City of Toronto
Collection Operations Safety Report

Final Report to Solid Waste Management Services

January 19, 2015

Executive Summary
Background

- Ernst & Young LLP ("EY") was engaged by the City of Toronto (the "City") pursuant to a contract agreement dated February 25, 2014 (the "Agreement") to review the Solid Waste Management Services Collection Operations' ("SWMS") current collection and operational practices, to identify potential areas for improvement and provide recommendations in a final report for additional safeguards to public safety (the "Project").

- This Report provides SWMS with our assessment and recommendations for their consideration based on the information received and discussions held as of the date of this Report. Our report has not considered issues relevant to third parties and any use a third party may choose to make of this report is entirely at its own risk.

- In preparing this Report, EY relied on information provided by and discussions with SWMS employees and other City division employees. EY has not audited, reviewed or otherwise attempted to verify the accuracy or completeness of such information and, accordingly, EY expresses no opinion or other forms of assurance in respect of such information contained in this Report. Readers are cautioned that, since these projected outcomes are based upon assumptions about future events and conditions, the actual results will vary from the projections, even if the assumptions materialize, and the variations could be significant

Executive Summary
Scope

- EY reviewed four business practice areas to enhance public safety:
  - Waste collection operations provided by City staff and contracted staff
  - Routing of collection vehicles and equipment
  - Operator training
  - Vehicles and equipment design

- The Project's scope is divided into the following tasks:
  - Task 1 – Ongoing Project Management
  - Task 2 – Review Current State
  - Task 3 – Identify Industry Best Practices
  - Task 4 – Gap Analysis Matrix – Toronto's Needs
  - Task 5 – Identify, Screen and Recommend Options
  - Task 6 – Prepare and draft Toronto's Collection Operations Safety Report

- All acronyms used in this Report are defined in Appendix D

Executive Summary
Overview

- Toronto SWMS operates in a complex environment in one of the most densely developed cities in North America
- SWMS, with the assistance of its contractors, handles a wide variety of waste, collected from many types of customers through the use of multiple types of vehicles
- The Commercial Vehicle Operators Registration ("CVOR") ratings indicate that the City's fleet (which includes SWMS) CVOR rating is in the middle of the participants with respect to safety
- SWMS accidents represent approximately 0.07% of all vehicle accidents involving pedestrians over the past 5 years in the City and approximately 3% of truck (City and non-City) accidents involving pedestrians
- Pedestrian behaviour is a significant factor. According to information provided by Transportation Services, Traffic Management Centre
  - In 38% of pedestrian fatal accidents from 2008-2013, involving both public and privately owned or operated vehicles classified as trucks, the pedestrian did not have the right of way
  - 13% on average (2008-2012) of pedestrians involved in a vehicle accident were inattentive
- From our observations, SWMS has many policies and procedures in place to monitor safe driving behaviour through its CVOR requirements and commitment to employee safety
- From our observation and through the detailed analysis performed, there did not appear to be any significant risks that were not mitigated by existing policies or procedures
- Many of our recommendations address gaps that exist throughout the industry and within other municipalities and not just in Toronto
  - Public safety is a common goal, however, there is no formal strategic framework to deliver on this goal
  - Obtaining and maintaining detailed accident information is a challenge for both municipalities and contractors. Furthermore, accident information is most often used to find fault rather than to identity root cause of incidents which could contribute to a better understanding of incident causal factors beyond those where the driver is at fault. (in 53% of SWMS accidents driver was not at fault)
  - Public safety focused outreach to the community is minimal. This means that risky behaviours of pedestrians/cyclists (such as distracted pedestrians) remain unaddressed

Executive Summary
Priority Recommendations

- As a result of our review and analysis, several opportunities for improvement were identified
- Each of these options was evaluated based on various factors relating to the benefits that the option could bring and the various factors that would affect the ease of implementation.
- The short list was then divided into priority recommendations and secondary recommendations.

	Priority Initiatives	Associated activities
1	**Build public safety into the culture, mission and strategy of SWMS operations**	1.1 Create a public safety mission statement and strategy to ensure public safety is an aspect that is incorporated into the culture and tone of SWMS 1.2 Create a dedicated role/committee to champion public safety 1.3 Incorporate safe driving into the existing rewards and recognition program
2	**Implement a detailed pedestrian accident analysis and risk management program**	2.1 Integrate the use of detailed accident analysis to effectively mitigate risks by understanding root causes of accidents and addressing them with an informed approach
3	**Educate the community**	3.1 Develop an outreach campaign to educate the public on garbage truck operation and how to be safe around them

These recommendations are priority based on the following factors:

- The identified gap has potentially high exposure
- Initiatives have a high potential to reduce the frequency of all types of accidents including all levels of severity;
- Associated activities can be handled within existing roles and responsibilities of the City
- Initiatives are transformational, targeting continuous improvement opportunities to transition SWMS into an industry leader

Executive Summary
Secondary Recommendations

	Secondary Initiatives	Associated activities
4	**Enhance monitoring capabilities for safe driving behaviour**	4.1 Review administrative duties that do not require supervisor`s expertise 4.2 Retrofit on-board monitoring/coaching devices 4.3 Include safe operating and driving behaviour assessment as part of the daily monitoring on the drivers 4.4 Identifying drivers for refresher vehicle and route training 4.5 Create driver notes to identify high risk areas and times
5	**Implement safety-related process improvements**	5.1 Require school safety practice from Contractors responsible for school pick-up 5.2 Review school pick-up to ensure they have the safest collection points 5.3 Review right-hand drive Standard Operating Procedures 5.4 Detailed review of policies/procedures from a pedestrian/cyclist safety perspective is required prior to accepting new services 5.5 Review additional safety approaches surrounding the automated arms 5.6 Ensure there are uniform features for a particular vehicle type

These secondary recommendations are based on the following factors:

- Initiatives are expected to be quick/easy to implement and to deliver quantifiable benefits
- They address existing gaps within specific components of the current operations
- The associated activities can be conducted within existing roles and responsibilities of the City
- These initiatives target improvements to operations

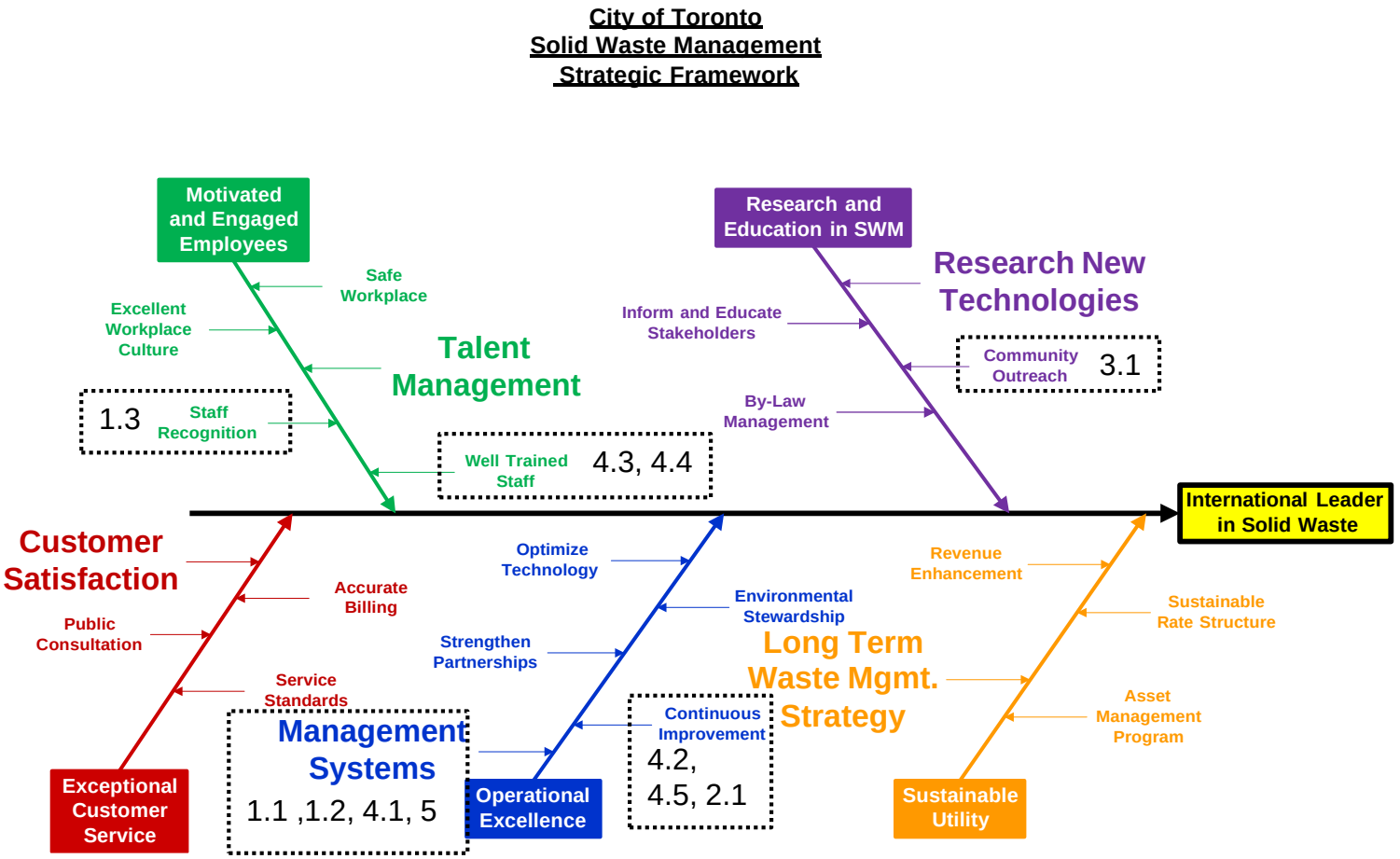
Executive Summary
Other options reviewed

The options listed below were considered in our analysis, but received low scores on benefit and ease of implementation

- Avoid collection during peak times in areas surrounding schools:
  - The average distance from a residential address to a school is approximately 350 meters
  - Requesting drivers to avoid schools during peak hours would make it impossible for any collection to occur across the City during those times
  - Drivers would have to make up those hours in potential overtime and during evening rush hour which would be extremely costly and could increase driver and public safety risks, such as fatigue from longer hours, dealing with night time reduced visibility, out of school children, public off work, increased rush hour traffic
  - It does not address the same risks that exist during summer months or after-school when child pedestrian traffic is also high
- Route training and mandatory rotation
  - As a result of the CUPE Local 416 Collective Agreement, all solid waste collection operators ("SWCO") are responsible for collection in their district, therefore many drivers are frequently asked to drive various routes in their district over the year
  - Unfamiliarity with streets are mitigated through discussion with supervisors and right to refuse work
- Reconsider the 4-10 Agreement
  - The work schedule of 4 days, 10 hours per day, was not unusual in the industry
  - The work schedule did not appear to be a significant factor in safety issues. Risks from fatigue are mitigated through supervisor interaction and the right to refuse work process

Executive Summary

Initiatives can easily be incorporated into the existing strategic framework



(Source: SWMS)

Executive Summary
Timeline

Recommendations	Immediate		Near-term		Mid-term				Long-term		
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	3Y	4Y	5Y
	14	15	15	15	15	16	16	16	17	18	19
Build public safety into the culture, mission and strategy of SWMS operations											
Implement a detailed pedestrian accident analysis and risk management program											
Educate the community											
Enhance monitoring capabilities for safe driving behaviour											
Implement safety-related process improvements											

- Timeline indicates implementation and does not include the on-going review and implementation processes

Scope and approach

Scope

- As specified in the RFP, the scope of work included:
  - A detailed review and documentation of all SWMS and Contractors' current collection and operational practices, including:
    - Day and night collection in Districts 2, 3 and 4, performed by the City and contractors
    - Litter operations
    - Park and Nights collections
    - Contracted Services
    - Schools, apartments, townhomes, ABCD (Agencies, boards, commissions, departments) and related facilities (currently performed by Miller Waste)
  - A thorough investigation and documentation of the City's staff safety training
  - An examination of training materials, training methods and frequency of refresher sessions
  - A review of the measures taken to record and track staff training, and monitoring to ensure staff are adhering to proper operational procedures
  - Examination and documentation of the City's collection fleet for safety features, design and suitability in assigned collection areas and review of the City's fleet procurement and the City's applicable maintenance procedures
  - A jurisdictional review of other municipalities and companies to determine industry safety best practices as they relate to operator training, new safety equipment features for vehicles, procurement and assignment of appropriate vehicle/equipment for the task, and vehicle routing to maximize public safety
  - Conducting a gap analysis between current state and industry best practices by identifying areas in SWMS current waste collection operations for implementation of potential additional safety control measures
  - Developing recommendations for changes that can be implemented to improve the safety of current collection operations

Scope (continued)

- Creating a high level cost/benefit analysis of the various recommendations
- Developing a road map with a planning horizon of 5 years, of the SWMS preferred recommendations complete with actions that include costing information that the City can implement to improve current collection operations. The recommendations and implementable actions must be compliant with City policies, SWMS contracts (and future contracts) with contracted collectors and industry safety standards
- Drafting a Final Report that will contain a review of SWMS collection operations and recommendations for potential changes to ensure continuation of safe operational procedures

Scope limitations

- District 1 was excluded from the scope as this contract was in the process of being renewed
- A limited review was performed on GFL's operation in District 2 due to the limited documentation provided. Review was based on knowledge obtained through our discussions with SWMS's contracted services and benchmarking discussions with GFL

Approach

Review of Current State

Approach included:

- Interviewing key management within SWMS responsible for collection operations, including contractors (List of all interviews performed are included in Appendix A)
- Interviewing other City division leaders identified by SWMS as integral to the SWMS collection operations
- Reviewing of key documents (List included in Appendix B)
- Observing collection operations through ride-alongs (Ride-along contacts included in Appendix A)
- Documenting risks and existing mitigating factors
- Reviewing vehicle design through vehicle observations to understand features, sight lines and safety features
- Conducting front-line staff survey regarding their perspective of various safety matters

Identify Industry Best Practices

Approach included:

- Identifying appropriate participants in other municipalities and in the private sector
- Interviewing key management and employees within participants
- Interviewing industry associations
- Reviewing studies surrounding pedestrian safety around vehicles
- Identifying and ranking industry practices and the City's position in relation to these practices

Approach (continued)

Gap Analysis Matrix, Identify, Screen and Recommend Options

Approach included:

- Identifying gaps between our current state review and industry best practice procedures
- Assessing gaps based on their risk exposure, maturity level of existing process and root causes
- Identifying potential options to mitigate these gap exposures
- Developing an option evaluation criteria to evaluate, rank options and screen options
- Reviewing options with SWMS Management and other responsible parties
- Developing final recommendations with action plan

Current State

Current State

Overview of collection operations in Toronto

Operations*	Products	Customers	General Statistics	Type of Vehicles Used
Daytime Collection – District 3 and District 4 (City Employees)	Garbage, Bulky Items, Recyclable Materials, Organics and Yard Waste	Single-family homes, Multi-residential locations, commercial locations, CIROs and ABCD	280 FTE 4 days 10 hrs./day 31,660 km of routes covered per week	Side loaders Rear loaders Automated arms Split packers Cube vans
District 2 – GFL (Contractor)	Garbage, Bulky Items, Recyclable Materials, Organics and Yard Waste	Single-family homes, Multi-residential locations, commercial locations, CIROs and ABCD	100 FTE 4 days 10 hrs./day 11,427 km of routes covered per week	Automated arms Split packers Cube vans
Litter Operations (City Employees)	Astral Media Bins Street Garbage, Bicycle Removal, Special Events	City Wide Streets and Special Events	195 FTE 4 days 10 hrs./day City Wide	Litter vacuums Sweepers Pick-ups
Night time Operations (City Employees)	Garbage, Bulky Items, Recyclable Materials, Organic Materials and Yard Waste	Single-family homes, Multi-residential locations and commercial locations	81 FTE 4 days 10 hrs./day 1,584 km covered per week	Rear loaders
Parks (City Employees)	Garbage, Recyclable Materials, and Organics	City Wide Parks	45 FTE 4 days 10 hrs./day City Wide	Small side packers
Miller Waste – City-wide	Garbage, Bulky Items, Recyclable Materials, Organics and Yard Waste	Schools, Apartments, Townhomes, ABCD and related Facilities	60 FTE 4 days 10 hrs./day 150 Kms covered per truck per day	Front-end loaders Cube vans Split packers

*District 1 is out of scope. Refer to page 12.

