TO:	**CHAIR AND MEMBERS COMMUNITY & PROTECTIVE SERVICES COMMITTEE MEETING ON TUESDAY, OCTOBER 20, 2015**
FROM:	**JOHN KOBARDA FIRE CHIEF LONDON FIRE DEPARTMENT**
SUBJECT	**REQUEST FOR PROPOSAL 15-03 DRIVER SIMULATOR – FOLLOW UP REPORT**

RECOMMENDATION

That, on the recommendation of the Fire Chief, and the concurrence of the Managing Director, Neighbourhood, Children & Fire Services, the following actions be taken:

1. The negotiated amount with KnowledgeSurge Learning Solutions Inc., operating as Drivewise, for the supply and delivery of a Driver Simulator at their proposed price of $169,342 HST extra, **BE ACCEPTED**;

2. That the funding for this project **BE APPROVED** as set out in the Source of Financing Report attached hereto as Appendix "A";

3. Civic Administration **BE AUTHORIZED** to undertake all the administrative acts that are necessary in connection with this purchase;

4. Approval hereby given **BE CONDITIONAL** upon the Corporation preparing a purchase order relating to the subject matter of this approval; and,

5. Civic Administration **BE REQUESTED** to provide an update to the Community and Protective Services Committee, following one year of full implementation, with respect to operations, usage, and potential partnership opportunities. (AS AMENDED) (2/8/CPSC)

PREVIOUS REPORTS PERTINENT TO THIS MATTER

- Request for Proposal 15-03 Driver Simulator, submitted to CPSC July 21 2015.

BACKGROUND

Fire Administration submitted a report to the Community & Protective Services Committee on July 21, 2015 and, subsequently, to Council on July 28 2015 proposing the purchase of a driving simulator. This matter was referred back to Civic Administration in order for further information to be gathered to determine if there was suitable need and justification for its purchase. This report is a supplement to the earlier report, submitted on July 21, 2015 which included the financial impact and source of financing.

In an effort to address the questions and concerns that were raised, the report is organized in the following manner:

- Background – Municipal responsibilities and emergency response
- Issues to consider in response to emergencies
- Description and assessment of the current driver training program
- Options to improve the driver training program and the recommended approach
- Options for simulation based training and the recommended approach
- Sharing/renting opportunities
- Additional Information – review of the purchasing process
- Summary
- Supporting appendices

BACKGROUND – MUNICIPAL RESPONSIBILITIES AND EMERGECY RESPONSE

Part II, Section 2(1) – Municipal responsibilities within the *Fire Protection and Prevention Act* (FPPA) include "(a) establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and (b) provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances."[a] The Ontario Fire Marshal and Emergency Management's office simplifies the legislative requirement to the Three (3) Lines of Defence, which the London Fire Department (LFD) has adopted as its mission, into the following statement:

> Line one: Public fire safety education
> Line two: Fire safety standards and enforcement
> Line three: Emergency response.[b]

Since the mid part of the last decade, the LFD has continued to place an increasing focus on preventing fires through the allocation of existing resources, as well as through the introduction of innovative concepts. In 2014, it received national recognition from the Canadian Marketing Association for reducing residential fires by 22% in one (1) year through its use of analytical marketing data in combination with fire safety marketing.[c] It has also received provincial recognition for its Smoke Alarm campaign in 2014[d], and with its partner, London Hydro, received provincial recognition for our creative partnership that enhances fire safety in the home of Londoners with lower incomes.[e]

Despite the increasing prevention efforts of the LFD, fires will continue to occur. This necessitates the third line of defence which is emergency response. Emergency calls continue to represent a significant portion of the workload of the LFD's Fire Fighting Division. In 2014, 76.77% of all calls were dispatched as emergencies (6,850 of 8,922 calls). When called upon to respond to emergencies, the LFD must be prepared to do so quickly and safely. (See Appendix A - Section 1 for a further breakdown of the 2014 calls).

ISSUES TO CONSIDER IN RESPONSE TO EMERGENCIES

Highlighted below are some key issues that need to be considered in the response to emergencies.

Response Times – Safety of the Public Requiring Emergency Services

In recent years, the Fire Fighting Division has increasingly contributed to Lines 1 and 2 – public fire safety education and fire safety standards and enforcement. It is however, only the Fire Fighting Division within the London Fire Department that is tasked with responding to emergency calls or Line 3. In this capacity, the Division focuses on protecting lives, minimizing property damage and protecting the environment resulting from human-made emergencies and natural disasters. In order to do this, it is imperative Fire Fighters are able to respond quickly to emergency calls. Jason Averill, who leads the United States National Institute of Standards and Technology's (NIST) Engineered Fire Safety Group within its Building and Fire Research Laboratory, cites that "Fire risks grow exponentially. Each minute of delay is critical to the safety of the occupants and firefighters, and is directly related to property damage".[f] Appendix A section 2 provides additional contextual information as to the critical importance of response time.

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a Province of Ontario. (2014, October 15). Fire Protection and Prevention Act, 1997, S.O. 1997, c. 4. Toronto, Ontario, Canada.

b Ontario Fire Marshal and Emergency Management. (2014, May 6). Integrated Risk Management Web Tool. Retrieved September 3, 2015, from Fire Marshal's Communique: http://www.mcscs.jus.gov.on.ca/english/FireMarshal/FireServiceResources/Communiques/OFM_Com_2014-12.html

c DePoe, J. (2014, December 8). London Fire Department with Partner Environics Analytics Wins Prestigious Canadian Marketing Association Award. Retrieved September 3, 2015, from Environics Analytics: http://www.environicsanalytics.ca/footer/news/2014/12/08/london-fire-department-with-partner-environics-analytics-wins-prestigious-canadian-marketing-association-award

d Ontario Association of Fire Chiefs. (2014, November 13). Ontario Fire Departments Recognized for Community Education and Safety - See more at: http://www.oafc.on.ca/ontario-fire-departments-recognized-community-education-and-safety#sthash.AH7knwKG.dpuf. Retrieved September 3, 2015, from Ontario Association of Fire Chiefs: http://www.oafc.on.ca/ontario-fire-departments-recognized-community-education-and-safety

e London Hydro. (2014, June 17). London Hydro Wins Fire Marshal's Safety Award . Retrieved September 3, 2015, from London Hydro: https://www.londonhydro.com/site/binaries/content/assets/lhcontent/news/mediarelease_firesafetyaward.pdf

f National Institute for Standards and Technology. (2010, April 28). Landmark Residential Fire Study Shows How Crew Sizes and Arrival Times Influence Saving Lives and Property. Retrieved September 6, 2015, from Engineering Laboratory: http://www.nist.gov/el/fire_research/residential-fire-report_042810.cfm

Public Safety Enroute to an Emergency Response

The safety of those needing emergency services is very important; however, equally important is the safety of citizens along the route of emergency responses. It is imperative that Fire Fighter Apparatus Operators receive proper training so that they react almost instinctively in a myriad of emergency situations and, furthermore, that their reaction times be quick due to the increased speeds. This is particularly critical given the fact that the vehicles are large and heavy further impacting their ability to stop suddenly (see Appendix A - Section 3). Further, experience has demonstrated that another critical factor relates to the actions, or lack thereof, of civilian drivers. Often they do not know what to do when an emergency vehicle approaches or they act inappropriately, which amplifies the dangers and increases risk. Consequently, Motor Vehicle Collisions (MVCs) with civilian vehicles are a very real possibility.

