

TO:	CHAIR AND MEMBERS CORPORATE SERVICES COMMITTEE MEETING ON MARCH 19, 2019
FROM:	CATHY SAUNDERS CITY CLERK
SUBJECT:	2018 MUNICIPAL ELECTION

RECOMMENDATION

That, on the recommendation of the City Clerk, the report dated March 19, 2019 and entitled “2018 Municipal Election” providing an update with respect to the 2018 Municipal Election, BE RECEIVED for information.

PREVIOUS REPORTS PERTINENT TO THIS MATTER
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Corporate Services Committee – February 20, 2018 – 2018 Municipal Election Update

Council – May 1, 2017 – Ranked Ballot Community Engagement Results Update

Corporate Services Committee – April 22, 2017 – Ranked Ballot Community Engagement Results

Corporate Services Committee – January 24, 2017 – Ranked Ballot Election Model

Corporate Services Committee – July 19, 2016 – Amendments to the Municipal Elections Act

Corporate Services Committee – October 20, 2015 – Ranked Balloting Process

Corporate Services Committee – July 21, 2015 – Province of Ontario Consultation – Municipal Elections Act

Corporate Services Committee – June 15, 2015 – Submission: Ranked Ballots for Municipal Elections in Ontario

Corporate Services Committee – June 15, 2015 – Submission: Province of Ontario – Legislation Review Municipal Elections Act, Municipal Conflict of Interest Act and Municipal Act

BACKGROUND

The purpose of this report is to provide a review of the City of London’s first experience with Ranked Choice Voting (RCV), to provide an overview of the 2018 Municipal and School Board Election, and to describe next steps towards planning the 2022 election.

Municipal Elections require extensive resources and planning. The *Municipal Elections Act, 1996* (the “Act”) directs that Municipal Elections are the responsibility of the Clerk. New amendments to the Act mean that preparations for Municipal Elections are continuous throughout non-election years. The City of London 2018 Municipal and School Board Election required approximately two years of preparation. Although the preparations for managing the election process are similar across the province, each municipality has unique procedures informed by best practices and past experience. The City of London Municipal Election was administered by the City Clerk and the Elections Team. The Elections Team included City Clerks’ staff and staff leads from areas essential to the administration of the Municipal Election. The Elections Team

started meeting weekly early in 2017 to coordinate, plan and implement all aspects of the Municipal Election, including significant work with the vendor selected to provide RCV-capable voting equipment and technology. The City Clerk's Division was able to successfully administer Ontario's first Ranked Choice Voting election thanks to significant staff dedication and collaboration from across the Corporation. In conducting a post-election evaluation, the Civic Administration identified several key aspects of the election administration that should inform decisions regarding future City of London municipal and school board elections:

- Communication and Voter Engagement;
- Voters' List;
- Election Signs;
- Voting Locations;
- Accessibility;
- Voting System and Service Provider;
- Ranked Choice Voting.

DISCUSSION

Communication and Voter Engagement

One of the most important aspects when introducing a new process is to ensure that those individuals that will be participating in the process have been given sufficient information to fully engage in the process. The Elections staff believed that this would be key with the introduction of Ranked Choice Voting.

It was important that we communicated with and educated the public to ensure to the best of our ability, that the candidates and the community were aware of the change in the voting process. In response, Elections staff held two candidate information sessions, attended over 160 community events throughout March to September 2018 and conducted demonstrations for the media. An enhanced communication effort through the media, the City's website, billboards and bus advertisements throughout the City was also undertaken with the assistance of a seconded member of the City's Communications staff who was dedicated solely to the election for a year.

Setting expectations as to how the results would be released was also key as the results would be released much later and in a different format from that of a first-past-the-post election. Given that in a ranked ballot election, all results must be counted in order to determine the 50 percent + one vote threshold, poll by poll reporting was not possible. In addition, given that it was important to be transparent and clear how the transfer of votes occurred in subsequent rounds, the City Clerk chose a single candidate elimination process. For example, in the Mayor's race, we had fourteen candidates, resulting in fourteen rounds of counting. To address these concerns the Elections staff met with the media to provide detailed information as to what to expect on election night and the day after. We also increased our presence on social media platforms throughout the count process to update the media and the public on what was happening and what to expect next. Our information sessions held throughout the community also addressed the timing of results.

The enhanced communication protocols for the 2018 Municipal Election was very labour intensive, with all the Elections staff and all Managers in the City Clerk's Office working evenings and weekends attending events, including festivals, community meetings and meetings of organizations. This process began in March and continued until mid-October.

We believe, based on the response from the elector at the Polls that generally speaking the public understood there was a change in the election process, with most electors (based on our analysis of the Mayor's race) choosing to rank their candidates.

Voters' List

The Municipal Property Assessment Corporation (MPAC) maintains owner and occupancy information in order to facilitate the creation of a complete and accurate municipal Voters' List. MPAC has the legislative responsibility of conducting enumeration and producing the Preliminary List of Electors (PLE) for each municipal election in Ontario. In accordance with section 19 of the *Municipal Elections Act, 1996*, the PLE is used by municipalities to create the final Voters' List.

Since the 2010 Municipal Election, MPAC no longer conducts their enumeration through mass mail out or by physically attending buildings. In 2010, MPAC introduced an online voter look-up tool (www.voterlookup.ca). The public can use this tool to confirm with MPAC if their information is accurate and complete on the PLE prior to the information being sent to the municipality for the creation of the official Voters' List. In order to provide an accurate database, MPAC maintains public information in non-election years through regular updates applied to the property assessment database, land titles/land registry changes, mailing address changes, school support changes, and new roll updates. The City of London does not conduct enumeration activities prior to receiving the PLE, and therefore, it is not possible to identify missing information or issues prior to receiving it from MPAC. Following the 2014 Municipal Election, the Civic Administration noted that large multi-residential rental buildings that were previously on the Voters' List were no longer included or missing tenant names in the PLE received from MPAC. In advance of the 2018 PLE, the Civic Administration consulted MPAC regarding these concerns with the PLE. According to MPAC, the buildings affected had recently undergone conversions to condominium units. MPAC indicated that, historically, when they are presented with a condominium conversion plan, the existing tenant names are deleted from the database in anticipation of the units being vacated for new condominium owners and MPAC would become aware of these new owners through the standard sales transaction process. However, it appears that instead of these units being sold, many of the new condominiums remained tenanted with the same persons who had occupied the units before they were converted. This scenario resulted in missing tenant names from London's PLE.

The Civic Administration, together with MPAC, worked to identify multi-residential buildings (7 or more units) in the City of London that had recently undergone condominium conversions. Since 2010, approximately 47 complexes have been converted to condominiums, affecting 6,949 individual units and approximately 5,000 electors.

The PLE is typically provided to the municipality by August 1 of an election year, at which time the Clerk is permitted to correct any obvious errors. MPAC's voter look-up site was actively promoted from April – September through a direct link on the City's website.

In order to try and mitigate the data gaps in voter information, the Elections Office prompted tenants to get their information on the PLE by mailing Voter Enumeration Forms throughout the month of August to residential buildings potentially affected by a condominium conversion. Approximately 1,054 residents in the City of London completed and returned this form to the Elections Office before October 22, 2018. Our dedicated Corporate Communications Specialist set up targeted location-based advertising for these buildings in addition to areas with historically low voter turnout. This included internet advertisements prompting people to get on the list through our online portal or check their voting location.

Between the receipt of the PLE from MPAC on August 1, 2018 and the production of the official Voters' List on September 4, Elections Office staff completed 34,635 changes and revisions to the PLE. Once voterlookup.ca was no longer receiving updates of eligible electors, the Elections Office promoted an online and in-person process for electors to register their information on the City of London Voters' List.

Missing tenant information was the main issue identified by Elections staff when making amendments to the PLE. The City of London is hoping MPAC can leverage this

information to identify vacant units, and potentially find tenant names for them in the National Register of Electors (Elections Canada) for the production of the 2022 PLE.

In total, there were 66,900 changes made to the PLE and Voters' List after it was supplied by MPAC. Of the total changes to the Voters' List, the majority were completed by Elections staff as part of the data cleansing process – correcting issues such as duplicates and invalid roll numbers. The next largest source of changes were the 17,418 revision forms filled out by electors prior to or during the Election to either add or correct information on the Voters' List. 14,851 of these forms were entered by Elections staff between October 23, 2018 and November 21, 2018. Below is a summary of changes to the 2018 Voters' List:

Change Source	Change Count
Election Office Data Cleansing	29,876
Revision Form	17,418
Online Voter Registration	10,848
Long Term Care Resident List	5,980
Direct Elector Changes	1,395
Enumeration Forms	1,054
Get on the List Web App	329
Grand Total	66,900

Table 1: Voters' List revisions summary

Multiple municipalities in Ontario required substantial corrections to their PLE supplied by MPAC. In response, some municipalities passed resolutions to find solutions to this issue. The City of Hamilton released a resolution on January 3, 2019 that seeks a transformational solution to the way that the Voters' List is created and managed. The resolution outlines the City of Hamilton's support for re-establishing the multi-stakeholder working group to explore and identify ways to create and maintain the Voters' List for municipal elections. The City of Hamilton is looking to the working group to find resolutions on such matters as incorrect names on the PLE, missing buildings, and electors who completed revision should be but were not on the Voters' List.

On January 15, 2019, the Brantford City Council passed a resolution to review the process and maintenance of the Voters' List used for their municipal elections to address multiple concerns including missing and incorrect voter information and missing multi-residential dwellings.

As per the *Municipal Elections Act, 1996*, municipalities must complete all revisions to the Voters' List within 30 days after Voting Day and forward a copy of these changes to MPAC. Once all municipal Voters' List revisions have been received and processed, MPAC will begin analysis to determine overall accuracy of the 2018 PLE and will be reporting results in 2019.

As municipalities and MPAC work through these issues and concerns, the City of London will continue to utilize information from existing databases and departments in an attempt to improve voter data accuracy for 2022.

Election Signs

One of the strategies in the City of London Strategic Plan aimed at "Leading in Public Service through open, accountable, and responsive government", was to explore opportunities for electoral reform through election signage. A new Election Sign By-law was adopted on November 14, 2017. The new by-law incorporated feedback provided by both the general public and the election candidates from the 2014 Municipal Election. The most common complaints related to the length of time election signs were posted, proximity of election signs to intersections, and election signs interfering with sight lines.

The following changes were incorporated into the new by-law to address those complaints:

1. Clearly defining election sign restrictions on all properties.
2. Restricting the earliest date for the placement of election signs to Nomination Day in the year of a regular election, excluding campaign office signs.
3. Requiring election signs to be removed no later than ninety-six (96) hours following the day of the election.
4. Prohibiting use of the City's logo or the City's Municipal Election logo on election signs.
5. Clarifying election sign placement at intersections.
6. Requiring election signs of the same candidate to be at least 10 metres apart.
7. Restricting election signs from being placed outside the ward(s) where a candidate is running for office, excepting elections signs placed within 50 metres of an adjacent ward.

The Civic Administration also refined the various processes associated with the handling of public inquiries and complaints regarding election signs, developing regulations under sections 5.2 and 5.3 of the by-law. Elections staff worked with the Municipal Law Enforcement Division to streamline the process for tracking complaints and their resolution. Election sign complaints and queries were tracked and submitted using Customer Relationship Management (CRM) software.

A total of 221 election sign complaints relating to the Municipal Election were received by the Elections Office and tracked in CRM from April – November 2018. Below is a summary of complaints and questions received by month for 2018. The Civic Administration will be providing an in-depth review and report of the Election Sign By-law at a later date.