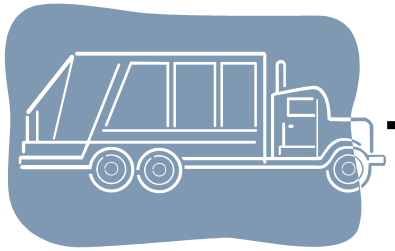
Current State

Impact of four business areas on public safety

"Employees of the City of Toronto strive to protect the interests of the residents of Toronto by carrying out their work in a safe and efficient manner, and to maintain good public relations while performing services in public areas including sidewalks, parks and roadways"
City of Toronto Fleet Safety Policy (2012)

"Never to work in a manner that may endanger themselves or the public"
Miller Waste Systems Safety Policy (June 2013)

Training of Drivers



Vehicle Procurement and Design

Routing

Collection Operations

Current State

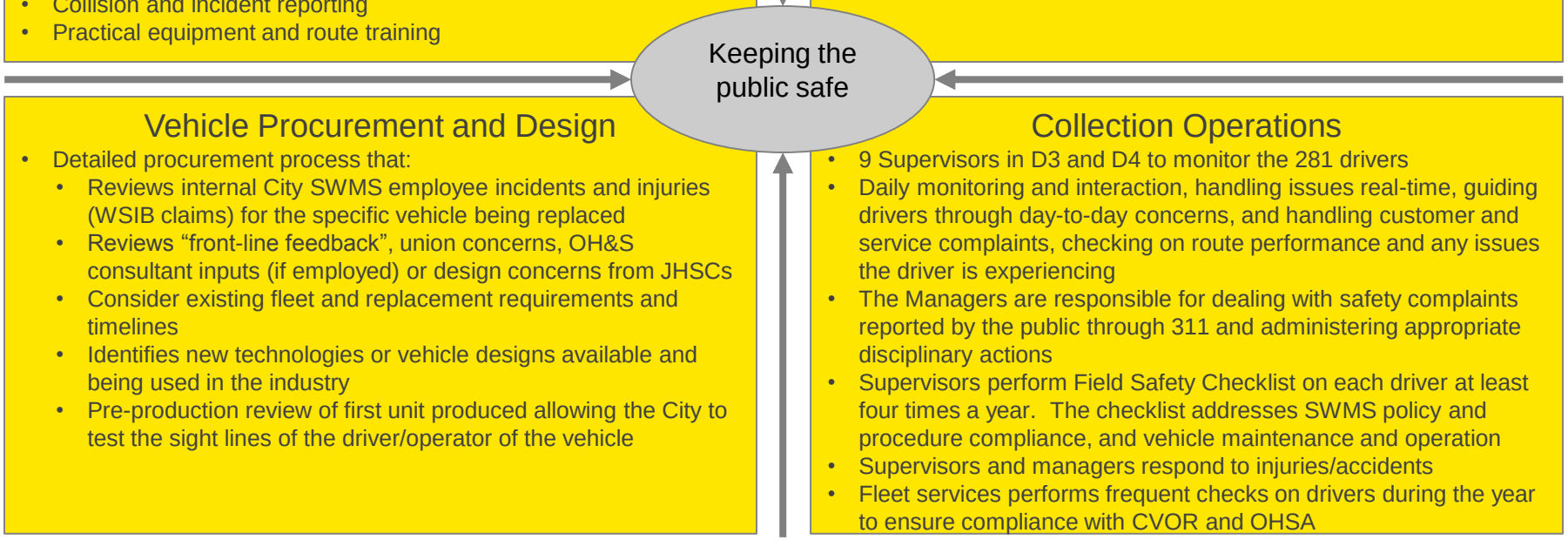
Highlights of SWMS efforts towards public safety

Training of Drivers

- City driver training to pass and receive a City Licence in addition to the MTO DZ licence
- Classroom training covering safe procedures for potential events on route
- Annual in-service training, including the adherence to provincial safety legislations such as Highway Traffic Act, CVOR, Occupational Health and Safety, and Acts under the Ministry of the Environment and Climate Change
- Driver reassessment occurs following an incident or reported near-miss, or to satisfy permit renewal requirements (every five years)
- Monthly tailgate sessions held by Supervisors to inform drivers on specific issues including recent accidents and safety concerns
- Collision and incident reporting
- Practical equipment and route training

Routing

- The City uses different routing software to suit the characteristics of the various types of service performed
- Routes are designed to minimize left turns and u-turns
- Software takes into account the number and types of residences, types of vehicles needed for a particular pick-up, product type, the number of trucks available for an area
- Miller Waste uses a run list which indicates the addresses and notes that may pertain to that address



Vehicle Procurement and Design

- Detailed procurement process that:
  - Reviews internal City SWMS employee incidents and injuries (WSIB claims) for the specific vehicle being replaced
  - Reviews “front-line feedback”, union concerns, OH&S consultant inputs (if employed) or design concerns from JHSCs
  - Consider existing fleet and replacement requirements and timelines
  - Identifies new technologies or vehicle designs available and being used in the industry
  - Pre-production review of first unit produced allowing the City to test the sight lines of the driver/operator of the vehicle

Collection Operations

- 9 Supervisors in D3 and D4 to monitor the 281 drivers
- Daily monitoring and interaction, handling issues real-time, guiding drivers through day-to-day concerns, and handling customer and service complaints, checking on route performance and any issues the driver is experiencing
- The Managers are responsible for dealing with safety complaints reported by the public through 311 and administering appropriate disciplinary actions
- Supervisors perform Field Safety Checklist on each driver at least four times a year. The checklist addresses SWMS policy and procedure compliance, and vehicle maintenance and operation
- Supervisors and managers respond to injuries/accidents
- Fleet services performs frequent checks on drivers during the year to ensure compliance with CVOR and OHSA

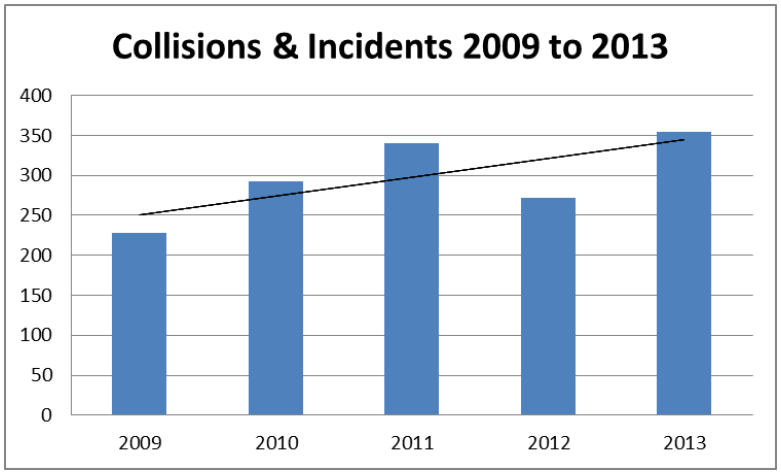
Current State
City SWMS fleet accidents

- Collision and incident rates for SWMS appear to be trending upwards over the last 5 years
- Note that this data includes both accidents as a result of City driver action and other vehicles colliding with a SWMS vehicle
- Majority of accidents relate to:
  - Side swipe - vehicles typically heading/facing the same direction where one collides with the other from moving sideways. Also includes collision with parked or stopped vehicles
  - Operational factors – accident that occurred during collection, such as automated arm movements, lifting bin or drive between pick-ups, vehicle/equipment malfunction
  - Backing up – Reversing into objects or other vehicles
- Further breakdown of pedestrian and cyclist accidents are not easily obtainable from the current database
- Accidents/incidents involving pedestrians are dealt with on a case-by-case basis, but no overall summary is maintained
- Based on easily accessible information, 8 incidents with pedestrians were noted with SWMS vehicles over the past 5 years, with 1 fatality

Accident Type	# of Accidents	Average Injury Class*	Type of Vehicle Involved
Making a Left Turn	3	2 (Includes 1 fatality)	Side loaders (1 automated)
Interference during pick-up	3	1	Side loader, rear loader, automated side loader
Indirect Injury	2	Unknown	Front loader, rear loader
	Total 8	Average 1.5	(Assumes injury class of 1 where unknown)

(Source: Fleet Services)

*Injury Class: 0 – none, 1 – Minimal, 2 – Minor, 3 - Major, 4 - Fatality



(Source: Fleet Services)

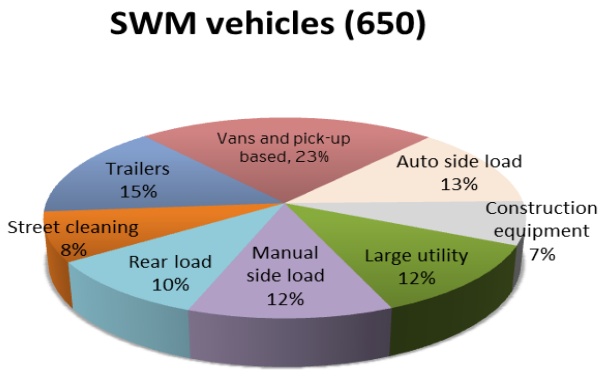
Collisions & Incidents Breakdown (2009 to 2013)					
Cause	Driver at Fault	Driver Not at Fault	Responsibility Undetermined	Total	
Side Swipe	238	168	11	417	28%
Operational Factor	166	20	87	273	18%
Back Up	167	36	6	209	14%
Other	11	25	98	134	9%
Rear-end Collision	29	76	2	107	7%
Improper Lane Change	23	64	3	90	6%
Circle Check		1	56	57	4%
Failure to Stop	20	37	0	57	4%
Alleged		2	42	44	3%
Right Turn	24	14	3	41	3%
Left Turn	15	10	4	29	2%
Fire		4	20	24	2%
Unknown		1	3	4	0%
Head-on Collision		1	0	1	0%
Vandalism			1	1	0%
Totals	**693**	**459**	**336**	**1,488**	**100%**

(Source: Fleet Services)

Current State

City SWMS fleet accidents by vehicle type

- Non-collection vehicles (trailers, vans, pick-up based vehicles, construction equipment, street cleaners, and large utility) make up 65% of all SWMS vehicles, however only involved in 25% of all SWMS collisions over the 5-year period
- Collection vehicles are involved in 75% of SMWS collisions over the 5 year period
- It is expected that collection vehicles would show a higher accident rate per fleet size than other non-collection SWMS vehicles, as collection vehicles travel greater distances per year and spend more time on the road
- Relative to the other collection vehicles, as listed in the chart on the side, rear loading vehicles experience a higher frequency of accidents
  - Rear loading vehicles represent only 10% of the fleet but 26% of accidents
  - Automated side loading vehicles represent 13% of the SWMS fleet and were in 22% of the accidents
  - Manual side loading vehicles represent 12% of the current fleet and 20% of accidents



Collisions & Incident Breakdown (2009 to 2013)					
Type of Vehicle	Driver At Fault	Driver Not at Fault	Responsibility Undetermined	Total	%
NON- COLLECTION VEHICLES	149	128	97	374	25%
CLASS 8 PACKER - REAR LOADING	193	123	43	359	24%
CLASS 8 PACKER - AUTOMATED SIDE LOADING	161	68	100	329	22%
CLASS 8 PACKER - SIDE LOADING	57	56	16	129	9%
CLASS 6/7 PACKER - SIDE LOADING	42	43	23	108	7%
LITTER VACUUM	35	11	29	75	5%
CLASS 4/5 PACKER - SIDE LOADING	32	6	18	56	4%
CLASS 6/7 PACKER - REAR LOADING	10	10	5	25	2%
CLASS 8 PACKER - FRONT END	5	7	2	14	1%
SIDEWALK SWEEPER	6	4	3	3	1%
STREET SWEEPER - 4 CUBIC YARD	3	3	0	6	0%
TOTAL	**693**	**459**	**336**	**1,448**	**100%**

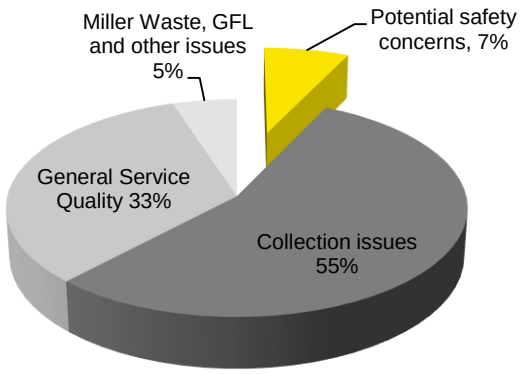
(Source: Fleet Services)

Current State

Operator complaints and potential near misses

- There were over 16,000 complaints received through the 311 Hot Line for the period from 2012 to 2013 relating to SWMS and its contractors
- Due to the volume and non-uniformed details of recorded complaints, the breakdown presented is derived from a key word search conducted on the records to focus on reported potential public safety issues
- It is estimated that approximately 7% (1,047 records) of the complaints likely involved public safety concerns, while the remaining 93% are primarily related to service quality and other miscellaneous issues
- Of the 7%, we noted at least:
  - 10 complaints related to near misses with pedestrians/cyclists
  - 200 complaints related to unsafe driving habits observed from caller

