



ELECTION SYSTEM HIGH-LEVEL REQUIREMENTS

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1 Introduction

The following is a high-level overview of the requirements for the new Election Control System. While detailed requirements will need to be gathered to determine exactly what needs to be built, this overview should provide enough detail to give the reader a sense of the scope of the Election System.

2 General Application Architecture

The following architectural guidelines define required characteristics of the solution to be delivered:

- A web application is the preferred delivery mechanism. Where applicable there can be multiple applications e.g. Intranet and Internet
- The web applications should work equally well with modern browsers including Internet Explorer, Chrome, and others. Features that require specific browsers will not be accepted.
- The solution must be written in C# or another mainstream .NET language using current .NET frameworks e.g. ASP.NET MVC
- Intranet applications hosted at the City should integrate with the City's Active Directory infrastructure for authentication purposes.
 - Internet applications will be read-only for public viewing only and will not require authentication.
 - Applications hosted by third party hosting providers outside the City (i.e. cloud providers) can use their own authentication services.
- Data for the applications will be stored in Oracle Standard Edition, SQL Server, or PostgreSQL as available in the selected runtime environment(s).
- Geo-spatial editing of boundary geometries will be done by City staff using Intergraph's GeoMedia Professional.
 - GeoMedia Custom Commands will need to be built to support various editing processes.
 - Custom GeoWorkspaces will need to be built to support batch printing of maps and editing of spatial data (details below).
 - The selected DBMS must work with GeoMedia Professional.

3 Geospatial Data Requirements

This section outlines data requirements for geospatial data. The first section describes the required types of spatial entities while the second describes the types of maintenance that those entities require.

3.1 Spatial Entities

Spatial entities used by the Election System include the following geometries:

- Points: simple (x, y) locations
- Polygons aka "boundaries": areal geometries that start and end at the same point. Note that some boundaries can be more complex, containing one or more "holes" which are sub-boundaries that are not part of the larger boundary. They can also be a collection of disjoint boundaries.

3.1.1 Addresses

This is one of the fundamental entities required by the Election system. The City maintains a database called the Spatial Data Interchange (SDI) which includes property address information. This information includes point geometry information for each address known to the City as well as other attributes including street addressing components (e.g. street name, number, street type, etc.) and status (e.g. active/deleted).

The SDI is stored on a Corporate Oracle server and is subject to continuous updates by various City staff. Because these edits can include destructive operations such as deletes, which typically occur as a result of property splits and mergers, and because Election data that could be associated to these addresses would become orphaned (e.g. a Voting Location or groups of Voters might “disappear” as a result), a separate copy of this data must be kept in the Election database.

The method by which this data will be kept current will be covered in a subsequent section.

3.1.2 Council Wards

Council Wards define the geographic boundary that City Councilors represent; every Voter in a given Council Ward votes for and is represented by the same Councilor. Ideally, they are constructed such that each Council Ward contains approximately the same number of voters as the others.

The boundaries themselves do not change very often but are subject to occasional review by the Ward Boundary Commission. If the Commission finds that large enough discrepancies exist between Council Wards, then an exercise to re-district (i.e. rebalance) them may take place. This exercise will be performed by City Clerk’s staff and a new set of geometries will be made available.

3.1.3 Communities

A Community boundary consists of three adjacent Council Wards. Currently there are five Communities defined. A given Council Ward will exist completely within one Community.

No elected officials are directly associated with a Community.

3.1.4 School Divisions

A School Division (SD) defines the boundaries of a school division.

No elected officials are directly associated with a School Division.

3.1.5 School Division Wards

A School Division is made up of one or more School Division Wards (SDW).

One or more School Trustees are elected to each School Division Ward.

3.1.6 Voting Subdivision

A Voting Subdivision (VSD) is an arbitrary boundary representing a collection of Voters that vote at the same Poll on Election Day. A VSD exists entirely within a Council Ward but can potentially span multiple SDWs.

In general, one Election Worker is assigned to record Votes at a given VSD. There may be cases where one Voter is responsible for more than one VSD.

3.1.7 Voting Boundaries

A Voting Boundary is a spatial union of VSDs. Each Voting Boundary is assigned a Voting Location. All Voters within a given Voting Boundary will vote at the associated Voting Location.

Voting Boundaries are defined for Election Day as well as for Advance Polls.