Month	Municipal Sign Complaint/Question	Provincial Sign Complaint/Question	Grand Total
Apr	4	2	6
May	11	70	81
Jun	9	14	23
Jul	14	1	15
Aug	60		60
Sep	62		62
Oct	55		55
Nov	6		6
Total	221	87	308

Table 2: Election sign complaints by subject/month

Voting Periods and Locations

The 2014 London election had 166 Voting Day polls and 12 advance polls. The number of polls was increased in 2018 to 199 Voting Day polls to accommodate both population growth and the potential for longer wait times with the introduction of Ranked Choice Voting.

The City of London conducted a vote-anywhere Advance Vote on October 4, and October 6 – 13 for a total of 7 advance vote days held at 12 unique voting locations across the City. New for 2018, the Civic Administration added two advance voting polls at University Hospital and Victoria Hospital held on Thursday October 11. Western University started a fall reading week during their 2017-18 school year, which occurred from October 9 to October 12, 2018. Due to the break, an additional earlier Advance Vote day was scheduled on October 4th so students could vote prior to the start of the reading week.

Elections staff collected information and feedback on each voting location's accessibility, parking, transit, room size, voter turnout, and signage from election workers, voters, and candidates. This information will inform voting location selection and assignment for the 2022 election.

Election Workers

Including Advance Vote and Voting Day, there were 1,906 worker positions required to administer the election. Workers could apply in person at the Elections Office, online, or at one of the two job fairs hosted by the Elections Office at the North London Optimist Community Centre on June 14, 2018 and at the Sherwood Forest Library on July 19, 2018. The online application was available on the City's website from May 1, 2018 until October 19, 2018. A total of 2,733 election worker applications were received by the Elections Office.

Effective and comprehensive training of election workers was essential to the operation of each voting place and the administration of the election as a whole. Throughout the months of September and October, 75 training sessions were conducted for an approximate total of 150 hours of training. There were 9 individual training programs developed to provide specialized exercises based on position and voting date. A total of 1,877 people attended training. Hiring almost 2,000 reliable workers presents a significant challenge to the administration of Municipal Elections. Although the hiring processes was initiated by the Elections Office well in advance of the election, between May 1 and October 22, approximately 501 election workers quit or were otherwise unable to work and ultimately had to be replaced before or on Voting Day.

Accessible Election

Accessibility was identified early in the election planning process as a priority for the 2018 Municipal Election. In 2017, the City Clerk's Office developed strategies and initiatives to identify, remove and prevent barriers that affect voters and candidates with disabilities during the election process by means of the City of London's Accessible Election Plan 2018. The Plan was developed by members of the City Clerk's Elections Team, in consultation with the Accessibility Advisory Committee and the City's Municipal Policy (AODA) Specialist. Leading up to the election, the proposed Plan was submitted to the Accessibility Advisory Committee for review and comment. This document identified barriers that could be experienced by people with disabilities during an election, and identified actions to address each barrier. The Plan established measurables by which to evaluate the effectiveness of each initiative. As indicated through the attached update to the Accessible Election Plan (Appendix 'A'), there were numerous accessibility initiatives undertaken by the Elections Office leading up and into the 2018 election. Election Worker Training stressed the importance of removing physical barriers to the entrance of the poll and ensuring ample space for maneuvering mobility aids. All voting places were deemed accessible according to the accessibility audit, and few complaints were received regarding accessibility issues. Vote by mail provided voters with the ability to mark their ballot from home at their convenience. In the event that a voter was unable to complete the vote by mail process on their own, Elections Office staff scheduled 45 home voting visits, where, upon request, a ballot was provided to the voter to mark in their home and given to the staff member to return to the drop-off centre.

Communicating the changes to the way London votes in a manner that was effective and appropriate for all citizens of London was a priority for the Elections Office. To reach persons with disabilities, the Elections Office investigated alternative communication methods and emphasized the availability of election information in alternate formats. For the first time, the Elections Office offered ballot instructions and candidate lists in braille and large print at each Advance and Voting Day poll. The Civic Administration also integrated accessibility information in election presentations and communications wherever possible. Before the next municipal election, a review and update of accessible and alternative communication formats will take place to ensure that all citizens of London are able to effectively participate in the election.

Voting Technology and Service Provider

The City Clerk's Office commenced an open and public Request for Qualifications (RFQual) on July 4, 2017, seeking a service provider for a 'Fully Managed Election Solution'. The RFQual sought interested qualified consultants to provide for a fully managed (hardware/software) turnkey election management solution which would include ranked ballot vote tabulation capabilities, election management software, in-poll tabulation for Voting Day and associated support for the 2018 Municipal Election.

Upon closing of the RFQual, there were no interested vendors. It was at this time the Civic Administration sought informal demonstrations of hardware and software capabilities from vendors that have partnered with the City of London in the past. As a result, at the end of this process, Dominion Voting Systems was awarded the contract to provide Vote Tabulation System and Election Software for the Municipal and School Board Elections in 2018, with the option for the City to extend the contract for services for any by-elections and the 2022 and 2026 elections.

A contract for hardware rental, software licence and services with Dominion Voting Systems was executed on December 15, 2017. The contract includes the following:

- Vote Tabulators – 225 units
- Accessible Voting Ballot Marker Device – 12 units (Advance Vote)
- Ballots
- Ballot Boxes
- Election Management Software System
- Ranked Ballot Module Licence
- Mobile Printing Module (Advance Vote)
- Professional Services and Support

The total cost for the above-noted vendor services for the 2018 Municipal Election was \$470,542 plus HST.

Included in the February 2018 Municipal Election Update Report was an initial estimate of supply costs provided by Dominion Voting Services. This estimate included ballot boxes, secrecy folders, marking pens, security seals, paper rolls for vote tabulators, shipping and handling, and storage devices at a total cost of \$49,150 (in 2014, supply costs were approximately \$35,000). The actual cost for supplies for the 2018 Municipal Election was \$24,782. By outsourcing the procurement of certain supplies to other vendors, the Civic Administration saved \$24,368 in supply costs. The Civic Administration slightly increased the number of ballots based on the Voters' List, therefore bringing the total savings to \$19,234.

Municipal Election Cost Analysis

The total cost of the 2014 Municipal Election was \$1,321,056. In 2018, the Municipal Election's total cost is \$1,779,149. The Elections Office noted along With Ranked Choice Voting, the overall increase in costs can be attributed to rising supplier costs, an increase in vote tabulator machines to meet the demands of a growing population, as well as a planned increase to temporary staff complement in the Elections Office in order to complete the regular election tasks.

Below is a summary of Ranked Ballot costs in comparison to the estimates provided in early 2017.

Election Item	Estimate of Ranked Balloting Costs	Actual Ranked Balloting Costs	Notes:
Consultation	150,000	202,108	This includes expenditures in 2017 for our consultation phase. The total cost in 2018 for ranked ballot outreach and education was \$141,108.

Election Item	Estimate of Ranked Balloting Costs	Actual Ranked Balloting Costs	Notes:
Tabulators	-	16,900	The cost of additional 13 vote tabulators attributed to Ranked Choice Voting.
Paper Ballots	42,500*	12,500	Additional ballots were required to accommodate a more fulsome logic and accuracy testing of ranked choice ballots and to ensure adequate quantities at the poll.
Vendor Cost	10,000**	12,000	This is the cost of the ranked ballot licence with Dominion Voting Systems.
Auditor	-	147,752	In the absence of provincial certification of ranked ballot voting equipment, the auditor provided verified processes, procedures, and tested the algorithm to provincial regulation.
Staff Resources	70,000	82,686	
Poll Workers	50,000	41,500	One additional election worker was assigned at each voting location during on Voting Day to provide additional efficiency. Elections Office staff were assigned polls on Advance Vote days for this purpose.
Total	\$322,500	\$515,446	

Table 3: Ranked Ballot Costs

* Cost is based on ranking a maximum of three candidates, legal sized ballot, printed double-sided. If the number of candidates or rankings increase, the number of ballots will increase and so will the cost.

** Not including the algorithm development and testing in results software. At the time the estimate was presented, the Civic Administration was requesting certification from the Province. In the absence of provincial certification, Civic Administration procured an auditor for ranked choice voting.

Independent Analysis

Given that there are no federal or Provincial standards to test voting and vote-counting equipment in Canada, the City Clerk requested Provincial representatives to consider certifying vote-counting equipment for this Ranked Choice Vote election. Despite these efforts, the Provincial representatives indicated that the Province would not be involving themselves in the certification. The City Clerk then requested funding from the Province to assist with the cost of retaining an auditor with expertise in ranked vote elections to monitor and review our processes and procedures. No Provincial funding was provided to the City of London.

As 2018 was the first year municipalities were permitted to use ranked ballots, the Civic Administration procured an outside evaluation by industry experts to ensure the

accuracy and integrity of the 2018 Municipal Election. The City retained Freeman, Craft, McGregor Group, Inc., (FCMG), a Florida-based corporation with expertise in testing and evaluating Ranked Choice Voting (RCV) elections and software. FCMG was specifically retained to conduct an independent audit of the RCV results utility and its functionality according to specifications. FCMG also evaluated the City's overall process and related procedures for tabulating election results. At a minimum, the evaluation was contracted to assist with the following:

- a mock election and functional test of the ranked choice voting system;
- the acceptance test for system and equipment;
- conduct of a logic and accuracy (L&A) test; and
- observation of tabulation and a post-election evaluation.

Through extensive testing and review, FCMG found that the election system produces accurate results data and the City's tabulation procedures are appropriate and adequate to determine official winners. Listed below is a summary of the key findings by FCMG. All evaluation reports, recommendations and key findings produced by FCMG are attached to this report as Appendix 'B'.

Mock Election

To test procedures, the City conducted a mock election from March 28 – 29, 2018 with FCMG. The mock election enabled Elections staff to fully test all new procedures prior to Voting Day. During the mock election, ballots were marked with a pre-determined outcome to ensure accuracy and reliability of the ranked ballot tabulation process as it relates to voting and vote-counting equipment. The exercise confirmed that proper procedures were in place to determine RCV results and the Election Management System (EMS) functioned with reliability and accuracy.

Acceptance, Logic and Accuracy Testing

Upon receipt of the equipment from Dominion, the City conducted extensive acceptance testing with FCMG to verify that the equipment received, and the software and firmware installed, were identical to the system prescribed in the contract between the City and Dominion. At a minimum, the acceptance test must verify that election equipment is configured to meet all requirements in the City's rules and procedures and components are undamaged and operational.

Following acceptance testing, the Civic Administration and FCMG conducted Logic and Accuracy testing of all equipment used in the 2018 election. The objectives of Logic and Accuracy testing are to verify that all of the appropriate ballots are properly read by each tabulator and that the Election Management System can consolidate and process the data from all tabulators, accurately perform the tabulation, and correctly report results.

Upon completion of Logic and Accuracy testing, FCMG concluded that the Election Management System and associated hardware performs accurate tabulations. The tabulated totals on each of the reports generated during testing matched expected totals. Audits of sample RCV results exports showed that the contents of the files were identical to those of the marked ballots and that the ability of the system to produce accurate RCV election results meets expectations. Additionally, FCMG determined that the procedures developed by the City to tabulate results are adequate to the task.

Based on testing and a review of system audit logs, FCMG's final observations conclude that the Election Management System and associated equipment used in the 2018 election accurately tabulated and reported results following the rules and procedures for RCV tabulation adopted by the City of London. Furthermore, the system records the ballots, ballot images, interpretations, export files of the cast vote records, and detailed reports of the ranking calculations to provide adequate transparency and sufficient evidence for the City to successfully defend against any challenges to the integrity of the tabulation process and election results.