Breakdown of Complaints 2008-2013



Current State

All accidents in Toronto, involving a public or privately owned/operated vehicles classified as a truck and a Pedestrian/Cyclist

- To put the SWMS current state findings into perspective, we analyzed the accidents involving any truck in Toronto, experienced over a recent 5 year period.
- From 2008-2013, there were approximately 12,000 vehicle accidents with pedestrians and 7,200 with cyclists according to data from Transportation Service. Of the pedestrian accidents, approximately 262 also involved a vehicle that was identified as a truck
- Similar to SWMS results, left-hand turns have the highest number of total pedestrian accidents
- Pedestrian behaviour is a significant factor in truck accidents. With the population of truck accidents with identified pedestrian behaviours
  - pedestrian did not have right of way (ROW) in 28% of truck accidents
  - pedestrian did not have right of way (ROW) in approximately 38% of all fatal pedestrian accidents
  - pedestrians were determined inattentive in 11% of these accidents

Top 5 cause of truck accidents involving pedestrians (2007-2012)	% of total accidents	% that are fatalities	Average Injury Rating
Vehicle turns left while pedestrian crosses with ROW at intersection (5 fatalities)	18%	11%	2
Vehicle turns right while pedestrian crosses with ROW at intersection (4 fatalities)	16%	9%	2
Pedestrian hit at mid-block (4 fatalities)	15%	10%	2
Pedestrian hit at parking lot	14%	0%	2
Pedestrian hit on sidewalk or shoulder (1 fatality)	9%	4%	2

(Source: Transportation Services, Traffic Management Centre)

Likelihood of Fatality (Top 5)	% that are Fatalities	% of Total Accidents
Pedestrian hit at pedestrian crossover (PXO)	25%	2%
Vehicle turns left while pedestrian crosses without ROW at intersection	22%	3%
Vehicle is going straight through intersection while pedestrian crosses without ROW	18%	4%
Other / Undefined	14%	5%

(Source: Transportation Services, Traffic Management Centre)

Industry Best Practices

Industry Best Practices

Selected CVOR information and accident data from other municipalities and private operators

- This first table compares the CVOR rating and information for municipalities and private waste operators who participated in our benchmarking study
- CVOR and the Carrier Safety Program is an Ontario program from MTO to promote safe operation of trucks and buses on Ontario's roadways
- CVOR registration is based on the entire Ontario fleet and therefore is not specific to just waste collection vehicles. For example, the CVOR for Toronto includes all vehicles registered to the City. Similarly, WasteCo would include all vehicles in Ontario, not just those in a particular city
- CVOR rating is based on the carriers safety rating which is assessed by on-road performance, and available facility audit results
- A carrier would normally receive a Satisfactory safety rating if they maintain an on-road performance level of 70% or less of their overall CVOR threshold. A conditional safety rating would be assigned if their on-road performance exceeds 70% of their overall CVOR threshold or fails a facility audit
- Toronto ranks at about the middle of the industry participants, which is a positive finding considering it has one of the largest fleets and that it is operating in a more densely developed community than its peers

Factor	Edmonton	WM	Miller Waste	Toronto	Participant F	WasteCo	London	GFL
Fleet (Trucks) size as per CVOR	1,728	775	510	1,830	740	143	146	692
Number of collision with CVOR points *	N/A	38	43	91	344	27	15	96
CVOR Rating	Satisfactory (R-factor 0.321)	Satisfactory (32.2%)	Satisfactory (41.4%)	Satisfactory (49.9%)	Satisfactory (45.2%)	Satisfactory (59.3%)	Satisfactory (64.1%)	Conditional (75.6%)

*As per MTO, collisions are assigned points based on the severity of the collision and those collisions where no improprieties or vehicle defects are noted on the police report do not incur points.

Industry Best Practices

Selected CVOR information and accident data from other municipalities and private operators

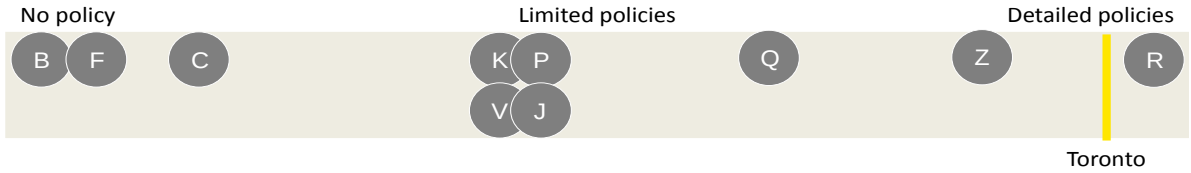
- This second table is about accident information specific to the corresponding municipalities' waste division. Many participants had difficulty providing segregated and detailed accident information therefore only the information available from the various participants are shown
- When compared to two other municipalities, Toronto operates 18 times more vehicles than the City of London and 2.3 times more vehicles as City of Edmonton
- The ratio of preventable and non-preventable accidents to number of vehicles shows Toronto outperforms the City of Edmonton, while the City of London exhibits a stronger performance than both cities
- Toronto has the lowest number of preventable accidents of all three cities, at 58%. However, Toronto has the highest number of right-hand drive accidents at 47%, circa double the City of London (25%) and the City of Edmonton (22%)
- It should be noted that the operating conditions in the City of London and especially the City of Edmonton are different than those in Toronto, with Toronto-based drivers managing far (physically) tighter operating conditions and population density

Factor	London	Edmonton	SWMS
Fleet (Solid waste management trucks)	**36**	**281**	**650**
Preventable accidents 2013	8	100	150
Ratio of accident to the number of vehicles	0.22:1	0.36:1	0.23:1
# of RHD accidents (percentage of preventable incidents)	2 (25%)	22 (22%)	70 (47%)
Pedestrian fatalities	0	0	1 (2013)
RHD?	N/A	N/A	Yes

Industry Best Practices
Collection operations

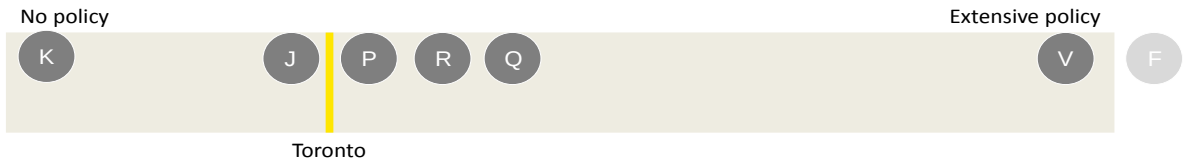
School zone collection policies

Leading Practice: Full collection policy for school zones, including detailed processes on what actions can be performed by the driver in different circumstances



Right-hand driving policies

Leading Practice: Drivers are only allowed to use the right-hand stand-up driving position when collecting in a sub-division; travelling under 20kph; and less than a 20 second drive between stops. A driver cannot make left hand turns from the right-hand drive position. Participant F has a policy of no right-hand drive vehicles following a fatal incident



Driver recognition

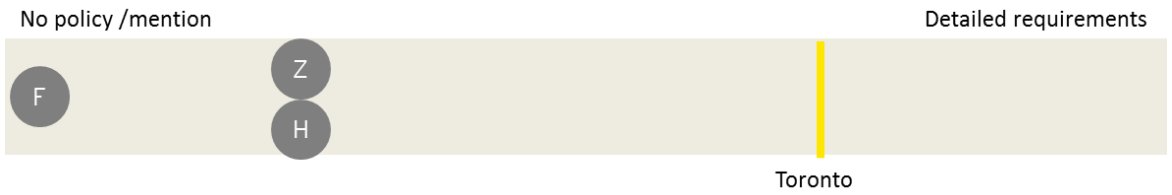
Leading Practice: Annual award of a city jacket with employee name embroidered and team lunch in driver's honour for no preventable accidents over five years and ten years and if there is no preventable accidents in the past year, they are eligible to participate in the annual city truck rodeo

B – Markham
C – Vaughan
D – Mississauga
Z – Waterloo
F – Anonymous
H – Halifax
J – Edmonton
K – London, Ontario
P – GFL
Q – Waste Management
R – Miller Group
U – Progressive Waste
V – BFI

Industry Best Practices
Collection operations (continued)

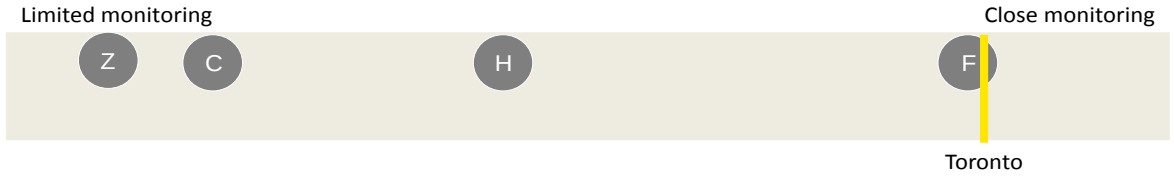
Municipal Requirement on Contractors

Leading Practice: Toronto has the best overall practice with respect to the safety requirements of its contractors. The only features that are included in other municipalities are specific vehicle safety features



Contractor Monitoring

Leading Practice: Toronto appears to be operating at a leading practice level having project leads: monitoring contractor customer service; monitoring contractor compliance; monitoring the contractor safety behaviour; using GPS to track vehicle time and location; and having contractors monitor their own customer complaints



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Industry Best Practices
Routing

Route setting and update

Leading Practice: Supervisors drive each new route once to personally verify nothing has been missed in the update. For schools, route setting guidance tries to channel vehicles at least one street away from a school

Routing Software

Leading Practice: Employ “Streets and Maps” GIS software and a proprietary system which provides a detailed run sheet providing drivers with information regarding each call in a specific order and individual call information, including number of lifts, contact details, special notices for the driver. Sequencing is undertaken to optimize routes, including call details, and avoidance of schools during peak times where possible

Future Practice: A proprietary system for commercial routes is being expanded for residential collection. Drivers are all issued a tablet which can upload any route and provides the following features: route map; route list with details; ability to sequence the route, currently more advanced on commercial than residential; supervisors with the ability to follow the vehicle in real time; and managers to run route reports, for example historic vs current route adherence ,etc.

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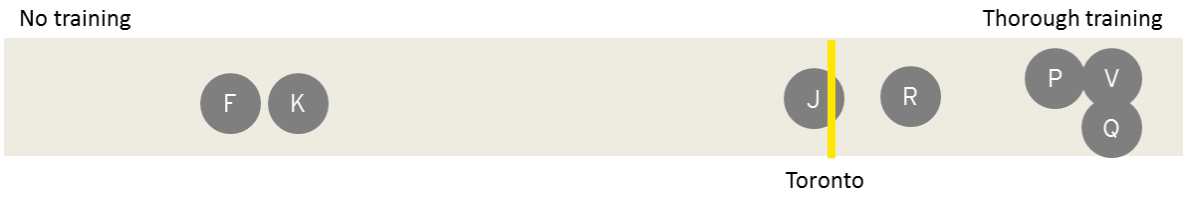
Industry Best Practices
Training

Vehicle Training and Licensing

Leading Practice: New driver training has both a vehicle and route training component. Training is progressive daily, with trainer sign-off daily. In addition, there is formal follow-up in the period following the training to ensure that the information and practices were retained



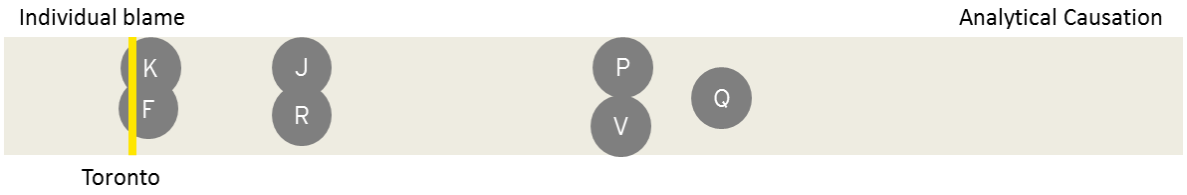
Ongoing monitoring

Leading Practice: Supervisor spot checks include safe driving behaviour, and have GPS and recordable cameras to assist them

Accident analysis

Leading Practice: Individual accident analysis is used to determine cause rather than blame. The results of this analysis are shared in weekly supervisor meeting and with drivers during tailgate sessions.

However, no participant utilized their accident information to create evidence-based incident analysis to derive overall risk mitigation and continuous improvement of all areas of collection operations, including, operations, training, routing and vehicle design.



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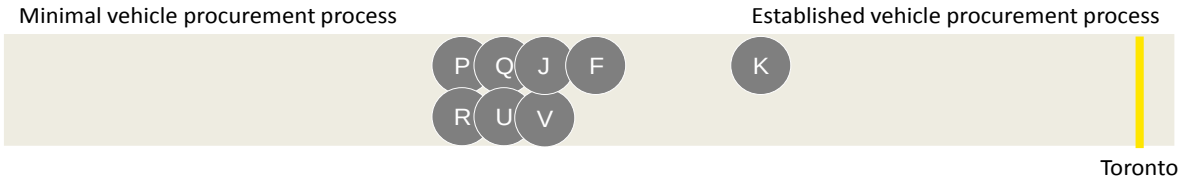
Industry Best Practices
Vehicle Procurement and Design

Vehicle procurement

Leading Practice: Toronto has the leading practice with an established formal process of including a business plan and involvement of various divisions, incorporating accident history and user experience to ensure all public safety-inputs are considered



Vehicle design

Leading Practice: Additional features that have been used are as follows: downview mirrors on both sides of the driver, and a system with vehicle sensors and in-cab recording devices which detect incidents that puts over 1g-force (as an example) on the vehicle. When detected, the system sends to the supervisor a video recording of the 10 seconds proceeding the time of incident

Vehicle design factor	F	K	R*	Q*	P*	V*	Toronto
Safety features:							
x3 mirror system	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Downview mirrors	No	No	No	No	Yes	No	No
Back-up alarms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reverse cameras	No	Yes	Yes	Yes	Yes	Yes	Yes
Street-view cameras	No	No	Yes	N/A	Yes	Yes	Yes
Curb-view cameras	No	No	Yes	No	No	Yes	Yes
Dead lock brakes	No	Yes	No	No	No	No	Yes
Tailgate open alarm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GPS equipped vehicles	Yes	Yes	Yes	Yes	Yes	Yes	No
Road facing real time cameras	No	No	No	No	No	Developing (Lytx)	No

* Statistics based on one residential municipal contract (full fleet is larger)