3.2 Geospatial Maintenance

This section describes how each type of geospatial entity is created and maintained.

3.2.1 Address/Location

A process is needed to compare the Election Database's Addresses against the SDI database's property address table in order to identify newly-added addresses, deleted addresses, and updated addresses.

Newly-added addresses can simply be added to the Election Database. Updates to existing Addresses can be applied to existing records. Updates typically involve tweaks to the associated point coordinates.

Deletions must be treated carefully, checking to see if anything references the Address record. If something does then a report should be generated to notify users so they can take action and assign another Address record to the affected references (e.g. Voting Locations, Voters). The next time this process runs, the Address record will no longer be associated with anything and can be deleted.

This process must also query the City's Tax/Assessment database to determine the number of Dwelling Units at each Address. A Dwelling Unit is a single inhabitable portion of an Address e.g. a single unit in an apartment building.

3.2.2 Boundary Maintenance

All boundary maintenance is manually performed using GeoMedia Professional by City Clerk's staff. The Solution will need to provide a report identifying errors with geometries including loops, overlapping vertices, and any other issues that can affect spatial relation operations.

The creation of one or more GeoWorkspaces will be required to enable City Clerk's staff to efficiently edit the boundaries. The boundaries that are typically edited include VSDs and Voting Boundaries, though in some cases minor edits to Council Ward boundaries may be required e.g. to establish or maintain geometric coincidence between Council wards and VSDs.

Maintenance of School Divisions and their Wards are the responsibility of other City departments.

During boundary maintenance, display of the following geospatial entities in the GeoWorkspace (in addition to the boundaries being edited) would be beneficial to the persons performing edits:

- Street outline
- Land parcels
- School Divisions and Wards
- Council Wards
- City outline
- Rivers
- Railways

These entities are available via the Spatial Data Interchange (SDI) which is a separate Oracle database available to City GIS users.

3.2.3 GeoMedia Professional Custom Commands

GeoMedia Custom Commands leverage that product's APIs to provide customer UI functionality. Custom Commands can be created using C or .NET. The Custom Commands should be abstracted to work with any underlying geospatial databases required by the Election System.

3.2.3.1 Count Voters

A Custom Command is required that will allow the user to select one or more boundaries and display in a modeless window the number of voters contained in each as well as the total number of voters and the average count. As each of the selected boundaries is edited, the counts and statistics should be updated.

This Custom Command will allow users to quickly perform redistricting operations that would otherwise require a tedious series of independent operations.

3.2.3.2 Create Voting Locations

This Custom Command will allow the user to select two or more VSD boundaries and merge them into a new Voting Boundary.

The previous Voting Location for the selected VSDs should automatically become the Voting Location for the new Voting Boundary.

4 Non-Spatial Requirements

While Spatial data is an important and fundamental requirement for the Election System, it plays a relatively small support role and is the responsibility of a limited number of staff. The following sections describe the requirements for the more mainstream parts of the Election System.

4.1 Security

A central Security subsystem is required to control user access to each of the Election subsystems. Each User will be authenticated using their Corporate Active Directory (AD) account if the Solution is hosted on City infrastructure, otherwise an external authentication database will be used. If the latter is used, then passwords must be encrypted using a suitably complex one-way hashing algorithm.

All Election System functions should be secured to prevent unauthorized access. This includes restricting what menu items can be seen as well as checking for authorization upon entry to each function to prevent parachuting.

Roles can be defined to group Users of a similar nature, and a User can belong to one or more Roles. A special Admin Role will permit member Users full access to all Election System functions.

The implementation of these Security requirements should be data-driven and customizable to allow City Clerk's staff to alter rules definitions as required without code changes.

4.2 Elections

Elections are a fundamental support entity so a maintainable list of Elections is required. There are two types of elections: General Elections and By-Elections.

General Elections are legislated to occur every four years in October. During a General Election voters elect a Mayor, City Councilors, and School Trustees. The City of Winnipeg runs the School Trustee elections for SDWs that fall inside City limits.

By-Elections are triggered when an elected official vacates their office. They can happen at any time between General Elections. A By-Election restricts the scope of the Election System to only include required boundaries, and can include a mix of different types of candidates e.g. Council Ward only, Council Ward and School Trustee, Mayoral, etc.