Results Tabulation

At 8:00 PM. on election night the polls closed and all tabulators were returned to City Hall from 199 polling places across the City by 9:30 PM. After 8:00 PM. The Civic Administration began to upload the memory cards from all voting tabulators. As each memory card was uploaded, the number of ballots included in the upload was verified against the results report tape printed from the tabulator. Memory cards were uploaded until all card data from all machines was transferred to the primary EMS laptop. Using the complete results data, the Civic Administration first determined if any candidate in any race had met or exceeded the established threshold of votes needed to be elected (50% +1 vote). The Clerk was able to declare unofficial winners in 8 of the RCV races on election night based on first-choice vote totals. In the remaining 7 RCV races, a definitive winner could not be identified, and additional rounds of tabulation were required. On election night, only first choice results were tabulated. On October 23, 2018 at 10:00 AM. Elections staff began subsequent rounds of RCV tabulation for races that had not been determined the night before. The results were printed for each office and delivered to the City Clerk where they were proofed one more time before the winner was announced and posted on the City's website. All unofficial results were published by approximately 3:00 PM. on October 23, 2018. On October 29, 2018 the official results were determined by the City Clerk and posted publicly on the City's website.

Ranked Choice Voting Outcomes and Analysis

There are numerous statistical conclusions that can be drawn from analyzing RCV results produced from the Election Management Software. The following analysis was conducted using ballot data for the 2018 Mayoral race to provide insight into City of London voter behaviour as it relates to RCV. This analysis was limited to the Mayoral race, as this contest provides the most consistent data set across all wards. The most significant statistic is the number of voters who participated in the option to rank up to three candidates. As seen in the table below, 30% of voters ranked only one candidate, leaving their other choices blank. 22% of voters ranked a first and second choice only and 47% ranked three candidates.* Of the 45,476 ballots with votes for 3 candidates, 1,694 ranked the same candidate for all three choices.

Candidates Ranked	Vote Count	%
Ranked 1 / Choice 2 & 3 Blank	29,428	31%
Ranked 2 / Choice 3 Blank	21,534	22%
Ranked 3 Candidates	45,476	47%
Total	96,438	100%

Table 4: Number of Candidates Ranked (overvotes and blanks removed)

Another analysis was conducted on the number of "non-transferable" ballots versus the total number of ballots cast for Mayor. An RCV ballot is "non-transferable" in the first round if the entire contest is blank or if there is an overvote so that it is impossible to determine which candidate the voter ranked as the highest (in accordance with O.Reg 310/16). An overvote occurs when multiple votes are cast within a single rank. As shown in the table below, there were a total of 1,067 overvotes across all rankings for Mayor, with 859 overvotes occurring in the first ranking.

Overvotes	Vote Count
Overvotes in rank 1	859
Overvotes in rank 2	166
Overvotes in rank 3	42
Total Overvotes	1,067

Table 5: Overvotes in Mayor race

* If the ballot was marked to indicate the rankings among the candidates, but there was no mark that indicated one or more of the rankings that could be assigned, the relative rankings that were marked indicated which candidate was ranked as the highest, in accordance with O.Reg 310/16.

In total, blank ballots and overvotes in the first rank represent 1.33% of the total votes cast for Mayor.

Ballot Type	Vote Count	%
Blank ballots	442	0.45%
Overvotes in rank 1	859	0.88%
Total Continuing Ballots	96,646	98.67%
Total Votes Cast	97,947	100%

Table 6: Vote totals for Mayor race

Conclusion and Next Steps

Planning for the 2022 Municipal and School Board Election is currently underway. The information gathered during and after the 2018 Municipal Election will provide the Civic Administration with the ability to seek ways to improve the vote process, results reporting, and overall accessibility for all electors in the City of London. Collaboration with other municipalities to monitor election trends and technologies will be taken into consideration during the planning phases for the next election. The Civic Administration will continue to work towards improvements in Voters' List management, internal processes, and voter engagement. At a later date, the Civic Administration will bring forward a report providing information regarding the 2022 Municipal Election for Council's information.

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Appendix 'A'
Accessible Election Report

ACCESSIBLE ELECTION REPORT 2019

City of London 2018 Municipal
Election

January 21, 2019

V  **T E S**

Introduction	3
Purpose.....	3
Plan Development and Review	3
Post-Election Report	4
Legislative Requirements – <i>Municipal Elections Act, 1996</i> , as amended.....	4
Accessible Customer Service.....	4
Definitions and Barrier Types	5
Key Areas of Focus in the Elections Process.....	5
Feedback	6
<u>Elections Communication and Information Initiatives</u>	7
<u>Voting Places Initiatives</u>	7
<u>Voting Methods Initiatives</u>	9
<u>Recruitment and Staffing</u>	10
<u>Assistance to Candidates</u>	10
Appendix 'A'	11

City of London Accessible Election Report 2018

Introduction

The City of London is committed to making municipal elections accessible to all citizens of London – including voters, candidates, and employees who participate in the election administration. The City Clerk's Accessible Election Plan was posted on the City's website on December 22, 2017 in accordance with section 12.1 of the *Municipal Elections Act, 1996*. The City of London's Accessible Election Plan 2018, supports and enhances the City's policies, multi-year Accessibility Plan and commitment to respond to the needs of persons with disabilities.

Purpose

The focus of the Accessible Election Plan 2018 is to:

- a) ensure that electoral services are accessible to all voters and candidates;
- b) identify and eliminate barriers for persons with disabilities; and
- c) create a positive and inclusive voting experience.

Plan Development and Review

The City of London's Accessible Election Plan 2018 was developed by members of the City Clerk's Elections Team, in consultation with the Accessibility Advisory Committee and the City's Municipal Policy (AODA) Specialist. Leading up to the election, the proposed Plan was submitted to the Accessibility Advisory Committee for review and comment. This document identified barriers that could be experienced by people with disabilities during an election, and identified actions to address each barrier.

The following criteria were considered in the development of this Plan:

Policies and procedures must be consistent with the principles of the [Municipal Elections Act, 1996](#), the [Ontarians with Disabilities Act, 2001](#), and the [Accessibility for Ontarians with Disabilities Act, 2005](#), and respect the dignity and independence of persons with disabilities.

Accessibility was identified early in the election planning process as a priority for the 2018 municipal election. In early 2017, the City Clerk's Office developed strategies and initiatives to identify, remove and prevent barriers that affect voters and candidates with disabilities during the election process. The Plan established measurables by which to evaluate the effectiveness of each initiative. As indicated through the attached update to the Accessible Election Plan, there were numerous accessibility initiatives undertaken by the Elections Office leading up and into the 2018 election.

A total of 1,895 election workers were given accessibility training and all 113 candidates were provided with accessible campaign guidelines and materials. During election worker training, ample time was dedicated to explaining appropriate conduct for voters requiring assistance. Every election worker received reference materials with tips and City of London standards for assisting voters with disabilities. Training stressed the importance of removing physical barriers to the entrance of the poll and ensuring ample space for maneuvering mobility aids. All voting places were deemed accessible according to the accessibility audit, and few complaints were received regarding accessibility issues. In the future, improvements to the communication regarding the availability of alternate accessible entrances to voting places may be made.

Vote by mail provided voters with the ability to mark their ballot from home at their convenience. This allowed increased rights of privacy to voters with disabilities whom may find voting at traditional paper based voting places more difficult. In the event that a voter was unable to complete the vote by mail process on their own, Elections Office staff

scheduled home voting visits, where, upon request, a ballot was provided to the voter to mark in their home and given to the staff member to return to the drop-off centre.

Communicating the changes to the way London votes in a manner that was effective and appropriate for all citizens of London was a priority for the Elections Office. To reach persons with disabilities, the Elections Office investigated alternative communication methods and emphasized the availability of election information in multiple formats. For the first time, the City offered ballot instructions and candidate lists in braille and large print at each advance and voting day poll. City staff also integrated accessibility information in election presentations and communications wherever possible. Before the next municipal election, a review and update of accessible and alternative communication formats will take place to ensure that all citizens of London are able to effectively participate in the municipal election.

The City Clerk's Office will continue to learn, develop and adjust the Accessible Election Plan 2018 in order to meet the needs of persons with disabilities. This Plan will be reviewed and updated as new opportunities are identified or become available.

Post-Election Report

Following the election, the *Municipal Elections Act, 1996* requires the City Clerk to submit a public report concerning the identification, removal and prevention of barriers that affect voters and candidates with disabilities. The City Clerk's post-election report is posted on the City's website in a format accessible to persons with disabilities and may be distributed to disability groups and other stakeholders, upon request.

Legislative Requirements – *Municipal Elections Act, 1996*, as amended

The City Clerk is responsible for conducting municipal elections and establishing policies and procedures to ensure all voters have the opportunity to fully participate in the 2018 municipal election.

The *Municipal Elections Act, 1996*, as amended states the following:

- 12.1(1)A clerk who is responsible for conducting an election shall have regard to the needs of electors and candidates with disabilities. 2009, c. 33, Sched. 21, s. 8 (8).
- 12.1(2)The clerk shall prepare a plan regarding the identification, removal and prevention of barriers that affect electors and candidates with disabilities and shall make the plan available to the public before Voting Day in a regular election. 2016, c. 15, s. 11.
- 12.1(3)Within 90 days after voting day in a regular election, the clerk shall prepare a report about the identification, removal and prevention of barriers that affect electors and candidates with disabilities and shall make the report available to the public. 2016, c. 15, s. 11.
- 41(3) The clerk shall make such changes to some or all of the ballots as they consider necessary or desirable to allow electors with visual impairments to vote without the assistance referred to in paragraph 4 of subsection 52 (1). 1996, c. 32, Sched., s. 41 (3); 2001, c. 32, s. 30 (1).
- 45(2) In establishing the locations of voting places, the clerk shall ensure that each voting place is accessible to electors with disabilities. 2009, c. 33, Sched. 21, s. 8 (23).

Accessible Customer Service

The City Clerk's Office is committed to providing quality goods and services that are accessible to all persons in accordance with the City of London Accessible Customer Service Standards and in compliance with the customer service standards of the *Accessibility for Ontarians with Disabilities Act, 2005*. In fulfilling our mission, the City Clerk's Office will provide services that respect the dignity and independence of persons with disabilities.

Definitions and Barrier Types

Disability: The *Accessibility for Ontarians with Disabilities Act, 2005* defines “disability” as follows:

- (a) any degree of physical disability, infirmity, malformation or disfigurement that is caused by bodily injury, birth defect or illness and, without limiting the generality of the foregoing, includes diabetes mellitus, epilepsy, a brain injury, any degree of paralysis, amputation, lack of physical co-ordination, blindness or visual impediment, deafness or hearing impediment, muteness or speech impediment, or physical reliance on a guide dog or other animal or on a wheelchair or other remedial appliance or device;
- (b) a condition of mental impairment or a developmental disability;
- (c) a learning disability, or a dysfunction in one or more of the processes involved in understanding or using symbols or spoken language;
- (d) a mental disorder; or
- (e) an injury or disability for which benefits were claimed or received under the insurance plan established under the *Workplace Safety and Insurance Act, 1997*.

Attitudinal Barriers: Barriers result when people think and act based on false assumptions. Example: receptionist talks to an individual’s support person because they assume the individual with a disability will not understand.

Information and Communication Barriers: Barriers created when information is offered in a form that suits some, but not all, of the population. Example: print that is too small for some people to read and public address systems that alert only people who can hear the message.