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Findings

Findings

Risk Exposure - Individual Carelessness/ Risky Behavior

Ref.	Current State	Front-line Perspective (Questions listed in Appendix C)	Future State	Gap Exposure
A1	Supervisors spend at least 2 hours in the office taking care of administrative work and could spent up to several hours for customer service and complaints. During this time, they are not monitoring their drivers	Question 10.4 – Around 16% choose front-line behaviour as the primary reason for accidents Question 10.11 – just over 20% of the drivers do not believe that drivers share their public safety concerns with others	Drivers perceive to be monitored 100% of the time. Monitoring/tracking devices such as GPS or in-cab recordable technology help supervisors track and monitor their drivers when they are not physically there	Frequency – High Impact - High
A13	It is very difficult to change the habits developed by the drivers. Some of these behaviors are developed during their training on their first truck by the individual they are shadowing. This is determined sometimes by schedule rather than by Supervisor choice of a role model SWCO	Question 13.2 – The two highest categories as being most important were both recognition for safety and for customer service. Two categories that were not too far behind were refresher courses on equipment and pedestrian specific policies/training	All drivers are regularly assessed/undertake a refresher course which prevent the formation of bad habits and reaffirm vehicle knowledge New drivers to receive this assessment shortly after beginning position	Frequency – Low Impact - Medium
A14	There are no regularly scheduled refresher courses on vehicles unless a new truck comes into the fleet or it is required as part of disciplinary action	Question 13.3 - There is small percentage, approx. 11%, that disagree which is consistent with Question 13.2 which indicated that 20% of drivers felt that more frequent refreshers would be most important to them to make them operate more safely	All drivers are trained on all vehicles and regularly assessed/undertake a refresher course which prevent the formation of bad habits and reaffirm vehicle knowledge	Frequency – High Impact - High
A15	Additional duties are transferred from other divisions without sufficient assessment of safety protocols (if any) to the public	Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public. The % is larger amongst the Parks and only slightly larger with Litter operations, which is expected as they are often immersed into high pedestrian traffic areas	The implementation of every new SWMS service requires a detailed public safety assessment to capture and mitigate any risks during the planning stage	Frequency – low Impact - High
A20	Vehicles can move forward with the arm out as long as the deadman switch is engaged	Question 10.2 - Drivers still viewed collecting with the RHD with automated arm and driving through a school zone their riskiest areas	Proper policy to assist the driver from performing two tasks together. Ways of warning the public of arm in operation - in person or through other means	Frequency – Medium Impact - Medium

Findings
Risk Exposures - Public's risky behaviour

Ref.	Current State	Front-line Perspective	Future State	Gap Exposure
A4	Automated Side Loaders - If seated, the driver does not leave the vehicle and cannot prevent interaction	Question 10.2 - Drivers still viewed collecting with the RHD with automated arm and driving through a school zone as their riskiest areas Question 10.4 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about	Driver is able to warn the public in person or through other means when arm is in operation	Frequency – Medium Impact - Medium
A5	The practice of redirecting public to the bi-level when the tipping floor is too busy, will only occur in yards that have a bi-level available and may not be a practice at all yards. There are minimal signs on safe practice and there are no procedures or policies that are made for the public. All direction is provided by the transfer station operators	N/A	All transfer stations have bi-levels Safety procedures are available for public entering the transfer station as reminders	Frequency – Medium Impact – Low
A16	There is minimal engagement on educating the public on the operations of the SWMS, their equipment and how to be safe around them There have not been opportunities to identify to the public the blind spots or the operations of the new style of trucks currently being used. This results in misconception and misguided expectation of truck driver behaviour	Question 10.4 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about Question 10.8 - Of the near misses, drivers believe that almost 68% is due to the distracted other party	Public education campaign. Leverage existing programs such as Waste Reduction Week or partner with organizations such as Canada Safety Council to get the word out about the public's role in staying safe around collection vehicles. Include targeting specifically for students. Utilize traditional advertising and social media to educate the public	Frequency – High Impact – High
A21	There are no markers, indicators, boundaries or audible noise when the automated arm operates to prevent the public from interacting	Question 10.2 - Drivers still viewed collecting with the RHD with automated arm and driving through a school zone as their riskiest areas Question 10.4 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about	Driver is able to warn the public in person or through other means when arm is in operation	Frequency – Medium Impact - Medium

Findings

Risk Exposures - No information / Misinformation

Ref.	Current State	Front-line Perspective	Future State	Gap Exposure
A17	There is inconsistency on how different project leads monitor their contractors No public safety focused training noted for project leads that monitor contractors	Questions 10.6 - There are still approx. 20% of the frontline that the SWMS do not include safety to the general public	Contractor leads and supervisors receive training on the key elements of safe driving behaviour and how to monitor this for their reporting SWCOs	Frequency – Medium Impact - Medium
A23	When new safety features are reviewed during the vehicle procurement process, employee accident files are reviewed and drivers are surveyed. Currently, the focus has been on employee safety and operability but not public safety	Question 10.10 - Just over 20% of drivers feel that they do not have proper channels to have their public safety concerns heard Question 10.11 - just over 20 % of the drivers do not believe that drivers share their public safety concerns with others Question 12.3 - 45% of the drivers disagree and with 32% strongly disagree with this statement - Do you agree that front line worker concerns/experience with equipment design issues are integrated into the next procurement of vehicles or equipment?	Public safety risks in existing vehicles are identified and formally considered in new vehicle procurement	Frequency – low Impact – High
A27	RouteSmart does not have the capabilities to identify landmarks. These have to be manually indicated Time factors are not being used to indicate high traffic areas or school areas during the pick-up route	Question 11.1 - The drivers wanted the routes to be safe in general and specifically for public safety. Speed is not the main factor	Drivers are provided real time route map; route list with details; ability to sequence the route, currently more advanced on commercial than residential; supervisors with the ability to follow the vehicle in real time; and managers to run route reports, for example: historic vs current route adherence etc.	Frequency – Medium Impact - Medium
A28	There is no formal and efficient feedback system to enable Routing to update the maps with any "non-temporary" changes. There is also no feedback on what is the "safest" route, to thereby learn from	Question 11.1 - The drivers wanted the routes to be safe in general and specifically for public safety. Speed is not the main factor factor	Drivers are provided real time route map; route list with details; ability to sequence the route, currently more advanced on commercial than residential; supervisors with the ability to follow the vehicle in real time; and managers to run route reports, for example: historic vs current route adherence etc.	Frequency – Medium Impact - Medium
A29	No routes are provided for non-collection driving. Drivers determine their own path to their collection zones and may select routes through high-density or other risky areas	Question 11.1 - The drivers wanted the routes to be safe in general and specifically for public safety. Speed is not the main factor	Supervisors with the ability to follow the vehicle in real time; and managers to run route reports, for example: historic vs current route adherence etc.	Frequency – Medium Impact - Medium

Findings
Risk Exposures - No information / Misinformation

Ref.	Current State	Front-line Perspective	Future State	Gap Exposure
A7	On the Supervisors Field Safety Forms there is no specific area for monitoring safe driving behavior	Questions 10.6 - There are still approx. 20% of the frontline who believe that the SWMS does not include safety to the general public	Formal policy of reviewing drivers for safe driving behaviour several times throughout the year. Results of assessment would be documented on the Field Safety Forms and incorporated into employee annual reviews	Frequency – Medium Impact - Medium
A24	City vehicles are not equipped with GPS or other monitoring equipment (e.g., on-board cameras) to continuously monitor the activity of their drivers	Question 10.5 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public. The percentage is larger amongst the Parks and only slightly larger with Litter operations, which is expected as they are often immersed into high pedestrian traffic areas Question10.7 - About 30% of the drivers indicated that they have near misses and another 35% indicated maybe 1-10 per year There is currently no way of recording or tracking near misses with pedestrians/cyclists Question 13.1 - . Approx. 15% of the frontline find the training ineffective with respect to helping them understand public safety. This is consistent with Question 10.6	Monitoring devices that capture information about accidents and near misses that can be used to reduce future accidents	Frequency – High Impact - High
E1	Right hand drive policy does not define the distance allowed to drive on the right-hand side	Question 10.2 Drivers still viewed collecting with the RHD with automated arm and driving through a school zone as their riskiest areas	RHD policy is optimized based on collection area, time of day and conditions, with links to real-time GPS and routing software to enforce compliance	Frequency – Medium Impact - High

Findings
Risk Exposures - No information / Misinformation

Ref.	Current State	Front-line perspective	Future State	Gap Exposure
A9	No on-going policies or procedures in place to monitor the trends of incidents/near misses with public. The current Supervisor's Report of Injury/Accident reporting is based on OHSA which focuses on the employee rather than the public. The Driver's Collision/Incident Report includes area for injured person but not near misses. These forms are also used mainly for employees and employee related purposes. The details of this information are not readily available for tracking or assessing pedestrian accidents or identifying root causes of accidents In addition, the accident information isn't used to create options for improvement to reduce further accidents at a business practice area level	Question 10.1 - Greater than 80% identify that SWMS and themselves are responsible for the public's safety Question 10.5 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public Question 13.1 - . Approx. 15% of the frontline that find the training ineffective with respect to helping them understand public safety. This is consistent with Question 10.6 Question10.7 - About 30% of the drivers indicated that they have near misses and another 35% indicated maybe 1-10 per year. There is currently no way of recording or tracking near misses with pedestrians/cyclists Question 12.3 - 45% of the drivers Disagree with 32% strongly disagree with this statement - Do you agree that front line worker concerns/experience with equipment design issues are integrated into the next procurement of vehicles or equipment?	Monitor and report on pedestrian accidents and risks to public safety with significant details to provide fact based results for decisions with respect to training, operations, routing and vehicle design. Front-line monitoring systems include near misses and capture events leading up to an incident (akin to Lytx system) Utilize these reports to initiate improvements, monitor success of previous decision and monitor the risks of accidents/injuries with pedestrians/cyclists from various factors	Frequency – High Impact – High
A10	Monitoring forms provide a medium for noting performance regarding public safety, but do not prompt it. Not all Monitoring Forms are the same, they vary from contract manager to contract manager	Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public. The % is larger amongst the Parks and only slightly larger with Litter operations, which is expected as they are often immersed into high pedestrian traffic areas. Question 10.11 - just over 20 % of the drivers do not believe that drivers share their public safety concerns with others	Contractor monitoring forms are consistent across all contractor leads. Key metrics related to public safety are identified and require monitoring on revised contractor monitoring template	Frequency – Medium Impact - Medium

Findings

Risk Exposures - No information / Misinformation

Ref.	Current State	Front-line Perspective	Future State	Gap Exposure
A11	The current contractor has detailed school safety procedures. However, there is currently nothing within the original contract or RFP that discusses the specific safety practices within the school zone. This poses an issue when this contract comes up for renewal and if a new contractor is awarded the contract	Question 10.2 - Drivers still viewed collecting with the RHD with automated arm and driving through a school zone their riskiest areas Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public Question 13.2 - The two highest categories as being most important were both recognition for safety and for customer service. However, the other two categories that were not too far behind were refresher courses on equipment and pedestrian specific policies/training	Require comprehensive school safety policies and procedures which can be monitored for compliance	Frequency – Medium Impact - Medium
A12	Lack of communication about the safety or logistics of the collection exist when decisions are made with changing how school waste is collected. This results in some school having a higher risk than necessary	Question 10.10 - Just over 20% of drivers feel that they do not have proper channels to have their public safety concerns heard Question 10.11 - just over 20 % of the drivers do not believe that drivers share their public safety concerns with others	Individual sites are assessed for the most appropriate collection-vehicle type	Frequency – Medium Impact - High
A18	There are different models that fall under the same category for licensing purposes. Drivers may not have current experience on all models. Different designs could impact the abilities of a SWCO to operate that particular model	Question 13.3 - There is small percentage, approx. 11%, that disagree which is consistent with Question 13.2 which indicated that 20% of drivers felt that more frequent refreshers would be most important to them to make them operate more safely	All drivers are equally familiar with all the routes and equipment that they are licenced to drive All drivers are regularly assessed/undertake a refresher course which resist the formation of bad habits and reaffirm vehicle knowledge	Frequency – Medium Impact – High
A19	Bin location may force a truck to go onto the sidewalk. Such maneuvers are not necessarily safe but required to fulfill duties. There are no procedures to appropriately manage safety in these worse case pick-up scenarios	Question 10.2 - Drivers still viewed collecting with the RHD with automated arm and driving through a school zone as their riskiest areas Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public Question 13.1 - . Approx. 15% of the frontline that find the training ineffective with respect to helping them understand public safety. This is consistent with Question 10.6	Provide procedures and guidance to the drivers to handle these specific situations Feedback from drivers can be relayed to other drivers through route notes. Identify high risk areas, ways of dealing with difficult pick-ups or other important information that can assist them in keeping the public safe	Frequency – Low Impact - High

Findings

Risk Exposures - No information / Misinformation

Ref.	Current State	Front-line Perspective	Future State	Gap Exposure
A3	There is currently no formal way of identifying or commending good/safe behaviour by the drivers Currently all recorded behaviour (spot checks, 311 calls, etc.) only record poor behaviour	Question 13.2 - The two highest categories as being most important were both recognition for safety and for customer service Question 10.1 - Greater than 80% identify that SWMS and themselves are responsible for the public's safety	Formal program for employees to be rewarded for clean safe driving record	Frequency – High Impact - Medium

Findings
Gaps in roles and responsibilities

Ref.	Current State	Front-line perspective	Future State	Gap Exposure
B1	Other parties are informed only when Drivers or Supervisors are not performing their tasks safely. No one is informed when they are performing their tasks correctly This was also identified as an opportunity in A3	Question 10.1 - Greater than 80% identify that SWMS and themselves are responsible for the public's safety Question 13.2 - The two highest categories as being most important were both recognition for safety and for customer service	Formal program for employees to be rewarded for clean safe driving record	Frequency – High Impact - Medium
B2	Accountability and responsibility for public safety and awareness fall upon the drivers. This important responsibility should be a division-wide and City responsibility, not just the drivers	Question 10.1 - Greater than 80% identify that SWMS and themselves are responsible for the public's safety Question 10.4 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public Question 10.8 - Of the near misses, drivers believe that almost 68% is due to the distracted other party Question 10.9 - Over 75% of the drivers said at least neutral to extremely well with respect to dealing with the safety of pedestrian. This means that there is still room for improvement	SWMS builds public safety into its mission and strategy Dedicated committee that mandates the continuous improvement of operation and management of operation risk of working intimately in public areas Public education campaign involving support from the City. Leverage existing programs such as Waste Reduction Week or partner with organizations such as Canada Safety Council to get the word out about the public's role in staying safe around collection vehicles. Include targeting specifically for students. Utilize traditional advertising and social media to educate the public	Frequency – High Impact - High
B3	No one is informed about how well the public is made aware of SMWS operations	Question 10.4 - With near misses due to distracted pedestrian/cyclist/driver at 65% overall, the daytime operators believed them to be over 70% of the near misses that they hear about	Public education as part of on-going risk management, monitoring and reporting processes	Frequency – High Impact - High

