential for two one-year extensions). In response, The City's Waste & Recycling Services Department (WRS) engaged CH2M HILL to conduct a review of its current residential collection practices in order to inform upcoming decisions impacting Calgary's residential diversion and waste collection.

More specifically, the findings of this study are intended to inform The City about how the types of services it provides and methods of service delivery compare to its peer jurisdictions, and provide information about the relative efficiency and effectiveness of its current collection services. These results can then be used to inform actions The City might take to improve service delivery. The results can also inform decisions about whether The City should continue to provide a full suite of residential collection services (black, blue and green carts), or whether introducing some form of private sector involvement would present an opportunity to deliver desired service levels at lower cost.

1.2 Study Approach

The CH2M HILL team used a variety of different sources and methods to analyze WRS' collection practices as described below.

1.2.1 City of Calgary Data Analysis

The CH2M HILL team obtained and analyzed extensive financial and operational data from WRS, and some information from The City's Fleet Services Department (Fleet Services). The data built on information previously analyzed during CH2M HILL's preparation of a Recyclable Material Transfer Study for WRS.

1.2.2 Interviews with City Staff

Two senior CH2M HILL team members conducted extensive in-person and telephone interviews with staff from WRS and Fleet Services over a one-week period, including interviews with:

- WRS senior management (for collection services, infrastructure, finance, collection support, routing)
- Black cart and Blue cart drivers, foremen, and supervisors at each residential collection district (Districts 1, 2, and 3)
- Fleet Services senior management

1.2.3 Research and Telephone Interviews with Other Jurisdictions

The CH2M HILL team conducted research and a series of telephone interviews to gain insight into three central topics for this study:

1. How the types of collection services provided by The City compare to those provided at peer jurisdictions¹
2. The advantages and disadvantages of different service delivery models (public, private, various hybrids)
3. The relative efficiency and effectiveness of WRS' current operations

For the peer jurisdictions, comparison information obtained includes materials collected and collection frequency; recycling depot availability; collection technology, staffing, and vehicle types; bin sizes; funding methods and set-out limits; recyclables contamination rates; vehicle fuels used; and vehicle replacement schedules.

¹ The peer jurisdictions include large Canadian cities/regions (Edmonton, Halifax, Ottawa, Peel Region, Toronto, Vancouver, Winnipeg), Victoria, B.C. (provincial capital), and San Francisco, CA. (a leader in providing innovative zero waste programs).

The CH2M HILL team conducted a literature search and conducted telephone interviews with 14 jurisdictions about the different delivery models they use for residential collection. The residential service delivery models and the jurisdictions interviewed are as follows:

1. Full Public Sector: Vancouver, San Diego
2. Full Privatization, One Hauler: San Jose, San Francisco
3. Full Privatization, Multiple Haulers in Exclusive Geographic Zones: Seattle, Palm Beach County, Collier County, Peel Region, Winnipeg
4. Mixed Service-Managed Competition: Toronto, Ottawa, Phoenix
5. Different Providers for Different Materials: Chicago, Victoria

To explore collection efficiency, the CH2M HILL team obtained and analyzed detailed data and conducted multiple telephone interviews with four cities our team and WRS staff felt would be willing to make the time to provide the necessary information and had other features of interest (such as similar weather, large city, known efficient operation). The cities contacted include Edmonton, Ottawa, Spokane, WA, and Toronto.

In addition, the CH2M HILL team contacted five private collection firms to obtain select information about the efficiency of their collection operations.

1.2.4 Evaluation of Potential Areas for Improvement

The CH2M HILL team used the results of Calgary staff interviews, analysis of City data, interviews and research from other cities, other studies, and in-house information from our team's collective experience to evaluate WRS' operations, and suggest areas of improvement.

1.2.5 Preparation of Findings and Recommendations

The study results were compiled into a series of findings and recommendations for The City to consider going forward.

1.3 Report Organization

This report is organized into the following sections.

- Section 2: Comparison of The City's collection system to a series of peer jurisdictions.
- Section 3: Analysis of different service delivery models.
- Section 4: Analysis of comparable city collection efficiency metrics.
- Section 5: Review of fleet management and maintenance procedures.
- Section 6: Operational performance review that summarizes results of interviews, data analysis, and comparison of metrics to other cities.

Comparison of Calgary to Peer Jurisdictions

This section provides information about current single-family collection practices in Calgary's peer jurisdictions. WRS provides the following collection services to The City's residential customers:

- Fully-automated weekly garbage (black cart and excess materials not oversized)
- Fully-automated weekly commingled recycling collection (blue cart and excess materials not oversized or contaminated)
- Cart delivery and repair of carts - including new delivery and replacement as required
- Special collection of seasonal materials (Christmas trees, leaves, pumpkins)
- Short-term collection for festivals and special events
- Contracted bin collection for some multi-family and commercial locations
- Occasional community cleanups (92 in total during 2013)
- Community recycling depot collection
- Lane clearing for accessibility in times of heavy weather events

This report focuses mainly on black cart and blue collection (the other services are accounted for separately) although many of the findings and recommendations apply to the other collection services.

The information in the section was compiled by conducting web research and telephone surveys of seven large Canadian cities, Halifax Municipal Region, the Region of Peel, and San Francisco, California. Information included in the OMBI and NSWBI benchmarking initiatives The City participates in was also consulted². This section provides information from Calgary and the peer jurisdictions regarding the following aspects of their residential collection systems:

- Collection service provider (public, private, or both public and private)
- Curbside collection services provided
- Community recycling depot (CRD) services provided
- Collection methods
- Bin sizes
- Method of payment




2.1 Collection Service Provider

Table 2-1 outlines the service providers for main curbside collection services offered in each jurisdiction.

² OMBI - The Ontario Municipal Benchmarking Initiative (OMBI) is a voluntary collaboration between the Chief Administration Officers and City Managers of Canadian municipalities working together to achieve service excellence. The purpose of OMBI is to facilitate collection of comparable data for specific performance measures across participating municipalities, analysis of results and sharing of best practices in order to improve performance, and reporting on performance to the public. Within the City of Calgary, OMBI is corporately mandated and facilitated by Corporate Initiatives.

NSWBI – The National Solid Waste Benchmarking Initiative (NSWBI) is facilitated by AECOM and is a benchmarking program specific to solid waste management. The main goal of the initiative is to create a constantly evolving tool for managing and monitoring the performance of solid waste collection, processing and disposal systems across the country. This knowledge supports solid waste planning & diversion strategies, cost considerations, program delivery approaches, issues & challenges and opportunities for improvement.

TABLE 2-1
Single Family Curbside Collection Service Provider in Task 3 Jurisdictions

			
	Garbage	Recycling	Organics
Calgary	City	City	Not provided
Edmonton	part-City; part-Private	part-City; part-Private	Removed post-collection
Halifax	Private	Private	Private
Ottawa	part-City; part-Private	part-City; part-Private	part-City; part-Private
Peel Region	Private	Private	Private
San Francisco	Private	Private	Private
Toronto	part-City; part-Private	part-City; part-Private	part-City; part-Private
Vancouver	City	City	City
Victoria	City	Private	City
Winnipeg	Private	Private	Not provided

2.2 Curbside Collection Services Provided

The extent and types of services offered by jurisdictions vary depending on a number of factors. Some jurisdictions have arranged to provide curbside collection of a full range of household items from household hazardous waste (HHW) to mattresses, appliances and electronics, while others provide garbage and recycling pick-up only.

Some contributing factors that affect the type of material streams collected curbside include, but are not limited to, the following:

- Availability and accessibility of drop-off locations (recycling depots, transfer stations, landfills)
- Marketability of materials and availability of special processing facilities
- Processing facility capabilities
 - Example: In Edmonton, organics are not source separated and are instead sorted from the garbage waste stream at the processing facility.
- The goals, drivers, and strategies of city leaders (reflected in policies and bylaws)
- Cost of providing additional service

Where collection services for a particular material are not offered, residents usually have the option of hiring a private hauler or self-hauling material to a depot, transfer station, landfill, recycle/compost/reuse centre or other appropriate location.

Curbside collection services provided to single family households in Calgary and similarly-sized jurisdictions are summarized in Table 2-2. For regularly collected waste streams, frequency of collection is color coded: blue (lighter shade) for weekly collection and gray (darker shade) for biweekly collection.






2.3 Community Recycling Depot (CRD) Services Provided

Community recycling depots provide drop-off locations for materials usually accepted by curbside recycling programs. Some depots also include areas for yard waste, textiles and other specialty waste services.

Comprehensive curbside recycling collection services and source separation requirements can affect the number of CRDs in a jurisdiction. The number of CRDs per jurisdiction is displayed in Figure 2-1 and the number of CRDs per hundred thousand households is shown in Figure 2-2. Note that these are municipally operated depots similar