Technology Barriers: Barriers occur when technology, or the way it is used, cannot be accessed by people with disabilities. Example: websites that are not accessible to people who are blind and require the use of screen reader software.

Physical and Architectural Barriers: Physical barriers or obstacles that make it difficult for some people to easily access a place. Example: a door knob that cannot be turned by a person with limited mobility or strength, or a hallway or door that is too narrow to allow a person who uses a wheelchair to pass through safely.

Organizational Barriers: Occur when policies, practices or procedures result in some people receiving unequal access or being excluded. Example: A hiring process that is not open to people with disabilities.

Key Areas of Focus in the Elections Process

The Elections Office has identified the following five key areas of focus within the election process to prevent and remove accessibility barriers:

1. Elections Communication and Information
2. Voting Places
3. Voting Methods
4. Recruitment and Selection of Election Workers
5. Assistance for Candidates

Feedback

The City Clerk welcomes feedback to identify areas where changes and improvements can be considered and ways in which the City can improve the delivery of an accessible election. The feedback process provides the City Clerk's elections staff with an opportunity to carry out corrective measures to prevent similar recurrences; address training needs, enhance service delivery, and offer accessible methods of providing election services.

Please provide us with your feedback so that we can continuously improve the accessibility of London's municipal elections. Feedback can be submitted to the Elections Office through a variety of methods including:

Telephone	519-661-4535
In Person	300 Dufferin Ave, 3 rd Floor
Fax	519-661-4892
Mail	300 Dufferin Ave, 3 rd Floor, Elections Office, London, ON N6A 4L9
Website	www.london.ca/elections
Email	elections@london.ca

The London Accessibility Feedback Form can be found on the City of London's website. Additionally, staff can, upon request, complete and submit the feedback form on behalf of a person with a disability. Each completed form is reviewed by the City Clerk's Office.

If you require this information in an alternate format, please contact the Elections Office.

City of London Accessible Election Plan Outcomes 2018

Elections Communication and Information Initiatives

- Provide election information in alternative formats and through multiple channels
- Provide an informative and accessible election website

Strategy	Outcome
Ensure election information is available in clear, simple language.	All election information provided in clear and simple language – available in alternate formats upon request.
Continuously update election information posted on the City's website to reflect the most recent information, and temporary disruptions. Enhance the City's "Where Do I Vote?" web application to provide accessibility information about voting places.	5,560 webpage views to "Where do I Vote?" webpage
Ensure election web pages are W3C Consortium WCAG 2.0 Level A compliant.	Compliant.
Establish and continuously update a dedicated accessibility section on the election's website that provides information on the initiatives undertaken by the City Clerk's Office.	3,229 webpage views to Accessible Election information ~51 inquiries related to election accessibility 4 social media posts directly related to election accessibility Accessible Voting webpage created in 2014, updated September 2018.
Make feedback and accommodation request forms available through website.	No requests received via feedback form.
Present information about election accessibility to stakeholder and community organizations.	8 presentations where accessible equipment was demonstrated 3 organizations requested accessible demos
Produce a "How to Vote" pamphlet in English and additional languages and make the booklet available in both print and alternative formats.	~4,600 pamphlets distributed Pamphlets produced in English and Braille. Downloadable version available on london.ca/elections
Produce an accessible "How to Vote" video and post it to the City's website.	6,102 views to Marking the Ballot webpage
Produce a city-wide mail out that outlines key election information.	~150,000 households reached

Voting Places Initiatives

- Ensure all voting place access routes and entrances are clearly identified
- Ensure all voting place owners and managers are aware of accessibility requirements
- Provide a contact centre to deal with accessibility issues, concerns or complaints
- Provide information on the accessibility features available at each Voting Place
- Ensure all voting places are accessible to voters with disabilities

Strategy	Outcome
Review and update Voting Place Accessibility Checklist.	Updated March 2018. See Appendix "A"
Review all potential voting places with consideration for public transit access; provide information to voters on public transit access.	179 voting places located directly on a public transit route less than 250 meters from public transit stop

Strategy	Outcome
Review all potential voting places with consideration for public transit access; provide information to voters on public transit access.	12 voting places located greater than 500 meters from a public transit route
Review all potential voting places for accessibility including two (2) accessible parking spots near the closest entrance to the poll(s).	202 voting places with accessible parking spots
All voting places to be inspected prior to Voting Day to ensure accessibility for all voters.	273 locations inspected
Where possible, the accessible entrance is to be the same as the main entrance.	145 voting places where main entrance is also the accessible entrance. 44 greeters hired to increase accessibility of entryways
<p>In the event of disruptions to service or unforeseen circumstances that affect the accessibility of voting places during the Advance Vote or on Voting Day, notices of disruption will be posted as soon as possible:</p> <ul style="list-style-type: none"> - on the City's website - Facebook: London Votes, - Twitter: @LondonVotes - at the site of the disruption <p>When applicable, a media advisory will be issued.</p>	No disruptions to services on Voting Day or Advance Vote days.
Ensure voters with accessibility needs are directed to the accessible voting entrance by prominent signage.	9 Voting places where additional directional or parking signage was provided by Elections Office for accessible purposes
Use large-print signage at voting places; train election workers to communicate with people who are blind or have low vision. Consult with Accessibility Advisory Committee on best practices.	Large print signage provided at all voting places.
Notify all voting place owners and managers of legislative accessibility requirements in order to prevent last minute changes to voting places.	211 Voting place managers notified.
Welcome the use of support persons and service animals in voting places. Educate elections staff on appropriate communication with voters and service animals.	Information provided in election manual. 1,895 manuals distributed.
<p>Establish a website link to an accessibility feedback form so an elector who encounters an accessibility issue can contact Election or Accessibility staff:</p> <p>Email: elections@london.ca</p> <p>Use the received feedback to ensure that voting places are accessible to voters, as required by the <i>Municipal Elections Act, 1996</i>.</p>	42 accessibility related emails received to elections@london.ca
<p>Provide details of accessibility features available to voters and candidates at Advance Vote locations on the City's website.</p> <p>Provide details of accessibility features available at voting places on Voting Day on the City's website.</p>	2,575 webpage visitors to Accessible Election information Accessible Voting webpage updated September 2018.

Voting Methods Initiatives

- Provide accessible voting opportunities
- Provide voting opportunities in institutions and long-term care facilities
- Provide assistance to voters with disabilities as requested
- Provide instructions on the use of accessible voting equipment

Strategy	Outcome
Provide voters with the option to vote by mail or vote by proxy.	~ 100 proxy forms distributed 40 proxy forms certified 115 Vote by Mail applications
Review ballot design to increase legibility; Increase legibility of ballots through use of accessible font styles and sizes, appropriate case usage, and colours, where possible.	Accessible ballot design reviewed by staff and produced by Vendor. Accessible equipment and ballot demonstration provided to Accessibility Advisory Committee September 2018. 211 sets of Braille Ballot instructions distributed to all voting places
Provide an accessible ballot-marking device at all advanced polls for independent voting via “sip-and-puff”, the use of paddles, or a tactile device.	12 accessible voting machines — one for each advance polling station. 3 voters used accessible ballot marking device during Advance Vote
Provide magnifiers, pens and paper at all voting places.	1 magnifying sheet per voting place 1 set of pen and paper pads per DRO (680 DROs)
Establish voting places at the following facilities in order to allow eligible residents of the facility the opportunity to vote: <ul style="list-style-type: none"> • any institution in which 20 or more beds are occupied by persons who are disabled, chronically ill or infirmed • a long-term care facility in which 50 or more beds are occupied. 	34 long-term care facilities where a dedicated voting place was established
Upon request, provide voters with the opportunity to vote from anywhere at the voting place (including curbside) with assistance from a Deputy Returning Officer. Upon request, assist the elector with voting or reading of ballot.	45 home voting visits on or before Voting Day
Train Deputy Returning Officers to assist voters with voting process when requested.	698 Deputy Returning Officers trained
Enable voters to swear an oath if they are unable to provide the required identification and/or documentation with a signature.	Declaration of Identity forms available at all 211 voting places. 3 engagement events focusing on Election identification options and elector qualifications
Produce videos that outline the voting process and the accessible voting technologies in use for the election. Videos will include accessible elements and captioning. Post the videos on the City’s website.	4 videos produced regarding the election
Provide pictorial instructions on voting processes at all voting places.	2 pictorial ballot instructions per poll provided to 211 voting places
Host a media promotion event (September 2018) on voting technology, including accessible voting equipment and processes.	6 Accessible demonstrations to specific community groups/organizations

Recruitment and Staffing

- Provide accessibility training to all Voting Day workers who participate in the election
- Ensure the recruitment process for staff is accessible

Strategy	Outcome
Develop an Accessible Election Procedure Manual providing direction on how the City of London will address the needs of persons with disabilities during the election and distribute the manual during training.	1,895 worker manuals distributed
Develop accessibility training and reference materials for all elections staff, including: <ul style="list-style-type: none"> • how to interact and communicate with persons with various types of disabilities; • how to interact with persons who use assistive devices or require the assistance of a service animal or support person; • how to use voting equipment and assistive devices to deliver election services; • what to do if a person is having difficulty accessing election information or services. 	75 training sessions held that included accessibility training
Require all elections staff and workers to confirm in writing that they have received elections and accessibility training.	1,895 workers trained on accessible standards and voting procedures
Provide accommodations and special services for interviews, upon request.	2 accommodation and special services requests
Ensure the worker's manual and/or other relevant materials are available in an accessible format, upon request.	2 sets of reference materials produced in an accessible format

Assistance to Candidates

- Provide candidates with access to information in alternative and accessible formats
- Provide candidates with information on how to make their campaign accessible to the public

Strategy	Outcome
Provide candidates with references and links to provincial publications, such as: <ul style="list-style-type: none"> • Accessible Campaign Information and Communication • Accessible All-Candidates Meetings • Candidates' Guide to Accessible Elections (by Association of Municipal Clerks and Treasurers of Ontario) 	3 guides/references focusing on accessible campaigns given to each of the 113 candidates at time of nomination filing
Provide information to each candidate on how to run an accessible campaign at the time of filing nomination papers, and during candidate information sessions.	113 candidates reached
Ensure the candidate guide and/or other relevant publications are available in an accessible format, upon request.	No requests received.
Provide the City of London Voters' List in an electronic format to candidates, upon request.	65 electronic Voters' Lists distributed
Hold candidate information sessions in accessible locations.	2 information sessions held
Provide accommodations and special information services upon request.	1 accommodation and special service request

Appendix 'A'
Voting Place Accessibility Checklist

Voting Place Accessibility Checklist

Ward / Poll:

Date Completed:

VOTING PLACE		
Action Item	✓ / X	Comments
Bus Access		
Stop located within 250m of voting place		
Accessible pathway from bus stop to voting place		
Short distance from stop to Voting Place		
Voting Place Visibility		
Signage visible from all directions		
Pedestrian Crosswalk (if applicable)		
Audible pedestrian signals		
Tactile plates		
Pavement markings clear		
Safe Sidewalks		
Curb cuts present where sidewalk meets roadway		
Sidewalk level		
Obstructions and debris removed		
Lighting		
Sufficient and bright path to the Voting Place		
Marked Accessible Parking		
Accessible parking spots clearly marked on pavement with appropriate signage		
Accessible parking spaces located closest to the accessible entrance		
Accessible Parking Space		
Min. of one (1) accessible parking spot		
Designated marked pathway to sidewalk		
Parking Lot Functionality		
Level ground (i.e free from pot holes)		
Curb ramps or cuts to access building entrance from parking lot		
Route to Facility Entrance		
Route wide enough for wheelchair		
Route free from debris and level ground		
Adequate lighting		
Facility Entrance Accessibility		
Entrance have ramps with handrails		
Door wide enough for wheel chair		
Easy to open or have door opener		
Adequate lighting		
Location of Entrance to the Polling Station		
Location within the Voting Place suitable for assistive mobility aids		
Short walking distance required to vote		