Findings
Gaps in roles and responsibilities (continued)

Ref.	Current State	Front-line perspective	Future State	Gap Exposure
B4	There is currently no one designated with the permanent responsibility or accountability of monitoring accidents/incidents, or near misses with the focus on public interaction with SWMS operators only. Reports on public interactions with SWMS operators have to date been ad hoc reports	Question 10. 6 - Approx. 20% of the frontline SWMS do not agree that the policies and procedures include safety to the general public Question 10.9 - Over 75% of the drivers said at least neutral to extremely well with respect to dealing with the safety of pedestrians. This means that there is still room for improvement	Ownership for public safety is assigned at a senior level within SWMS, with a formal reporting structure to support information gathering and analysis Monitoring and report on pedestrian accidents and risks to public safety with significant details to provide intel for decisions with respect to training, operations, routing and vehicle design. Front-line monitoring systems include near misses and capture events leading up to an incident (akin to Lytx system) Utilize these reports to initiate improvements, monitor success of previous decision and monitor the risks of accidents/injuries with pedestrians/cyclists from various factors	Frequency – High Impact - High
E3	There is no visible indication of the level of emphasis of Pedestrian/public safety within SWMS. Policies that reference public safety are ad hoc and are not centralized under a formal program or mission statement	Question 10.9 - Over 75% of the drivers said at least neutral to extremely well with respect to dealing with the safety of pedestrians. This means that there is still room for improvement	Formal mission statement and program driving SWMS's commitment to maintaining public safety Dedicated committee that mandates the continuous improvement of operation and management of operation risk of working intimately in public areas	Frequency – High Impact - High

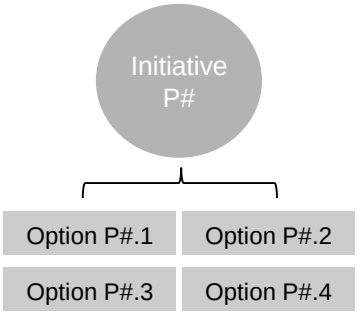
Findings
Vehicle Design

Ref.	Current State	Front Line Perspective	Future State	Gap Exposure
D1	Acterra model rear loading (Class 8) Only vehicle that has no rear camera and dead brakes or back-up sensors, or motion sensors	Question 12.1 - Most believe that the equipment is sufficient	All SWMS fleet vehicles have a secondary backing up feature such as rear camera, dead brake and/or backup sensor	Frequency – High Impact - High
D2	Only the LEU613 has a curb-side camera	Question 12.1 - Most believe that the equipment is sufficient	All SWMS of the same type have the same safety features (unless under pilot project)	Frequency – Medium Impact - Medium
D3	Even though Cab-over trucks allow for increased visibility in front of the truck, the test sample had decreased visibility on the opposite side as the trucks tend to be longer and the drivers visual sight starts right from the front side of the truck With standing right-hand drive vehicles, the visibility decreases significantly	Question 12.1 - Most believe that the equipment is sufficient	Both drivers and public should be made aware of the differences in the vehicles used in operation and the various sight lines between models Public campaign to educate community on garbage vehicles and their blind spots and sight lines	Frequency – High Impact - High
D4	There is a small angle with all the trucks that are completely out of view from driver in the rear camera. Therefore, sensors become extremely important	Question 10.8 - Of the near misses, drivers believe that almost 68% is due to the distracted other party Question 12.1 - Most believe that the equipment is sufficient	All SWMS collection vehicles have a secondary backing up feature such as rear camera, dead brake and/or backup sensor Public campaign to educate community on garbage vehicles and their blind spots and sight lines	Frequency – High Impact - High
D5	Trucks with Cabs - The convex mirrors allow the driver to see directly in front of the truck. However, within a few feet out there is a blind spot where the driver will not be able to see anything that is shorter than the height of the engine	Question 10.8 - Of the near misses, drivers believe that almost 68% is due to the distracted other party and 11% is due to weather	Public campaign to educate community on garbage vehicles and their blind spots and sight lines All SWMS collection vehicles have a secondary sensor in front	Frequency – Medium Impact - High
D6	Public is unaware on how far, fast or when the automatic arm is protruded. Ie. There is no visual aid (signs), audible noise or markers/barriers of operating area	Question 10.8 - Of the near misses, drivers believe that almost 68% is due to the distracted other party	Driver is able to warn the public if required - in person or through other means Public campaign to educate community on garbage vehicles and their blind spots and sight lines	Frequency – Medium Impact - High

Recommendations

Recommended Options
Overview

- As a result of our review and analysis, several opportunities for improvement were identified
- Options have been grouped into Initiatives to facilitate implementation
- Each of these options was evaluated based on various factors relating to the benefits that the option could bring and the various factors that would affect the ease of implementation.



- In the following section we focus on the recommended options that scored above a 2.0 in our assessment of their benefit/opportunity criteria and above 2.0 in their ease of implementation criteria
- Options that fall within this category:
  - have medium to high benefit in terms of closing known gaps, potential in reducing risk and providing positive action in reducing future incidents
  - Medium to low effort required to implement
- Within each option we present the:
  - Associated gap, risk exposure, benefits and constraints
  - Value of their ranking on the benefit and ease of implement scale
  - High level estimated costs associated with the initial and on-going implementation
  - Maturity movement that illustrates the movement of the current process to the future process. Maturity levels are defined as follows:

Basic	- Almost nothing exists for this performance factor
Evolving	- Some parts of this performance factor exist, application on different levels is inconsistent
Established	- Performance factor is pragmatically defined, consistently applied on a few levels involved
Advanced	- Performance factor is defined in more detail, consistently applied on most levels involved
Optimized	- Performance factor is defined in more detail and consistently applied on all levels

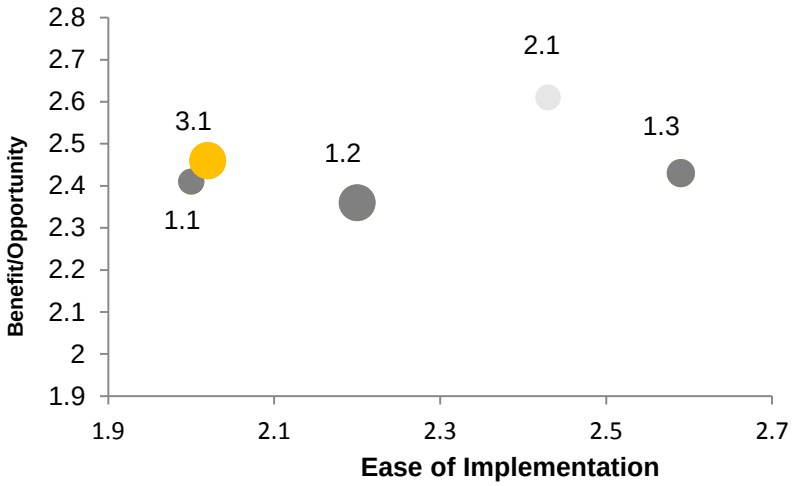
Recommended Options

Priority Recommendations

	Initiatives	Associated activities	
1	**Build public safety into the culture, mission and strategy of SWMS operations**	1.1	Create a public safety mission statement and strategy to ensure public safety is an aspect that is incorporated into the culture and tone of SWMS
		1.2	Create a dedicated role/committee to champion public safety
		1.3	Incorporate safe driving into the existing rewards and recognition program
2	**Implement a detailed pedestrian accident analysis and risk management program**	2.1	Integrate the use of detailed accident analysis to effectively mitigate risks by understanding root causes of accidents and address them with an informed approach
3	**Educate the community**	3.1	Develop an outreach campaign to educate the public on garbage truck operation and how to be safe around them

These recommendations are priority based on the following factors:

- The identified gap has potentially high exposure
- Initiatives have a high potential to reduce the frequency of all severities of accidents
- Associated activities can be handled within existing roles and responsibilities of the City
- Initiatives are transformational, targeting continuous improvement to transfer SWMS into an industry leader



Benefit scale 1 – 3 (low to high)

Ease of implementation 1 – 3 (Challenging to Easy)

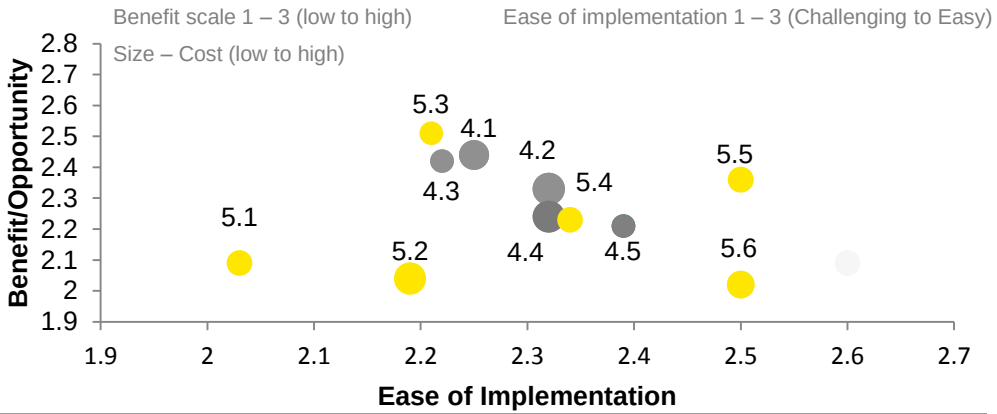
Size – Cost (low to high)

Recommended Options
Secondary Recommendations

	Initiatives	Associated activities
4	**Enhance monitoring capabilities for safe driving behaviour**	4.1 Review administrative duties that do not require supervisor`s expertise 4.2 Retrofit on-board monitoring/coaching devices 4.3 Include safe operating and driving behaviour assessment as part of the daily monitoring on the drivers 4.4 Identifying drivers for refresher vehicle and route training 4.5 Create driver notes to identify high risk areas and times
5	**Implement safety-related process improvements**	5.1 Require school safety practice from Contractors responsible for school pick-up 5.2 Review school pick-up to ensure they have the safest collection points 5.3 Review right hand drive Standard Operating Procedures 5.4 Detailed review of policies/procedures from a pedestrian/cyclist safety perspective is required prior to accepting new services 5.5 Review additional safety approaches surrounding the automated arms 5.6 Ensure there are uniform features for a particular vehicle type

These secondary recommendations are based on the following factors:

- Initiatives that are expected to be quick/easy to implement and will deliver quantifiable benefits
- They address existing gaps within specific parts of the current operations
- The associated activities can be handled within existing roles and responsibilities of the City
- These initiatives target continuous improvements to operations



Recommended Options
Timeline

	Initiatives	Immediate		Near-term		Mid-term				Long-term		
		4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	3Y	4Y	5Y
		14	15	15	15	15	16	16	16	17	18	19
1	Build public safety into the culture, mission and strategy of SWMS operations											
2	Implement a detailed pedestrian accident analysis and risk management program											
3	Educate the community											
4	Enhance monitoring capabilities for safe driving behaviour											
5	Implement safety-related process improvements											

- Timeline indicates implementation and does not include the on-going review and implementation processes
- Timeline is based on all options that make up each initiative
- These timelines are estimated and actual time frame of project may vary

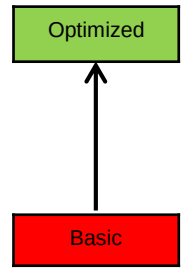
Recommended Options 1.1

Create a public safety mission statement and strategy to ensure public safety is an aspect that is incorporated into the culture and tone of SWMS

Gap	Risk Exposure	Benefits	Constraints
E3 - No visible commitment from leadership to ensure pubic safety is paramount	• No leadership results in no movement • Efforts towards public safety remain obscure • Does not show the dedication that exists • Does not illustrate accountability for holding public safety as a strategy for operations	• Focused and defined effort towards safe operations in the public space • Leadership and tone from the top • Shifts attitudes towards achieving a desired goal • Fits within the existing strategies	• Even though efforts are driven by the SWMS, public safety should be a City wide endeavor • Will need to have measurable indicators, such as accidents analysis and risk management, to ensure that efforts are heading in a positive direction

Action Items	Participants
1.1.1 Develop and implement a public safety mission statement	(Corporate) City of Toronto SWMS Fleet
1.1.2 Promote new mission statement	
1.1.3 Develop process for assessing efforts in reducing accidents with pedestrians/cyclists	

Implementation Costs	**Low - Medium**
Initial	3 months of effort
Communication costs	Cost benefit will need to be done on public campaign
On-going	One month of effort annually



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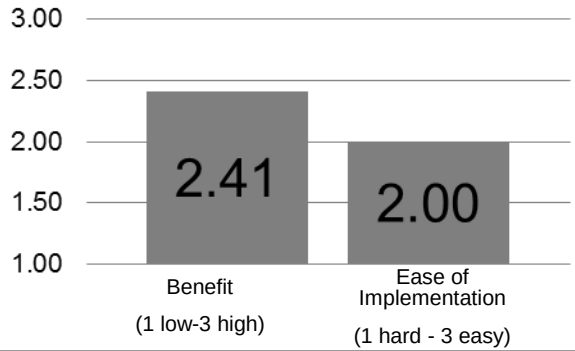


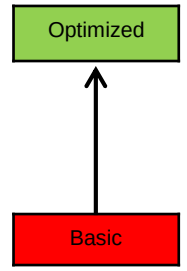
Recommended Options 1.2

Create a dedicated role/committee to champion public safety

Gap	Risk Exposure	Benefits	Constraints
B4 – No committee assigned formally to be accountable for public safety	• Current governance structure fails to enable management of public safety • The information available with respect to public safety risks is not centrally understood and there is a lack of authority to identify and implement improvements • Individual efforts of drivers are not sufficient to make organizational changes • Public and City are not working together towards a solution	• Right level of governance empowered to make significant changes • Public representative can provide the public's position • Allows focus to be on an entire operational level and big picture changes rather than only bandage solutions at the individual driver level • Constant monitoring and sharing of best practices within the City	• Even though efforts are driven by the SWMS, public safety should be a City wide endeavor • Will need to have measurable indicator, such as accidents analysis and risk management, to ensure that efforts are heading in a positive direction

Action Items	Participants
1.2.1 Bring leadership together	SWMS, Fleet, HR Corporate, Other City divisions PSC
1.2.2 Develop the charter for the public safety committee/role	
1.2.3 Hold Public safety committee meetings	

Costs	**Low**
Initial	EE Time - Existing Role
On-going	Meetings, dependant on frequency