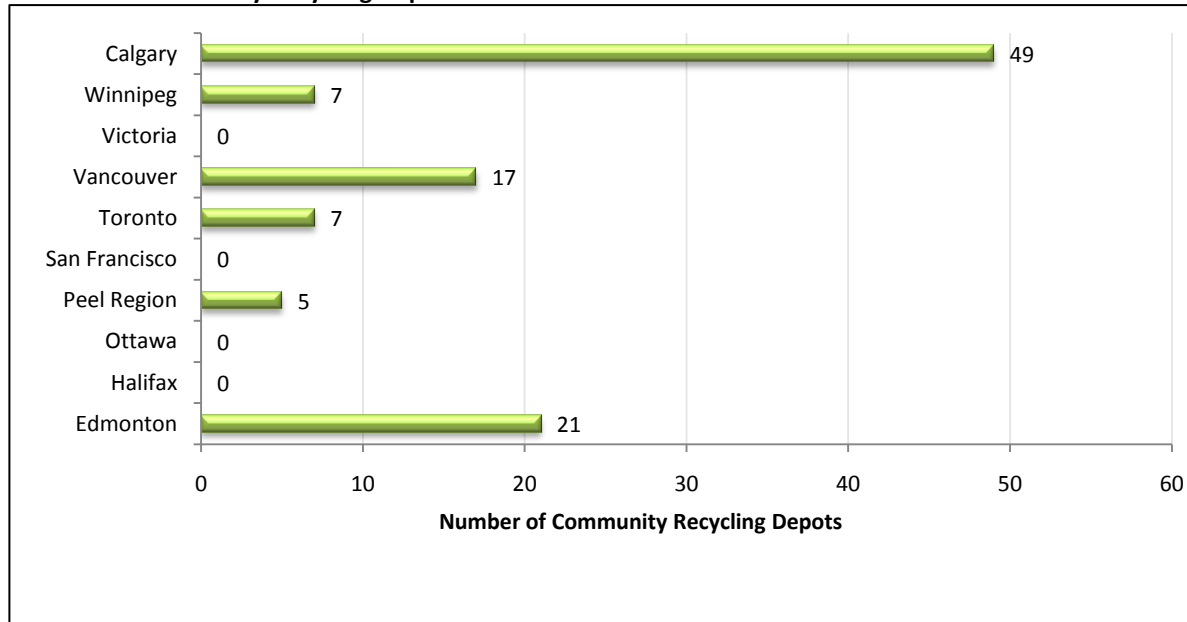
TABLE 2-2

Summary of Curbside Collection Services Provided to Single Family Households

					
Weekly	Garbage	Recycling	Organics	Other	Seasonal
Calgary	Garbage	1 Stream Containers, plastics, glass, paper, cardboard, metals	None	Community cleanups; Festival waste	Leaves and pumpkins; Christmas trees weekly in January
Edmonton	Garbage Food waste Yard Waste	1 Stream Containers, plastics, glass, paper, cardboard, metals	None	None	Christmas trees: 2 weeks in January
Halifax	Garbage	2 Streams -Containers, plastics, glass, metals -Paper and Cardboard	Food Waste Yard Waste	Bulky items (1 per collection day) Renovation bundles	Christmas trees: biweekly for 3 weeks in January
Ottawa	Garbage	2 Streams -Containers, plastics, glass, metals -Paper and Cardboard	Food Waste Yard Waste	Bulky Items	Christmas trees: biweekly in January
Peel Region	Garbage	1 Stream Containers, plastics, glass, paper, cardboard, metals	Food Waste Yard Waste: biweekly in summer	Bulky Items	Christmas trees: 1 opportunity during regular collection
San Francisco	Garbage	1 Stream Containers, plastics, glass, paper, cardboard, metals	Food Waste Yard Waste	Collected twice per year by request: Bulky Items, HHW and e-waste	Christmas trees: weekly for 2 weeks per year
Toronto	Garbage	1 Stream Containers, plastics, glass, paper, cardboard, metals	Food Waste Yard Waste	Bulky Items E-waste	Christmas trees: biweekly in January Unlimited leaf collection weekly from Oct to Feb
Vancouver	Garbage	3 Streams -Containers, plastics, glass, metals -Paper and Cardboard -Newsprint	Food Waste Yard Waste	None	Christmas trees: weekly in January
Victoria	Garbage	2 Streams -Containers, plastics, glass, metals -Paper and Cardboard	Food Waste	None	None
Winnipeg	Garbage Food Waste	1 Stream Containers, plastics, glass, paper, cardboard, metals	Yard Waste: (only from Apr-Nov)	None	None

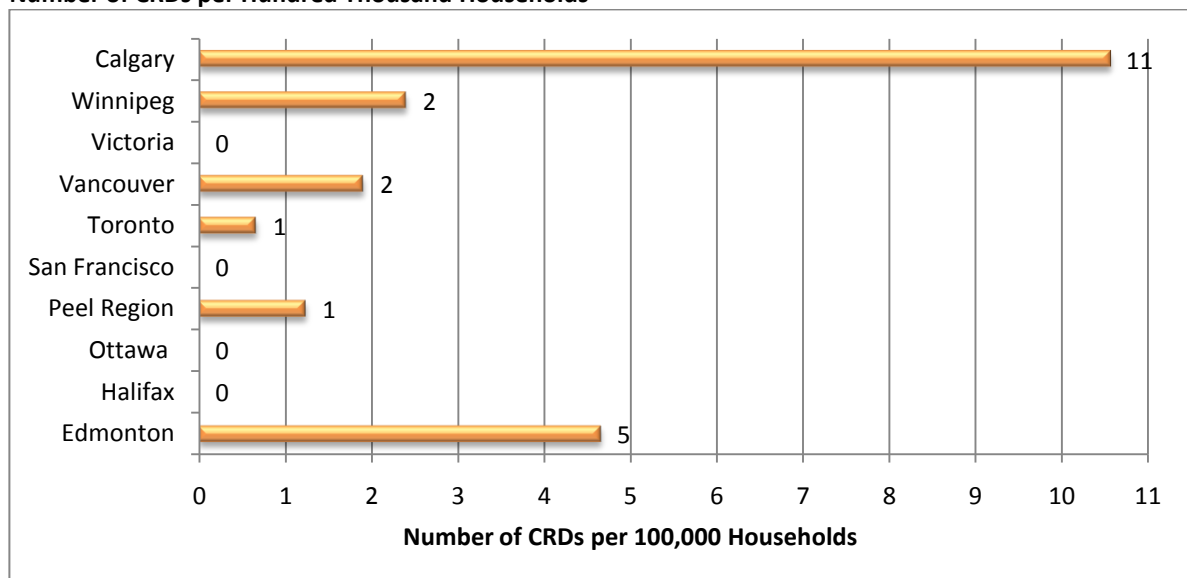
to Calgary's CRDs accepting non-refundable non-hazardous blue bin materials. They do not include Extended Producer Responsibility (EPR) drop-off locations. While some depots may offer a variety of services, household hazardous waste drop off locations and bottle depots are not considered CRDs. Calgary has 49 CRDs, which is more than double the amount of depots provided on a per-household basis than any of the other jurisdictions; four cities had no CRDs.

FIGURE 2-1

Number of Community Recycling Depots

Results for Vancouver are for the Metro-Vancouver area.

FIGURE 2-2

Number of CRDs per Hundred Thousand Households

The numbers of households are from the Statistics Canada 2011 Census.
Results for Vancouver are for the Metro-Vancouver area.

2.4 Collection Methods

Collection methods are listed in Table 2-3 along with typical crew sizes. When both one- and two-person crews are indicated, two-person crews are used in areas with on-street parking, tight alleys or other circumstances that make fully-automated collection impractical.

TABLE 2-3

Main Collection Methods and Crew Sizes

	Stream - Collection Method	Crew
Calgary	All - Automated	1
Edmonton	All - Manual (side loaders)	1
Halifax	Garbage – Manual	1-2
	Recycling - Manual	1-2
	Organics - Semi-automated	1-2
Ottawa	Garbage – Manual	2
	Recycling - Manual (Co-collection w/ Organics)	2
	Organics - Semi-automated (Co-collection)	
Peel Region	All- Manual (Moving to fully automated collection in 2016)	2
San Francisco	All - Semi-automated	1
Toronto	All -Fully and Semi-automated (some Co-collection Organics w/ Garbage or Recycling)	1- 2
Vancouver	Garbage - Fully Automated	1
	Recycling-Manual	2
	Organics - Fully Automated	1
Victoria	Garbage and Organics -Semi-automated	1-2
	Recycling – Manual	2
Winnipeg	Garbage - Fully Automated	1
	Recycling - Fully Automated	1
	Yard Waste - Manual (side loaders)	2-3

2.5 Bin Sizes and Method of Payment

Tables 2-4 to 2-6 show bin sizes provided by jurisdictions where applicable, and the method of payment for the services provided. In the table, pay-as-you-throw (PAYT) refers to a volume-based user fee system which charges the household differently based on selected bin size. Where bins are not provided, residents purchase their own bins or bags based on specified requirements and limits.

TABLE 2-4

Garbage Cart Sizes Provided by City

	Garbage Bin Sizes Provided (Litres)					Customer Provided	Limits
	75-80	120	180	240	360		
Calgary				✓			Unlimited. Additional bags must be <20kg
Edmonton						✓	Unlimited 100 L max. for bin. Additional bags must be <20kg each
Halifax						✓	3 bags (<25kg each) + 1 bulky item Bag tags (1\$) for additional bags
Ottawa	✓	✓					6 bag/bin maximum, not enforced. 75-125L, <15kg each
Peel Region						✓	2 bag/bin limit (<20kg each) Bag tags (1\$) for additional bags
San Francisco	✓	✓		✓	✓		No extra items will be collected
Toronto	✓	✓		✓	✓		Bag tags for additional bags
Vancouver	✓	✓	✓	✓	✓		Extra bag tags are \$2 each
Victoria	✓	✓	✓			✓	Extra bags require tickets (\$4) Bags <15kg each
Winnipeg				✓			Cart +5\$ per bag up to 3 bags Bags must be <50 lbs

TABLE 2-5

Recycling Cart Sizes Provided by City

	Recycling Bin Sizes Provided (Litres)						Customer Provided	Limits
	45-60	75	120	180	240	360		
Calgary					✓			Unlimited
Edmonton							✓	Unlimited. Bags <20kg
Halifax							✓	Bags<25kg
Ottawa	✓							Unlimited. \$8.50 for additional box. Additional Bags <15kg
Peel Region							✓	Unlimited
San Francisco		✓	✓		✓	✓		No extra items will be collected
Toronto	✓		✓		✓	✓		Unlimited
Vancouver	✓							Unlimited. City provides blue boxes and bags
Victoria							✓	Unlimited.
Winnipeg					✓	✓		No extra items will be collected

TABLE 2-6

Organics Cart Sizes Provided by City

	Organics Bin Sizes Provided (Litres)						Customer Provided	Limits
	45-60	75	120-132	180	240	360		
Calgary ^a			pilot					TBD
Edmonton								Unlimited
Halifax					✓	✓		<100kg, 20 bag limit (<25kg/bag)
Ottawa							✓	Unlimited. 15kg max paper bags
Peel Region	✓							20 kg max for all bins/bags
San Francisco		✓	✓		✓	✓		No extra items will be collected
Toronto				✓				Non-food organics in clear bag; no limit for yard
Vancouver			✓	✓	✓	✓		No extra items will be collected
Victoria			✓					Pilot program
Winnipeg (yard waste)							✓	Unlimited yard waste. Bags must be <50lbs

^a Calgary currently operates a pilot organics collection program in four communities.