Important information to record about an Election includes its type and date as well as the date at which updates to the Voters database are prevented. This date begins the Voter Update Freeze Period. The Election record also includes the date at which updates to the Voters database are once again permitted.

4.3 Voting Locations

A subsystem to create and maintain the list of Voting Locations is required.

While a Voting Location is fundamentally geospatial in nature, it does not need to be created in GeoMedia because its coordinates can be determined by a simple address lookup.

A Voting Location can be classified as a Special Poll (Seniors Advance, Vote by Mail, Hospital, Designated Health Care Facility, City Hall Advance, Information Officer, or Other), however there is nothing to prevent it from being used as an Election Day or Community Advance poll.

A lot of information must be maintained for a Voting Location. Subject areas include:

- General information such as name, location type (school, community centre, church, other)
- Facility contact information
- Description of available rooms
- Seating information
- Parking features
- Log of on-site inspections
- Per-election usage and notes
- Other addresses associated with the Voting Location

Each of these subject areas has several attributes that must be tracked.

4.3.1 Reports

Required Voting Location reports include:

- Voting Locations
- Election Day Voting Locations - Delivery List
- Election Day Voting Locations - Mailing List
- Seniors Advance Voting Locations - Mailing List
- Designated Health Care Facility Voting Locations - Mailing List
- Voter Turnout - Seniors Advance
- Applications Processed - Vote by Mail

- Polling Subdivision Spec Sheet

4.4 Ballot Index

A Ballot lists the Candidates available to the Voters in a particular VSD. The combination of Candidates depends on a Voter's location and the boundaries within which it exists as well as whether the Voter is eligible to vote for the School Trustee; as such there can be many different combinations of Ballots.

The Ballot Index identifies which Ballot is associated with each VSD. It is supplied by City Clerk's and needs to be input into the Election System either via spreadsheet upload or manual entry. It is used to display what Ballot should be handed out to a particular Voter.

4.5 Voters

This subsystem will allow Users to add, update, and delete Voter records. The type of information to be tracked for each Voter includes:

- Name (First, Last, and Middle)
- Address (including address history) plus Unit numbers
- Birth and Move-In Dates
- Elections Canada Voter Id
- Postal Code

An update to a Voter record can include changing or removing its Address. It is important to track when an address change occurs because there are certain voter eligibility rules that depend on how long a Voter has resided in a particular area.

4.5.1 Elections Canada Import

Rather than coordinating manual door to door Voter Enumeration campaigns, City Clerk's request a current listing of Voters from Elections Canada (EC). This requires a process to import the EC file and populate the City's database.

Because City Clerk's staff monitor local publications for obituary notices and update the Voter database accordingly, any Voter record that has been deleted by the City is not reinstated by the import process. Similarly, any address differences between what City Clerk's staff have recently recorded and what is in the EC database is biased toward the City's version.

There is a great deal of mapping/transformation logic required by this process to translate EC data into City of Winnipeg address formats. Examples include:

- Accented characters
- Incompatible street type abbreviations (e.g. "Rd" vs "Road")

- Street numbering systems (e.g. “½” vs “1/2”)
- Apartment numbers & Unit numbers
- Street name formats

4.5.1.1 Import Errors

Voter records that cannot be mapped to City Address records should be placed into a separate table that can be viewed online by City Clerk’s staff where they can review the original data, see a selection of “nearby” (or suggested) Addresses, and assign the Voter record to one of the suggested Addresses or select a different Address.

4.5.2 Elections Canada Update

Similar to the Elections Canada Import, some months after the initial EC Voter import a new file of updated Voter records may be received. An Update process is required to examine each update Voter record and compare it to the Voter database looking for new and updated records. As with the original import, recent updates by City Clerk’s staff should take precedence over updates in the EC file.

4.5.3 Non-Resident Owners

A Non-Resident Owner (NRO) is a person who owns a property within City limits but does not reside there. Like Dwelling Unit counts, NRO information can be pulled from the Tax/Assessment database. A separate import process is required for this.

A NRO is not eligible to vote for School Trustees but they can vote for Mayor and Councilor.

One important aspect of NRO Voter records is that they have an associated multi-line, free-form mailing address because they do not live at the City address associated with their property.

An example query to pull NRO data appears as Appendix A.

4.5.4 Online Editing

Maintaining the database of Voters is an important function and possibly the most frequent source of Election System updates. However, its requirements are relatively simple as the only information tracked for each Voter is as listed above. In addition to this there is the free-form address information required for NROs.