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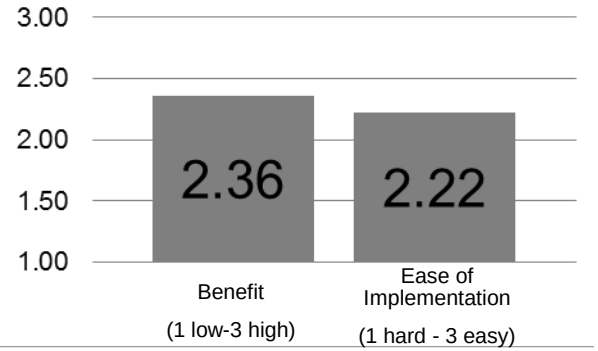


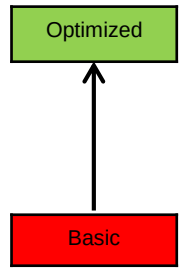
Recommended Options 1.3

Incorporate safe driving into the existing rewards and recognition program

Gap	Risk Exposure	Benefits	Constraints
A3/B1 - No recognition for safe driving behaviour	Disciplinary action only without recognition programs for positive behaviour decreases morale Decreased morale will not promote safer behaviour	• Reinforce good behaviour • Recognition for safety efforts helps morale • Rewards provide incentives for everyone to perform better • Rewards do not have to be large	• Not everyone is incentivized by rewards • Determining eligibility of reward will be a challenge • May be difficult to find the right reward that motivates a driver

Action Items	Participants
1.3.1 Define Criteria for eligibility, thresholds for recognition, and awards	SWMS, Fleet, HR
1.3.2 Determine process for reward recognition	
1.3.3 Incorporate into existing performance measures of the employee	
1.3.4 Implement the reward and recognition program and assign responsibilities	
1.3.5 Continuously improve safety reward and recognition	

Costs	**Low**
Initial set up	6 months of effort
On-going	One month of effort annually
Awards Gift Annual lunch/ ceremony	$ 2,000 – 5,000 annually



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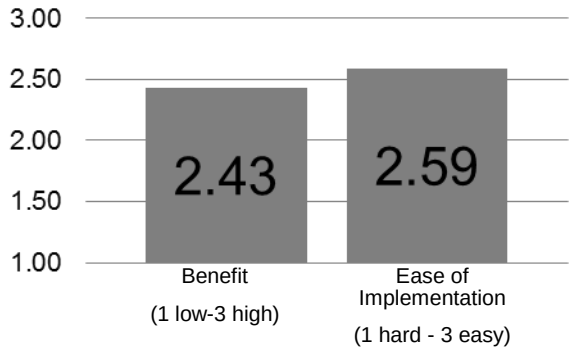


Recommended Options 2.1

Integrate the use of detailed accident analysis to effectively mitigate risks by understanding root causes of accidents and address them with an informed approach

Gap	Risk Exposure	Benefits	Constraints
A9 – Accidents are only reviewed at an individual driver level to determine blame. Accidents reviewed at a higher level are for the purposes of CVOR only	• Accident analysis does not focus on root cause therefore cannot determine a mitigation factor beyond driver punishment • Focus on driver blame does not address accidents that were not preventable by driver. Only 50% of accidents/incidents were considered driver at fault • Limited access to specific pedestrian/cyclist incidents for SWMS makes it difficult for SWMS to make informed decisions • Without focus on incident prevention beyond driver discipline, the City does not take accountability for reducing risks	• Identifies cause thereby allowing for divisions to make informed decisions at an operational level • Allows accident/incident information to be used as measurement or performance indicators of initiatives • Can focus specifically on pedestrian/cyclist incidents • Addresses all accidents/incidents including those where the driver is not at fault • Analysis can assist public outreach programs, vehicle procurement and design and enhancing training and operational procedures • Can benefit from existing accident analysis performed in other City divisions • Facts can demystify misconception and provide more substantial support	• Information is only useful if the user is empowered to make changes and is mandated to use this information as part of their decision making • Many sources of information exist but may take time to determine how to collect and store in a central location • Must be an on-going and fluid data set to continuously reap benefits of the knowledge

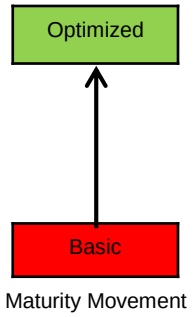
Action Items	Participants
2.1.1 Engage Senior Leadership in the City	Fleet, Traffic Services, SWMS PSC, HR
2.1.2 Add policies and procedures to report detailed incidents/accidents, specifically identifying those that involve pedestrians or cyclist	
2.1.3 Require pedestrian/cyclist accident information to be reviewed as part of making significant changes to operations or vehicles	
2.1.4 Require follow up review on significant changes to operations or vehicles, by review of accident information	
2.1.5 Develop a process for Supervisors to properly identify and classify near misses	
2.1.6 Report and monitor of near misses, incidents and accidents involving pedestrians and cyclists	

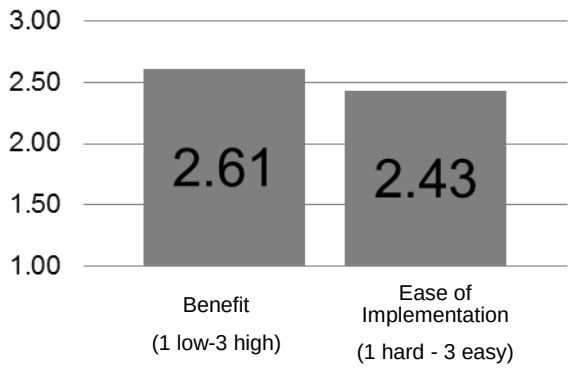
Recommended Options 2.1

Integrate the use of detailed accident analysis to effectively mitigate risks by understanding root causes of accidents and address them with an informed approach (continued)

Action Items	Participants
2.1.7 Share accident information with key stakeholders and assign follow up actions	Fleet, Traffic Services, SWMS PSC, HR
2.1.8 Public Safety Committee is mandated to monitor risks and drive improvements and determine root causes	
2.1.9 Determine the most effective way to align data from all sources of accident/incident information	
2.1.10 Add accident monitoring to development and performance maps	

Costs	**Low**
Initial set up	6 months of effort
On-going	Existing roles





Recommended Options 3.1

Develop an outreach campaign to educate the public on garbage truck operation and how to be safe around them

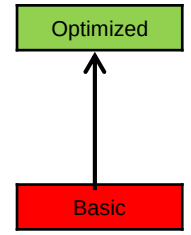
Gap	Risk Exposure	Benefits	Constraints
B2/ B3 - The general public is not sufficiently aware of safety risks in relation to waste collection operations and the equipment used A16 - SWCO and SWMS lack sufficient tools to engage the general public on the topic of safety D5 - Automated Arm - There is currently no identification to the public on how far, fast or when the automatic arm is protruded D4 - All Trucks with rear cameras. There is a small angle with all the trucks that are completely out of view from driver, therefore sensors become extremely important	• Public is misinformed on the ways to reduce their own risk while around garbage vehicles • Public misunderstands driver blind spots and regular operation of vehicles • Distracted pedestrians are an increasing risk • Pedestrians and drivers decisions do not align with each other resulting in increased risk • Small children run greater risks as they are less visible to the driver	• Builds a cooperative relationship with the Community and SWMS • Public is aware of the new way that SWMS operates and the vehicles that they are using • Clarification of pedestrian and driver behaviour to avoid accidents • Public can make proper decisions to avoid accidents • Can teach children how to safely handle situations when they encounter a SWMS vehicle with school demonstrations	• City is large and there needs to be a cost benefit on the number of outreach campaigns • Will require pulling trucks out of service during these times • This campaign needs to be at least annually performed as the City and its residents are constantly changing. The challenge will be devising a plan that can be sustained

Action Items	Participants
3.1.1 Engage senior leadership in the City	SWMS, Corporate, Fleet
3.1.2 Define the goals and objectives and success indicators of the campaign	
3.1.3 Determine the desired interactions between pedestrians/cyclists/children. Aligning policies to clarify the actions of City drivers when encountering another party	
3.1.4 Cost/benefit options on achieving the goals and objectives	
3.1.5 Prepare and initiate campaign	
3.1.6 Assess success of campaign, modify and improve for next campaign	

Recommended Options 3.1

Develop an outreach campaign to educate the public on garbage truck operation and how to be safe around them (continued)

Costs	High
• Event includes costs of trucks and drivers off the road • Publicity costs • Increases with the increased number of events around the City	Depending on extent of campaign



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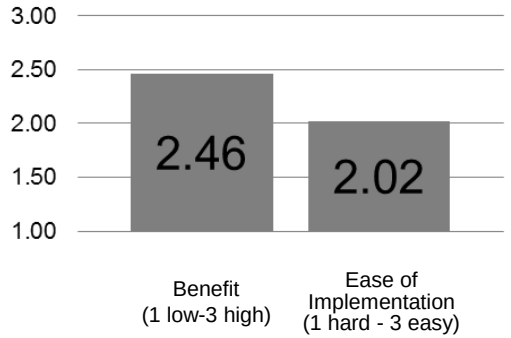


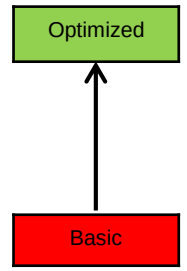
Recommended Options 4.1

Review administrative duties that do not require supervisor`s expertise

Gap	Risk Exposure	Benefits	Constraints
A1 - Supervisors may not have sufficient time on the road to monitor their staff due to the burden of office-based administrative duties	• Drivers may not have the same level of effort or care when they know they are not being monitored • Supervisors are performing tasks that can be performed by a lower level • Supervisors are taken from their duties of performing adequate number of Field Safety Checks used for compliance with MTO and CVOR requirements	• Increased visibility of Supervisor by drivers therefore increases the effort and care of drivers • Increased time allocated to more effective monitoring	• May require an addition FTE • May require involvement of different divisions • Supervisors will still need the tools to be able to monitor effectively • Supervisors still cannot be everywhere at one time

Action Items	Participants
4.1.1 Rank supervisor duties based on level of expertise required for completion and identify administrative duties that may be allocated to other levels	SWMS, Other Divisions / HR
4.1.2 Identify individuals/roles that may take on the additional administrative duties	
4.1.3 Implement changes to relevant roles, and responsibilities	

Costs	**Low to Medium**
Initial set up	3 months of effort
On-going	Additional FTE



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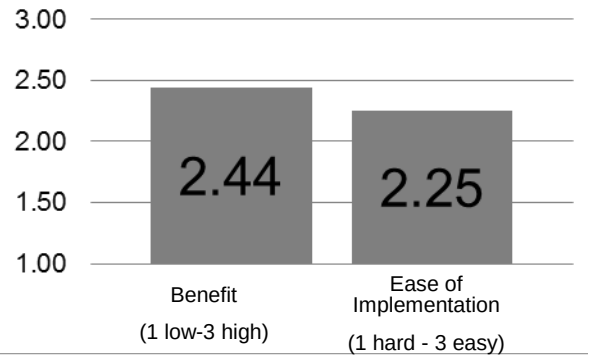


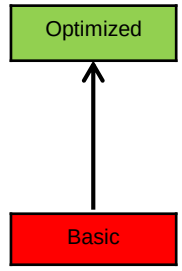
Recommended Options 4.2

Retrofit on-board monitoring/coaching devices

Gap	Risk Exposure	Benefits	Constraints
A1 - Supervisors may not have sufficient time on the road to monitor their staff due office-based administrative duties A9 - Accidents are only reviewed at an individual driver level to determine fault. Accidents reviewed at a higher level are for the purposes of CVOR only A24 – Unable to continuously monitor the activity of their drivers A27 –No information provided to drivers through maps or notes regarding high risk areas and unique route situation A29 – There is no way of knowing where the vehicles are located between collections and yards	• Inaccurate understanding of the situation and factors that cause an accident/incident, the solutions used may be misdirected • Some individuals do not work at optimal levels if they are not being monitored • Often the understanding of a situation is currently based only on potentially conflicting stories as no hard facts are available • Lack of information about accidents or near misses can lead to unsupported decisions	• Continuous monitoring and collection of data for accidents • Can also collect near miss data which is difficult to ascertain • Informational is factual and can be used for other purposes such as customer service	• Overwhelming amount of data make it difficult to retrieve valuable data • Additional devices can be distracting for the driver • Drivers taking more time to interact with the system will take away from their primary duties, extending working hours • As this is a long time frame, other options should be considered in the short term to address the risks immediately

Action Items	Participants
4.2.1 Research GPS tracking and in-cab recording options/technologies currently available in the marketplace	Fleet, IT, SWMS, PSC
4.2.2 Determine the existing capabilities of the City to support on-board monitoring or GPS style devices and costs of integration	
4.2.3 Assess the requirements of the information into the other public safety initiatives	
4.2.4 Analyze, assess and recommend options	
4.2.5 Run pilot project	
4.2.6 Run full project	

Costs	**Medium to High**
Initial set up	IT supporting infrastructure and significant time to cost/benefit options
On-going	Maintaining system



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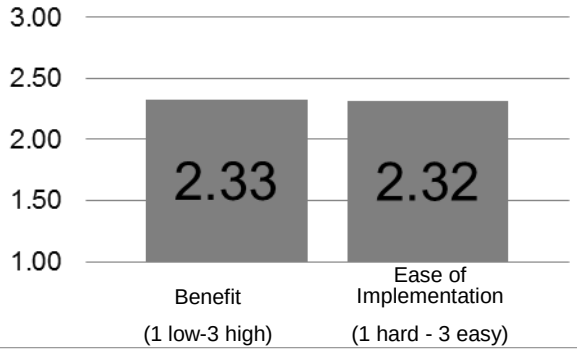


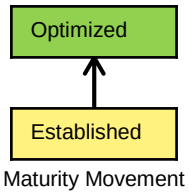
Recommended Options 4.3

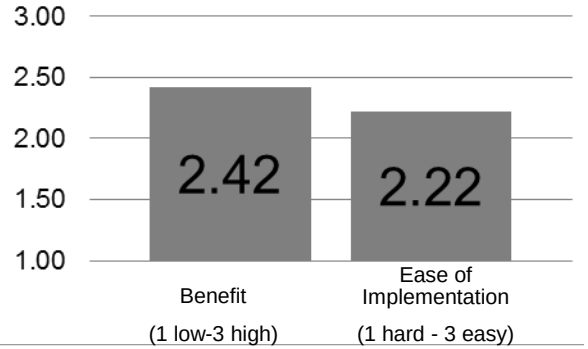
Include safe operating and driving behaviour assessment as part of the daily monitoring on the drivers