In viewing the information presented in Tables 2-4 to 2-6, The City of Calgary is one of only two of the surveyed jurisdictions that allow residents to set out unlimited garbage at the curb, and one of three that allows six or more bags of garbage at the curb for a single, flat fee.

The City also differs from the other communities by charging explicitly for recycling. Only one other jurisdiction (Vancouver) has an explicit charge for recycling. Finally, Calgary and Edmonton are the only jurisdictions that do not provide a separate collection for yard waste and/or food waste (although this service is planned for implementation shortly in Calgary, and Edmonton separates organics at its processing facility).

2.6 Funding Methods

Jurisdictions use a variety of different methods to collect funds to pay for collection services. Funds can be collected through property taxes, a utility bill by the jurisdiction, or billed directly by a private hauler. The amount charged can be fixed or variable. Examples of variable rates include Pay-As-You-Throw (PAYT) systems which charge more for larger container sizes, or requiring residents to purchase bag tags or special bags for excess material. Finally, some jurisdictions receive provincial funding for recycling programs.

The methods used to of charging for collection services can be found in the Table 2-7. Also shown in this table is information on how collection services costs are recovered if not fully through a user-fee system.

TABLE 2-7
Funding Methods

City	Service	Property Tax				Utility Bill				Private Hauler Billing			Comments
		Mill Rate on Property Value	Flat Fee per Parcel	Charges for Extras	Incl. in Garbage Fee	Flat Fee per HH	PAYT	Charges for Extras	Incl. in Garbage Fee	Flat Fee	PAYT	Charges for Extras	
Calgary	Garbage Recycling Organics, Other	✓				✓							All residential waste collection activities are fully funded by the mill rate and per-parcel fee. No organics collection at this time.
Edmonton	Garbage Recycling Organics, Other					✓			✓				Full cost recovery of residential services through utility billing. \$35.36/month. Organics separated at processing plant; no separate collection.
Halifax	Garbage Recycling Organics, Other		✓		✓ ✓								Base Rate (General Tax) funded - approximately 5% of property taxes fund solid waste services
Ottawa	Garbage Recycling Organics, Other		✓ ✓		✓								Stewardship Ontario, funded by industry stewards, provides partial funding for curbside recycling programs in Ontario; remainder is funded by municipalities
Peel Region	Garbage Recycling Organics, Other	✓		✓	✓ ✓								Stewardship Ontario, funded by industry stewards, provides partial funding for curbside recycling programs in Ontario; remainder is funded by municipalities
San Francisco	Garbage Recycling Organics, Other									✓ ✓ ✓			Customers are billed for collection directly by the private hauler. No extras will be collected. Environmental programs receive general fund monies.
Toronto ^a	Garbage Recycling Organics, Other						✓		✓ ✓				Stewardship Ontario, funded by industry stewards, provides partial funding for curbside recycling programs in Ontario; remainder is funded by municipalities
Vancouver	Garbage Recycling Organics, Other					✓	✓ ✓	✓					Full cost recovery through utility billing
Victoria	Garbage Recycling Organics, Other						✓	✓	✓				Recycling is funded through tipping fees from the landfill - no funding is drawn from tax system
Winnipeg	Garbage Recycling Organics, Other	✓		✓		✓							Approx. 4.5% on tax bill. Manitoba Product Stewardship Corp funds 80% of residential recycling cost. Other funding from landfill tipping fees and recyclable sales.

^a Prior to 2008, costs for solid waste services were collected as part of property taxes. These costs cannot easily be removed from the property tax bill, therefore every household/multi-residential building receives a credit equal to the average amount collected through the tax bill. Home owners receive a \$224 yearly rebate towards paying for their solid waste service fees.

2.7 Findings

Calgary's peer jurisdictions provide different types of collection services: the choice of the quantity and type of services provided is a policy decision. Key findings about the comparison of Calgary with its peer jurisdictions follow:

1. Compared to its peer jurisdictions, The City of Calgary provides similar services to its residents. Once Calgary implements the city-wide Green Cart program, it will resemble seven of the nine peer jurisdictions that provide kitchen waste collection service. Like Calgary, eight of the nine peer jurisdictions provide full-time or seasonal yard waste collection service to residential customers.
2. Calgary is similar to only two of the nine peer jurisdictions that allow unlimited material to be set out for garbage collection. Further, Calgary is the only jurisdiction using fully-automated collection that allows customers to set out "excess" material. CH2M HILL estimates that The City could save approximately \$600,000 annually not allowing unlimited material to be set-out for garbage collection, and instead directing residents to deliver those materials to a transfer station (i.e. Waste Management Facility).
3. Calgary has 49 community recycling depots (CRDs), which is more than double the amount of depots provided on a per-household basis than any of the other jurisdictions; four cities had no CRDs. Also, it is noteworthy that Calgary provides more than double the number of community recycling depots on a per-household basis than any of the other peer jurisdictions.

2.8 Recommendations

CH2M HILL has the following recommendations about the types of residential collection services provided by The City compared to peer jurisdictions:

1. CH2M HILL recommends that WRS consider no longer allowing residents to set out excess material beyond what fits in the black cart container provided, or implement a tag-based system where residents must pay to set out excess material. If The City does make this change, it should consider how to implement the change, make necessary changes to City bylaws, and accompany the change with multiple forms of communication and education to residents (e.g., flyers, on-line, media). Another potential cost saving option would be to implement a tag-based system where residents must pay to set out excess material. Another option that may not save money but would help maintain high service levels would be to provide periodic bulky waste collection service to all black cart customers.
2. WRS should also consider implementing a pay-as-you-throw PAYT program (e.g., varying cart sizes) that would provide an incentive to residents to properly source separate their garbage and recycling into the proper carts, minimizing contamination to recyclables collected. If The City were to move toward PAYT pricing, it should institute a charge for excess material.

Further, if WRS continues with its plans to implement a combined food/yard waste collection service to single-family residents, it should note in its messaging to customers that this is a service provided by most large cities in Canada.

Analysis of Service Delivery Models

This section provides a discussion about the features, advantages, and disadvantages of different collection service delivery models, and to assess how well each of the models could meet The City of Calgary's service delivery criteria. In order to gain insight into the experiences of other jurisdictions with various collection models, The City of Calgary commissioned a survey by the CH2M HILL team. After some initial online research and consultation with industry contacts, 14 jurisdictions were identified that were of interest to The City.

3.1 Jurisdictions Contacted Regarding Service Delivery Model Features

The 14 jurisdictions contacted were categorized based on the service delivery model that they employ as follows:

5. Full Public Sector: Vancouver, San Diego³
6. Full Privatization, One Hauler: San Jose⁴, San Francisco
7. Full Privatization, Multiple Haulers in Exclusive Geographic Zones: Seattle, Palm Beach County, Collier County, Peel Region, Winnipeg
8. Mixed Service-Managed Competition: Toronto, Ottawa, Phoenix
9. Different Providers for Different Materials: Calgary⁵, Chicago⁶, Victoria⁷,

A summary of relevant information about the jurisdictions surveyed is shown in Table 3-1.

3.2 Service Delivery Model Definitions

Cities have a number of collection service delivery models to choose from that can be organized as follows:

1. **Full public sector collection**, in which collection operations are performed by City employees.

In the full public sector service model, The City is responsible for recruiting, hiring and managing truck drivers, swappers, route supervisors and administrative personnel needed to perform collection. The City also must specify, procure and maintain collection vehicles and equipment, such as bins and carts.

Often, cities that operate their own collection systems also conduct their own customer service operations as well.

Typically, full public sector collection systems employ unionized labour and provide benefits that other collection operators may not.

³ San Diego has public sector collection for all single family residential homes; multifamily and commercial are collected via open competition among non-exclusive franchisees.

⁴ San Jose recently bid two commercial zones and gave extra points to a bidder that proposed cost savings if it was allowed to collect both zones. Residential zones are currently collected by many different haulers, and will likely transition to one hauler in future if a single bid is less expensive.

⁵ Calgary tendered recycling collection separately from refuse collection, and The City won the right to collect all recycling and refuse from residents.

⁶ Chicago employs the full public sector collection model for its residential garbage collection, which includes organic materials. However, in October 2013, Chicago implemented curbside recycling for all residents, using the managed competition collection service delivery model.

⁷ Victoria collects all materials, except recycling, via public sector. Recyclables are collected via a private hauler serving the entire region.

TABLE 3-1
Summary Characteristics of Service Provider Survey Jurisdictions

Jurisdiction	Full Public Sector	One Private Hauler	Multiple Private Haulers	Mixed Service	Different by Material	Estimated Population	Square km
Calgary					✓	1,149,552	825 km
Chicago, IL.					✓	2,714,856	606 km
Collier County, FL.			✓			285,000	5,246 km
Ottawa				✓		883,391	2,778 km
Palm Beach County Solid Waste Authority, FL.			✓			558,000	5,113 km
Peel Region			✓			1,296,814	1,247 km
Phoenix, AZ.				✓		1,470,000	1,338 km
San Diego, CA.	✓					1,307,402	842 km
San Francisco, CA		✓				825,111	601 km
San Jose, CA.		✓				984,299	457 km
Seattle, WA.			✓			621,000	217 km
Toronto				✓		2,615,060	630 km
Vancouver, BC.	✓					603,502	115 km
Victoria					✓	80,032	20 km
Winnipeg			✓			663,617	463 km

2. **Full privatization with one hauler**, is a collection model in which one private company is selected to provide collection services throughout the city.

In the full privatization, one hauler model, the City maintains a connection to the private hauler via an exclusive franchise agreement, an exclusive permit, or other legal mechanism whereby the city agrees to allow only one hauler to collect materials within the city. These exclusive relationships are often through a request for proposal (RFP) process, or sometimes by negotiating with existing private haulers to establish an exclusive franchise or exclusive permit.

Many private collection companies employ a mix of unionized and non-unionized workers, depending on the job classification. While many truck drivers may have union representation, administrative and sorting staff, for example, may not.

Large private collection companies often own or have relationships with other waste services, such as material recovery facilities (MRFs), transfer stations, landfills, and regional customer service centres.

Once exclusive collection is established, the incumbent hauler has a distinct advantage in future proposals or bids, unless the incumbent is disqualified due to non-performance. If performance issues arise, there may not be a ready pool of collectors able to step in to collect materials without significant lead time.