Safety of Fire Fighters

The City, through the Fire Department, is required to meet various legislative requirements including those outlined in the Occupational Health and Safety Act ("OHSA"). Section 25(2) of the OHSA requires that "an employer shall, (a) provide information, instruction and supervision to a worker to protect the health and safety of the worker;" and "(h) take every precaution reasonable in the circumstances for the protection of a worker".[g] In exercising due diligence, the City must take such actions necessary to ensure the competence and capability of individuals performing tasks, particularly where such tasks may adversely impact a "workers" health and safety, including other "workers". It is important to note that with the exception of Tankers, a Fire Fighter Apparatus Operator is operating a fire truck with between one (1) and three (3) additional "workers" on board. Therefore, the health and safety of up to four (4) "workers" must be taken into consideration.

Accidents and Risks

During a seven year period (2007-2014), the London Fire Department was involved in 168 motor vehicle collisions (MVCs). This resulted in a total net cost to the city of $734,584. While the financial risk that each accident can present is an important consideration, the risk of injury to the public and to the Fire Fighters is paramount. Appendix A -Section 4 provides an overview of motor vehicle collisions (MVC) involving City of London vehicles, including the London Fire Department, as well as the associated risks.

An important aspect of the LFD driving training program must be about preventing injury and loss of life through a reduction of accidents while responding quickly to an emergency.

DESCRIPTION AND ASSESSMENT OF THE CURRENT TRAINING PROGRAM

The current London Fire Department driver training program focuses on training new Fire Fighter Apparatus Operators to drive and operate the frontline emergency trucks within the LFD fleet. The LFD draws its drivers from its pool of 1st Class Fire Fighters. To ensure that new recruits can drive when required later in their career, the City introduced a mandatory condition of employment requiring all Fire Fighter recruits prior to hire to commit, in writing, to driving fire apparatus in the future. Furthermore, the City also requires all potential recruits to possess a valid DZ drivers licence at the time of application, as well as to maintain the same until such time they are reclassified as Senior Qualified Fire Fighters and, therefore, are no longer required to drive. Whereas a G licence is all that is required to drive a passenger car or small truck, all of the LFD's frontline fire apparatus weigh in excess of 30,000 pounds and are equipped with air brakes. Drive Test, which is licensed by the Government of Ontario, notes:

> "A class "D" driver's licence allows you to drive a motor vehicle exceeding 11,000 kg (24,000 lb) gross weight or registered gross weight, or any combination of motor vehicle exceeding a total gross weight of 11,000 kg (24,000 lb) and towed vehicle not exceeding a total gross weight of 4600 kg (10,000 lb).
>
> .....
>
> A "Z" air brake endorsement is required on a driver's licence to operate any air brake equipped motor vehicle." [h]

g Ontario Ministry of Labour. (2014, November 20). *Occupational Health and Safety Act*. Retrieved August 24, 2015, from e-laws: http://www.ontario.ca/laws/statute/90o01#BK42

h Drive Test. (n.d.). *Licencing Requirements*. Retrieved August 25, 2015, from Drive Test: http://www.drivetest.ca/EN/licencing/Pages/Licencing-Requirements.aspx

In order to suitably prepare individuals to drive a wide variety of emergency vehicles, at high speed, a comprehensive driver training program in addition to the licensing requirement is imperative.

Following the International Academy for Professional Driver's (IAPD) curriculum, the LFD currently provides its trainee drivers with sixteen (16) hours of theoretical and practical defensive driving training. Successful completion of this course then enables the individual to progress to the experiential portion of the program, whereby they are required to accumulate fifteen (15) hours of "hands on" driving time with the various types of fleet vehicles driving at posted speed limits, which they do returning from emergency incidents, as well as responding to non-emergency events.

The LFD undertook a review of the current driving program. Appendix A section 5 outlines in more detail some of the issues regarding the current training program.

Based on the review, the LFD has identified four (4) issues that it is seeking to address:

1. It does not provide adequate training and hands-on experience to new Fire Fighter/Apparatus Operators (fire apparatus drivers and operators) with respect to responding to emergency calls at higher speeds, in different vehicle types and the challenges associated with the same;
2. For the purposes of evaluating competency and capability, it does not enable Training Instructors to observe new Fire Fighter/Apparatus Operators, as well as permanently classified Fire Fighter/Apparatus Operators, operate at emergency speeds and perform evasive manoeuvres in "real life" situations;
3. It does not include the component whereby existing Fire Fighter/Apparatus Operators are provided training and retesting on a recurring basis; and,
4. It does not include an assessment component whereby supervisors (Captains) can provide ongoing assessments of Fire Fighter/Apparatus Operators performance.

OPTIONS TO IMPROVE THE TRAINING PROGRAM AND THE RECOMMENDED APPROACH

In order to address the gaps in the current training program, LFD has examined three (3) different options. The three options are:

- Maintain the current program
- Invest in a driver training track
- Invest in a driver simulator

Appendix B provides a detailed overview of each option and assessment of the associated advantages and disadvantages.

Some additional factors that were considered in the assessment of the options included the future availability of the vacant parking lot that is currently used by the LFD for training, as well as research into the effectiveness of driver simulators.

To perform the practical defensive driving course currently employed by the Department it is necessary to rely on the generosity of a third party company. The company allows the Department to make use of a vacant parking lot on the site of their former factory. Furthermore, the site is much smaller than what is required to conduct the International Association of Professional Driver's (IAPD) program. Of serious concern, the factory site is for sale and, should the site be sold and used by the new owner, the LFD will have nowhere in the city to conduct this form of training. The LFD has been exploring options for some time with no success.

While the LFD has not excluded looking for additional sites, it remains critical to note that this form of training alone cannot provide the trainees exposure to situations that may arise on the road to the same extent as a driver simulator.

In preparing this report, LFD also undertook extensive research regarding the effectiveness of simulators. Please refer to Appendix C for an overview. Based on this review, LFD is convinced of the effectiveness of simulators for this type of training.

Recommended Approach: Invest in a Driver Simulator

The proposed purchase of the simulator is viewed as an opportunity for improvement, to build on the foundations in place, and provide a training medium that affords the user with the chance to develop their driving skills across the range of situations they will subsequently find themselves in.

The London Fire Department is recommending that the City purchase a driver simulator for the following reasons:

- Simulators, which are effectively used in the airline industry, military applications and trucking, provide "new" drivers, as well as existing drivers, hands-on experience responding to emergency calls at high speeds, as well as perform evasive manoeuvres in high risk "real life" situations. The goal is to provide them with the tools and knowledge in advance of facing such a situation, instead of chancing that they will react appropriately - their reactions should be almost instinctive. This allows trainees to hone their driving skills in a safe, predictable, and controlled environment. This addresses issues 1 and 2 identified in the gap analysis of the current program.

- Training Instructors can assess the competency and capability of new Fire Fighter Apparatus Operators as they challenge a myriad of scenarios, which also provides the opportunity for additional instruction and feedback. Based on their observations through the simulations, the Training Instructors can confidently approve the new individuals for driving duties. Recognizing the benefits in training new Fire Fighter Apparatus Operators, tools would be available to conduct ongoing assessments of the existing Fire Fighter Apparatus Operators. One of the packages included with the drive simulator would also provide training for all Captains in command of the LFD's fire apparatus thereby enabling them to assess their Fire Fighter Apparatus Operators driving and provide feedback, or advise the Training Division of concerns. This addresses issues 3 and 4 in the gap analysis of the current program.