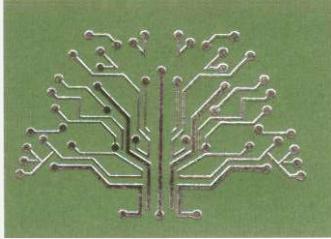
Voting Place Accessibility Checklist

Ward / Poll:

Date Completed:

POLLING STATION		
Action Item	✓ / ✗	Comments
Entrance to Polling Station		
Entrance level with access route		
Ramp or handrails available if necessary		
Non-slip floor		
Adequate lighting		
Doors		
Wide framed doorways		
Doors opened with closed fist		
Poll Station Location		
Entrance close to the poll		
Poll location on same level as entrance		
Elevator available (if applicable)		
Corridors		
Wide enough for wheel chair access		
Free from obstructions		
Adequate lighting and signage		
Washrooms		
Accessible washroom available and nearby		
Adequate room for mobility aids		
Signage		
Large easy to understand signs		
Available along the path of travel from entrance to polling station		
Voting Booth/Table		
Booth low enough for wheel chair access		
Space around booth free from obstructions		
Chairs available		
Ballot Aids		
Magnifying glasses		
Braille ballot template		
Assistive Devices		
Pads of paper and pens		
Voter Assist Terminals (if available) in good working condition		

Appendix 'B'
FCMG Evaluation and Observation Reports



FREEMAN, CRAFT, MCGREGOR GROUP

Evaluation of Dominion Voting
Systems Democracy Suite 5.4.7.2 and
Procedures Proposed for Its Use by
the City of London, Ontario for the
conduct of the October 22, 2018
Municipal Election.

Prepared April 12, 2018

Post Office Box 1716 – Tallahassee, Florida 32302-1716

Introduction

On April 4, 2017, under the authority provisions of subsections 42(1)(a) and (b) and 42(5) of the Municipal Elections Act, 1996, as amended, the Council of City of London, Ontario (the Council) passed By-Law Number E-182-116, a by-law to authorize the use of vote counting equipment and alternative voting methods that do not require electors to be present at a voting place in order to vote in the 2018 municipal election. The By-Law states:

1. The use of poll optical scanning vote tabulators for the purpose of counting votes at Municipal Elections is hereby authorized.
2. Sections 43 (Advance Votes) and 44 (Voting Proxy) of the Municipal Elections Act, 1996, as amended, apply to the City of London 2018 Municipal Election.
3. The use of touchscreen voting machines for advance voting at all advance poll locations is hereby authorized.
4. The use of voting by mail be provided upon request to qualified voters as an alternative voting method that does not require electors to attend at a voting place in order to vote at Municipal Elections is hereby authorized.

On May 1, 2017, under the authority provisions of subsection 41.2(1) of the Municipal Elections Act, 1996, as amended, the Council passed By-Law Number E-183-143, a by-law with respect to ranked ballot for the 2018 municipal election. The By-Law states:

1. Ranked ballot elections shall be used for all offices on the council for The Corporation of the City of London.
2. An elector is entitled to rank a maximum of three (3) candidates for the office of Mayor and three (3) candidates for the office of Ward Councillor.
3. This by-law applies to all regular elections and by-elections of The Corporation of the City of London.

On December 15, 2017, the City of London, Ontario (the City) executed a contract for hardware rental, a software license and services with Dominion Voting Systems (Dominion). The contract includes the following:

- Vote Tabulators – 225 units
- Accessible Voting Ballot Marker Device – 12 units (Advance Vote)
- Ballots
- Election Products: Ballot Boxes, Secrecy Folders, Marking Pens, Security Seals
- Election Management Software System
- Ranked Ballot Module License
- Mobile Printing Module (Advance Vote)
- Professional Services and Support

On March 20, 2018, the City entered into a contract with the Freeman, Craft, McGregor Group, (FCMG) to provide election consultant and audit services to assist them with their preparation for, and conduct of, the October 22, 2018 municipal election. The schedule of activities and deliverables under the contract is provided as Attachment A to this report.

Objectives

Our contract calls for FCMG to evaluate the accuracy, reliability and usability of the ranked ballot software; evaluate the City's proposed ranked ballot procedures for using the system during the 2018 municipal election; and that we provide reasonable assurance that any weaknesses in the system are mitigated by their proposed procedures. At a minimum, the evaluation will address:

- whether the Ranked Ballot Module utility functions with reliability, accuracy and sufficient usability to allow it to be used with a reasonably low risk of operator error;
- whether the ImageCast Precinct Optical Scan Ballot Tabulator has an acceptable feed rate, accurately handles ballot rejection conditions as determined by the City in procedures, has low levels of ballot rejection errors, and can handle ballots that have been folded; and
- whether the City's procedures for tabulating and displaying results using the Results Tally and Reporting (RTR) software are adequate.

Tasks and Services Performed

From March 27 through 29, 2018 FCMG assisted the City with their mock election and RCV functional test. Goals for this event included:

- allowing City staff to take the system through an end-to-end operation of the system, from preparing the system for an election to opening polling places, voting, closing polls, uploading results, conducting the RCV tabulation and reporting results;
- testing the RCV tabulation software for compliance with the RCV tabulation requirements stipulated by the City;
- testing the vote tabulators against the City's functional requirements, including feed rate, ability to handle folded ballots, handling marginal marks, tolerance for torn ballots and ballot acceptance and rejection requirements; and
- creating forensic benchmarks to verify whether system installations encountered in future test events are identical to the system installation tested during the mock election.

On the evening of March 27, we developed a marking plan for a test deck containing sixty-one ballots specifically designed to test whether the RCV tabulation system was compliant with requirements provided by the City.

On March 28, we met with City officials and representatives of Dominion. The discussion included a description of the system functions, City requirements, procedures to be followed during the day and expected outcomes.

The DVS.DemocracySuite.ResultTally.exe software used in the test was copied from a laptop provided by Dominion. Both City staff and FCMG took MD5 and SHA256 hashes.

The MD5 hash returned a value of 1f2b76dda386314d63787b27abe1a737.

The SHA256 hash returned a value of

c1c7f7513332623b0f75262e6f18981493d50dfe09a8a6bc43181544a4113ea2

The ImageCAST Precinct Tabulator features an internal firmware hashing utility. The utility was run on two “ImageCAST PCOS-321C” tabulators with serial numbers “AAFAKEM104” and “AAFAKEM123.” Each tabulator returned a value of 05 68 ce a7 c7 81 65 47 2f 4e 78 6c fb 38 4f b1 84 b1 b0 76 5d 1a ef 1a 7e 19 6a 1f d5 e0 d2 f1.

Following the RCV ballot-marking plan, we prepared a test deck. Polls were opened on an ImageCAST precinct tabulator, the ballot test deck was scanned, the polls were closed and results were printed. The results were uploaded to a laptop running the DemocracySuite Results Tally system. RCV processing was completed, reports were printed and the results were verified.

In order to test the system’s sensitivity to, and handling of, marks that do not completely fill the ovals, but could indicate a voter’s choice, we prepared a deck of test ballots with a variety of marginal marks. These marks included check marks, lines through the oval, marks outside of the oval, and hesitation marks. The deck was processed. The tabulator rejected a number of ballots with marginal marks. When a ballot was rejected, it displayed a message saying “Warning! One or more ambiguous marks were detected on the ballot. Please use the proper marking pen and fill in the targets completely. For additional details please press the ‘more’ button.” The rejected ballots were examined by City staff and are further discussed in the Findings and Recommendations section of this report.

Finally, we prepared a deck of marked ballots that included ballots folded in various manners, including folds across and between timing marks, one ballot that had been wadded into a ball, ballots with slight tears along the side and top, ballots with ink and mascara smudges, and a ballot with a stray mark through some of the timing marks. The ballots were scanned and the results were recorded. The rejected ballots were examined by City staff. A full evaluation of the outcome is discussed in the Findings and Recommendations segment of this report.

Although the initial test deck exercised the system’s RCV logic, it contained an artificial pattern and included an unrealistic number of candidates with zero votes and tied vote totals in the initial elimination rounds.. This deck allowed us to conduct a thorough test of how the RCV tabulations handled tied races using a minimal number of marked ballots, but it was not representative of an actual election. In order to present a more realistic tabulation, we prepared a second test deck of sixty ballots that did not include any candidates receiving zero votes after the first round of voting.

On March 29, a tabulator was cleared, the poll was opened and the sixty ballot deck was processed. After the ballots were run, the poll was closed, results were uploaded, the RCV tabulation was completed and results reports were prepared. Members of the City staff took the results and began to format them in order to create an output data file that could be elegantly displayed on their results web pages.

An initial review of the City’s procedures is progressing. The City has provided us with the most recent draft of the documents in a Microsoft word file. Our observations, suggested edits and comments will be provided using Word Track Changes markup and the document will be returned to the City.

Findings and Recommendations

RCV Tabulation

As tested, the Dominion Voting Systems Democracy Suite provides RCV tabulation that complies with the requirements specified in Ontario Regulation 310/16, as interpreted by the City as applicable to the October 22, 2018 election.

Rules for tabulating RCV elections vary from jurisdiction to jurisdiction. The Dominion system is designed to accommodate a variety of election rules. Settings that control RCV tabulation are managed through RCV “profiles,” and users can select from existing profiles as well as edit, create and delete profiles. For the October 22, 2018 election, Dominion created a profile named “London RCV”. This profile includes the following settings:

Setting	Value
• RCV Method =	IRV
• Previous Round Evaluation Method =	Backwards from previous round
• Elimination Type =	Single
• Votes to include in Threshold Calculations =	Continuing Ballots 1 st Round
• Use Previous Tie Break Decision =	Checked
• Exclude Unresolved Write-ins =	Unchecked
• Declare Winners By Threshold =	Checked
• Uses Precincts =	Checked
• Pause After Round =	Checked
• Perform Elimination Transfer in Last Round =	Checked
• Skip Over voted Rankings =	Unchecked
• Use First Round Suspension =	Unchecked

These settings are critical for the system to perform the RCV tabulation in compliance with the City’s requirements. Any operator in the Result Tally and Reporting (RTR) module can change these settings and alter the tabulation. The system provides documentation of most of the settings in the result report as shown below:

Tabulation Options	
RCV method	IRV
Exclude unresolved write-ins	FALSE
Declare winners by threshold	TRUE
Uses precincts	TRUE
Previous rounds evaluation method	Backwards from previous round
Elimination type	Single
Fixed precision decimals	0
Perform elimination transfer in last round	TRUE
Skip over voted rankings	FALSE
Votes to include in threshold calculation	Continuing ballots 1st round
Use first round suspension	FALSE

We recommend that procedures require that the selected profile and the settings for that profile be verified at the beginning of the tabulation of each race. After the reports are generated, the tabulation options should be reviewed and verified once more.

ImageCAST Precinct Tabulator Functionality

The tabulators processed ballots at a rate of ten ballots in one minute, fifty nine seconds or five ballots per minute. This exceeds the City's requirements of 4.5 ballots per minute and 280 per hour.

The tabulators properly rejected ballots that did not include the initials of an election official.