3. **Full privatization, multiple haulers in exclusive geographic zones**. In this collection model, multiple collection zones are established within the jurisdiction, but only one hauler collects from each geographic zone. Typically, cities divide their jurisdictions along geographical features such as mountains, rivers or highways that divide sections of the city, or according to waste sheds, political districts, neighborhoods, or business districts.

Private haulers are given the exclusive right to collect within a zone on the basis of historical collection patterns, through an RFP or permitting process, or through direct negotiations. Allowing different haulers to collect in different zones allows multiple private hauling competitors to collect within a city without direct competition for accounts and space on the roads. Some cities select this approach to allow smaller haulers to compete for a portion of the collection business in the city.

With multiple private haulers collecting within a city, cities may choose to operate customer service call centres or allow haulers to provide this service. Once one or more private hauler is selected, having the city as the first point of contact adds to the complexity of providing customer service through the city. Many jurisdictions that use multiple private haulers allow the haulers to be the first point of contact, and the city plays the customer service oversight and dispute resolution role.

4. **Mixed service - managed competition.** In the mixed service model, city crews collect in one or more zones within a city, and other zones are collected by one or more private firms. Cities may choose to have some zones or service types set aside for public sector collection, while other zones or service types are open to private haulers that compete for the ability to provide collection.

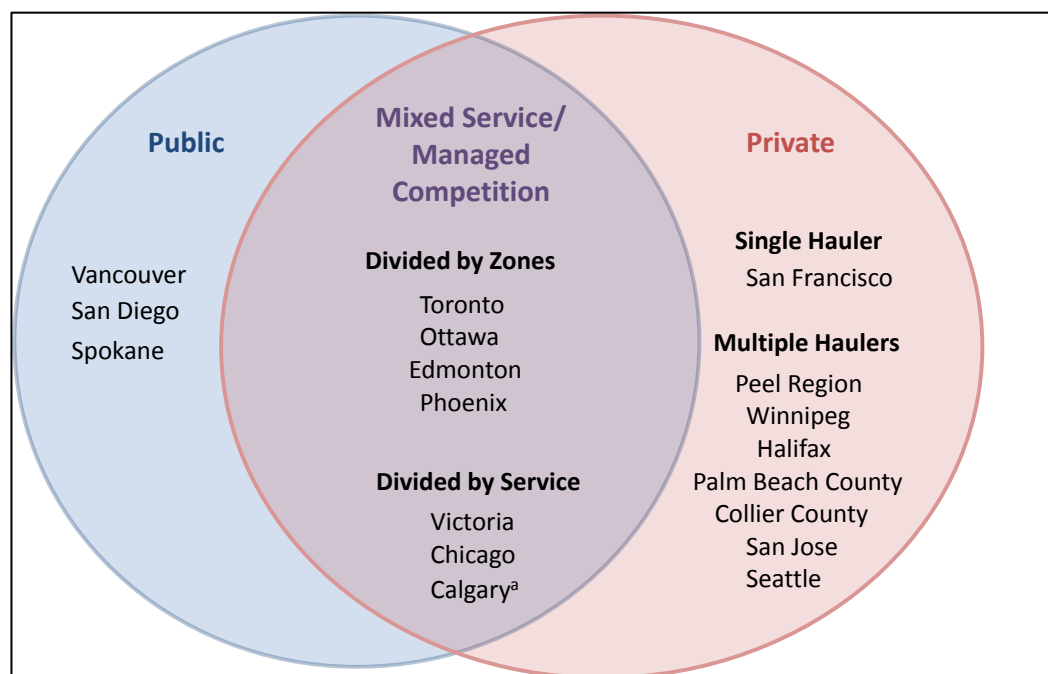
A variation on this approach is the managed competition model, in which a city is divided into exclusive collection zones, and city crews compete with private collection firms to win collection contracts in those zones. In this approach, public sector collection departments bid along with private collection firms for the right to provide collection service in a particular collection zone.

5. **Different providers for different materials.** In this model, different providers collect different materials within the same zones or throughout the city. For example, if a City has separate collection service for refuse, recycling, and organic materials, one collector may collect refuse, another may collect recycling, and a third collector may collect organic materials. One of these collectors might be public sector and the other two might be private. A number of variations on this theme could be used.

There are a number of challenges associated with dividing collection along collection material lines. As the number of collection providers that touch each customer increases, so does the complexity. For example, multiple collectors need to align service days to avoid customer confusion, and collection times to avoid traffic congestion. Customers with comments, complaints, or billing questions may need to first determine which company to call before submitting their feedback. Cities often have environmental goals associated with their collection services, which drive certain materials from one collection service bin to another (e.g. driving more of what used to belong in the refuse bin into the organics bin). Different haulers will naturally want to protect their portion of the collection business.

Figure 3-1 shows graphically where the jurisdictions contacted as part of this study fit in the spectrum of public and private service delivery for single family residential collection.

FIGURE 3-1

Single-Family Residential Collection Service Delivery Model Classification

^a Calgary tendered recycling collection separately from refuse collection, and The City won the right to collect all recycling and refuse from residents.

3.3 Findings

There are many examples where privatizing collection operations resulted in substantial cost savings, but there are many other examples where privatization resulted in cost savings that were small or non-existent. Some key factors that determine whether or not private service provision may be cheaper follow:

- How efficient are The City's collection operations? The City does many things well, but could stand to improve in other areas. The profit motive helps drive innovation and efficiency, which can result in more efficient routing, fewer supervisory employees, more flexible work rules, more collection stops per employee, lower maintenance costs, and other tangible cost savings. There are many highly efficient public sector operations, but absent the profit motive, public operators must institute other processes and incentives to achieve similar results.
- Labour costs: in many cases, the majority of the cost savings afforded by the private sector results from paying less to collection workers (in salary plus benefits), and because private providers have more flexible work rules. The City must decide if that would be an acceptable policy outcome.
- Procurement and maintenance: Typically, private operators are driven by the profit motive to seek value from fleet vehicle purchases and devote considerable resources to refining and streamlining maintenance practices. In the public sector, staff have to be motivated by other factors (such as good government initiatives or personal pride) to obtain similar outcomes. As a result, fleet and maintenance costs are often lower for private operators than for public operators.
- While profit can drive efficiency, it also adds an additional 5-20 percent to the cost of private sector service delivery that is not included with public sector service delivery.
- The profit motive and the drive for efficiency may sometimes be in direct conflict with service quality: Providing extra services to the public, or simply fulfilling all requirements of a contract, typically result in

lower profits to a private service provider. This does not mean that private sector operations always or even typically provide lower service quality. It does mean that the public sector must spend the resources to develop and negotiate high quality service requirements, and then spend additional resources to enforce those requirements on an ongoing basis while the private collector is providing the service. These added resources cost money.

- Privatizing collection operations would affect other city-wide services that are indirect costs to WRS such as fleet services, information technology, legal, risk management, and perhaps the 3-1-1 system (depending on who is responsible for customer service). These impacts would need to be assessed and managed appropriately to ensure that costs don't increase for other City departments.

On the basis of the analysis conducted for this study, CH2M HILL is of the opinion that at least initially a competitive private sector procurement process would result in lower costs to residents for an equivalent level of service than the current cost of WRS' collection operations. The extent of any savings would depend on many factors: it could be quite small, or perhaps substantial. Some key factors that would influence the extent to which using the private sector for residential collection in The City of Calgary could result in lower costs include the following:

- Competition is an important factor in determining the cost of private sector service provision. The City of Calgary is the third largest city in Canada and one of the largest in North America. If private sector provision is considered, because of its size any private collection system should include multiple haulers perhaps with staggered contract terms to help ensure that future procurements will be competitive as well. The City should not contract for collection of the entire city to one or two haulers: the larger the number of accounts awarded to any one hauler, the less competition there will be for future procurements. Conversely, the greater the number of haulers operating in the city the more time City staff must spend monitoring and auditing hauler performance and the more difficulty it would have ensuring consistent messaging to customers. A good upper limit might be four to six contractors.
- The City would need to account for the considerable resources required to prepare a clear, well researched set of procurement documents. The contract(s) it executes must include clear service expectations with liquidated damages for service failure (and perhaps include incentives to prevent against such failures).

The results of our analysis indicate that mixed service and managed competition have proven to be service delivery models that can both help facilitate service quality and provide the public sector with an opportunity to continue providing some or all service within a city. There are advantages to The City retaining an in-depth understanding of collection operations in order to monitor private sector performance, and retain the existing knowledge provided by collection operations about how waste management policies affect City residents. There is also tremendous value in keeping the public sector as an additional competitor to private sector firms competing for contracts. Thus the mixed service or managed competition model might be a good approach if The City is intrigued by private sector service delivery but uncertain if it wants to fully privatize operations.

3.4 Recommendations

CH2M HILL has the following recommendations related to the choice of service delivery model:

1. CH2M HILL does not have a particular opinion about whether The City should remain with public sector collection or change to private sector collection. Both models can perform well or perform poorly depending on how they are managed and implemented.
2. If The City wants to move toward some type of private sector collection, CH2M HILL recommends that it use a mixed service or managed competition model rather than going completely to private sector service delivery. This would help The City monitor private sector performance, retain knowledge about how waste management policies affect City residents, and retain the public sector as an additional competitor to private sector firms competing for contracts. Further, once a city changes to full private collection, it is difficult to switch back to public sector collection because of the loss of knowledgeable staff and facilities.

3. CH2M HILL recommends that The City change from the current service delivery model in which it recently used a managed competition process for recycling while retaining public sector provision of garbage. The City should avoid having multiple entities deliver different services to the same customer: for example, do not have one entity (private or public) providing garbage, and another entity or company providing recyclables or organics. Having each customer served by only one collector will minimize customer confusion about which entity provides which service, allow for more clear messaging to customers, and minimize service disputes.

SECTION 4

Collection Cost and Efficiency

This section provides a comparison of how performance metrics of The City of Calgary's collection system compare to those of the following four cities:

- Edmonton, Alberta
- Ottawa, Ontario
- Spokane, Washington
- Toronto, Ontario

The number of households served by these cities ranges from a low of 62,750 in Spokane to a high of over 457,000 in Toronto: Calgary, with just under 305,000 households, is larger than all of the other cities except Toronto. Edmonton, Ottawa, and Toronto all have mixed collection with city crews providing service in part of the city, and contractors providing service in part of the city.