A more detailed review of the driver simulator and how it addresses the gaps in the current driver training program is addressed in Appendix A - Section 6.

OPTIONS FOR SIMULATION BASED TRAINING AND RECOMMENDED APPROACH

A review of options for simulation based driver training was undertaken by Fire Administration and the results are summarized in the table below. This table utilizes costs on both a 5 year term, as well as a 7 year term because the Drivewise's Lease to Own program is 7 years in duration. Neither timeframe, however, is indicative of the anticipated life of the simulator, as Drivewise has informed the Department that it has simulators in place that are 10 years old. Furthermore, it is important to note that the Acquisition option and Lease Option would enable the LFD to still partner with Engineering & Environmental Services Division (EESD) and other divisions within the Corporation – the others would not. Accordingly, if EESD were to use a driver simulator under the other models identified EESD would bear additional costs. Appendix A – Section 7 provides additional cost comparison and cost avoidance analyses of this option.

Based on this review, it is recommended that the Acquisition model be pursued. In addition to it being the most cost effective option, it also provides users, the LFD and EESD, with the greatest flexibility for planning and delivery of their training.

Table 1: Driver Simulator Costing Options

	5 Year Term Total Cost & Annualized Costs	7 Year Term Total Cost & Annualized Costs	Notes
Acquisition (Recommended)	**Total $199,842** **Annual $39,968**	**Total $219,442** **Annual $31,349**	• Includes municipal simulations, as well as Fire EESD as well as other City divisions will have access to the simulator • Training can be done on duty • Total scheduling flexibility • May have excess time to sell to other agencies
Pay as You Go	**Total $603,400** **Annual $120,680**	**Total $841,200** **Annual $120,171**	• Limited to Fire only • Training can be done on duty • Scheduling may be a challenge, as it may need to be done a year in advance • Based on 40 training days per year, train the trainer year 1, and courseware (fire only)
7 Year Lease to Own		**Total $331,139** **Annual $47,055**	• 7 year Lease to own $3594.51 per month plus other frontend expenses • Training can be done on duty • Total scheduling flexibility • Fire simulations only – EESD will need to purchase their own simulations • The operating budget does not allow for the added expenditure
Fanshawe College	**Total $255,675** **Annual $51,135**	**Total $353,275** **Annual $50,468**	• *Collective agreement does not allow for contracting out of Association work • Overtime required, as Firefighters will be off duty (8 hours training time plus 1 hour travel time x 2 people x 2 days) • Scheduling challenges based on Fire Fighter shifts
Rental Elsewhere	**Total $293,727** **Annual $58,745**	**Total $404,708** **Annual $57,815**	• Limited to Fire only • Based on a 1 hour driving distance • Potential scheduling challenges regarding availability, as well as aligning with Fire Fighter shifts • Overtime required, as Firefighters will be off duty (8 hours training time plus 3 hours travel time x 2 people x 2 days) • Instructor Overtime (Minimum 2 hours per day x 2 days) • Currently no adequate sites are known

SHARING/RENTING OPPORTUNITIES

As noted in the previous report, the inherent flexibility of a simulator means that it need not be limited to fire type vehicle training. The simulator is programmable and, as such, for an additional fee, it can be programmed to replicate multiple vehicle types, such as snowplows, garbage collection trucks, police cars, ambulances, and municipal buses. Over and above the fire apparatus software simulations included for LFD use, the recommended proposal includes two (2) municipal vehicle types currently used by the City. Therefore, EESD could benefit through this purchase with minimal, to no investment. Further, there could be opportunities in the future to generate revenue from the rental of the simulator to other external organizations, when not in use by the City of London.

In the short term, the Fire Department plans to work solely with the Engineering & Environmental Services Division's driver training staff to provide them with access to the driving simulator. From experience, LFD anticipates it will take up to two (2) years to acquire a full year of training experience with the device. This is based on the time required to order, receive and train a full complement of staff. Once that is complete, it is anticipated that following the first year of operation the LFD can confidently seek other potential opportunities.

Recently, the LFD consulted Middlesex London EMS concerning their driver training needs and they have an interest in exploring possible use of the simulator for an annual fee in the next few years.

Local fire departments may also be interested in renting the simulator; noting that one (1) fire department in Middlesex County has expressed interest. At this time, an offer has not been extended to fire departments in the County.

ADDITIONAL INFORMATION

Review of the purchasing process

Following the development of a comprehensive specification, in April 2015 the City issued a Request for Proposal 15-03 (RFP) for the purchase of a Driver Simulator. Advertising through Biddingo, the City received three (3) responses, noting that one (1) proposal significantly exceeded the Department's capital funding and, therefore, a decision was made to evaluate the two (2) proposals that were within the budgeted amount.

On receiving the proposals, an evaluation team with representation from the London Fire Department (LFD), more specifically Director of Training Beasley, Assistant Director of Training Howard, Training Instructor Beer, as well as Deputy Fire Chief Lazenby, and Purchasing and Supply undertook a comparative line by line analysis of all responses to establish each bidder's compliance with the specifications. Further to this analysis, the team individually scored the proposals based on pre-established criteria. Based on the analysis and the scored evaluation, the evaluation team's findings show that the response from KnowledgeSurge Learning Solutions Inc., operating as Drivewise, scored the highest, met the Department's needs with respect to functionality and performance and offered best value based on a five (5) year life cycle analysis, albeit the company has units 8 and 10 years old still operating.

The previous report to CPSC provided additional information about the purchasing process and the source of financing.

SUMMARY

In summary, acquiring a driver training simulator enables the London Fire Department to enhance its driver training program by introducing realistic, hands-on experiences that will result in more knowledgeable, competent, capable and confident drivers that are better prepared to operate the LFD's emergency vehicles in a wide array of weather and traffic conditions, as well as be prepared to quickly and appropriately react when unpredictable situations arise. The outcome will be a benefit to citizens and visitors through quick, safe and efficient responses to emergencies, as well as enhance the safety of responding Fire Fighters.

PREPARED BY:	RECOMMENDED BY:
	
DAVID LAZENBY **DEPUTY FIRE CHIEF**	**JOHN KOBARDA** **FIRE CHIEF**
REVIEWED AND CONCURRED BY:	
LYNNE LIVINGSTONE **MANAGING DIRECTOR, NEIGHBOURHOOD, CHILDREN & FIRE SERVICES**	

APPENDIX A – Additional Analysis

SECTION 1 – FURTHER ANALYSIS OF 2014 EMERGENCY CALLS

In 2014, there were 8,922 calls, of which 76.77% (6,850) were for emergencies. Further dissection of the latter statistic reveals that 3,394 calls or 49.5% were fire related emergencies, whereas the remainder were emergency in nature but non-fire related. Fifty percent of the LFD's call volume is therefore outside the scope of the Three (3) Lines of Defence. Of the remaining emergency calls, cardiac related emergencies represented the next largest number with 1,921 (28.04% of emergency calls and 21.53% of total call volume), followed by 1,153 (16.83% of emergency calls and 12.92% of total call volume) Motor Vehicle Collisions (MVCs) and MVCs with Personal Injuries and finally 382 (5.58% of emergency calls and 4.28% of total call volume) Specialty Rescue type calls.