Gap	Risk Exposure	Benefits	Constraints
A7 - Monitoring of safe driver behaviour is not formally conducted or documented on supervisors' Field Safety Forms or Fleet Services spot check forms A10 - Contractor monitoring forms do not consistently require that SWMS personnel comment on safe driver behaviour A17 - Contractor leads and SWMS supervisors are not formally trained on how to monitor safety practices of contractors and their drivers	• Without formal monitoring of safe driving behaviour, performance improvements are unlikely to be sustained by SWMS/Fleet as an operation • Inconsistent monitoring templates may lead to unidentified risks • Lack of formal monitoring hinders SWMS's ability to ensure contractors' compliance with current and potential future safety policies	• Focuses on the driver behaviours and operating that are dangerous to pedestrians/cyclists • Clarifies expectations on drivers and supports the dedication to pedestrian/cyclist safety • Formalized process adds accountability to SWMS and Fleet for the safety of the public through the monitoring of their drivers	• Drivers will usually act on their best behaviour when they know they are being watched. This process may not capture any unsatisfactory behaviour • Monitoring capabilities need to be weighed with the drivers abilities to perform their tasks • Will be a continuous learning curve on what constitutes proper/good driving behaviour and collection operation

Action Items	Participants
4.3.1 Identify factors to be observed to help reduce unsafe driving/operating behaviours that could result in accidents/incidents with pedestrians/cyclists	SWMS, Fleet, HR
4.3.2 Amend or create documentation to support ongoing monitoring process	
4.3.3 Determine the monitoring procedures for safe driving/operating behaviour	
4.3.4 Train supervisors/project leads on how to monitor safe operations and driver behaviour	
4.3.5 Link monitoring process to impact performance reviews for both the driver and those that are monitoring	

Costs	**Low to Medium**
Initial set up	3 months of effort
On-going	Additional FTE





Recommended Options 4.4

Identifying drivers for refresher vehicle and route training

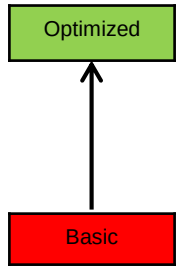
Gap	Risk Exposure	Benefits	Constraints
A13 – Beyond initial testing requirements, no further driver, vehicle or route training is required unless for disciplinary purposes A14 - There are no regularly scheduled refresher courses on vehicles unless a new truck comes into the fleet or there is disciplinary action A18 – SWCO are licenced to drive many different models and types of equipment. However, their familiarity is not necessarily equal or current with each of the models or types Supervisors do not have a formal way of knowing which routes an operator has experience with or, more importantly, those with which the operator has no experience. There is no immediate information available for a supervisor to determine the familiarity of a driver with a particular vehicle model	• The various types of collection vehicles, rear loading, side loading and automated loaders require different safety precautions • Within any type of collection vehicle, there are various models within the fleet that have different designs that have different sight lines and blind spots • The longer a driver becomes unfamiliar with equipment the greater risks they could have in operating the equipment safely • Other factors over the years, such as physical mobility, bad habits, and change in work habits, can change a driver into a risker driver and operator • Without sufficient knowledge, supervisors can not manage this risk when reallocating drivers • New drivers could be taught poor habits or fail to retain information from their initial training	• A way of proactively ensuring that driver's vehicle knowledge and operation are current • Preventative action rather than waiting for accident/incident to occur and disciplinary action to be recommended • Reduces the risk of vehicle unfamiliarity • Allows for a way to ensure high risk drivers have been retrained successfully or training retained • Allows drivers to have direct training of the vastly different neighborhoods in Toronto that require different attention • Regular assessment could be part of field spot checks • This recommendation can help ensure new drivers retain information and received top quality training and be retrained before these poor habits manifest	• Retraining of a driver requires the driver to be pulled from his regular route. The rest of the staff will have to accommodate • It may be difficult to determine the frequency or requirement for these assessments to be effective • If using an assessment method for determining retraining, spot checks may still not identify bad drive as most drivers will be on their best behaviour if they know the are being watched • May be difficult to obtain the necessary information to determine when a driver is a higher risk due to unfamiliarity of vehicle or route

Recommended Options 4.4

Identifying drivers for refresher vehicle and route training (continued)

Action Items	Participants
4.4.1 Bring required divisional leadership together	Fleet, SWMS, HR
4.4.2 Determine the criteria for setting schedule or regular assessment of drivers	
4.4.3 Based on criteria developed on when to assess drivers, determine how to obtain information	
4.4.4 Incorporate driver assessments into individual driver abstracts	
4.4.5 Develop method of assessment and implementation	

Costs	**Low to Medium**
Initial set up	3 months of effort
On-going	Time off for retraining



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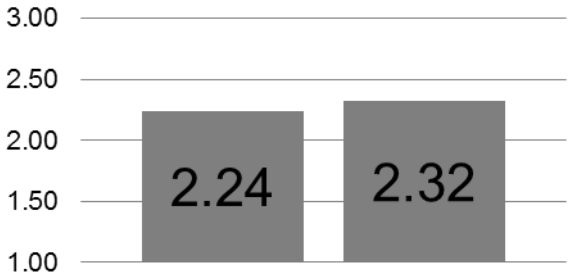


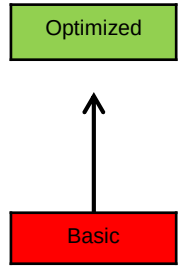
Recommended Options 4.5

Create driver notes for identified high risk areas and times

Gap	Risk Exposure	Benefits	Constraints
A19 – No formal way of relaying information between drivers and between drivers and supervisors with respect to high risk pick-ups that require awkward maneuvers A27 – Current maps don't provide details on landmarks that could be high risk areas, such as schools, churches, etc. A28 – There is no formal process for updating maps with non-temporary changes	• Drivers may not express to other drivers difficulties or challenges that they have experience on specific routes. If various drivers are assigned to a route throughout the year, the learning curve starts over again with each new driver • Supervisors rely heavily on their memory to recall all of the situations that they know of and relay back to the new driver when they are allocating their routes • No learned lessons passed on	• Notes can easily be referred to by the Supervisors for accurate recollection of notes for any particular pick-up • Notes can be easily updated on a daily basis by supervisors' interaction with drivers and ready for the following day • Notes can also provide evidence and reminders for situations that require a larger solution beyond the driver • Can bring about a more efficient approach to routing	• Only as effective as the notes that are provided. This may currently be limited to identify special type of pick-up • Need to brainstorm the information that is useful to the drivers to caution them around high pedestrian areas • Cooperation from schools and other local organizations can help provide important information about school fairs, charity events and other local events

Action Items	Participants
4.5.1 Consider additional safety information to be added to driver maps	SWMS, Traffic Services, IT
4.5.2 Review current available GIS data to augment driver-maps or ability to add notes to daily runs	
4.5.3 Test sample one division before incorporating into both divisions	

Costs	**Low**
Initial set up	3 months of effort
On-going	Minimal



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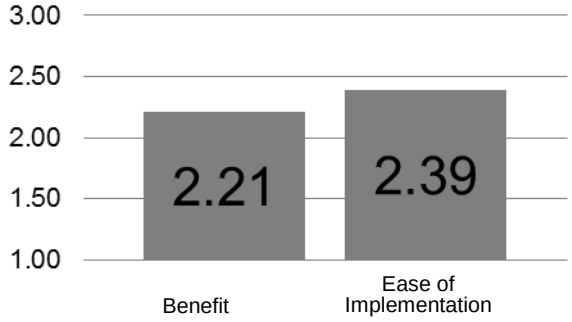


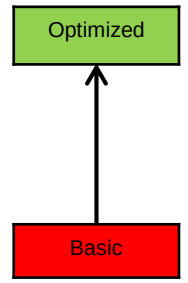
Recommended Options 5.1

Require school safety practice from Contractors responsible for school pick-up

Gap	Risk Exposure	Benefits	Constraints
A11 - There is currently no requirement in the RFP or the associated contracts responsible for school pick-up, to have a comprehensive safety policy and procedures for such a task	• Contractors are responsible for their own operations, including how they address public safety. Their approach may differ the City's • Contract only allows City to manage what is within the contract which does not include the way the Contractor operates • Contractors may not have sufficient school pick-up policies that they can be accountable for	• Standard can be set at the level that exists with current contractor • Links contractor compliance to the contract to public safety • Can include penalties for non-compliance or poor performance • Both the City and the Contractor are monitoring this high risk area	• May not be able to adjust existing contract • Will require negotiations between the City and the Contractor regarding who will monitor their staff frequently for these procedures • By Contract, it is the Contractor's responsibility to handle their operations. The more requirements placed on contractors may increase push back from the contractor or fees for renewed Contracts

Action Items	Participants
5.1.1 Develop the revised contract criteria	SWMS, Corporate
5.1.2 Revise the RFP process	
5.1.3 Require Accident Analysis and Risk Management from Contractors	

Costs	**Low**
Initial	Under 3 months of time
Ongoing	Under 3 months of time



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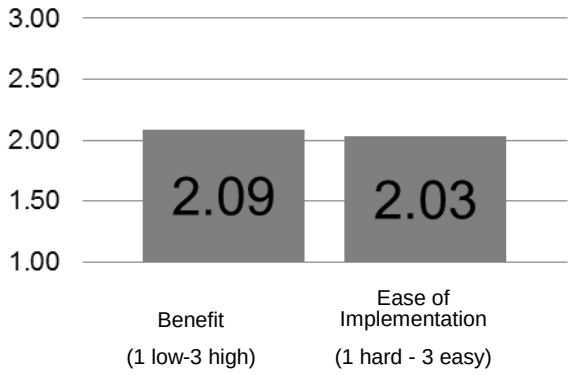


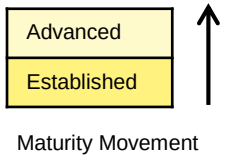
Recommended Options 5.2

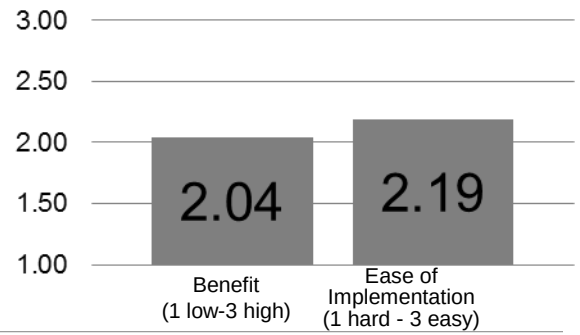
Review school pick-up to ensure they have the safest collection points

Gap	Risk Exposure	Benefits	Constraints
A12 –A detailed review of individual sites is infrequently undertaken for vehicle suitability; a “common-to-all” solution is applied	• School pick-ups have high risk potential • Unsuitable bin placement and type force potentially unsafe maneuvers by garbage vehicle • There are no procedures set for these high risk situations and awkward maneuvers	• Choosing the safest pick-up point for each school mitigates the risks more effectively • Provides guidance to drivers and schools to mitigate risks when the safest pick-up point still has a high risk factor • No issue with respect to Contract of front load pick-up	• May have resistance of bin location due to other prioritized factors • Due to some school configurations the best option still has high risk

Action Items	Participants
5.2.1 Engage contractors and school boards	SWMS, Schools / School Board, Contractors
5.2.2 Assess the current school pick-up points	
5.2.3 Implement identified alternatives	
5.2.4 Continuous monitoring of schools for adherence and risk level	

Costs	**Low**
Initial assessments	3 months of time
Changing pick-up type (changing bins and switching routes)	Most are Contracted, however, if moved it would go back to the City
On-going	Minimal expected as there are not many that would switch from front load pick-up





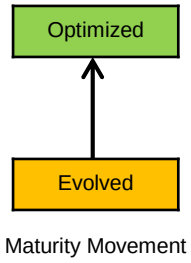
Recommended Options 5.3

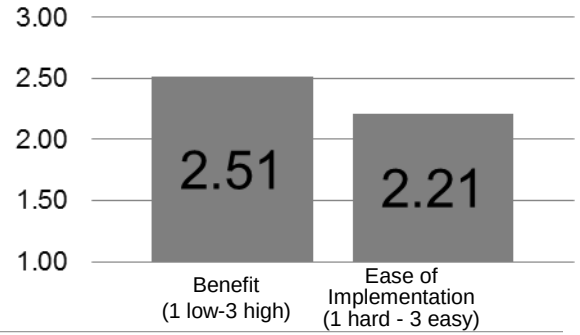
Review right-hand drive Standard Operating Procedures

Gap	Risk Exposure	Benefits	Constraints
E1 – Policy is silent on when a driver can make a left hand turn while operating from the right side and what defines house-to-house collection	• Vague policies lead to misinterpretation • City vehicles operate on all types of roads, therefore, house-to-house collection is not a valid policy for all operators	• Clarified procedures are easier to follow and enforce • Helps add another mitigating factor to RHD vehicles	• Increasing policy must be balanced with operational effectiveness • It is only a formalization of policy, however, individuals may already have safe behaviour

Action Items	Participants
5.3.1 Review RHD Standard Operating Procedures to include a distance factor and specific left-hand turns situations	SWMS, Fleet Services

Costs	**Low**
Initial assessments and policy amendments	3 months of time





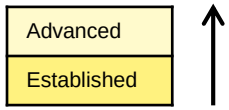
Recommended Options 5.4

Detailed review of policies/procedures from a pedestrian/cyclist safety perspective is required prior to accepting new services

Gap	Risk Exposure	Benefits	Constraints
A15 – New duties are transferred from other divisions without sufficient assessment of safety protocols (if any) to the public	• High risk level due to lack of knowledge of procedures and safety risks • Unknown risks of other departments are assumed by SWMS without assessing it to meet SWMS standards	• Assesses risks prior to accepting them • Initiation of mitigating processes and procedures at the same time SWMS begins new service • Can initiate the safety assessment for pedestrian/cyclist safety perspective • Utilize accident information from other divisions	• Other departments may not appreciate the delay of transferring services • Other divisions may or may not have detailed accident/incident information

Action Items	Participants
5.4.1 Ensure this process is part of any new service that is incorporated into SWMS	Fleet Services, SWMS

Costs	Low
Initiate or on-going	3 months of Time



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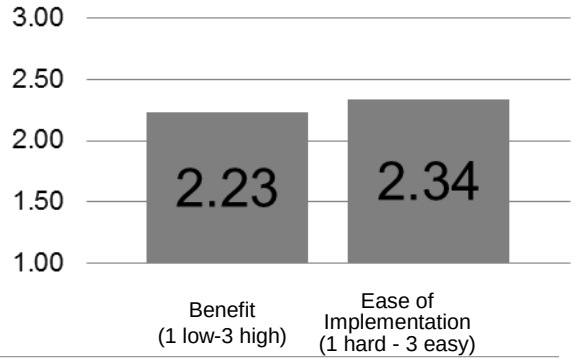