Collection methods vary among the different cities. Edmonton and Ottawa use manual collection with a blend of one- and two-person crews. Like Calgary, Spokane and Toronto use fully automated collection where feasible, and two-person manual or semi-automated collection in areas where fully automated collection is infeasible. Toronto also runs a number of split trucks with recycling and organics or garbage and organic in two different compartments of each truck. All of the Canadian cities collect Tuesday through Friday with 9.5-10 hour shifts, and the U.S. cities collect Monday through Friday with eight hour shifts.

When deciding upon collection metrics for comparison, the project team selected metrics that might result in insight into how well WRS is meeting the following objectives it has articulated for its collection operations:

1. **Cost effective service delivery** – provide good value for customer dollars spent
2. **High level of service** – declare and meet customer service expectations
3. **Strong workforce with low turnover** – this objective is key to meeting first two objectives
4. **Zero injuries to staff and the public** – provide consistent focus on safety
5. **Zero emissions** – collection service must meet high environmental standards

Obtaining detailed collection data from other jurisdictions is challenging because staff that best understand collection operations are extremely busy, the information needs to be relatively detailed to ensure accurate comparison, and cities need to have full or partial public sector collection: private collection firms are typically unwilling to share detailed collection statistics for competitive reasons. These cities were selected because they have many features similar to Calgary (large Canadian city, cold weather, unionized staff, and/or maintenance performed by a central fleet department), and because WRS staff or CH2M HILL team staff have prior relationships with key staff at these jurisdictions which helped increase the likelihood that detailed data would be made available to the project team.

It should be noted that these cities were not selected as high performers, so the results should not be viewed as comparing Calgary to “best in class” service delivery. Rather, it's a comparison of Calgary against peer jurisdictions.

4.1 Findings

The findings of the comparison of collection cost and efficiency metrics follow.

4.1.1 Service Levels

Toronto provides the widest variety of curbside service with five distinct services provided (garbage, recycling, kitchen waste, yard waste, and bulky waste/special wastes). In order to normalize collection cost and operations data, it is important to note differences in the number of collection stops (pickups) provided annually by the

different cities. Toronto provides the most annual pickups at each household per year (153) followed by Ottawa (134), Spokane (121), Calgary (104), and Edmonton (92).

Calgary and Edmonton have no limits on the amount of garbage set out at the curb, Ottawa has a 6-bag limit that is not enforced routinely, and Spokane and Toronto have PAYT programs. As noted in Section 2, seven of the ten jurisdictions listed in the comparison of waste management services enforce limitations on the amount of garbage set out at the curb: Calgary, Edmonton, and Ottawa were the three that did not.

The cities were asked about challenges that affect collection productivity. All of the cities mentioned being affected by snow and ice on roads in the winter. All cities except Edmonton mentioned parked cars as being a constraint to efficient collection, with Toronto noting that about 30 percent of the households it serves have on-street parking. Other challenges mentioned include traffic congestion in Toronto, alley service in Spokane, and excess material policies in Calgary and Ottawa.

4.1.2 Collection Routes, Labour Force, Routing, and Fleet

Information was obtained from each city about collection routes, labour force, routing and technology, and fleet services. The number of collection routes is used in subsequent calculations of stops per route: they reflect the types of number of households, the number of services provided, and collection productivity. For households served by the public sector operation, Toronto and Calgary have the largest number of collection routes each collection day (153 and 152, respectively). The other public sector operations are considerably smaller ranging from 30 to 69 collection routes per collection day. All of the cities use union labour.

For establishing and modifying collection routes, a mix of technologies are used: Edmonton and Toronto use a leading waste collection-specific software package (Routesmart); Calgary uses a GIS-based system developed in-house; Ottawa and Spokane do not use any specialized software for routing.

All cities except Toronto's public sector operations use GPS systems on trucks, but they varied in the extent to which the units are used to drive collection efficiency. Spokane, for example, finds the units to be important to monitor and reinforce good driver behaviour. Many of the cities reported using the systems to verify accident claims and resolve missed collection complaints (e.g., use the unit to document that the truck was in the area at a particular time of day). For the cities with some private collection providers, all of them used GPS units.

The percent of the collection vehicles not used routinely (spare vehicles) ranged from 20 to 30 percent with Toronto having the highest percentage (30 percent), and Edmonton the lowest (20 percent). Calgary was the second lowest at 23.7 percent. Toronto reported that the contractor selected in a recent procurement for one of its collection zones plans purchased four new collection vehicles for spares, which represents only five percent of its total fleet.

In all cities, maintenance is performed by a central fleet department, and the shifts used to perform maintenance vary among the cities. All cities use a swing shift or night shift; three of the six use a day shift as well. Edmonton, Ottawa, and Toronto perform maintenance seven days per week. Calgary is the only city that does not routinely perform some maintenance on Saturday, Sunday, or Monday.

4.1.3 Collection Costs and Collection Stops per Day

Collection costs were obtained and summarized into six cost components, households per route per day (route-day), labour rates, collection costs per household, and wage-adjusted costs per household⁸.

Calgary's residential collection costs were compared to costs in four other jurisdictions. There are a variety of factors that make cost comparisons difficult between jurisdictions such as differences in services provided and labour rates, winter weather, on-street parking, excess material policies, union work rules and such. For example,

⁸ No exchange rate adjustment was made to Spokane's 2012 costs because the Canadian-US dollar exchange rate was within 3 percentage points of 1:1 throughout the year.

one of the comparison cities, Toronto, is an old city with 30 percent of households having on-street parking that cannot be served by automated collection vehicles, which increases the cost of providing collection services.

Recognizing those challenges, a common method of comparing costs is on a wage-adjusted cost per pickup basis, which tends to give a more valid comparison of costs than unadjusted costs. Labour costs are generally a result of local labour markets and outside the control of management: in this situation, adjusting for labour costs has the effect of lowering Calgary's unit costs compared to many of the other cities because of the relatively high wage rates paid in Alberta versus other areas of the country. Adjusting for the number of pickups normalizes for the frequency that service is provided to each resident: this adjustment tends to increase Calgary's unit costs slightly compared to most of the other cities that provide somewhat more frequent service.

The 2012 wage-adjusted cost per pickup for each jurisdiction is as follows: Ottawa (\$0.83), Edmonton (\$1.11), Calgary (\$1.27), Spokane (\$1.34), and Toronto (\$1.77). Like Calgary, the public sector provides all collection services in Spokane. The other jurisdictions all have a mixed service model with the public sector collecting material in some areas of the city and the private sector collecting material in other areas of the city.

By component, the data reviewed suggest that compared to the other cities Calgary's costs are relatively low in administration/overhead/central office and fuel use, comparable in collection labour and maintenance, and relatively high in vehicle ownership/leasing.

Collection costs are highly related to the number of collection stops per day: In 2012, Calgary averaged 825 stops per day for garbage whereas Edmonton, Ottawa, Spokane and Toronto ranged from 431 to 1,022 stops per day. The average number of stops per day for garbage collection in 2013 at five private operations surveyed ranged from a low of 665 to a high of 1,368 with an average of 990, which is about 10 percent more than what is achieved in Calgary today.

For recycling, Calgary averaged 1,177 households per day in 2012 compared to a range of 988 to 1,310 for the four public sector communities: the two private sector operations that provided data about recycling collect from slightly fewer recycling stops per day than does Calgary.

4.1.4 Missed Collections, Driver Injuries, Employee and Customer Satisfaction

4.1.4.1 Missed Collections

For missed collection, Calgary reports 0.60 missed collections per thousand pickups compared to 0.14 for Edmonton and 0.68 for Spokane. Thus, it appears that Calgary's rate of missed collections is similar to Spokane's and higher than Edmonton's.

4.1.4.2 Driver Injuries

For injuries, Calgary reports about 0.06 lost-time injuries per hundred thousand pickups compared to 0.09 for Toronto, 0.11 for Edmonton, 0.43 for Ottawa, and 1.16 for Spokane. Thus, it appears that Calgary has a lower rate of lost time injuries than the other cities.

4.1.4.3 Employee Satisfaction

Other than Calgary, relatively little information was available from cities about employee satisfaction and retention. Both Calgary and Ottawa report approximately 92 percent of employees are retained annually. Calgary was the only city that reported conducting regular surveys of employee satisfaction. Calgary conducts an annual survey of employee satisfaction, with results tracked year to year to examine areas where employee satisfaction is growing or diminishing. WRS management report that they use the results to assess and develop initiatives to address areas where more could be done to improve employee satisfaction and retention.

4.1.4.4 Customer Satisfaction

Calgary routinely conducts customer satisfaction surveys. None of the other jurisdictions surveyed conduct them routinely. In recent years, survey results indicate that Calgary residents have satisfaction rates ranging between 80 percent and 90 percent.

4.2 Key Findings and Recommendations

1. The cost of collection in The City was compared to four comparable jurisdictions using the wage-adjusted cost per pickup. This is a metric that controls the differences in wage rates and the number of service pickups provided to each customer. As reported in Section 4.1.3, in 2012 the wage-adjusted cost per pickup for each jurisdiction is as follows: Ottawa (\$0.83), Edmonton (\$0.98), Spokane (\$1.04), Calgary (\$1.27), and Toronto (\$1.77).
2. In all cities, maintenance is performed by a central fleet department, and the shifts used to perform maintenance vary among the cities. All cities use a swing shift or night shift; three of the six use a day shift as well. Edmonton, Ottawa, and Toronto perform maintenance seven days per week. Calgary is the only city that does not routinely perform some maintenance on Saturday, Sunday, or Monday.
3. WRS should continue aggressively acting to improve the efficiency of all aspects of its collection operations to lower the cost of providing its targeted type and quality of service. To further this objective, it is recommended that WRS monitor and track its costs by District for five to 10 key cost components (such as administration and overhead, collection labour, carts, training, fuel, vehicle maintenance, vehicle ownership), then develop efficiency plans for each cost component thus aligning efficiency initiatives to its major cost drivers.

Fleet Management and Maintenance Procedures

The CH2M HILL team conducted interviews with WRS and Fleet Services management and staff responsible for maintenance management and warranty recovery, mechanics, supervisors, foremen, and drivers to secure information and relevant data in reviewing The City's fleet maintenance practices and the interface between WRS and Fleet Services. This section reports the results of those interviews and CH2M HILL's analysis of WRS and Fleet Services' fleet management and maintenance procedures.