SECTION 2 - CONTEXTUAL INFORMATION ON THE CRITICAL IMPORTANCE OF RESPONSE TIMES

Quick response times are critical to all public safety agencies, as they are the expectation of the public who is in need of an emergency service. Concerning responses to fires, John R. Waters, in his Fire Engineering article *Fire Department Response Times vs. Flashover*, stated that "the bedroom fire in the movie Fire Power reached flashover in three minutes and 41 seconds. In the movie Fire: Countdown to Disaster, flashover occurred in two minutes 12 seconds. If we averaged these times, we would find that flashover can occur in approximately three minutes and 18 seconds."[i] Flashover is the point where the room of origin is completely engulfed in flame, and even Fire Fighters donned in protective clothing might have 6 to 8 seconds to escape.

Noted earlier, the London Fire Department also responds to cardiac related calls, as well as motor vehicle collisions involving the public - the speed of response is important in both of these types of emergency calls. Concerning cardiac emergency calls, the U.S. National Library of Medicine states, "Time is very important when an unconscious person is not breathing. Permanent brain damage begins after only 4 minutes without oxygen, and death can occur as soon as 4 - 6 minutes later."[j] Time to intervention is also critical from a survivability perspective with the Heart and Stroke Foundation claiming that:

> If an AED is immediately applied to a victim of cardiac arrest due to ventricular fibrillation, particularly within the first 5 to 10 minutes, the likelihood of survival is high. Survival rates in cardiac rehabilitation programs that provide defibrillation within the first few minutes after a cardiac arrest are higher than 85 per cent.[9] With each passing minute from the time of the arrest, the probability of survival declines about 7 to 10 per cent.[6] Studies show that few patients survive if the time from collapse to defibrillation is greater than 12 minutes.[10,11] If CPR is performed from the time of collapse to the time the defibrillator arrives, survival may be possible after a longer time interval. [k]
>
> (Note: Footnote references within the quote are found on the Heart and Stroke Foundation website)

Victims suffering trauma in motor vehicle collisions similarly benefit through a quick response. In the case of a MVC victim suffering trauma, two (2) well known rules of thumb exist: The Golden Hour; and The Platinum Ten. Excerpts from the Calgary (AB) Fire Department are quoted below describe each term. One (1) hour seems like a long time, but it is important to remember that a number of sequential steps must occur before an auto-extrication commences, with all taking time.

> The Golden Hour
>
> The Golden Hour is used to describe the critical period that exists for the patient from the time of the incident until the patient is delivered to physicians at the hospital. In just one hour, the patient must be located, extricated, transported, medically stabilized in the emergency department, and delivered to a surgical team. This means that the time allotted to pre-hospital care workers is very short.

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i Waters, J. R. (1999, February 1). Fire Department Response vs. Flashover. Retrieved September 6, 2015, from Fire Engineering: http://www.fireengineering.com/articles/print/volume-152/issue-2/features/fire-department-response-times-vs-flashover.html

j U.S. National Library of Medicine. (2015, August 3). CPR - adult. Retrieved September 6, 2015, from Medline Plus - Trusted Health Information for You: https://www.nlm.nih.gov/medlineplus/ency/article/000013.htm

k Heart and Stroke Foundation. (2015). Heart and Stroke Foundation of Canada Position Statement. Retrieved September 6, 2015, from http://www.heartandstroke.com/site/c.ikIQLcMWJtE/b.3799199/k.F45A/Position_Statements__Public_access_to_Automated_External_Defibrillators_AEDs_Position_Statement.htm

The Platinum Ten

Ideally, the patient should be en route to the hospital within 10 to 15 minutes of the arrival of the first rescue. This 10-minute time frame is called the Platinum Ten. Proper scene size-up and extrication techniques will help rescue crews to work within these critical time frames. The combination of time, established procedures, and overall scene safety is critical to the patient's chances for survival and recovery.[l]

Figure 1 details the sequential steps from the point that a MVC occurs until the trauma victim reaches the Emergency Room. The times provided are estimates and could be shorter or longer. Nonetheless, this example shows at least 40 minutes transpiring.

Figure 1: Sequential Steps in Auto-Extrication

ACTION	EST. TIME (secs)	EST. CUMULATIVE TIME (secs)	EST. CUMULATIVE TIME (hrs)
Accident Occurs	0	0	0
Time to Call 911 (est.)	90	90	0.03
Police Answer/Transfer Call to CACC	15	105	0.03
CACC Dispatcher Process Call/Hotlinks to Fire	90	195	0.05
LFD Processes Call & Dispatches Vehicles	70	265	0.07
FFs Receive Dispatch and Proceed to Truck	90	355	0.10
FFs Travel to Scene (2nd vehicle)	360	715	0.20
FFs Setup Auto-extrication/Secure Scene	180	895	0.25
Extrication	300	1,195	0.33
Stabilize & Package Patient	180	1,375	0.38
Transport Patient to Hospital	900	2,275	0.63
Hospital Processing to ER	120	2,395	0.67

The performance goals cited earlier require an expeditious response requiring Fire Fighter Apparatus Operators to drive beyond the posted speed limit, when conditions permit. Being a large major urban centre, London is not different than other comparable municipalities with respect to the associated traffic challenges, noting that 80% of the alarms occur between the hours of 7:00 am and 11:00 pm – times when there is most likely to be traffic on the roads and people about. Adding to the complexity of the response, Fire Fighter Apparatus Operators must also contend with all of the challenges associated with driving in traffic during various weather conditions.

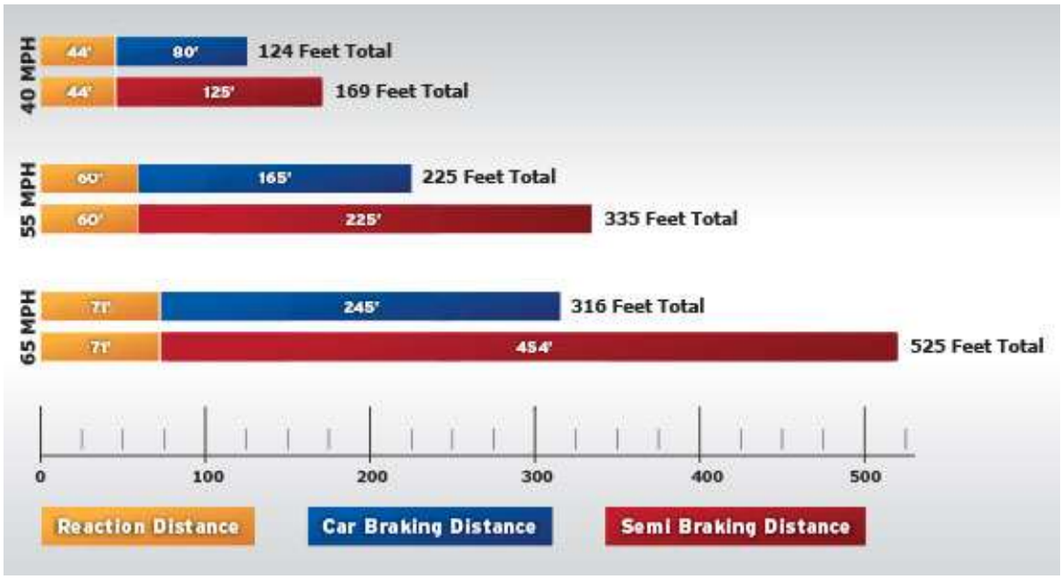
SECTION 3 – IMPACT OF SPEED AND WEIGHT

On the matter of the impact of speed, whereas a vehicle travels 44.0 feet per second at 30 miles per hour, travelling at an alarm speed of 50 miles per hour the vehicle travels 73.3 feet per second, 29.3 feet or 66.59% farther in same time.[m] Further complicating matters, the average car weighs just over 3,000 pounds - vehicles within the LFD frontline fleet weigh between 11 and 26 times greater. Looking to correlate the impact of speed and weight, the Utah Department of Transportation provides a comparison shown in Figure 2, albeit it compares a passenger car to a tractor trailer weighing 80,000 pounds (weight of the Aerial Platform). Despite not being an exact comparison, it clearly demonstrates how weight and speed impact stopping distances.