Tracking voter movement adds a little complexity to Voter maintenance. Due to the School Trustee eligibility requirement that a Voter must have lived within the School Division for at least six consecutive months leading up to an Election, it is important that a Voter’s addresses during this six-month period be recorded.

During Advance Voting periods, Voter records will be updated to record the fact that a Voter actually voted. The Voting Location and voting time are stored with the Voter’s record and are used to prevent a Voter from voting more than once e.g. at multiple Advance

Polls and/or Election Day. The Ballot Index is used to display to the user which Ballot a Voter should use.

4.5.4.1 Voters Update Freeze Period

Based on the current Election record, updates to the Voter database are to be disabled during the Voter Update Freeze Period. Note that the Freeze Period need not have an end date in which case updates are disabled indefinitely. This can happen if for example an Election Race result is in dispute and the City Clerk's Department wishes to preserve the integrity of the Voter database for an extended period.

4.5.4.2 Future Changes

During the Voters Update Freeze Period, there will continue to be reasons to update the Voters database e.g. identification of deceased Voters, notification of newly-identified Voters, etc. While the Voters database cannot be updated during this Freeze, pending updates must be entered into the Election System to ease data entry efforts. A means of recording these pending or Future Changes into the system is required, then once the Freeze Period has ended, a process to apply the Future Changes to the Voter database can be run.

4.5.4.3 Obscured Voters

Voter information is considered public in nature because it appears in files and reports made available to Candidates by City Clerk's. As such, a Voter may request to have their name obscured in these publications, replaced with a Personal Security Certificate (PSC) Code. Such Voters are only eligible to Vote by Mail. The Voter subsystem must allow this to be recorded.

4.5.5 Voters List Generation

A Voters List Generation Process is required to consider each Voter in the database and determine their eligibility for the current Election. Depending on the type of Election (General, By-Election) and the location of the Voter, they may or may not be eligible to vote. Additional rules include the length of time residing in the City, the School Division, and Non-Resident status.

The net result of this process is a static view that makes up the eligible Voters for the current Election. Note that persons not on this list may still vote by completing Affidavits at the poll; these Voters will be added to the Election System in the days following the Election.

The process to generate the Voters List is usually repeated at various stages prior to the Election just to get a count of the number of eligible Voters. For example, it is first performed when Elections Canada data is imported, then when EC updates are applied, when again when NROs are introduced.

Once the Freeze Period has taken effect, the final Voters List can be generated. This final Voters List will be used for a variety of publications including reports and data extracts.

4.5.6 Reports

Several Reports are required including:

- Elector Counts by Voting Boundary
- Elector Counts by School Division Ward
- Orphaned Removed Electors
- Orphaned Removed Electors (by User Id)
- Deleted Electors
- Recently Changed Records
- Advance Votes

4.6 Election Workers

A Workers subsystem is required to enter and track all information related to temporary Election Workers, namely non-City staff that are hired into various positions.

4.6.1 Support Areas

The Workers subsystem will rely on a few key support tables.

4.6.1.1 Poll Types

Poll Types define the various type of Polls that take place. They are an important attribute in the hiring process and include:

- Election Day: Polls are set up at each Voting Location that is assigned to a Regular Voting Boundary
- Community Advance: Polls are set up at each Voting Location that is assigned to an Advance Voting Boundary
- Seniors Advance: Polls are set up for a few hours at designated seniors residences and similar facilities.

There can also be Special Advance Polls set up at Hospitals, Universities and Malls, and City Hall.

4.6.1.2 Position

Worker Positions define the different functions that are required at a Poll. Defining Positions is an important and complex part of Worker configuration:

- Different Elections require different Worker Positions at each Poll
- Different Poll Types require different Worker Positions

- The number of Workers required for a given Position can vary from Poll to Poll
- The amounts for Training Pay and Worker Pay is specified by Position

Positions can include:

- Senior Voting Officer
- Voting Place Director
- Voting Record Officer
- Clerk for Oaths
- Voting Place Clerk
- AVM Clerk
- AVM Escort
- Safety Officer
- Additional Worker
- Assistant Rover
- Driver
- Spare
- Information Officer

4.6.1.3 Teams

One or more Teams can be defined for the special Advance Polls e.g. Seniors Polls. For example, each Seniors Team will be scheduled to visit a series of Seniors Advance polls.