Fleet Services provides management, maintenance and related services for The City's vehicle fleet and equipment, excluding Transit, Fire, Police, and Development & Building Approvals. Fleet Services leases vehicles and equipment to City business units that are responsible for providing front-line services to citizens such as WRS.

Fleet Services has 125 staff in seven locations with three dedicated to serving WRS' fleet maintenance needs. Fleet Services manages approximately 4,200 total pieces of equipment and 450 are dedicated to the WRS fleet. Unlike WRS, The City's Fire, Police, and Transit departments all perform their own fleet maintenance. The Roads Department is the largest customer of Fleet Services. WRS is second largest and the only one that owns its own facilities for fleet maintenance.

In 2012, WRS exceeded its vehicle maintenance and lease budget by \$0.8 to \$1 million, and it looks likely it will exceed its budget again in 2013. This is attributed largely to higher than anticipated maintenance costs on WRS' fully automated, side-loader (ASL) collection trucks.

In an effort to improve turnaround times on WRS' fleet maintenance and warranty repairs, Fleet Services has recently partnered with the local International Navistar dealer and now has four additional maintenance bays dedicated to WRS for repairs.

Findings and recommendations related to fleet management and maintenance procedures follow.

5.1 Fleet Size, Specifications, and Standardization

5.1.1 Findings

Key findings related to fleet size, specifications, and standardization include the following.

- Currently, about 24 percent of the WRS collection fleet are spare vehicles.
- WRS has done a good job maintaining standardization within its collection fleet.
- When collection vehicles are procured by Fleet Services, they are procured along with other pieces of equipment. The evaluation of different firms is not necessarily specific to waste collection vehicles.

5.1.2 Recommendations

CH2M HILL's recommendations related to fleet size, specifications, and standardization include the following.

1. Tenders should be specific only to WRS to ensure that best value is received for the specific needs of WRS. WRS should lead the development of specifications (with support from a procurement specialist who has expertise developing collection vehicle specifications), and at least one WRS representative should be present during evaluation of all fleet vehicle tenders.
2. WRS should consider owning its collection vehicles rather than leasing them from Fleet.
3. WRS should review its fleet specifications, collection chassis and bodies to optimize the specifications and reduce costs for purchasing new trucks.
4. In the next WRS vehicle procurement, trucks with larger engines should be specified for District 1 due to the hilly terrain, particularly for black cart collection, because the current fleet is underpowered for this topography.

5.2 Maintenance Procedures and Practices

5.2.1 Findings

Historically, WRS has experienced substantial challenges with vehicle down time and a lack of transparency and poor communications with Fleet Services about maintenance procedures and practices. On the basis of interviews with Fleet Services and WRS it is clear that the scope of these problems have been expressed to Fleet Services, and Fleet Services has recently suggested a series of potential remedies.

5.2.2 Recommendations

CH2M HILL has the following recommendations regarding maintenance procedures and practices.

1. It is recognized that there is a trade-off between having mechanics working nights, weekends, and/or overtime perhaps at higher hourly rates (depending on union agreements), but it appears that Fleet Services and WRS should jointly place more emphasis on keeping first line vehicles on the road at all times. The cost in added collection labour, poor route productivity, and vehicle ownership of having vehicles out of service are very high and it typically outweighs the cost of ensuring sufficient mechanic availability to keep those trucks on the road. Maintenance bays need to be fully utilized as necessary during non-collection times to ensure trucks are ready to perform their duties.
2. WRS and Fleet Services should jointly assess a preventive maintenance (PM) plan for vehicles, and then agree upon and implement that plan: PM should be performed routinely and should not be skipped to “get trucks on the road”. In particular, PM on mechanical arms would help minimize down time and lower costs overall. Currently, not much of a structured maintenance program is in place.
3. Poor condition spare vehicles are a major problem for WRS. WRS should consider reconditioning some of the spares that are currently in the best condition. This will help lower vehicle down time and maintenance costs, and improve driver morale when they must use a spare vehicle while their regular frontline truck is being repaired.
4. WRS and Fleet Services should reassess mechanics’ work schedules to ensure that more mechanics are available when WRS trucks and drivers are not on collection routes. Many of the comparable cities contacted do the vast majority of maintenance during non-work hours including weekends. The City should evaluate changing service hours for WRS fleet maintenance, shifting some work to Saturday, Sunday, and Monday when the WRS fleet is not operating in addition to weekdays.
5. Fleet Services and WRS should jointly develop a fleet maintenance report card by truck and truck type to identify high cost repairs and repeat repairs.
6. Fleet Services should ensure that there is one person who is fully dedicated to WRS fleet performance. This person should be accountable for vehicle down time, customer service, and maintenance costs for the WRS fleet with performance standards in his/her performance agreement.
7. The drive for efficiency and maximizing the number of stops collected per day puts strain on vehicles and hydraulic lifting arms. Some of the maintenance issues WRS is experiencing may be the result of drivers abusing equipment. Information from the recommended fleet maintenance report card should be used to give feedback to driving trainers, management, and drivers and used to develop targeted training programs to ensure an appropriate balance between collection productivity and the cost and frequency of repairs.
8. WRS should consider conducting PM, inspections and lubes in the truck barns to keep service bays free for other higher priority repairs.
9. Recurring downtime could be a result of performing poor quality pre- and post-trip inspections, or not performing them at all. WRS should insist that all drivers perform complete pre- and post-trip inspections of vehicles. Morning repair down time should be recorded and tracked by vehicle and driver. Corrective action, such as foremen participating in inspections, should be taken for drivers whose trucks continually have recurring morning repairs.

10. WRS and Fleet Services should more formally define roles and responsibilities and establish clear communication processes to ensure that the proper level in each organization is communicated with about work being performed. A system should be devised so that the status of fleet maintenance mechanic availability is communicated promptly to the Districts so that WRS is informed when a mechanic is off for vacation or is ill. Fleet Services should have a ready pool of support mechanics so that backup can always be provided when a regular mechanic is off duty for any reason. If labour agreements require overtime, that overtime should be paid if there is no other way to ensure mechanic availability.
11. Mechanics should routinely check the Fleet Services FleetFocus (M5) system for warranty items before every repair, which would probably only take a couple of minutes and could eliminate time spent diagnosing problems and then discovering a part is under warranty.
12. WRS Truck Coordinators should be allowed to work more closely with Fleet Services to ensure that vendor repairs to trucks are inspected by Fleet Services before the trucks are returned to operations.
13. Evaluate the management and service provided on collection vehicles at the Manchester Centre to assess if that facility has the skills and capability to provide high quality service to WRS. Consider a change in policy so that any work not done at the Districts is sent to that centre or other vendors on the basis of which entity is right for the job based on cost, quality, and customer service for WRS.
14. Review and assess the tire inventory management system as there was not much information provided by any department within The City on the costs or management of tires for the WRS fleet. Currently, no one at The City appears to be tracking tires by serial number.

5.3 Maintenance and Lease Costs for First Line Vehicles and Spares

5.3.1 Findings

An analysis of WRS' maintenance costs in 2012 indicates that maintenance per vehicle was approximately \$32,000 for black cart vehicles and \$29,700 for blue cart vehicles. Annual lease costs were \$39,500 for black cart vehicles and \$39,340 for blue cart vehicles. Compared to the four other public-sector operations analyzed, WRS' maintenance costs are about average and the lease costs are relatively high.

Maintenance costs for spare vehicles are considerably higher than the maintenance costs for first line vehicles. This result is surprising: typically spare vehicles are used much less frequently than first line vehicles and they incur lower maintenance costs per unit. This result probably occurs because of the difficulty WRS has experienced in keeping first line vehicles on the road: spare vehicles are being used much more frequently than they would in a benchmark collection operation.

5.3.2 Recommendations

Recommendations that may affect The City's maintenance and lease costs are provided elsewhere in Section 5 of this report.

5.4 Potential Savings from Reducing the Fleet Spare Ratio

5.4.1 Findings

WRS has about 50 total spare black cart and blue cart vehicles system wide, however staff report that often only three to eight vehicles are actually available at the beginning of a work day; operations are regularly short of trucks required to collect waste and recycling materials. All WRS Districts cited that the spare ratios could be lower if the vehicle maintenance practices and the condition of the spare truck fleet were improved.

Currently, 23.7 percent of The City's residential collection fleet are spare vehicles (vehicles not used routinely). This spare ratio is not particularly high compared to the other cities analyzed. However, many high performing organizations have spare ratios well below 20 percent. For example five private collection operations contacted by the CH2M HILL team operate at spare ratios ranging from 7 percent to 20 percent, with an average of 14 percent.

The operator running at 7 percent stated that was an insufficient number of spares and that 12-15 percent would be preferred. Toronto reported that the private firm that won a recent procurement for one if its collection zones will start at a spare ratio of five percent. Interviews with WRS supervisors suggested that a spare ratio of 15-18 percent should be sufficient with a high functioning maintenance department.

CH2M HILL estimates that lowering the spare ratio to 15 percent could save WRS \$1.35 million annually.

5.4.2 Recommendation

WRS should establish a target spare ratio of 15 percent, and enact improvements in its maintenance practices and procedures (as discussed above) in order to achieve this goal.

5.5 Lease Rates Charged on Collection Vehicles

5.5.1 Findings

Based on lease rate calculations conducted by Fleet Services on a recent vehicle procurement provided by WRS, the lease rate charged by Fleet Services for new collection vehicles purchased in 2013 includes 9.8 percent overhead and 11.5 percent return on equity. Thus, 21.2 percent⁹ of total leasing costs paid by WRS are for indirect charges not associated with the purchase price and carrying costs (principal and interest) associated with the vehicle.

In 2012, WRS paid \$8.1 million to Fleet Services for leasing its collection vehicles: at 21.2 percent, \$1.7 million of that cost was for indirect charges. While there is some overhead associated with procuring and tracking fleet, this is one area where significant savings could be achieved if other arrangements were made for owning fleet. For example, if WRS ran this function with assistance from procurement, legal and other city departments, it should be able to manage its collection fleet at an overhead rate of 5-10 percent or less. It is estimated that managing the collection fleet at a 5-10 percent overhead would result in annual savings of \$900,000 to \$1.3 million.