l Calgary Fire Department. (2011). *Fire Cadet Training Module: Vehicle Extrication - Stabilization* . Calgary, Alberta, Canada.

m Miller & Zois, LLC. (2015). *Time, Speed and Distance*. Retrieved August 25, 2015, from Miller & Zois, LLC: https://www.millerandzois.com/time-speed-and-distance.html

Figure 2: Distance Travelled vs. Speed during Braking [n]



SECTION 4 – ACCIDENTS AND ASSOCIATED RISKS

A summary of motor vehicle collisions is provided in Figure 3. The summary identifies not only the MVCs attributable to LFD, but also the City as a whole (excluding London Police). Through the study period, the LFD was involved with 168 MVCs resulting in a total net cost of $734,584, which includes two (2) 3rd party claims. Using simple averaging, this equates to 23 MVCs per year with a net annual average cost of $104,941. The summary shows that throughout the balance of the Corporation, excluding London Police Services, there were 308 MVCs resulting in net cost of $1,959,904, which equates to, on average, 42 MVCs annually with a net cost of $279,986. Blending the LFD results with the balance of the Corporate, the net cost through this period was $2,694,488 equating to an approximate annual average of $384,927. In the case of the LFD MVCs during this period, fortunately civilians and Fire Fighters have not suffered significant injuries and, consequently, such costs are absent from the summary.

n Utah Department of Transportation. (2015). *Stopping Distances*. Retrieved August 26, 2015, from Truck Smart: http://www.udot.utah.gov/trucksmart/stopping-distances.php

Figure 3: City of London Accident Summary 2007 – 2014 [o]

Fire Department		
Description	**7 Year Results**	**Annual Average**
Number of MVCs	168	23
Net cost of damages LFD vehicles	$454,584	$64,941
Claims for third party auto liability (2 incidents since 2007)	$280,000	$40,000
Subtotal (Costs)	$734,584	$104,941
Other City of London Departments (excluding London Police)		
Description	**7 Year Results**	**Annual Average**
Number of MVCs	308	42
Net cost of damages LFD vehicles	$1,959,904	$279,986
Subtotal (Costs)	$1,959,904	$279,986
Combined Total Costs	$2,694,488	$384,927

Risks

Public

Risk of civilian deaths and injuries are realities confronting all municipalities, their fire services and other divisions using vehicles. Scanning incidents across the Province, at least two (2) MVCs occurred within the last 10 years involving fire apparatus that resulted in civilian deaths: Vaughan 2010; and Mississauga 2011.

Figure 4: 1979 London Accident [p]

Figure 5: 1991 London Accident [q]

Fire Fighters

Fire Fighter deaths and injuries are another reality faced by municipalities. Two (2) serious MVCs involving London Fire Fighters with such outcomes occurred in 1979 and 1991. The first was a tragic accident that occurred in 1979 when Engine 4 was struck by

o Wills, J. (2015, May). 2007 – 2014 City of London Accident Statistics. London, Ontario, Canada.

p London Fire Buffs. (2013, April 4). Retrieved August 25, 2015, from London Firefighters.ca: http://londonfirefighters.ca/?s=fire+truck+accident

q London Fire Buffs. (2014, April 29). Search results for: Engine 9. Retrieved August 25, 2015, from London Firefighters.ca: http://londonfirefighters.ca/?s=Engine+9

an ambulance at an intersection resulted in the death of a London Fire Fighter (Figure 4). In 1991, while responding to an alarm in the south end of the City, Engine 9 hit black ice and skidded on the Vauxhall Bridge, spun around and plunged into the Thames River (Figure 5). The responding fire crew, which was upside down in the river, sustained injuries, noting that for some the serious injuries were life altering.

Similarly, a serious MVC occurred involving a fire truck in 2007 in the City of Windsor. That situation is of interest given the findings of the Ministry of Labour. That catastrophic MVC resulted in the Fire Fighter who was driving becoming a quadriplegic due to his injuries. The Captain never returned to full duties. We understand that the Ministry of Labour's (MOL) investigation found the driver training provided to Windsor Fire & Rescue staff as generally acceptable; however, they also concluded that the driver training provided did not expose the drivers to situations that they might encounter in emergency conditions. Additionally, the driver training program did not re-evaluate those qualified to drive on a recurring basis to ensure they maintained their competencies and, as such, lacked a quality control component.

Further to the legislative requirements, where there is a Critical Injury, the Ministry of Labour (MOL) is compelled to investigate. Where the Ministry makes findings that an individual or corporation failed to adhere to the provisions the Act, Section 66 empowers it to impose fines and recommend imprisonment or both. In the case of an individual (Section 25(1)), the fine is up to $25,000 and imprisonment for up to 12 months. Where a corporation is found guilty, the fine can be up to $500,000 (Section 25(2)).[r]

Corporate

Corporately, risks exist from several different perspectives. Discussed earlier, the *Occupational Health and Safety Act* legislates the responsibilities of employers with respect to protecting its employees. As such, corporations found not to be carrying out the legislative requirements can be fined up to $500,000. Furthermore, the Ministry of Labour has the right to cease operations and/or order action be taken by the employer. Such action may flow from an inspection conducted by an MOL Inspector or through a Critical Injury investigation. The likelihood of avoiding the fines is increased where the employer is found not to be carrying out its legislative duties and exercising due diligence.

Beyond fines and orders, Fire Fighter injuries, depending upon the extent of the same, may result in a Fire Fighter(s) being off duty and those associated costs are noteworthy.

Shown through historical experience, the obvious risk to the Corporation surrounds the cost of claims. Figure 3, shown in preceding pages, provided an overview of the City of London MVC experience between 2007 and 2014, as well as provides a summary of costs. In reviewing the data, it is important to note that the gross repair costs are the total cost to the insurance company, less the applicable deductible payable by the City. Where the City is not found at fault for the MVC, the deductible is $25,000 and, alternatively, where the City is found at fault the deductible is $100,000. Where claims involve injuries to third parties the deductible increases to $250,000. Limiting the risk only to historical experience, if the Corporation makes no changes, one can anticipate the MVC experience, and consequently the associated costs, will be on average the same plus inflationary increases.

The final risk, while not monetary, poses a challenge to the LFD when a vehicle must come out of the fleet for repair. The LFD does have three (3) reserve Engines, one (1) reserve Aerial and one (1) reserve Tanker, but it is not uncommon for most of these vehicles to be out replacing other vehicles in for service, planned or otherwise. Despite the LFD's superior preventative maintenance program, this challenge will become more problematic as the fleet ages because the vehicles will be in the Apparatus Division more frequently and probably for longer periods of time. In summary, the LFD does struggle to maintain service levels when it loses the use of a vehicle anywhere from six (6) weeks up to several months.