4.6.1.4 Training Locations

A list of locations where training can take place must be maintained. This information includes a simple name of the Training Location and a free-form, multi-line description e.g. to contain a mailing address.

4.6.1.5 Training Sessions

A list of Training Sessions must be defined. Each Session is defined for a particular Worker Position at a Training Location on a given date & time. The Trainer (free-form name) and Capacity are also specified.

The Training Location can be "TBD". Workers will eventually be assigned to a Training Session that matches the Position for which they are hired.

4.6.2 Workers

Every temporary Election Worker will have a record in the Workers subsystem. Basic tombstone information will be recorded for each. While address information can be selected from the Address table, a provision must exist for workers that do not live in the City (and hence have no Address record) whereby their mailing address can be entered in a free-form format to allow for flexible entry e.g. PO Boxes etc.

Important attributes to be recorded include:

- Do Not Hire Again indicator
- Worker Contacted
- Worker Available
- Completed Secrecy Form
- Completed Oath Form

Previous Election experience must be recorded along with responses to questions:

- Indictable Offences
- Age of Majority
- Will Attend Training
- Vehicle Access
- Valid Driver's License

Availability attributes include:

- Regular Poll
- Community Advance Poll
- Hospital Poll
- Seniors Poll
- Position
- Flexible Location
- Preferred Locations

Fluency in various languages must be recorded as well as current employment status. Several other attributes and comments are also required.

4.6.3 Employment

An Employment record indicates that a Worker has been considered for a specific Position at a specific Voting Location. Associated with an Employment record will be the Training Session(s) for the Worker and whether they are ultimately hired or not.

In the case of a Voting Record Officer, the VSD(s) to which the Worker is assigned is also recorded.

4.6.4 Attendance

Attendance must be recorded for each Worker both for their Training as well as their actual Work assignments.

4.6.5 Payment

Once all Attendance information has been recorded, the System will be required to produce a Payment File to be uploaded to PeopleSoft. This will ultimately result in cheques being produced for each Worker.

4.6.6 Reports

Several Worker reports are required including:

- Previous Election Workers
- Workers Not Contacted
- Available Workers
- Workers by Desired Position
- Workers by Community
- Workers that Speak a Particular Language
- Do Not Rehire Workers
- Employment Status
- How They Heard
- Very Good Candidate
- Indictable Offence
- Workers with "Courteous" Attribute
- Workers with "Comprehension" Attribute
- Workers with "Communication" Attribute

- Positions by Poll Type
- Positions by Voting Location
- Hired Stats by Voting Location
- Hired Position Counts by Council Ward
- Senior Voting Officers
- Vacant Positions (Regular Poll)
- Duplicate Poll Assignments
- VSD Groupings
- Riel Bilingual Workers
- Pending Hires (Hired Field Not Set)
- Workers with No Job Assignment
- Workers Needing Training Sessions
- Training Position Mismatches
- Training Mailing Lists
- Worker Payments
- Rural Addresses
- Peculiar Civic Addresses
- Invalid Worker Payment Addresses

4.7 Election Rebates

A subsystem is required to track Election Rebates. Contributors, which can be Individuals, Organizations, Corporations, or Trade Unions, may be eligible for reimbursement of political contributions to Candidates.

The Election Rebates subsystem must track Contributors and their Contributions. A Contribution is for a particular Candidate for a certain amount. The date and receipt number for each Contribution is also tracked.

A formula is used to determine the Rebate amounts, and payment batches are used to track which Contributions have had Rebates paid out. A download file similar to that used for Election Worker payments is generated and sent to PeopleSoft.

4.8 Problem Tracking

A rudimentary system is required to record and track Election-related Issues that are reported from City Staff and remote Election Workers.

A full-fledged ticketing system may be considered but would likely be overkill both in terms of feature set as well as complexity.

All that is required is to capture details about an Issue:

- Priority (1-10)
- Title
- Description/details
- Name and phone number of reporter
- Voting Location/other location

The ticket can then be assigned to a person and comments can be added as required. Ultimately a ticket can have its status changed to Closed or it can be deleted.