5.5.2 Recommendation

WRS should request that Fleet Services provide a complete accounting of overhead and return to equity charges. If those charges appear inordinately high to WRS, it should explore whether it should propose taking over the fleet ownership function from Fleet Services.

5.6 Fleet Replacement

5.6.1 Findings

WRS typically replaces vehicles on an eight year cycle. This is longer than optimal for ASLs, which take considerable abuse. Maintenance costs on vehicles nearing the end of this service life become excessive.

5.6.2 Recommendation

WRS and Fleet Services should jointly use the Fleet Services Life Cycle Management model FSP 411, or a similar fleet replacement model to optimize the replacement cycle for vehicles. Trucks should be sold before maintenance costs get too high: perhaps a six or seven year life cycle with arm rebuilds at year four would lower overall fleet and maintenance costs. If the useful vehicle lives are shortened, WRS should develop a fleet replacement policy based on the shorter fleet lifecycle.

5.7 Warranty Recovery Process

5.7.1 Findings

Fleet Services has a reasonably well-developed process for warranty recovery, however, it is possible that if more staff time was devoted to this activity, the resulting warranty recovery savings would be greater than the added staff time. There is considerable concern at WRS that Fleet Services charges labour on warranty repairs that are

⁹ Total does not add because of rounding.

not reimbursed by the original equipment manufacturers (OEMs), and labour is also charged a second time by outside vendors after an initial diagnosis from Fleet Services.

5.7.2 Recommendations

CH2M HILL has the following recommendations related to the warranty recovery process.

1. Consider hiring a WRS employee to interface with the Warranty Agent to assist in further pursuing warranty recovery to identify the maximum recovery that would be possible with additional staff resources devoted to this task. Increasing the percent of warranty claims recovered from 50 percent to 70 or 80 percent would result in \$275,000 to \$400,000 in annual savings to WRS.
2. WRS and Fleet Services should have a conversation about labour charges for warranty work to ensure that charges are reasonable.
3. WRS should work with Fleet Services to explore the feasibility of including labour costs in future warranty agreements.

5.8 Fleet Billing and Information Technology

5.8.1 Findings

Currently, invoices are sent by Fleet Services electronically in a PDF format to WRS on the third day of each month without any review by WRS. There's no way for WRS to access individual line items in the invoice. Once received, Truck Coordinators at each District within WRS then have to match invoices manually to those reports to cross check billings and review the invoices for accuracy and identifying any discrepancies such as overcharges. It is estimated that WRS has disputed approximately 600 invoices during the first nine months of 2013, or 3-4 per working day.

WRS only has partial access to the M5 system to view what its being charged for and what repairs are being completed to its collections fleet. Complete access would make analysis less time consuming to conduct. Fleet Services confirmed there are no specific policies for internal billing from them to WRS.

Fleet billing discrepancies are noted by the Truck Coordinators and sent to the Fleet Services accounting department in an attempt to resolve the discrepancies; however, there does not appear to be a clear process for resolving billing discrepancies.

WRS staff reported that markups on Fleet Services maintenance are unusually high for both repair services provided by Fleet Services and by third parties that are managed by Fleet Services.

5.8.2 Recommendations

CH2M HILL has the following recommendations related to fleet billing and information technology.

1. WRS and Fleet Services should establish a formal process for dialogue and resolution of questions or complaints about maintenance charges, and then develop a system that allows integrated access to invoices and bills, and an automated process to question charges. The process should include appropriate controls, such as periodic reconciliations and monitoring, to ensure data integrity and reliability and to build trust between staff at Fleet Services and WRS.
2. WRS and Fleet Services should jointly determine a new coding system for repairs that will provide additional insight into common maintenance repair issues and can be used for root cause analysis to lower the costs of maintenance and repair, and reduce vehicle down times.
3. Fleet Services should partner with WRS to determine which standard and typical repairs should be billed at a flat rate, and it should share information about how that rate is developed and consider WRS input about what those flat rates should be.
4. WRS should be given access and adequate training on the use of M5 to actively manage their vehicles, and review invoices. Fleet Services should work with WRS to develop M5 reports that will help WRS be better informed about the tradeoffs between collection productivity and maintenance and repair costs. WRS can then

use this information to help educate drivers about the impact of their actions on maintenance costs that they can impact.

5. WRS and Fleet Services should jointly participate in a study to benchmark the shop rates of third party shops in Calgary to those used by Fleet Services.

5.9 Maintenance and Fleet Management Improvement Plan

5.9.1 Findings

This report provides a series of findings that demonstrate challenges WRS has with the maintenance and fleet management services provided by Fleet Services. Rather than address these challenges in a piecemeal fashion, a coordinated strategy should be developed to improve maintenance and fleet management services.

5.9.2 Recommendations

WRS should work with Fleet Services to develop a Maintenance and Fleet Management Improvement Plan. The Plan should be chartered with the senior leadership of both organizations with a defined set of goals and objectives, and a working team should be identified to develop the plan. The plan should evaluate the recommendations in this study and other ideas from WRS and Fleet Management staff, prioritize the recommendations and further study needed, and develop a timeline to implement process improvements. The improvements should include the communication, service, and efficiency of the maintenance services provided by Fleet Services, supplemented with driver training and performance feedback to drivers to ensure that the tradeoff between high productivity and overworking equipment is balanced appropriately.

One year after initiation of the Plan, WRS should evaluate the extent to which Fleet Services is meeting the targeted outcomes requested. If those expectations are not being met to its satisfaction, WRS should request approval to either bring the maintenance function in-house within WRS or initiate a managed competition process that would allow Fleet Services to propose against private sector service providers on a multi-year contract for providing vehicle maintenance services.

5.10 Maintenance and Fleet Management – Key Findings and Recommendations

In summary, CH2M HILL evaluated The City's fleet management operations with extensive interviews of staff from WRS and Fleet Services, review of detailed statistics, and comparisons to fleet management operations at other jurisdictions. Six key findings and recommendations from this evaluation follow:

1. Compared to the four other public sector operations analyzed, WRS' maintenance costs are about average and lease costs are relatively high.
2. Historically, WRS has experienced substantial challenges with vehicle down time, and poor communications and transparency with Fleet Services about maintenance procedures and practices. These challenges have been expressed to Fleet Services, and Fleet Services has recently suggested a series of potential remedies.

CH2M HILL recommends that WRS work with Fleet Services to develop a Maintenance and Fleet Management Improvement Plan. The plan should evaluate the recommendations in this study and other ideas from WRS and Fleet Management staff, prioritize the recommendations and further study needed, and develop a timeline to implement process improvements. One year after initiation of the Plan, WRS should evaluate the extent to which Fleet Services is meeting the targeted outcomes requested. If those expectations are not being met to its satisfaction, WRS should request approval to either bring the maintenance function in-house within WRS or initiate a managed competition process that would allow Fleet Services to propose against private sector service providers on a multi-year contract for providing vehicle maintenance services.

3. Currently, 23.7 percent of The City's residential collection fleet are spare vehicles (i.e., vehicles not used routinely). This spare ratio is not particularly high compared to the other cities analyzed. However, many high performing organizations have spare ratios well below 20 percent. For example five private collection operations contacted by the CH2M HILL team operate at spare ratios ranging from 7 percent to 20 percent,

with an average of 14 percent. Interviews with WRS supervisors suggested that a spare ratio of 15-18 percent should be sufficient with a high functioning maintenance department. CH2M HILL estimates that lowering the spare ratio to 15 percent could save WRS \$1.35 million annually.

4. In 2012, WRS paid \$8.1 million to Fleet Services for leasing its collection vehicles: 21.2 per cent, or \$1.7 million, of that cost was for indirect charges. While there is some overhead associated with procuring and tracking fleet, this is one area where significant savings could be achieved if other arrangements were made for owning fleet. If WRS ran this function with assistance from procurement, legal and other city departments, it should be able to manage its collection fleet at an overhead rate of 5-10 per cent or less, resulting in annual savings of \$900,000 to \$1.3 million. WRS should consider owning its collection vehicles rather than leasing them from Fleet Services.
5. Preventive maintenance (PM) on collection vehicles is not being completed as frequently as it should be. WRS and Fleet Services should jointly develop a preventive maintenance (PM) plan for vehicles, and then agree upon and implement that plan: PM should be performed routinely and should not be skipped to “get trucks on the road”. In particular, PM on mechanical arms would help minimize down time and lower costs overall.
6. Currently, WRS collection vehicles are procured along with other City equipment. Collection vehicle tenders should be specific only to WRS to ensure that best value is received for the specific needs of WRS. WRS should lead the development of specifications (with support from a procurement specialist who has expertise developing collection vehicle specifications), and at least one WRS representative should be present during evaluation of all fleet vehicle tenders.
7. It is recognized that there is a trade-off between having mechanics working nights, weekends, and/or overtime perhaps at higher hourly rates (depending on union agreements), but it appears that Fleet Services and WRS should jointly place more emphasis on keeping first line vehicles on the road at all times. Maintenance bays need to be fully utilized during non-collection times to ensure trucks are ready to perform their duties.

Operational Performance Review

This section includes a summary of the results of research findings, interviews with management, supervisory staff, drivers and mechanics within each of The City's three collection districts. It also summarizes the observations, data analysis, recommendations supported by the information and data collected throughout the course of the project, coupled with experience and known industry best practices.

The CH2M HILL team evaluated The City's current residential refuse (black carts) and recycling (blue carts) collection system. In conducting this evaluation, CH2M HILL analyzed the following information:

- Cost of Service
- Route Productivity
- Beat Design & Mapping
- Health & Safety
- Training, Culture & Communications
- Cart Procurement, Maintenance, and Management
- Customer Service, Public Education and Outreach

Findings and recommendations from this review follow.