SECTION 5 – CURRENT DRIVING PROGRAM ISSUES ASSESSMENT: ADDITIONAL INFORMATION

The London Fire Department operates multiple types of frontline vehicles, namely, Engines, Pumper Rescues, Quints, Aerial Ladders, an Aerial Platform, a Rescue Unit,

r Ontario Ministry of Labour. (2014, November 20). Occupational Health and Safety Act. Retrieved August 24, 2015, from e-laws: http://www.ontario.ca/laws/statute/90o01#BK42

Tankers, Command Cars, as well as a Hazardous Materials vehicle and an Air/Light Unit. Each type of vehicle has different handling characteristics, weight distributions, overall weights, lengths, heights, etc. and, in fact, some vehicles within a type vary. One such example would be Engines, as the LFD fleet includes three (3) Engines with one (1) carrying 500 imperial gallons of water, whereas the second carries 800 imperial gallons and a third 1,000 imperial gallons. Each vehicle is incrementally longer and heavier. Similar variances exist within the Pumper Rescue, Quint, and Tanker types of fire vehicles. In total, the LFD operates 13 configurations of frontline diesel powered fire apparatus, as well as pickups for Command Cars. The LFD has different vehicle configurations to address specific needs. In order to provide a more comprehensive training experience, the Training Division would require, at the very least, to include each of the vehicle types during the training program. Operationally, this is impossible as areas of the City could lose their frontline protection during the training session and, as such, the LFD primarily relies upon a dedicated 24 year old E-One fire truck with older technology.

Further to the above, the LFD is currently unable to provide trainee drivers with a realistic experience driving at alarm speeds because the current site, the former ASEA Brown Boveri plant parking lot, used for the practical defensive driving component of the program is not large enough. As well, the useful life of the site is questionable because the asphalt is deteriorating due to age and the fact that it was not designed to support heavy trucks. A few larger municipalities have attempted to address such driver training challenges by constructing dedicated driving tracks that provide their trainee drivers the opportunity to practise their driving skills at speeds within a controlled environment; nonetheless, at least three (3) challenges arise with this solution, as well as the London solution. First, as discussed earlier, the lack of vehicle availability makes it near impossible to let every trainee experience each type of vehicle under higher speed conditions. Second, while the training is “hands on”, it still cannot provide realistic training experiences of driving to emergent incidents, or to experience driving in poor weather conditions, or to react to an unforeseen event, such as a tire blow out, a skid or a car pulling out in front of them. Finally, such a track would require at least six (6) acres of land, noting that a previous consultation with Mississauga’s Fire Chief suggests that an investment of several million dollars would be required. In summary, it is to not say that such tracks do not add value to a training program, quite the opposite; nevertheless, as noted, they do have limitations and represent a very significant investment.

SECTION 6 – MORE INFORMATION ON HOW DRIVER SIMULATORS ADDRESS THE GAPS IN THE CURRENT DRIVER TRAINING PROGRAM

JP Molnar, M.Ed. in his article *Five Benefits to a Driver Simulation Program - Virtual driver training can be lifesaving for students;* he makes the following statement with respect to the advantages of a driver simulator.

> **“Practicing the Unpracticeable**
>
> The first benefit of a driving simulator is that students can be exposed to extremely dangerous driving conditions in a realistic, virtual environment that would be far too hazardous to practice in real life. Scenarios like head-on collision avoidance, intersection and angle crash avoidance, animals entering the roadway and many other real-life causes of crashes can be presented to the student in a manner that allows them to learn strategies to avoid a collision or at least minimize the damage and injuries. For safety, these types of scenarios can be practiced only in a virtual environment. They allow for the implications of positive and negative decision processes to be played out in their entirety, which significantly strengthens the learning curve.”[s]

Currently new drivers are not provided with those learning opportunities. It is only when they experience these situations for real that they will know whether they have a natural ability to deal with such a situation. It is not possible to safely and consistently provide these valuable training opportunities any other way than through simulation. Fire apparatus range in weight from 34,000 to 80,000 pounds and, therefore, are significant vehicles that require driving skills way beyond that required of a passenger vehicle. By complementing the existing Fire Fighter Apparatus Operator Driver Training program with a driver simulator, the LFD will be able to address the first challenge, as determined by its gap analysis.

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s Molnar, M. J. (2011, July 19). *Five Benefits to a Driver Simulation Program - Virtual driver training can be lifesaving for students*. Retrieved August 26, 2015, from Journal of Emergency Medical Services: http://www.jems.com/articles/2011/07/five-benefits-driver-simulation-program.html

Because it is impossible to simulate the myriad of emergency situations a Fire Fighter Apparatus Operators might face driving to emergency events, it is also impossible for the Training Instructors to truly assess the capabilities and competencies of “new” Fire Fighter Apparatus Operators, as well as existing Fire Fighter Apparatus Operators. That certainly is cause for concern, as it is their responsibility to acknowledge when a “new” Fire Fighter Apparatus Operator is prepared to respond to alarms. Furthermore, lacking this component of the experiential learning, the Training Instructors have no opportunity to offer more training or offer suggestions for improvement, as they have no basis from which to make that assessment. It is important to note that that this issue, as well as the one immediately above, were findings of the MOL in the case of the Windsor MVC. In sum, the introduction of a driver simulator would enable the LFD to satisfy the second challenge, as determined by its gap analysis.

With the introduction of a driver simulator, the LFD plans to schedule recurring assessments and refresher training for existing Fire Fighter Apparatus Operators, noting that this was the other finding of the MOL in the Windsor case. It is important to note that in its proposal, KnowledgeSurge Learning Solutions Inc., operating as Drivewise (herein referred to as Drivewise) includes a specially designed Recurrent Training package, including a four (4) custom program, PowerPoints, Quizzes, Instructor Guides, Evaluation Forms, Course Standards, and driving simulation exercises. Using this package, the LFD and EESD will be able to ensure that their Fire Fighter Apparatus Operators and drivers remain current and, at least in the case of the LFD, address the third challenge, as determined by its gap analysis.

Further to the above, the LFD sees another opportunity with the tool. In cases where a Fire Fighter Apparatus Operator has a MVC, the Training Division could undertake an assessment using the simulator in an effort to identify potential underlying issue(s), if any, and take appropriate action to remedy the situation where necessary. Within its proposal, Drivewise includes a Focus Training program that includes a four (4) hour custom program and a risk identification process designed for At Risk Drivers, which lists at $7,500. The program enables the LFD and EESD to proactively address issues in advance and ensure that safe practices and proper techniques are reinforced, albeit the program does not rely on theory solely, as there is a simulation component or the “show me”.

The last challenge identified in the gap analysis speaks to a need for a supervisory assessment process, whereby the Captains have the requisite tools and training to conduct ongoing assessments of Fire Fighter Apparatus Operators under their command and, if required, refer them for additional training. Another value added component of Drivewise proposal includes a Pre & Post Training Package that includes an online Captain and Participant Introduction modules, an In Cab Evaluation form and other related items. The advantage of this process is that an ongoing assessment can be undertake in “real time”, which will supplement the recurring assessment and refresher training delivered by the Training Division.