The history of each Issue must be maintained. Automatically-refreshing online reports should display a listing of Issues using various criteria including:

- Open Cases
- Closed Cases
- All Cases
- My Open Cases
- My Closed Cases
- All My Cases

4.9 Voting Location Status

A large number of Voting Locations (150+) are in use on Election Day. Each Voting Location has its own AVM with a Memory Pack that, once Polls close, needs to be delivered to City Hall where its contents are read into the Election Results System, a third-party system that is not a part of the Election System described in this document. The status of a Voting Location is updated when the AVM Clerk leaves for City Hall with the Memory Pack. Once the Memory Pack has arrived the SVO is alerted, then the Rover is alerted.

It is paramount that the status of this process is tracked for each Voting Location, therefore a subsystem for this is required to track each of the Events described above per Voting Location.

A list of Voting Locations, optionally filtered by Council Ward, will display the current status of each. Filters can be used to look at each Voting Location based on a particular type of Event.

The Voting Location Status system should also track the 10am and 4pm Voter Counts that are to be called in. These Events could be considered pre-cursors to the post-Polls-closing Events.

Note that the type of Events to be tracked can vary from Election to Election. As such a support table of Events will be required.

4.10 Sealed Envelope Ballot (“Vote by Mail”)

Voters can request to receive an Election Ballot package delivered to them. The Voter will then mark their Ballot and return it to City Clerk’s in a Sealed Envelope by a certain date.

The Election System must allow Sealed Envelope Ballots (SEB) to be recorded for a Voter. The date that the SEB was sent out must be captured as well as the Ballot Type and delivery method. Once the Ballot is returned to the City, the SEB record is updated indicating the date received.

4.11 SVO Logs

Senior Voting Officials (SVO) keep logs of issues and observations that must be recorded. Some of these pertain to specific Voting Locations while others are general in nature.

Each SVO Log entry is relatively simple containing the following elements:

- Category (Location, Staffing, Process, Supplies, Campaigning, or Technical)
- Short description (one-liner)
- Long description (multiple lines)
- Reporter’s name
- Resolution text

A report will list the SVO Logs entries for an election by Category.

4.12 Voter Turnout

A means of entering and displaying Voter Turnout for the different types of Polls is required e.g. Community Advance, City Hall Advance, Seniors Advance, and Election Day.

For each of the different types of Polls, a list of applicable Voting Locations will be displayed along with the number of voters for each date that Voting Location is open to Voters. The user can update the Turnout for any particular day and compare that number to the total number of eligible Voters to yield a turnout percentage.

The numbers for each Voting Location should calculate and display sub-totals by Council Ward, Community, and City-Wide.

4.13 Political Contacts

A simple subsystem is required to enter and maintain contact information for the City Councilor of each Council Ward boundary including the name, phone number, and email address of both the Councilor and their Assistant.

Similarly, contact information is required for the Community Clerk of each Community boundary.

4.14 Data Migration

Data Migration processes must be built to convert data from the legacy system into the new system, where possible. Some Data Migration activities might be performed in a third-party tool (e.g. geospatial data could be copied using GeoMedia's built-in functionality) while other activities will require custom programming and/or use of a dedicated ETL tool.

Entities that should be considered for Data Migration include:

- Support Tables (e.g. Elections, Poll Types, etc.)
- Geospatial boundaries (e.g. Council Wards, VSDs, SDWs, etc.)
- Voting Locations
- Voters
- Election Workers
- SVO Logs
- Election Rebates
- Problem Tracking
- Voting Location Status
- Voter Turnout

5 Other Application Requirements

5.1 Internet "Where Do I Vote?"

A "Where Do I Vote?" application (WDIV) is required to provide a simple means for citizens to enter their address and learn when and where they can vote. Voting information would include Election Day, any Advance Polls that are applicable to their Location, and times that the Polls are open for each.

It's important to note that sensitive information such as Voter names will not be displayed.

City Staff will also use WDIV in the 311 Call Centre to answer citizen enquiries as well as at Polls and at public information sessions e.g. malls.

When no Election is currently defined the WDIV application should present users with an "Application is Offline" sort of message.

5.1.1 Candidates and Races

Once they have been confirmed, City Clerk's staff will need to define the various Races to the system. A Race can be for Mayor, Councilor, or School Trustee. A Race for Councilor is associated with a particular Council Ward boundary while a Race for School Trustee is associated with a particular School Division Ward.

Each Race also defines the number of persons who will be elected for that Race. For example, there is typically one Councilor elected per Council Ward while there may be more than one School Trustee for a School Division Ward.