The tabulators produced a status report that detailed poll information, the serial number of the tabulator and the total number of ballots scanned on that tabulator

The tabulators successfully scanned ballots that had been folded, including folds across timing marks, between timing marks, lengthwise, and included a ballot that had been wadded into a ball. Any ballot that was sufficiently straightened to enter the feed mouth was accepted, scanned and accurately tabulated.

The tabulators were reasonably tolerant to stray marks and smudges in the ballot header, footer and areas containing timing marks. A stray pen mark from the clerk's initial block through one of the timing marks was accepted, as was a mascara smudge in the top header marks. A thumbprint with ink from a ballot marking pen in the footer of the ballot caused the ballot to be rejected.

Over voted, under voted and blank ballots were not rejected and proper marks on ballots with over votes and under votes were counted. However, the system did reject ballots when it detected one or more marks that it classified as ambiguous on a ballot. We reviewed the rejected ballots with City staff. They determined that many of the marks rejected for being ambiguous were typical of marks made by voters and, as such, should be counted. These marks included checkmarks, slashes and large dots within the ovals. Although the instructions for marking the ballot call for the voter to fill in the oval, in practice, a high number of voters simply do not do that. The threshold for an "ambiguous mark" appears to be set too high. The system's scanning parameter settings allow the thresholds of mark detection on the ballot in the percentage of marked pixels to be adjusted. However, the Democracy Suite EMS Election Event Designer User Guide states:

"The scanning parameters should only be changed by an advisory of the Dominion Voting Systems engineering group. When creating a new project, these settings will be set at their default values. The default values represent the calibrated values. Settings should be left at the default values unless the Dominion Voting Systems engineering group recommend otherwise."

We recommend that the City work with Dominion to resolve this issue, setting thresholds that will be more tolerant of the marks that voters will make as they mark their ballots. The test deck

exercising these marginal marks was left with the City and may be used to re-test the system after the threshold settings are modified.

Since the threshold numbers used in our test are presumably “default” values automatically assigned by the system when a new election is defined, we further recommend that procedures to verify the modified threshold settings are included in all future election definitions.

Election Results Reports

Although the system can produce election reports and logs, those provided by the RCV tabulation module have fields that are too wide to fit on standard paper and result in an inelegant solution for posting results on a web page. If they use an XML, or other data file, that City staff can create their own web based reports, which is an acceptable solution to this issue. The Democracy Suite EMS Results Tally & Reporting User Guide describes various export types and the possibility of “export packages” within the system presented for the mock election however neither we, nor City staff, were able to create an XML or delimited text file with the election results. We recommend that the City contact Dominion and discuss the file formats that are available to them and how they are generated.

Methodology and Scope Limitations

Our expertise is in examining computerized voting systems, analyzing systems operation, evaluating system compliance with established criteria, developing standards for systems and reviewing and developing procedures for the use of these systems. We are not attorneys and do not offer legal advice. To advise the City on the legal requirements for the conduct of their election would require an interpretation of law. Accordingly, we do not provide any opinion regarding those issues.

We provided assistance to the City when it conducted a set of tests on the voting system and a review of proposed procedures for use in planning and preparing for the October 22, 2018 election. The intended audience for this report is the election administrators of the City and those stakeholders responsible for enacting election law, formulating policy, funding and budgeting for election administration.

Both the work we performed and our findings are strictly limited to the specific serial numbered hardware elements, software elements and proposed procedures we examined. The results described in this report should be reliable and repeatable for those specific items as they were configured during the examination, using the same election definition and test ballots. The decision to apply those results to other items is solely at the discretion and risk of the City. Use of this information by others for purposes not contemplated in the design of this project may lead the users to unfounded conclusions.

Attachment A

Activities and Deliverables

Mock Election and RCV Functional Test

March, 28, and 29, 2018

- Review the City's procedures to conduct RCV tabulation and the system documentation provided by Dominion
- Meet with the City's election officials, tour facilities and finalize project plans.
- Verify that the versions of firmware and software provided for the mock election are identical to those identified in the contract between the City and Dominion and planned for use in the October 22, 2018 election.
- Develop ballot marking pattern and expected results for RCV tabulation during the mock election.
- Create a test deck for the mock election.
- Evaluate and resolve any variance from the expected results.
- Identify and document any part of the system's RCV tabulation that deviate from the requirements in Ontario Regulation 310/16.
- Recommend solutions to resolve any variation from those requirements.
- Provide an analysis to identify internal and external factors that affect the validity, efficiency and timing of results.
- Suggest ways to improve the process based on a review of the procedures and conduct of the mock election.

Acceptance Test

August, 2018

- Assist the City and Dominion to create an acceptance test plan to verify that the equipment received, the software and firmware installed is physically, electronically, mechanically and functionally correct. The system should be identical in every respect to the system prescribed in the contract between the City and Dominion. The system should also be configured to meet all requirements enumerated in the City's laws, rules and procedures. Every system component should be undamaged and operational. The system should pass every diagnostic routine prescribed by Dominion.
- Verify the correct firmware and software is installed on every element of the voting system. The firmware and software should be identical to that verified during the mock election. This verification may be accomplished either by witnessing the software and firmware being installed on every device from trusted installation media or through verification routines similar to those described in Volume I, Section 7.4.6 "Software Setup Validation" of the Voluntary Voting System Guidelines published by the US Elections Assistance Commission.
- Assist the City with the acceptance test, record the proceedings and report any findings.
- Help the City and Dominion resolve any anomalies found during the acceptance test.

Logic and Accuracy Test

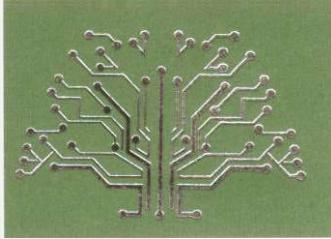
September 10-14, 2018

- Provide the City with the tools to develop and evaluate the logic and accuracy test for the tabulation equipment, results software and display.
 - Develop and evaluate includes, but is not limited to:
 - create marking pattern and expected results for test decks;
 - oversee, and participate in, marking ballots with City staff;
 - proof test decks and correct any mismarked ballots;
 - Test the system's ability to process folded ballots and marginal marks;
 - verify that all equipment is programmed with the correct election definition for the polling place to which it is assigned and can process the ballots for that polling place;
 - analyze any variance from the expected results and determine whether ballots were marked in error or there was a tabulation error;
 - help the City and Dominion resolve any anomalies found during the Logic and Accuracy test.

Tabulation Observation and Post-election Evaluation

October 21 — 23, 2018 and Dates TBD in 2019 for Final Report.

- Onsite observation and evaluation will include:
 - observe election night tabulation;
 - observe RCV tabulation;
 - prepare an audit report on the RCV tabulation;
 - present the audit report to the Corporate Services Committee during the first quarter of 2019 as part of the City's comprehensive debriefing on the 2018 Municipal Election.



FREEMAN, CRAFT, MCGREGOR GROUP

Acceptance Test and
Logic and Accuracy Test for
Dominion Voting Systems'
Democracy Suite 5.4.7.2 Prior to Its
Use by the City of London, Ontario
for the conduct of the
October 22, 2018 Municipal Election

Prepared September 30, 2018

Post Office Box 1716 – Tallahassee, Florida 32302-1716

Introduction

On April 4, 2017, under the authority provisions of subsections 42(1)(a) and (b) and 42(5) of the Municipal Elections Act, 1996, as amended, the Council of City of London, Ontario (the Council) passed By-Law Number E-182-116 to authorize the use of vote counting equipment and alternative voting methods that do not require electors to be present at a voting place in order to vote in the 2018 municipal election. The By-Law provides:

1. The use of poll optical scanning vote tabulators for the purpose of counting votes at Municipal Elections is hereby authorized.
2. Sections 43 (Advance Votes) and 44 (Voting Proxy) of the Municipal Elections Act, 1996, as amended, apply to the City of London 2018 Municipal Election.
3. The use of touchscreen voting machines for advance voting at all advance poll locations is hereby authorized.
4. Upon request, vote by mail be provided to qualified voters as an alternative voting method that does not require electors to be present at a voting place in order to take part in Municipal Elections is hereby authorized.

On May 1, 2017, under the authority provisions of subsection 41.2(1) of the Municipal Elections Act, 1996, as amended, the Council passed By-Law Number E-183-143, a by-law with respect to ranked ballot for the 2018 municipal election. The By-Law provides:

1. Ranked ballot elections shall be used for all offices on the council for The Corporation of the City of London.
2. An elector is entitled to rank a maximum of three (3) candidates for the office of Mayor and three (3) candidates for the office of Ward Councillor.
3. This by-law applies to all regular elections and by-elections of The Corporation of the City of London.

On December 15, 2017, the City of London, Ontario (the City) executed a contract to rent hardware, a software license and services with Dominion Voting Systems (Dominion).

On March 20, 2018, the City entered into a contract with the Freeman, Craft, McGregor Group to provide election consultancy and audit services for their preparation and conduct of the October 22, 2018 municipal election. The contract requires four sets of services as listed below:

1. Assist the City with a mock election and a functional test of the ranked choice voting system. This work was completed March 27 through 29, 2018. Our report on that work was completed on April 12, 2018.
2. Assist the City and Dominion with the acceptance test for the system. This work was completed August 6 through 10, 2018 and is included in this report.
3. Assist the City with conduct of a logic and accuracy (L&A) test. This work was completed September 10 through 14, 2018 and is included in this report.
4. Observe tabulation and provide a post-election evaluation. The observation is scheduled for the week of October 22, 2018. The observation and post-election evaluation report will be prepared thereafter.

Acceptance Test Objectives

The objectives of an acceptance test are to verify that the equipment received, and the software and firmware installed, are physically, electronically, mechanically and functionally correct. The system should be identical to the system prescribed in the contract between the City and Dominion, configured to meet all requirements enumerated in the City's laws, rules and procedures and all components should be undamaged and operational.

In order to be effective, the test must include all components of the system that will be used in the election. Firmware and software installed on the system must be identical to that which was tested during the mock election.

Tasks and Services Performed

On August 7 and 8, 2018, we assisted City staff conduct acceptance tests on two hundred polling place tabulators, thirteen advance vote tabulators and twelve ballot marking stations.

These tests included a physical inspection to ensure the machines had no damage, the use of both battery and AC power, verifying the firmware, confirming that the system has the ability to read ballots fed to them in any orientation, then tabulating the ballots preparing the reports to show that the system met the expected results.

On August 9 and 10, 2018, we assisted City staff conduct acceptance tests on the election management and reporting software. The test included verifying the software version and exercising the capabilities for ranked choice tabulation, reporting and providing audit data.

Acceptance Test Findings and Recommendations

The tabulators were inspected and a variety of minor issues were noted. Most significantly was that a hasp on the USB/Modem door on numerous machines had been bent in order to prevent the door from opening. While this apparently secured the door for some former user, it also prevented the USB port from being inspected to ensure that no unauthorized devices were resident on the unit. On some other machines, the door was loose and would not latch.

We recommended that during the L&A test all of these doors be opened and the ports inspected to verify that they have no improper devices installed. The area is small enough to allow a USB transceiver to be inserted and avoid detection.

- Dominion support personnel should be assigned to straighten the hasp. The hasp is made of a fairly soft metal and there is danger of it breaking due to metal fatigue when it is straightened.
- The verification and sealing should be performed, or witnessed, by two or more people in order to verify that no lone individual could install and conceal an unauthorized device. Both individuals should sign the L&A checklist.
- The console port behind the Card 2 door should also be inspected to be sure that it is clear and sealed by two or more people.