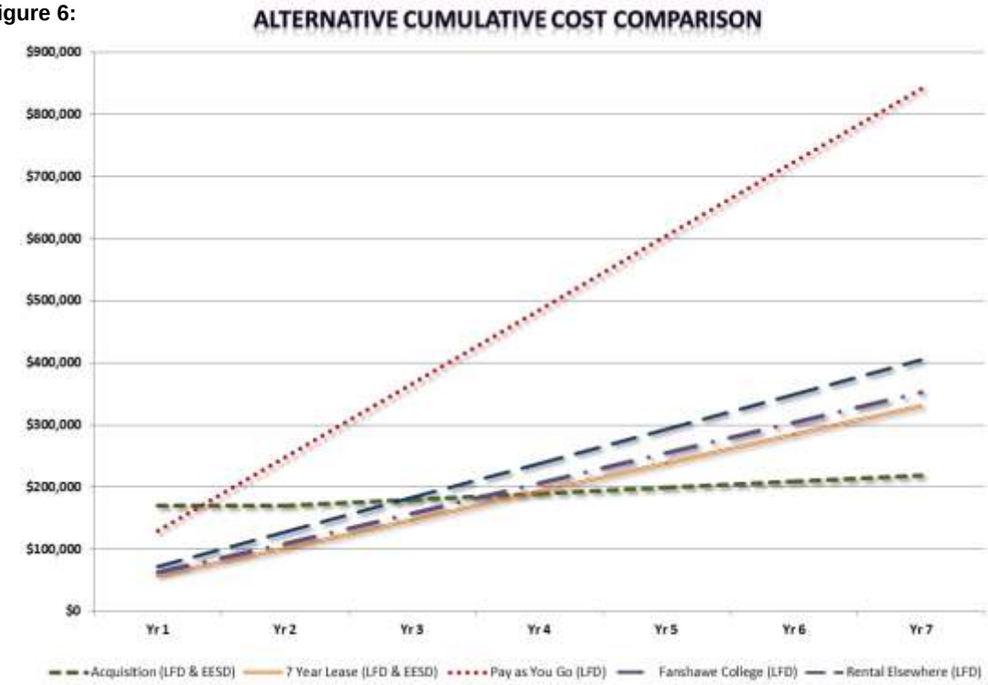
SECTION 7 – ADDITIONAL COST ANALYSIS

Looking to determine the effectiveness of the various alternatives, the LFD compared the cumulative annual operating costs, which included the capital acquisition cost, where applicable, as well as ongoing operating costs. Figure 6 depicts the summation of that exercise. Of the five (5) alternatives presented, the Acquisition option is the most costly in Year 1, as the upfront capital expenditure occurs in that year. Pay-as-You-Go, is the second most expensive option, with Rental Elsewhere, Fanshawe College being the next two (2) most expensive options followed by the Seven (7) Year Lease. Concerning the Rental Elsewhere model, it should be noted that the LFD could not find another driver simulator in the immediate area; nonetheless, depending on distance, it would be no more economical than the Fanshawe rental model. Furthermore, it is critical to note that only the Acquisition and Seven (7) Year Lease models enable the LFD and EESD to partner, whereas the other three (3) models do not. Based on the assumptions and only looking at operational costs, the graph shows that the Pay-as-You-Go model would equal the Acquisition model within a year, whereas the same would occur within three (3) to four (4) years for the other models.

Further on the matter of the annual costs of operation by simulator model, Figure 6 extrapolates the numerical data shown in Table 1 into a year over year pictorial summary. The Seven (7) Year Lease, Fanshawe College and Rental Elsewhere models are initially more economical to operate, as is the Pay as You Go model, because of the lack of

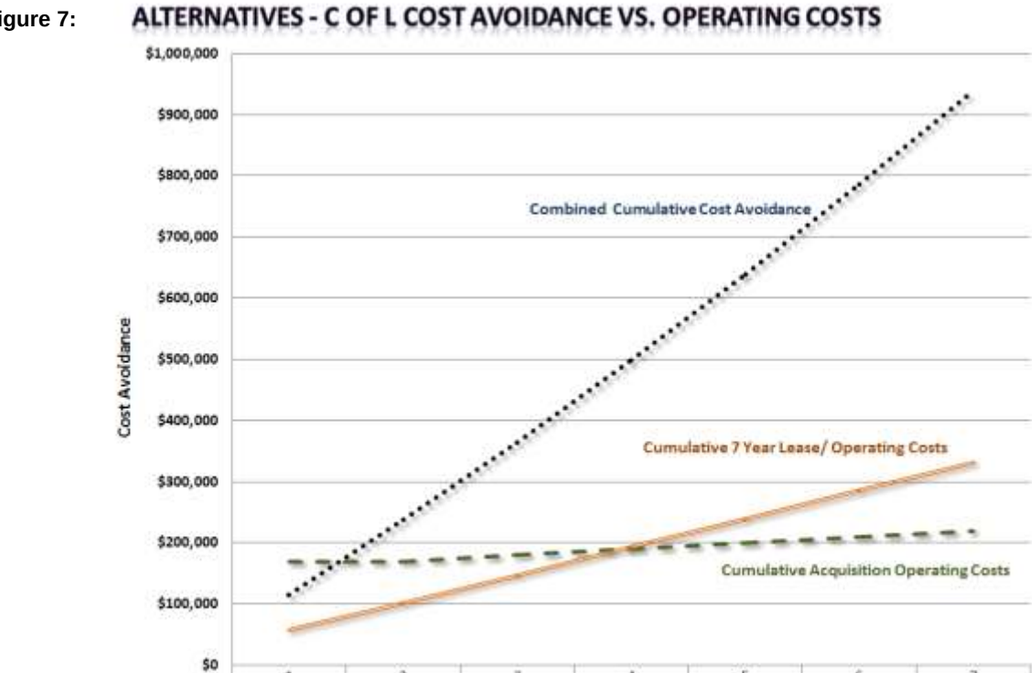
upfront capital cost. However, the lower year over year operating costs gives the advantage to the Acquisition model between years 3 and 4.

Figure 6:



The next analysis sought to determine the advantage of the Acquisition and Seven Year Lease models, as they are the only two (2) models that EESD can partner with the LFD. Figure 7 plots the potential Corporate cumulative net claim cost avoidance based on the historical average against cumulative operating costs of both models. The leasing model, as shown in Figure 7, is more economical for the first four (4) years but is surpassed by the Acquisition model beyond that point, noting that DriveWise still has simulators between 8 and 10 years of age in operation. The seven year lease term attracts $111,697 in additional costs (51% greater). Looking at the situation from a cost avoidance perspective, whereas the Acquisition model could result in $720,781 (Predicted cumulative cost avoidance minus cumulative operating costs) the Seven Year Lease model would only result in $609,084 of cost avoidance.

Figure 7:



	1	2	3	4	5	6	7
Acquisition (LFD & EESD)	$169,842	$170,442	$180,242	$190,042	$199,842	$209,642	$219,442
7 Year Lease (LFD & EESD)	$57,234	$100,968	$147,002	$193,036	$239,071	$285,105	$331,139
Cost Avoidance(Fire & EESD)	$115,478	$236,730	$364,045	$497,725	$638,089	$785,472	$940,223

APPENDIX B -: Comparison of Driver Training Methods

Method	Advantage	Disadvantage
Maintain Current 16 hours of defensive driving at former Asea Brown Boveri plant parking lot	Most economical to operate Provides valuable but limited practical defensive driver techniques	All practical driver training sessions done at a relatively low speed "New" Fire Fighter Apparatus Operators do not get to experience the full range of vehicles in the frontline LFD fleet – 13 types of large vehicles plus Command Cars "New" Fire Fighter Apparatus Operators do not experience driving in potential "real world" conditions Limitations concerning delivering recurring assessment Limited ability of instructors to properly assess how individuals will react in emergencies and regular driving At the very least, costs of claims will continue; however, a higher potential exists for: Civilian and Fire Fighter death or injury; and 3rd party claims, catastrophic claims, WSIB related costs A possibility that MOL may determine that the driver training program does not meet the intent of the OHSA – order changes or in the case of a Fire Fighter Critical Injury or death potential fines Uncertain as to how long we can operate at the site and, how long the asphalt will last, which would also end the training At the time of investigations, no alternatives available
Invest in a Driver Training Track	"New" Fire Fighter Apparatus Operators would be able to drive at alarm speeds; however, due to safety reasons, many manoeuvres could not be practiced Provides valuable but limited practical defensive driver techniques	Extremely expensive At least a 6 acre parking lot built to road specifications is require – Facilities estimated over $1M, not including land Mississauga professional driver training track in excess of $3M Practical driver training sessions involving the majority of dramatic scenarios still need to be done at a relatively low speed Harder use of vehicles will end up with greater vehicle wear and possibly breakage