Once the Races and Candidates are defined, a flag in the WDIV application can be set to display the Races and Candidates. Up until this point the WDIV application will indicate that "Candidate Information is Coming Soon" when displaying details for an Address.

5.2 Standalone "Where Do I Vote?"

A standalone version of the WDIV application is required in case remote connectivity is lost. It will also provide some enhanced functionality.

Similar to the WDIV application the user will perform searches based on Address, but unlike the online version it will also allow searches by Voter name. Ultimately the same sort of Voting information will be displayed.

A simply-deployed .NET desktop application (e.g. "xcopy deployment") with an easily-refreshed database (e.g. MS Access, SQL Server Express, SQLite) will allow City Clerk's support staff to keep their users' laptops updated.

5.3 Street Index Report

The Street Index report will list all Streets and Addresses involved in the Election and show in which VSD and SDW they reside. It enables Election Workers to quickly determine where a Voter should vote based on their Address.

Rather than list every single address, contiguous ranges of Addresses that are in the same boundaries can be grouped. In many cases a boundary may run down the middle of a street. As such, a contiguous range can include even-numbered Addresses, odd-numbered Addresses, or both sides.

A significant complicating aspect of this report is newly-developed streets that may not have any Addresses yet created in the Property Address system. Voters may in fact be

living in these areas and will come in to vote and need to be directed to the correct Voting Location and Poll.

To accommodate these scenarios the SDI's street segment linear geometries that exist for street names which have not already been covered need to be examined to determine which boundaries they exist within. This will require "walking" along street segments for a given street and performing a series of spatial intersection tests to determine which boundaries each segment lies within.

5.4 Non-Resident Voters

As mentioned previously, NROs are associated with the Addresses that they own, but have a separate mailing address that is free-form in nature. The information recorded is otherwise the same as for regular Voters.

A couple of additional rules exist for NROs:

- While an NRO may own several properties, they may only cast a Vote for one of them.
- There may be several NROs for a given Address, but at most two of them may cast Votes.

5.4.1 Reports

To ensure these restrictions are enforced, two reports are required to identify NROs in each scenario. City Clerk's staff will then contact the NROs and have them decide who should be included in the Voters List. The other NROs are then removed from the Voters List.

5.5 Voters List

A Voters List report is required to list each and every Voter on the Voters List. The Voters List will be sorted by Council Ward, then VSD. Voters in each VSD will be sorted by whether they are Regular Voters or NROs first, then by Street Name, Street Type, Street Direction, Last Name, and First Name. Using this sort order, Voters within a VSD are assigned a Voter Index number starting at 1. This Voter Index is attached to the Voter Notices and enables quick lookups in the Voters List and Poll Book reports.

Portions of the Voters List report that include Riel VSDs must be bilingual.

5.5.1 Import Legal Descriptions

The Voters List report also includes a Legal Description of each VSD that describes the perimeter of their boundary in detail. These Legal Descriptions are supplied by City Clerk's staff and need to be imported into the Election System database so they can be included in the Voters List report.

5.6 Voter Notices

An extract file for Canada Post is required to produce Voter Notices cards. These are mailed out to everyone on the Voters List and include information on where and when to Vote as well as their Voter Index number.

The extract is a comma-separated text file containing a series of fields from the Voters List plus the Voting Locations. The file format will change from Election to Election.

5.7 Poll Books

The Poll Book report will be similar to the Voters List report in terms of structure and organization. It is designed for use at the Polls to look up Voters and determine what Ballot they get. Once a Voter has voted their will appear as being stricken off in the report. When used in Advance Polls a vote is recorded in the Voter subsystem, then when the Poll Book is regenerated, any Voter who has voted will have their name displayed with a line through it to indicate that they have already voted.

5.8 Candidate Voters List

A series of extract files are required to give to Candidates. The information in each extract matches what is on the Voters List but is in a comma-separated text file.

There will be one extract file per Council Ward, and one extract files per School Division Ward. Candidates for City Council and School Trustees are given the file that is applicable to them, while Mayoral Candidates receive all Council Ward files.

5.9 Print Ballots

A standalone Windows desktop application is required to select a type of Ballot and print it.