A number of machines needed to have their clocks reset. A few machines also required that their touch screens be recalibrated. Cosmetic damages to tabulator cases were documented. The hash values taken from all of the machines verified that the correct firmware was installed. Overall, there were no issues that resulted in a machine being rejected. It was noted that on many machines the “System Ready” text on the touch screen would flicker or flash. City staff confirmed with Dominion that this was normal. Although the occurrence and frequency of this was somewhat inconsistent, it did not appear to have an impact on the functionality of the machines.

Accessible machines were exercised. The audio ballot operated as expected. The devices marked ballot selections made within the audio ballot correctly. Within the noisy environment of the City Hall basement, the initial volume settings made it difficult to hear the audio ballot. Once the volume was turned up, it was no longer a problem. We believe that within an advance voting location this should not be a problem.

On August 9, 2018 the test ballot decks that were run during the mock election were re-run on new memory cards provided by Dominion for the acceptance test. All of the tabulated totals matched those previously tabulated during the mock election. There were differences in format and content on the tabulator results tape. The test deck was re-run using the same memory card as used in the mock election. When the ballots were run using the memory cards from the mock election, the content of the report was identical to that produced after the mock election. The differences in format and content of the tabulator results tape were based upon differences in the report formatting for the mock election verses the acceptance test.

We tabulated the results with the same profile used in the mock election. We duplicated the manual tiebreaks and arrived at identical results. After the mock election, the City decided to use a new ranked choice profile that does not use automated tie breaking. The logic of breaking a tie will not change, but the process will be performed manually rather than automatically. The profile was changed as follows:

- Previous Round Evaluation Method was changed to None and
- Use previous tiebreak decision was changed to No.

The ranked choice elections were re-tabulated using the same tiebreaker process as in the original mock election without automatic tie breaking. The results were identical and the program behaved as expected.

We tested the speeds of uploading results and ballot images. With three hundred one ballots on a file, the ballot images were uploaded in twenty-seven seconds and data took between fourteen and seventeen seconds. This indicates that the combination of ballot images and data takes approximately twice as long to upload as only data. Unless there is a need for ballot image data on election night, we recommend only the data be uploaded.

We reviewed the EMS “Results Tally and Reporting” application capability to export cast vote records, audit files and ballot image files. Our expectation was that data from the cast vote record could be exported either in a spreadsheet or delimited file that could be viewed in a

spreadsheet with each row of the spreadsheet displaying the selections made on a single ballot. It appears that Dominion attempted to implement such a report with a Comma Separated Values (CSV) file that appeared to meet our needs. However, the file only contained data for votes on the first ranking in each contest. We attempted to produce the file using a number of the options in the menu but were unable to produce a file containing data for second and third rankings.

We followed the steps for “Exporting Audit Files” and produced the Export Audit File as shown in the system manual. The file contained detail of the contents of each ballot including a ballot file name that can be used to retrieve the ballot image. However, the file does not allow the images to be sorted or the number of selections on the ballot to be calculated.

We followed the steps in section 14.3 “Exporting Audit Images” and produced a directory of ballot images. We compared a sample of those images to the audit file data produced in the section 14.2 process. For all of the records sampled, the images and audit data matched.

We recommended that the City work with Dominion to resolve the inability of the CSV file of cast vote record data so it would include the data for votes in the second and third rankings and make reconciling the data on tabulator reports with the data imported into the “Results Tally and Reporting” application easier.

L&A Test Objectives

The objectives of an L&A test are to verify that all of the equipment is operating properly, programmed with the correct election definition and can process the ballots that will be used in the election. Polling place equipment must be assigned to, and programmed for, use in specific polling places. The L&A test must demonstrate that each piece of polling place equipment is correctly programmed and can process the ballots that will be used in its assigned polling place. Testing the election management and reporting systems must demonstrate that they can consolidate and process the data from all polling place devices accurately, perform the tabulation and correctly report results.

When these verifications were complete, the test data were zeroed on all system components. Polling place equipment was sealed, packed for transport to polling places and stored in a secure, sealed room.

L&A Test Tasks and Services Performed

On August 10, 2018 we received a ballot proof file for the ballots that would be used in the October 22, 2018 election. We began developing a ballot marking pattern file for the City staff to use in the L&A test decks for polling place machines. To create test decks that would test every marking position on every ballot style, and how the system handles under voted contests and over voted contest required twenty-three ballots per ballot style. With five ballot styles per ward, the test deck for each ward totaled one hundred fifteen ballots. The master deck covering all fourteen wards required one thousand, six hundred ten ballots. After the City had approved

the strategy and volume of ballots proposed for the test, we developed a ballot marking pattern and expected results file for each of the fourteen wards.

On September 10, 2018 City staff began the L&A test. We assisted by performing the first tabulation of each test deck, proofing the deck and correcting any marking errors that occurred. From September 10, 2018 through September 12, 2018, we also assisted by verifying the hash totals of the firmware on each device and auditing test results against expected results.

On September 10, 2018 we completed a ballot marking pattern and expected results file and marked a test deck for the Advanced Vote tabulators. This deck required at least one ballot from each of the seventy ballot styles, and verifying all marking positions for each contest. In order to meet these requirements, we assembled a test deck comprised of eighty ballots. We processed the test deck through each of the advance vote tabulators, verified firmware and results, cleared the data for the election and transferred the tabulators to City staff who sealed, packed and transferred them to secure storage.

On September 13, we provided a set of ballots for testing of the accessible ballot marking machines. A set of twenty ballot styles were identified which would test the audio ballot and proper marking of all contests in the election. City staff conducted the test by marking two of the ballots on each of the accessible machines.

On September 13 and 14, we conducted a mass ballot count on one of the advance vote machines. The master test deck of one thousand, six hundred ten ballots was fed through a single machine. Between the first and second day, the machine was shut down and secured and reopened on the second day following the procedures for advance voting sites. When all ballots had been processed, the machine was closed, and results printed out. The time for the machine to tabulate the ballots was measured and compared to the time for machines that had processed only a single ward test deck.

On September 13 and 14, we worked with City staff to exercise the ranked choice tabulation and reporting functions. Using an Excel formula developed by City staff, we developed a model for Excel templates to process data export files from the election management system and create a report that could be used to audit data on the election management system against the results tapes produced by individual tabulators.

On September 17 through 19, we developed templates for the Mayor's contest and each of the fourteen Councillor contests.

L&A Test Findings and Recommendations

All but three of the tabulators, including polling place and advanced voting machines, processed the test decks and reported results identical to expected results. The three tabulators were failed for operational issues rather than tabulation errors. They were replaced by Dominion and the replacement machines successfully processed and reported results identical to expected results. We recommend and agree with the City's plan to have sufficient back up tabulators available on Election Day to cover any operational failure of equipment.

Although setting the clock on tabulators to the correct time was part of the protocol during the acceptance test, numerous units displayed the incorrect time during the L&A test and had to be reset. The time errors were small, usually less than five minutes. We recommend that, unless the City has already trained polling place officials to check and set the time upon opening the polls, that they simply be aware of this issue when reviewing results tapes and audit records after the election. These time errors are immaterial and changing polling place procedures at a late date introduces unnecessary risk.

The tabulator configured for advance voting and used to conduct the volume test successfully processed the one thousand, six hundred ten ballot test deck and reported results identical to expected results. When the election was closed the machine took twenty seconds longer to tabulate and print the results than machines that had processed test decks consisting of one hundred fifteen ballots.

All of the accessible ballot marking machines provided the correct audio ballot and marked ballots consistent with the selections made by testers.

We found that, as discovered during the acceptance test, the CSV file of cast vote record data did not include the data for votes in the second and third rankings and could not be used to reconcile the data on tabulator reports with the data imported into the “Results Tally and Reporting” application. We worked with City staff to develop Excel templates that can process data export files from the election management system and create a report that can be used to audit data on the election management system against the results tapes produced by individual tabulators. We recommend that the Excel templates be used to verify that data imported from tabulators into the Results Tally and Reporting Application has been uploaded correctly and is consistent with the results produced by the tabulator.

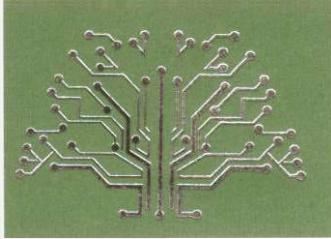
Our overall finding is that the system is now election ready. All devices are performing as expected and the procedures developed by City staff appear to be sound.

Methodology and Scope Limitations

Our expertise is in examining computerized voting systems, analyzing systems operation, evaluating system compliance with established criteria, developing standards for systems then reviewing and developing procedures for the use of these systems. We are not attorneys and do not offer legal advice. To advise the City on the legal requirements for the conduct of their election would require an interpretation of law. Accordingly, we do not provide any opinion regarding those issues.

We provided assistance to the City when it conducted a set of tests on the voting system and a review of proposed procedures for use in planning and preparing for the October 22, 2018 election. The intended audience for this report is the election administrators of the City and those stakeholders responsible for enacting election law, formulating policy, funding and budgeting for election administration.

Both the work we performed and our findings are strictly limited to the specific serial numbered hardware elements, software elements and proposed procedures we examined. The results described in this report should be reliable and repeatable for those specific items as they were configured during the examination, using the same election definition and test ballots. The decision to apply those results to other items is solely at the discretion and risk of the City. Use of this information by others for purposes not contemplated in the design of this project may lead the users to unfounded conclusions.



FREEMAN, CRAFT, MCGREGOR GROUP

Tabulation Observation and
Post-election Evaluation Report
For the City of London, Ontario
October 22, 2018 Municipal Election

Prepared December 7, 2018

Post Office Box 1716 – Tallahassee, Florida 32302-1716

Introduction

On April 4, 2017, under the authority provisions of subsections 42(1)(a) and (b) and 42(5) of the Municipal Elections Act, 1996, as amended, the Council of City of London, Ontario (the Council) passed By-Law Number E-182-116 to authorize the use of vote counting equipment and alternative voting methods that do not require electors to be present at a voting place in order to vote in the 2018 municipal election. The By-Law provides:

1. The use of poll optical scanning vote tabulators for the purpose of counting votes at Municipal Elections is hereby authorized.
2. Sections 43 (Advance Votes) and 44 (Voting Proxy) of the Municipal Elections Act, 1996, as amended, apply to the City of London 2018 Municipal Election.
3. The use of touchscreen voting machines for advance voting at all advance poll locations is hereby authorized.
4. Upon request, vote by mail be provided to qualified voters as an alternative voting method that does not require electors to be present at a voting place in order to take part in Municipal Elections is hereby authorized.

On May 1, 2017, under the authority provisions of subsection 41.2(1) of the Municipal Elections Act, 1996, as amended, the Council passed By-Law Number E-183-143, a by-law with respect to ranked ballot for the 2018 municipal election. The By-Law provides:

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On December 15, 2017, the City of London, Ontario (the City) executed a contract to rent hardware, a software license and services with Dominion Voting Systems (Dominion).

On March 20, 2018, the City entered into a contract with the Freeman, Craft, McGregor Group to provide election consultancy and audit services for their preparation and conduct of the October 22, 2018 municipal election. The contract requires four sets of services as listed below:

1. Assist the City with a mock election and a functional test of the ranked choice voting system. This work was completed March 27 through 29, 2018. Our report on that work was completed on April 12, 2018.
2. Assist the City and Dominion with the acceptance test for the system. This work was completed August 6 through 10, 2018.
3. Assist the City with conduct of a logic and accuracy (L&A) test. This work was completed September 10 through 14, 2018. Our report on the acceptance and L&A tests was completed on September 30, 2018.
4. Observe tabulation and provide a post-election evaluation. The observation was conducted on October 22 and 23, 2018. This report describes assistance we provided to the City with final preparations for the election on October 20 through 21, 2018, our observations and evaluation of the tabulation, and our recommendations.