6.1 Collection Productivity

6.1.1 Findings

WRS has taken a series of actions in the past couple of years to improve operational performance. The scope of the improvement that has resulted from these changes is impressive. Some of the actions taken and the results of those actions include:

- Changing to an area routing concept in all Districts which provides more effective supervision and lowers the cost of supporting drivers with truck breakdowns or other issues.
- Beginning to implement improved tracking of performance metrics by driver such as: fuel, tonnages and delivery times for each load, tips from main truck and helper truck, and percent of containers set-out.
- Eliminating the night transfer for recyclables in District 1, which was a high-cost operation.
- Reviewing invoices from Fleet Services and identifying many incorrect billings.
- Changing how routing was done within the organization to engage drivers more actively in the beat development process.
- Consolidating training functions and developing a comprehensive training program intended to improve driver skills.
- Taking a series of actions to improve culture, morale, and labour-management relations.
- Purchasing new "minimax" vehicles that should increase productivity on beats where maneuverability constraints prevent the use of larger automatic side loader vehicles.
- Surveying drivers about various aspects of their employment, then acting to address areas where drivers are relatively dissatisfied.

These and other improvements have led to an increase in the average number of stops per beat for automatic side loader garbage collection (excluding manually-collected beats) from 842 in 2012 to 895 in 2013, and an increase in the average number of households per beat for blue cart collection from 1,177 in 2012 to 1,232 in 2013.

In various interviews conducted by the CH2M HILL team with City Management, District Foremen, District Supervisors and Drivers, several factors were identified in The City's collection operations that impact collection productivity, and ultimately increase collection operating costs for The City of Calgary that suggest some areas for improvement.

6.1.2 Recommendations

It is recommended that WRS continue seeking to improve its operational performance by engaging drivers, foremen, and supervisors for ideas; improving communication and trust throughout the ranks, evaluating the suggestions identified in this report and prioritizing the best ideas for implementation. Specific recommendations for WRS to consider include the following:

1. Review and benchmark beat productivity by driver, truck type, km, payload and fuel consumption to track individual driver / beat performance. This will give information about what's happening in field and ways to improve productivity. In the past, WRS has not been consistent about collecting information and using it to identify efficiency improvements.
2. Driver start time hours should be staggered by +/- 15 minutes to reduce traffic in and out of the yard during shift changes.
3. CH2M HILL staff is aware of other jurisdictions that have successfully overcome labour union concerns about full use of GPS technology to improve collection productivity (e.g., Seattle). It is recommended that WRS pursue this issue further with its labour unions then consider implementing a robust GPS technology solution that would help provide real-time vehicle and driver performance information.
4. Supervisors should perform daily pre- and post-trip field inspections, not just driver paperwork reviews to validate that drivers are performing both pre- and post-trip inspections properly to minimize unscheduled maintenance downtime.
5. Foremen and Supervisors should perform more frequent beat audits / driver ride-alongs than is currently being done: it is recommended that ride-alongs be performed at least quarterly per driver as opposed to less than once per year per beat and driver. One approach might be as follows:
 - Each District choose three routes each for black carts and blue carts and have a route auditor / driver trainer or Supervisor perform full-day random ride-alongs.
 - Ride-alongs would be targeted to drivers thought to have low, moderate, and high productivity.
 - Conduct time in motion studies to develop a baseline of productivity, and note safety or equipment issues, routing inefficiencies, and other driver activities.
 - Analyze and summarize the information received to determine what activities drivers are performing each day and how much “non-productive” work time may be occurring.
 - Once the baseline is established, The City will have a better idea of just how much of each 9.5 hour paid day is actually being productive, and have data that can inform decisions about appropriate beat sizes.
6. To ensure that drivers do not abuse equipment or drive at unsafe speeds, maintenance and repair costs by type of repair by truck should be used as a driver performance measure.

6.2 Excess Material on Garbage Collection Routes

Allowing excess material on collection routes has a significant negative effect on collection productivity. Findings and recommendations regarding this practice are provided in Sections 2.7 and 2.8.

6.3 Beat Design and Mapping

6.3.1 Findings

Throughout North America, larger cities such as Calgary typically use collection routing software built around the requirements of the waste collection industry to improve beat design and collection productivity. These packages

may have more advanced turn-by-turn algorithms and logic than The City's current GIS-based system, and can be configured to account for hills, right-hand pickups, vehicle compaction ratios, roadway issues and other input constraints specific to waste and recycling collections.

6.3.2 Recommendation

It is recommended that WRS explore the potential benefits of waste collection industry-specific routing software further by pilot testing some routing software packages and comparing route maps generated by those packages to route maps generated by The City's existing mapping software. WRS should conduct a detailed business case study about whether the potential benefits of improved ongoing on-route efficiency and more balanced routes would be greater than the added cost of software and training associated with implementing a commercial routing software package.

6.4 Health and Safety

6.4.1 Findings

WRS places considerable emphasis on ensuring safety in the workplace. Workplace safety statistics are measured and reviewed by WRS management. A new training program is being developed that should improve safety performance further.

6.4.2 Recommendations

CH2M HILL has the following recommendations related to WRS' health and safety practices.

1. WRS should develop a system whereby safety statistics are tracked by beat and by District and use the information as an input into evaluations of driver performance.
2. To minimize "In the Zone" issues, WRS should consider requiring that drivers switch positions in the cab partway through the day on the dual drive cabs.
3. Supervisors and Foremen should conduct regularly scheduled and randomly selected drivers ride-alongs and observe driver behaviour, actions and counsel drivers accordingly to ensure safety rules and policies are being enforced.
4. WRS Foreman and Supervisors should have a role in directing the six allocated Driver Trainers to engage in problem areas and troubleshoot remedies to unsafe situations in, on and around collection vehicles, in the District facilities and at the MRF and landfills.

6.5 Training, Culture, and Communication

6.5.1 Findings

The City of Calgary provides driver training for approximately 4,500 certified operators who drive City fleet vehicles or operate equipment. WRS noticed a need for increased driver training and as a result started a new program in October 2013 that includes six driver trainers and a new, comprehensive driver training program that should produce many tangible benefits for the operation.

Each District has its own culture, and each Supervisor is making efforts to promote a positive workplace while improving collection efficiency. WRS would benefit from more formalized interaction between management (Foreman and Supervisors) and drivers.

Of the four cities surveyed, Calgary was the only city that reported conducting regular surveys of employee satisfaction, which it conducts annually. The results are tracked year to year to examine areas where employee satisfaction is growing or diminishing. WRS management report that they use the results to assess and develop initiatives to address areas where more could be done to improve employee satisfaction and retention.

6.5.2 Recommendations

CH2M HILL has the following findings and recommendations about training, culture, and communications

1. The new training program being implemented should provide significant benefits in many areas of WRS' operations. The program should be evaluated at least annually to ensure that training is effective and is providing good value for the money spent.
2. WRS should actively pool ideas for staff motivation, driver incentives, performance reviews, and improved communication. Actions to improve culture should be left to each District generally, but management should encourage cross-pollination of good ideas between the Districts.
3. It is recommended that Supervisors conduct brief (10-15 minute) meetings with each driver at least semi-annually to ask about what's going well and what's going poorly. The intent of these meetings would be to continue to build trust and ensure that good ideas from the field flow up through the management ranks, and the basis for decisions are explained clearly to drivers.

6.6 Cart Procurement, Maintenance, and Management

6.6.1 Findings

WRS does a good job tracking container status. Staff members track inventory by type of cart, entity responsible for damage (warranty, collector, other), and six types of damage (e.g., repair one wheel, or a lid). The City's blue carts and black carts have all been in service for less than five years. Thus, as expected cart replacement rates are low: approximately 0.7 percent for blue carts and 0.1 percent for black carts.

6.6.2 Recommendation

It is recommended that WRS conduct a pilot study and business case to assess the benefits and costs of implementing an electronic cart management system (i.e., RFID, Barcodes, handhelds, cart database management, container delivery management). This type of system would include using bar codes or RFID tags and handheld readers to ensure real time management cart management.

6.7 Customer Service, Public Education, and Outreach

6.7.1 Findings

WRS is the only one of the four public sector operations surveyed that conducts regular customer satisfaction surveys. WRS management routinely receives reports from the 3-1-1 system to track customer service performance. Reports document the number of service requests (SRs) by type and how long it took to resolve each SR. Reports are provided to management about reasons that SRs are closed as a non-deficiency (e.g., if there was a good reason why WRS didn't pick up a container such as not being set-out at the curb), and complaints/compliments about vehicle drivers.

6.7.2 Recommendations

CH2M HILL has the following recommendations for WRS related to customer service, public education, and outreach.

1. Collection operations would run more smoothly if WRS improved public education and outreach to citizens to make sure they are setting out their carts properly and to help minimize recycling contamination. More specifically, a good suggestion offered by a WRS driver to place large stickers on each cart showing what is and is not acceptable should be evaluated by WRS and considered for implementation.
2. Consider modifying the 3-1-1 system to report service request data by District. This would provide additional insight into how each District is performing on various service metrics. WRS should also assess if 3-1-1 service information could be provided by beat as well, and if so, consider adding service performance as another driver performance metric.
3. Customer satisfaction surveys should be structured so that results can be summarized by District.

6.8 Operational Performance Review – Key Findings and Recommendations

Four key findings and recommendations from the performance review of WRS' black cart and blue cart collection operations follow.

1. It is recommended that WRS explore the potential benefits of waste collection industry-specific routing software further by pilot testing some routing software packages and comparing route maps generated by those packages to route maps generated by The City's existing mapping software. WRS should conduct a detailed business case study about whether the potential benefits of improved long-term on-route efficiency and more balanced routes would be greater than the added cost of software and training associated with implementing a commercial routing software package.
2. CH2M HILL staff are aware of other jurisdictions that have successfully overcome labour union concerns about full use of GPS technology to improve collection productivity (e.g., Seattle). It is recommended that WRS pursue this issue further with its labour unions then consider implementing a robust GPS technology solution that would help provide real-time vehicle and driver performance information.
3. WRS places considerable emphasis on ensuring safety in the workplace. Workplace safety statistics are measured and reviewed by WRS management. A new training program is being developed that should improve safety performance further. To minimize "In the Zone" issues (where repeated container lifts can result in drivers becoming less aware of their surroundings), WRS should consider requiring that drivers switch positions in the cab partway through the day on the dual drive cabs.
4. Collection operations would run more smoothly if WRS improved public education and outreach to citizens to make sure they are setting out their carts properly and to ensure minimization of recycling contamination. More specifically, a good suggestion offered by a WRS driver to place large stickers on each cart showing what is and is not acceptable should be evaluated by WRS and considered for implementation.