City Clerk's create a complete set of Ballots in PDF format. An application is required to import these and present the user with a simple interface that allows them to select and print the desired Ballot. This is used when the Voting Location runs out of a particular type of Ballot.

5.10 Map Generation

A mechanism is required to generate PDFs of various Election maps.

In the past a GeoMedia Custom Command was created to load a predefined GeoWorkspace, iterate through all boundaries of a particular type and generate a Layout that centered the boundary, zoomed in on it to fill the viewport, update labels on the page, and "print" a PDF.

Unfortunately, these Custom Commands do not work with the latest version of GeoMedia so a new approach is necessary.

Newer versions of GeoMedia should be able to perform batch plotting of maps without resorting to custom code. Whether GeoMedia does this by itself or if custom development is required, the Election Solution must deliver on this requirement.

Different types of boundaries require different map layouts including the features displayed, the manner in which they are displayed, and the map page size.

The typical workflow is as follows:

- 1) Sample maps are created in PDF format (typically ANSI-E for the larger boundaries or Tabloid size for VSDs) and sent to City Clerk's
- 2) City Clerk's staff request changes to the map layout
- 3) Repeat above until no more changes are needed
- 4) Full set of PDFs are generated and sent to the City's Print Shop for plotting

6 Appendix A: Non-Resident Owners Query

Here is a query to return NROs from the City's Tax database, an Oracle server running the MANTA software:

```

SELECT p.property_id,
       p.condo_number,
       p.condo_unit,
       pc.customer_number,
       ci.interest_desc customer_type,
       c.last_name,
       c.first_name,
       c.middle_initial middle_name,
       pa.address_type pa_address_type,
       pa.unit pa_unit,
       pa.bldg pa_bldg,
       pa.street_number pa_street_number,
       pa.street_suffix pa_suffix,
       street pa_street_name,
       pa.street_type pa_street_type,
       pa.direction pa_street_dir,
       ma.address_type ma_address_type,
       ma.unit ma_unit,
       ma.bldg ma_bldg,
       ma.street_number ma_street_number,
       ma.street_number_suffix ma_suffix,
       ma.additional_contact_info,
       ma.additional_address_info,
       RTRIM (
         sn.lookup_street_name
         || ' '
         || st.lookup_street_type
         || ' '
         || sd.lookup_street_direction)
         ma_street_name,
       md.mode_designator_code,
       ma.mode_identifier,
       ma.installation_area_name,
       it.installation_type_code,
       ma.installation_qualifier,
       ct.lookup_city_name ma_city,
       pv.province_code ma_province,
       ma.postal_code ma_postal_code,
       pc.effective_date
FROM (SELECT *
      FROM customer_mailing_address
      WHERE city_id <> 873) ma
JOIN (SELECT *
      FROM customer
      WHERE RTRIM (company_name) IS NULL) c
      ON c.customer_number = ma.customer_number
JOIN (SELECT *
      FROM property_customer pc

```

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```
WHERE is_resident = 0) pc
ON pc.customer_number = c.customer_number
AND pc.mailing_addr_id = ma.mailing_addr_id
JOIN customer_interest_type ci
ON ci.cust_interest_id = pc.cust_interest_id
JOIN property p
ON p.property_id = pc.property_id
JOIN property_address pa
ON pa.property_id = p.property_id
JOIN city ct
ON ct.city_id = ma.city_id
JOIN province pv
ON pv.province_id = ct.province_id
JOIN street_name sn
ON sn.street_name_id = ma.street_name_id
JOIN street_type st
ON st.street_type_id = sn.street_type_id
JOIN street_direction sd
ON sd.street_direction_id = sn.street_direction_id
JOIN mode_designator md
ON md.mode_designator_id = ma.mode_designator_id
JOIN installation_type it
ON it.installation_type_id = ma.installation_type_id
WHERE p.roll_type = 1
AND p.property_active_status = 1
AND ma.mailing_addr_active_status = 1
AND LOWER (c.first_name) NOT LIKE '%estate of%'
AND pv.country_id = 233
AND pc.effective_date < (election date - 6 months)
```

This is a complex query for which a MANTA expert could explain the nuances from that system's perspective, but at a high level this query will return:

- Realty properties only (as opposed to Business)
- Active properties only
- Active mailing addresses only
- First Name field not indicating an Estate situation (e.g. "Estate of...")
- Mailing address country of Canada
- Effective date of customer record within six months prior to the election date