Recommended Options 5.5

Review additional safety approaches surrounding the automated arms

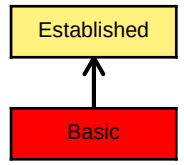
Gap	Risk Exposure	Benefits	Constraints
A4 – Seated automated side loaders are not physically able to warn pedestrians from approaching the arm A20 – As vehicles can move while operating the arm, the driver is only focused on one operation but not both A21 - Automated vehicles do not have a warning system (e.g., lights, audible noise) to notify surrounding individuals that the loading arm is in operation D3 - Although Cab-over trucks allow for increased visibility in front of the truck, it actually has significant decreased visibility on the opposite side as the trucks tend to be longer and the drivers visual sight starts right from the front side of the truck. Driver must use mirrors to be able to see the entire opposite side of the truck when operating. With standing right-hand drive, the visibility decreases significantly D5 - Automated Arm - There is currently no identification to the public on how far, fast or when the automatic arm is protruded D5 - Trucks with Cabs. The convex mirrors allow the driver to see directly in-front of the truck. However, within a few feet out there is a blind spot where the driver will not be able to see anything that is shorter than the height of the engine. Small children in front of the trucks will not be seen prior to moving forward	• Distracted pedestrians can be hit by automated arm • Pedestrians that don't understand how the automated arm works can put themselves in harm's way • Drivers are not given instruction on how to deal with pedestrians that approach the arm during operation • Moving forward and operating poses all the risks associated with both actions • Slight differences between models creates unfamiliarity with visibility issues • Drivers choose how to deal with pedestrians in their own manner rather than a on policy directed manner	• Provides explicit instructions to drivers to guide pedestrians from injury • Provides an alternative risk mitigation away from driver who is already focused on multiple tasks • Brings awareness to pedestrians operation in progress • Clarifies any operational ambiguities	• Additional noises may cause customer complaints • Additional features could be costly • Additional signs and noises still may not be acknowledged by distracted pedestrians • This solution is only specific to automated arms as it appeared to be the riskier and newest equipment for SWMS. However, this type of review should exist for all new equipment/vehicles that are introduced to SWMS • The solutions may not immediately result in an optimized state as there may be trial and error with options to land on a balanced approach

Recommended Options 5.5

Review additional safety approaches surrounding the automated arms (continued)

Action Items	Participants
5.5.1 Understand the factors that caused accident/incident with automated arms	Fleet Services, SWMS
5.5.2 Develop options to mitigate the risks identified and perform cost/benefit analysis	
5.5.3 Finalize and develop risk mitigation measures	

Costs	**Med to High**
Initial Research	9 months of time
Implementation	Will require training and equipment depending on option taken
On-going	Regular maintenance



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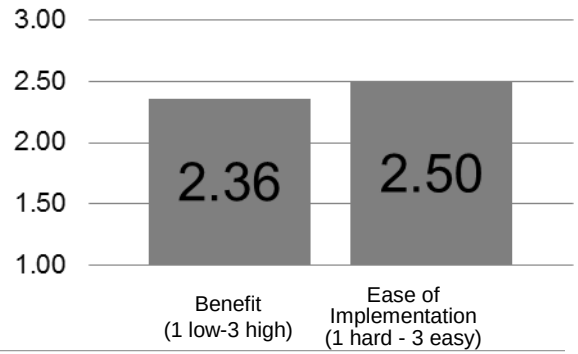


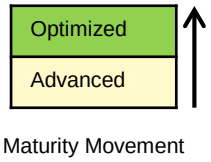
Recommended Options 5.6

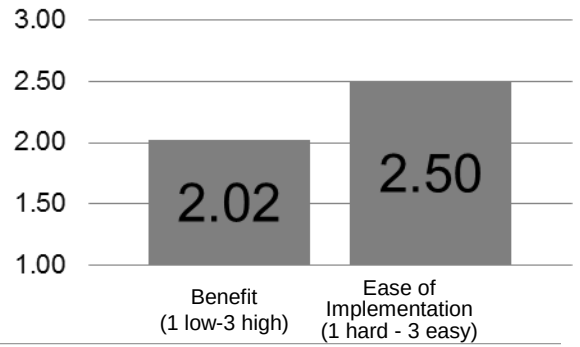
Ensure there are uniform features for a particular vehicle type

Gap	Risk Exposure	Benefits	Constraints
D1 - Acterra model rear loading (Class 8) . Only vehicle that has no rear camera and dead brakes or back-up sensors, or motion sensors D2 - Side Loading Packers. Only the LEU613 has a curb-side camera. Inconsistencies with model features may result in lack of safety behavior when placed on an unfamiliar model	• Rely heavily on the second crew member • Backing up is the most common incident/accident • Inconsistent features on vehicles can create risk due to the learning curve time to be familiarized with switching between vehicles with or without camera features	• Rear camera protects both the employee and the public • Ensures that all vehicles have the same high level of safety features • Reduces the variation of driver operating habits	• Even with rear camera there is still a small field that is not visible to the driver • May be difficult to mount due to configuration of the trucks • Additional visual may be a distraction to the driver or result in the driver only focusing on rear camera

Action Items	Participants
5.6.1 Identify vehicles without rear camera system or curb-side cameras that are in the same licence class as others that do	Fleet, SWMS
5.6.2 Procure and install cameras	
5.6.3 Train employees on new device	

Costs	Low to Medium
Initial Assessment	3 months of time
Installation of cameras on trucks	Trucks will have to be pulled off the road during this time And cost of cameras ($1-2K per unit)
Training	Trucks and drivers will have to be pulled off the road during this time





Appendices

Appendix A
Interviews Conducted and Ride-alongs

Solid Waste Management Services	
John Ioannou	*Manager, Daytime Operations*
Lisa Duncan	*Manager (Acting), Litter Operations*
Dennis Lam	*Manager (Acting), Night Collection and Parks*
Nick Nippalow	*General Supervisor (Acting)Night Collection and Parks*
Jesse Redditt	*Research Analyst*
Harpreet Singh	*Research Analyst*
Frank Canestraro	*Special Projects*
Gilbert Siu	*Manager, Customer Service & Waste Diversion Implementation*
Annette Synowiec	*Manager (Acting), Customer Service & Waste Diversion Implementation*
Grant James	*Manager (Acting), Contracted Services*
Ralph Butera	*General Supervisor, Contracted Services*
Emily LeBlanc	*Supervisor, Contracted Services*
Desmond Amos	*Supervisor, Contracted Services*
Neil Brown	*Manager (Acting), Haulage*
Grace Maione	*Manager, Transfer Stations*
Garvin Williams	*Manager, Environmental H&S Compliance*
Ride –alongs	
Rob Orpin	*Director, Collections and Litter Operations SWMS*
Emily LeBlanc	*Supervisor, Contracted Services*
Charlotte Ueta	*Project Lead, Customer Service and Waste Diversion Implementation*
Keith LeBlanc	*Supervisor, District 4*
Frank Sguigna	*Supervisor, District 3*
Suthakaran Kasilingam	*Project Lead, Contracted Services*
Americo Pacitto	*Project Lead, Contracted Services*
Sam Attardi	*Supervisor, Litter Operations*
Steven Ross	*Supervisor, Nights*
Carson Wiseman	*Supervisor, Parks*
Todd Laggault	*Route Supervisor*

HR OH&S Disability Management	
Dan Gingras	*Manager, Occupation H&S/Disability Management*
Ali Golbabai	*Senior HR Consultant, Occupation H&S/Disability Management*
Tamiko Matsumoto	*HR Ergonomics Consultant, Occupation H&S/Disability Management*
Fleet Services	
Lloyd Brierley	Director, Fleet Services
Sarah Gingrich	*Manager, Fleet Services*
Mark Coates	*Fleet Safety & Education Consultants*
Vukadin Lalovic	*Manager, Fleet Asset*
Transportation Services	
Myles Currie	*Director, Traffic Management Centre*
Sheldon Koo	*Senior Traffic Safety Engineer, Traffic Management Centre*
Miller Waste	
Gord Allen	*District Maintenance Manager*
Todd Laggault	*Route Supervisor*
Colin Easson	*Manager, City of Toronto Contract*
Chris Lobo	*Safety and Training Specialist*
GFL	
Brian Kent	*Manager, City of Toronto Contract*

Note: All positions as at the date of this report

Appendix B
Documents Reviewed

Solid Waste Management Services

- 2013 OCCUPATIONAL HEALTH & SAFETY REPORT - multiple divisions, including SWM
- All 311 operator calls for the past 2 years
- AUDITOR GENERAL'S REPORT - District 2 Curbside Collection Contract – Review of Cost Savings and Opportunities for Improving Contract Monitoring
- BREAKDOWN OF CVOR POINTS 2009 - 2013
- City's Requirements for Waste Collection Services for New Developments and Redevelopments (rev. May 2012)
- Cluster B safe working procedure around reporting critical incidents (and other policies additional to the standard City-wide one)
- Complaint form
- Compliance Spot Check Form (Vehicle/Driver)
- Copy of Memos for tailgate, and Crew Audits
- Details the attendance program
- Driver's Collision/Incident Report (Sample)
- Example of meeting minutes and actions tracker for Central Divisional JHSC
- FINAL MEMORANDUM OF SETTLEMENT - Article 7 Wages
- Instructions for filling out collision incident reports
- Memoranda of Settlement – Canadian Union of Public Employees (CUPE), Local 79 and the City of Toronto, Full-Time Unit and Part-Time Unit B
- Memorandum of Agreement - SWMS and Toronto Civic Employees' Union, Local 416 Re: 4x10hr day work week
- On-road compliance monitoring: DISTRICT 1 AND 2 CONTRACT MANAGEMENT - DAILY REPORT
- Organizational Structure of the SWMS operation
- Quotation Request - 6033-14-3004 - Special Collection Services. Service Delivery Requirements for District 1. Outlines responsibilities for the upcoming RFQ
- Requested filtered information of injuries reported on the Supervisor injury Report
- RFQ for collection, transportation and off-loading for multi-res, CIROs and ABCD (Sept 2011)
- RFQ for collection, transportation and off-loading of waste (July 2007) single family and apartment
- School Zone Safety Strategy - pedestrian traffic zones and safety
- Solid Waste Curbside Collection, District 2 Contract Monitoring Plan
- Solid Waste Management Accident Summary (2012 - 2014)
- Solid Waste Management Services, Collection Operations Quarterly Report – October to December, 2013
- Supervisor's Report of Injury/Incident
- SWMS Incident tracking sheet, by yard since Oct. 2013
- SWMS OCCUPATIONAL HEALTH AND SAFETY AUDIT REPORT (PHASE 1) - Nov 2007
- SWMS recommended 2014 capital and operating budgets
- TERMS OF REFERENCE FOR THE STRUCTURE AND FUNCTION OF JOINT HEALTH AND SAFETY COMMITTEES

Appendix B
Documents Reviewed (continued)

Solid Waste Management Services (continued)

- TORONTO MUNICIPAL CODE - CHAPTER 844, WASTE COLLECTION, RESIDENTIAL PROPERTIES
- Truck Daily Pre-trip Inspection Report
- RouteSmart Training Workbook
- RouteSmart Centerline and Customers information Inputs
- Routing Information (Customer Specific, i.e. D3, D4, Parks, Nights, Litter Operations)
- City Driver's Manual
- City Supervisor Development Map
- Collection - Health and Safety In-Service Training Presentation
- Environment Day - Customer Service - Health and Safety In-Service Training Presentation
- Fleet Safety policy
- Litter - Health and Safety In-Service Training Presentation
- SWMS Safe Working Procedures
- Customer Feedback Survey
- Details of the RFP for the last equipment Parks collection vehicles
- Fleet Asset Business Case – Organic Packer
- List of SMWS Trucks and Equipment
- SWMS Divisional Central Committee Meeting Minutes for March 20, 2014
- Vehicle Purchase Process Flow Chart

Miller Waste

- Employee's report of accident/incident/injury form
- Miller Waste Safety Policy; Safety Rules and Operational Procedures manual
- Pre-trip inspection sheet
- Safety Lead observation report
- Vehicle Inspection and Road Observation Report
- Sample Route Schedule
- Daily Training Sheets for new drivers and new hire checklist
- Safety Lead observation report
- Supervisor Due Diligence Training and Self Evaluation
- Training record entry form – description of training performed
- List of City Contract Fleet

Appendix C
Survey Questions

Ref.	Question
10.1	Who do you think is responsible for ensuring the public's safety while you are performing day-to-day work?
10.2	Rank the activities least likely (1) to most likely (5), to cause an accident with a pedestrian
10.3	Rank the operations from least likely (1) to most likely (5) to cause an accident with a pedestrian.
10.4	What factor do you think is the main reason for accidents (choose one)?
10.5	What type of "near misses" do you hear about the most? (Please select one)
10.6	Do you feel that the SWMS policies and procedures adequately address safety to the general public
10.7	In the past two years, approximately how many "near misses" have you had with pedestrians, and/or cyclists? (Select One)
10.8	What type of "near misses" do you hear about the most? (Please select one)
10.9	How do you feel about SWMS performance when dealing with the safety of pedestrians?
10.10	Do you agree that your public safety concerns are address or that there are proper channels to hear your comments?
10.11	Do you agree with this comment? Most drivers share their public safety concerns with their supervisors, managers or others responsible for public safety.
11.1	Rank in order from 1- least Important to 4 - Most Important, the following factors that you would like route to represent
11.2	Rank in order from 1- least Important to 4 - Most Important, the factors that have led to you changes to the route from the route provided
11.3	Typically, how much of the provided route do you follow (including step by step turns, if applicable)?
11.4	Rank in order from 1- least Important to 4 - Most Important, that you believe would increase public/pedestrian safety?
12.1	Do you think the vehicles have enough safety features for the following exposures
12.2	In your experience, how long does it take for damaged/faulty equipment to be removed from operations?
12.3	Do you agree that front line worker concerns/experience with equipment design issues are integrated into the next procurement of vehicles or equipment
13.1	How effective is the safety training you receive in helping you understand safe operating procedures and how to report accidents with pedestrians?
13.2	Rank in order from 1- least Important to 5 - Most Important, what you believe would increase your ability to perform your daily task in a safer way for pedestrians?
13.3	Do you feel that you have sufficient training/refreshers/retesting on all of the models that you have a license to drive?

Appendix D
List of Abbreviations

ABCD	–	Agencies, boards, commissions, and departments
CIRO	–	Charities, institutions and religious organizations
CVOR	–	Commercial Vehicle Operator's Registration
FTE	–	Full-time employee
JHSC	–	Joint Health and Safety Committee
GFL	–	Green for Life Environmental Corporation
Miller Waste	–	Miller Waste Systems
MTO	–	Ministry of Transportation, Ontario
OHSA	–	Occupational Health and Safety Act
PSC	–	Public Safety Committee (proposed)
RFP	–	Request for Proposal
RHD	–	Right-hand drive
ROW	–	Right of way
SWCO	–	Solid Waste Collection Operators
SWMS	–	Solid Waste Management Services
D2, D3, D4	–	District 2, District 3 and District 4 as defined by the City for City-wide waste collection