Method	Advantage	Disadvantage
		"New" Fire Fighter Apparatus Operators do not get to experience the full range of vehicles in the frontline LFD fleet – 13 types of large vehicles plus Command Cars "New" Fire Fighter Apparatus Operators do not experience driving in potential "real world" conditions Limitations concerning delivering recurring assessment Does not enable Instructors to properly assess how individuals will react in emergencies Costs of claims may decrease somewhat with possibly a lesser potential for: Civilian and Fire Fighter death or injury 3rd party claims, catastrophic claims, WSIB related costs Uncertain if MOL will determine that the driver training program and meets the intent of the OHSA given the limitations May order changes or in the case of a Fire Fighter Critical Injury or death potential fines Excluding potential catastrophic claims, fines, etc., assuming a 30% decrease in MVC claims, which probably be unlikely, the ROI would be 7 – 9 years for the driver training pad and approximately 20 years using a track design (assumption City land would be used) In future years, when the track requires resurfacing or repair, the capital costs would be significant
Invest in a Driver Simulator	Moderate cost All practical driver training sessions can be done at a simulated alarm speeds "New" Fire Fighter Apparatus Operators will get to experience the full range of vehicles in the frontline LFD fleet – 13 types of large vehicles plus Command Cars "New" Fire Fighter Apparatus Operators will be experience driving in potential "real world" conditions Provides for easier recurring assessment of existing Fire Fighter Apparatus Operators, as well as those experiencing	Hands on experience driving to alarms is ideal; however, not practical or safe without proper training

Method	Advantage	Disadvantage
	an abnormal number of MVCs Enables Instructors to view how individuals will react in emergencies and regular driving, thereby giving them confidence that the person is competent and capable to drive fire apparatus Enables LFD to have Captains continually assess their Fire Fighter Apparatus Operators during responses and, thereby, provide immediate feedback or recommend remedial action Because of the improved training, research shows claims will decline and there should be a: Lower potential for civilian and Fire Fighter death or injury Lower potential for 3rd party claims, catastrophic claims, WSIB related costs Lower probability that MOL may determine that the driver training program does not meet the intent of the OHSA – order changes or in the case of a Fire Fighter Critical Injury or death potential fines Simulators 8 – 10 years are still in operation but should it need to be replaced at that time the replacement cost would be moderate ROI based on EESD and LFD use is approximately 2 years after “full” implementation, although gradual benefits would be seen as the training proceeded Proven solution in airline industry, military applications and trucking industry	

APPENDIX C – Effectiveness of Simulators

Whether looking at the claim for vehicle repair, a 3rd party claim and/or a "worker" injury, the costs are significant. Not unlike the Fire Service, which looks to reduce fires through education, awareness and changing behaviour, the objective of adding a driver simulator to the Driver Training programs at the LFD and EESD is to reduce near misses and in turn reduce collisions. Looking to do the same, Schneider National, a large North American trucking firm, introduced driver simulators to reduce vehicle crash frequency. "The company noted that technology helped in part to reduce the carrier's crash rates by 32% when compared to its use of "traditional" training methods that relies exclusively on classroom work and in-cab instruction." [t] The company also sought to reduce the severity of accidents and, following the introduction of driver simulators it observed reductions in five of six categories ranging from 19.4% to 50%.[u] Looking at successes related to the introduction of driver simulators in the Public Safety sector, Robert Raheb in an article in Fire Engineering stated the following:

> "Fire Department of New York EMS experienced a reduction in intersection collisions by as much as 38 percent after implementing simulation training.[5] A large oil refinery transportation company in Canada reduced fatal accidents by more than 50 percent after implementing simulation training.[6]
>
> The Los Angeles City (CA) Fire Department has been using its simulator program since 2006. An independent auditor for the city performed a "Vehicle Liability Claim/Litigation Frequency by Accident Type" audit and identified the following:
>
> - a 50-percent reduction of broadside collisions;
> - a 75-percent reduction in failure to stop/yield collisions; and
> - a 59-percent reduction in litigation severity costs, from just under $900,000 to just above $350,000.[7]
>
> The average cost per claim dropped 58 percent from just under $9,000 to just over $3,600. "We have trained over 2,700 members, and the simulator allows us to see how our members will react and drive during an emergency scenario and shows members how to improve their driving skills," said Captain Kevin Mulvehill, who oversees the department's simulator program." [v]

Raheb goes on to add that,

> "Simulation training has become the benchmark and an acceptable standard in training. Departments that fail to proficiently and routinely train their members in vehicle operations are leaving themselves exposed to litigation not only from the community but also from the members themselves. Fire apparatus collisions are a leading factor in traumatic firefighter deaths; more than 25 percent occurred in apparatus collisions in 2008, surpassed only by medical emergencies such as stress-induced heart attacks." [o]

Patrick J. Parker, through his applied research paper *Vehicle Driving Simulation – A Possible Solution for Vehicle Crashes*, sought to identify if simulators would reduce accidents in his Fire Department. As is required by Executive Fire Officer (EFO) candidates, their applied research must move beyond the fire service. He cites,

> "The research found numerous non-fire organizations using driving simulation to reduce crashes and improve training efficiency. As was assumed, the airline industry has been and continues to use simulation exclusively for aircraft operations. **Their belief in simulations is so great that the first time flying an actual aircraft is for their check ride, the second time is with paying passengers onboard [sic]**." [w]

Further on the matter of simulators being used in the airline industry, Raheb adds,

> "The safe emergency landing of U.S. Airways Flight 1549 into the Hudson River in New York City was not just a matter of luck. Rather, it was what happens when preparation meets opportunity. Captain Chesley "Sully" Sullenberger had clocked hundreds of hours on simulators practicing emergency situations, so he was "lucky" that all of his preparation met opportunity." [x]

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t Penton Publishing Company. (2013, September 4). *Saving via "virtual" driver training*. Retrieved August 26, 2015, from Fleet Owner: http://fleetowner.com/technology/saving-virtual-driver-training

u Randall & Reilly. (2008). *Virtual skills training*. Commercial Carrier Journal, 1.

v Raheb, R. (2010, November 1). *Simulation: The Next Step in Driver Training*. Retrieved August 26, 2015, from Fire Engineering: http://www.fireengineering.com/articles/print/volume-163/issue-11/departments/fire-service_ems/simulation-the-next-step-in-driver-training.html

w Parker, P. J. (n.d.). *Vehicle Driving Simulation – A Possible Solution for Vehicle Crashes*. Retrieved August 26, 2015, from United States Fire Academy: http://www.usfa.fema.gov/pdf/efop/efo40105.pdf

x Raheb, R. (2010, November 1). *Simulation: The Next Step in Driver Training*. Retrieved August 26, 2015, from Fire Engineering: http://www.fireengineering.com/articles/print/volume-163/issue-11/departments/fire-service_ems/simulation-the-next-step-in-driver-training.html