Final Preparation Assistance Objectives

The objectives for this engagement were to prepare polling place tabulators that were previously used as accessible ballot marking devices in advanced voting sites for use as backup for any tabulators that failed on Election Day, conduct a final validation on the election management and reporting software and, using test data, conduct a final walk through of the system operation with City staff.

Final Preparation Tasks and Services Performed

On October 20, 2018, we assisted City staff members as they conducted acceptance and L&A tests on six polling place tabulators that had previously been used as accessible ballot marking devices during advanced voting. These tests included physically inspecting each unit to ensure the machines had not incurred any damage, verifying the firmware, installing memory cards programmed to read ballots assigned to any polling place and, using the test deck from the previous test, conducting an L&A test. Ballots were scanned and the results verified. Reports were printed and uploaded to the election management and reporting software. The test data was cleared for the election and the tabulators were sealed, packed and placed in secure storage by City staff.

Six of the machines used for accessible voting were staged without memory cards or seals. These machines were available to replace any equipment that encountered a mechanical failure. The expectation was, that for any machine that has only a mechanical failure, recovery could be made by providing a new machine and inserting the memory cards from the failed unit into the new machine. After the memory cards and seals were removed from these machines, they were packed and placed in secure storage.

On October 21, 2018, we verified the hash values for the election management and reporting software on the primary, as well as the backup, laptop. Reports were generated using data uploaded from the six backup machines tested the previous day and hard copies were printed. We observed City staff execute ranked choice voting (RCV) tabulation using the test data in the Mayor's race and edit the format of the printed reports to improve readability. We exported ballot data from EMS to cast vote record files (the RTR files), processed the RTR files through Excel worksheets and compared the data in the RTR file to the results tapes generated on the precinct tabulators. We reconciled results in the mayor's race between the results tapes and RTR files.

Next, both laptops were purged of all election data. After the data were removed, we discovered that both machines retained test voter registration data from the 2014 election. The documentation provided no information on how to clear or edit this data. The City contacted Dominion for assistance on this issue. We learned that there was a separate user account that allowed voter registration data to be entered and edited through the Election Management System Election Event Designer software. City staff entered current voter registration data onto

the system and proofed the data after it was entered. Both laptops were shut down and placed in secure storage for the night.

Observation and Evaluation Objectives

The objectives of Observation and Evaluation were to observe both the election night and the RCV tabulation processes and to provide a report of our observations and recommendations to the City.

Observation Tasks and Services Performed

On Election Day, October 22, 2018, we verified the hash of the election management and reporting software on both the primary laptop and the backup once more. Beginning at 1:20 PM we observed City staff purge test results from the primary and backup laptops, then print zero reports to show that no data remained on either machine.

At 2:05 PM City staff closed the advanced balloting machines. The machines had been kept in secure storage since their return from advanced voting sites. Each machine was powered up, the polls were closed and the results were printed. As the results tape was printing, it was rolled up in a manner that prevented the operator from observing totals on the tape. The serial numbers of the tamper evident seals on the machines were verified against a record of seals applied to each machine. The seals were removed and pasted to sheet of paper, labeled and made a part of the election records. With the exception of one machine, no tamper evidence or inconsistency in seal numbers was detected. The results tapes and memory cards were put in a results envelope and staged for processing through the Election Management System (EMS) and RCV tabulation. The machines were repacked in their original boxes.

The machine bearing serial number AAFAJHY0207 had seals that showed evidence of tampering, so the log files for the memory card were downloaded and examined. The logs indicated that, during advanced voting on October 6, 2018, the machine was shut down and its compact flash cards were transferred to a replacement unit (serial number AAFAJEM0029) and voting continued through the day. On October 13, 2018 voting resumed on the second machine. At around 1:00 PM the original unit was returned from being serviced and replaced the second machine. Apparently, the tamper evident seals from the first machine were retained with it and reapplied when it was reinstalled. The information in the log file corresponds to City staff accounts of the incident. The number of ballots tabulated, 1,510, is an exact match to the record of the number of voters who cast votes in the advanced voting site.

The mail ballots were tabulated at 3:00 PM. Before they were brought to the tabulation room, the ballots were processed and the outer envelopes with voter identification had been removed. City staff began opening the secrecy envelopes and flattening the ballots in preparation for scanning. Two staff members fed vote by mail ballots through the tabulator. When the polls closed at 8:00 PM, and no more mail ballots had been delivered, the tabulator for the vote by mail ballots was closed out and the results printed. The memory cards were pulled and staged with the results tapes so they could be uploaded and processed through EMS.

After 8:00 PM, a final pre-tabulation zero report was printed from EMS. Members of the City staff began to upload the memory cards from the mail ballot and advanced voting tabulators. As each memory card was uploaded, the number of ballots included in the upload was verified against the results report tape from the tabulator.

Thirty-one machines arrived from polling places with seals that either been removed or showed evidence that the seal had been lifted from the machine and put back in place. When this was initially discovered, at the warehouse, the machines had low ballot counts so they were closed, the ballots were rescanned and the number of rescanned ballots was compared to records from polling place that logged the number of ballots used. However, as more machines arrived with compromised seals and higher ballot counts, rescanning on election night became impossible. The City Clerk and Manager of Elections agreed to document the machines that were returned with broken seals as they came in and revisit the polling place records before the results were certified.

Two machines arrived from polling places with unscanned ballots in the auxiliary bins. City staff scanned these ballots at City Hall, closed the machines and printed the results.

One special polling place, located in a nursing home, had “bed to bed” ballots as well as ballots that were scanned through the tabulator by voters. The tabulator was re-opened at City Hall and the bed to bed ballots were scanned by City staff. The tabulator was closed and the results were printed.

Memory cards were uploaded until all of the cards from all of the machines were transferred to the primary laptop. When all of the memory cards for a Councillor seat were uploaded and the results were decisive (50% + 1 vote) based on the first choices without RCV tabulation, the results reports were printed and the City Clerk announced the winners. The final results of election night tabulation were completed at approximately 11:00 PM. The room and all equipment were secured for the evening. On election night, only first choice results were tabulated. RCV tabulation was scheduled for the next morning.

On October 23, 2018 at 10:00 AM, City staff began the RCV tabulation for the offices that had not been determined the night before. As we monitored the process, City staff manually checked the math for each ranking step against the tabulator. The results were printed for each office and delivered to the City Clerk’s office where they were proofed one more time before the winner was announced. There were no anomalies throughout this process. All unofficial results were published and the room was secured at approximately 3:00 PM.

On October 24, 2018 at 10:00 AM we assisted City staff as they uploaded the ballot images to EMS. We also copied system audit logs from each of the tabulators with compromised or missing seals, the two tabulators with ballots in the auxiliary bins and the tabulator that was reopened to scan “bed to bed” ballots. City staff backed up the system then copied the data to the backup laptop and a jump drive. We debriefed with City staff and observed the room being secured and all equipment transferred to secure storage.

Post Election Analysis Services

During the week following the election, we analyzed the system audit logs that were collected on October 24. We prepared a work paper summarizing the significant events in each tabulator's audit log and provided it to City staff on October 30, 2018.

Observations and Recommendations

First, we commend the City of London, City Clerk Cathy Saunders, her managers and staff on their excellent performance in the conduct of this election. In addition to the usual challenges of running a successful election, such as training hundreds of poll workers to carry out complex tasks for a one-day event, planning for, and the logistics of, distributing and recovering election equipment from hundreds of poll locations, they had the added complexities implementing RCV tabulation. Added challenges related to RCV tabulation included a short time frame to acquire and learn how to use the new system, providing voter education and poll worker training. There was also the added pressure of being the first entity in Canada to use RCV tabulation. Their performance was exceptional and their success stunning.

Based on our tests of the system and its programming, our observation of City staff using the system and our review of system audit logs, we believe that the system accurately tabulated and reported results from the ballots cast following the rules and procedures for RCV tabulation adopted by the City of London. We further believe that the system records, including the ballots, ballot images and system interpretations of each image, the export files of the accumulated cast vote records, and detailed reports of the ranking process and calculations provide adequate transparency and sufficient evidence for the City to successfully defend against any challenges to the integrity of the tabulation process and election results.

After the system was received and the acceptance and L&A tests were completed, City staff took complete control and custody of the system isolating it from vendor support personnel. They learned to operate the system independently and practiced operational steps. As a result, they could operate the system without the support of the voting system vendor on Election Day. We recommend that they continue to use this approach to system management and security in all future elections.

In our post-election analysis of system audit logs from tabulators with compromised or missing seals, we found no evidence that the machines were powered up between the L&A test and the beginning of voting or any ballots cast outside of the hours of polling place operation, except for the three units with ballots in the auxiliary bin and bed to bed ballots. The logs indicate that these machines were reopened and the additional ballots were fed into the machine after it was received at City Hall. In thirty-one out of one hundred ninety-nine polling places, poll workers compromised the seals on the memory card compartments. There are several factors that could have contributed to these seals being compromised. First, the Training Manual does not discuss the seals on the memory card doors, the importance of not breaking the seals or what steps to take when a seal is broken. Second, the seals are very easy to remove. They are a piece of

adhesive material similar to an adhesive tape and can easily be lifted with a fingernail. We recommend that future poll worker training and procedures emphasize the importance of maintaining the integrity of the tamper evident seals, provide procedures for reporting broken seals and issuing replacement seals and creating incident reports when seals are found broken or when a machine failure requires a seal to be broken. We further recommend that a seal that will provide some resistance to tampering such as a wire seal or a plastic padlock style seal that requires a tool or significant effort to remove be used instead of the adhesive tape seal.

In the instance of the advance poll machine (serial number AAFAJHY0207) that developed mechanical problems and was replaced, we do not understand why it was serviced and then returned to operation replacing its replacement. This created a second and unnecessary exchange of machines in the polling place. We recommend that a procedure to swap out tabulators experiencing mechanical failures be developed that includes documenting the seal broken on the replaced tabulator, applying security seals to the replacement tabulator and documenting the seal numbers, removal of the replaced tabulator from the inventory of “usable” machines and when a machine is repaired, it must undergo acceptance testing before it can be brought back into the inventory of usable machines.

Scope Limitations

The scope of this engagement was limited to election preparation and tabulation activities conducted at City Hall. We did not assist with or observe poll worker training, advanced voting sites or Election Day polling places. Our observations and recommendations on the use of seals in polling places are based solely on our observations and examination of equipment received at City Hall from polling places.

Our expertise is in examining computerized voting systems, analyzing systems operation, evaluating system compliance with established criteria, developing standards for systems, reviewing and developing procedures for the use of these systems and conducting observations of the conduct of elections. We are not attorneys and do not offer legal advice. Our understanding of the controlling law and policies in this election is based upon documents provided by and discussions with City staff.

We provided assistance to the City when it tested the voting system, assisted the city in planning and preparing for the October 22, 2018 election and observed the conduct of the election. The intended audience for this report is the election administrators of the City and those stakeholders responsible for enacting election law, formulating policy, funding and budgeting for election administration and evaluating operations.

The work we performed, as well as our observations and recommendations, are strictly limited to the specific serial numbered hardware elements, software elements procedures and conduct of the election we observed. The decision to apply our recommendations in other elections is solely at the discretion and risk of the City. Use of this information by others for purposes not contemplated in the design of this project may lead the users to unfounded conclusions.