



Electoral Redistribution and Delineation

By
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Abstract

Every 10 years in Canada, following the Statistics Canada decennial Census, Elections Canada reviews and updates the federal electoral districts and their underlying polling divisions. This process is called redistribution. Past redistributions have been heavily oriented toward manual processing, while the current redistribution has taken advantage of the mature level of the technology and data to allow more focus on the production of multiple scenarios for Electoral boundary creation. This paper presents the development of two key systems, a redistricting tool to allow creation of Electoral Districts (ArcView 3.x) and a polling division delineation and maintenance tool (ArcGIS/ArcSDE, Geodatabase) to create the underlying polls. Looking toward the future, this paper will also examine the role GIS technology may play in providing Elections Canada field staff increased automation to facilitate the ongoing maintenance of our business data (ArcGIS/ArcIMS).

AGENDA

- ❖ Canadian Electoral System
- ❖ Electoral District Redistribution
- ❖ Polling Division Redistricting
- ❖ Polling Division Revision
- ❖ Future Direction(s)
- ❖ Perhaps some questions
 - ❖ Hopefully some answers

GEOGRAPHY

The Basis of the Canadian Electoral Process

Defines:

- ❖ Federal Electoral District (FED)
- ❖ Polling Division (PD)
- ❖ Advance Polling District (ADV)
- ❖ Polling Station
- ❖ Electors associated within a polling division and a polling station

Federal Electoral Districts

Representation Order of 2003

- ❖ 308 Electoral Districts
- ❖ Independent commissions set up to define boundaries
- ❖ 3 phases with public and governmental consultation

Federal Electoral Districts

Representation Order of 2003

- ❖ Boundaries defined by
 - ❖ Population count
 - ❖ Statistics Canada 10 year census
 - ❖ Community of interest (demographics)
 - ❖ Geographic size

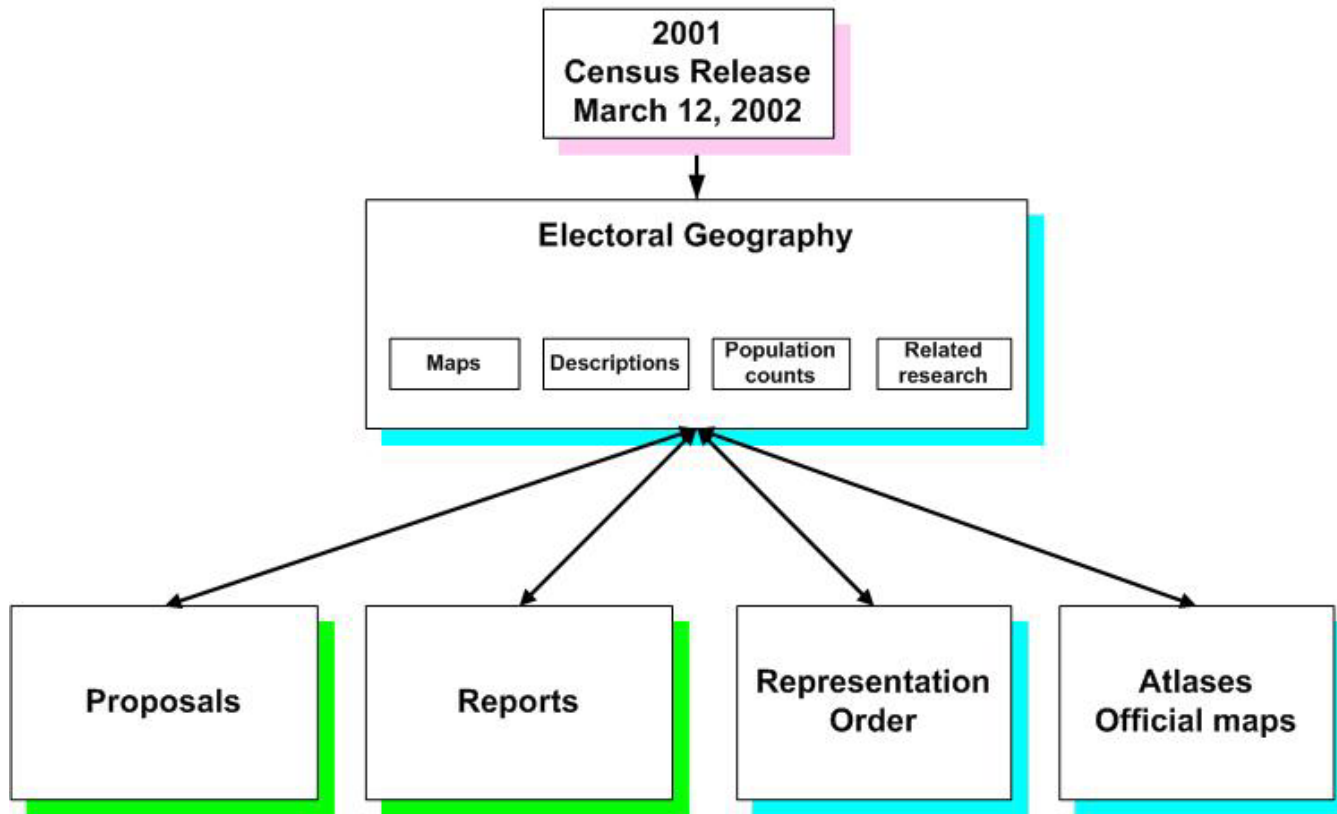
Federal Electoral Districts

Representation Order of 2003

- ❖ Started with existing boundaries (by choice)
- ❖ Work by region / large cities
 - ❖ Build / revise scenarios
 - ❖ Produce maps and statistics
 - ❖ Validation from Statistics Canada and Natural Resources Canada
 - ❖ Produce official maps and atlases at Elections Canada headquarters

Federal Electoral Districts

Work Flow



GEOGRAPHY PROCESS (1991)

- ❖ Creation of scenarios (manual)
- ❖ Base maps used with acetate and markers
- ❖ Everything calculated by hand (population and demographic data)
- ❖ Ten Scenario's took approximately 5 days

Manual Redistricting



GEOGRAPHY PROCESS (2001)

- ❖ Commission Redistricting Tool (CRT)
 - ❖ Geographic information system (GIS) allows us to create and modify federal electoral districts (FED)
 - ❖ Interactive redistricting
- ❖ Benefits
 - ❖ Very efficient process (interactive)
 - ❖ Instantaneous results (population, demographics)
 - ❖ 10 scenario's took about 1 day
 - ❖ Manage multiple scenarios (maps, population, etc.)
 - ❖ Electronic documents transfer (Natural Resources Canada, Statistics Canada and Elections Canada)

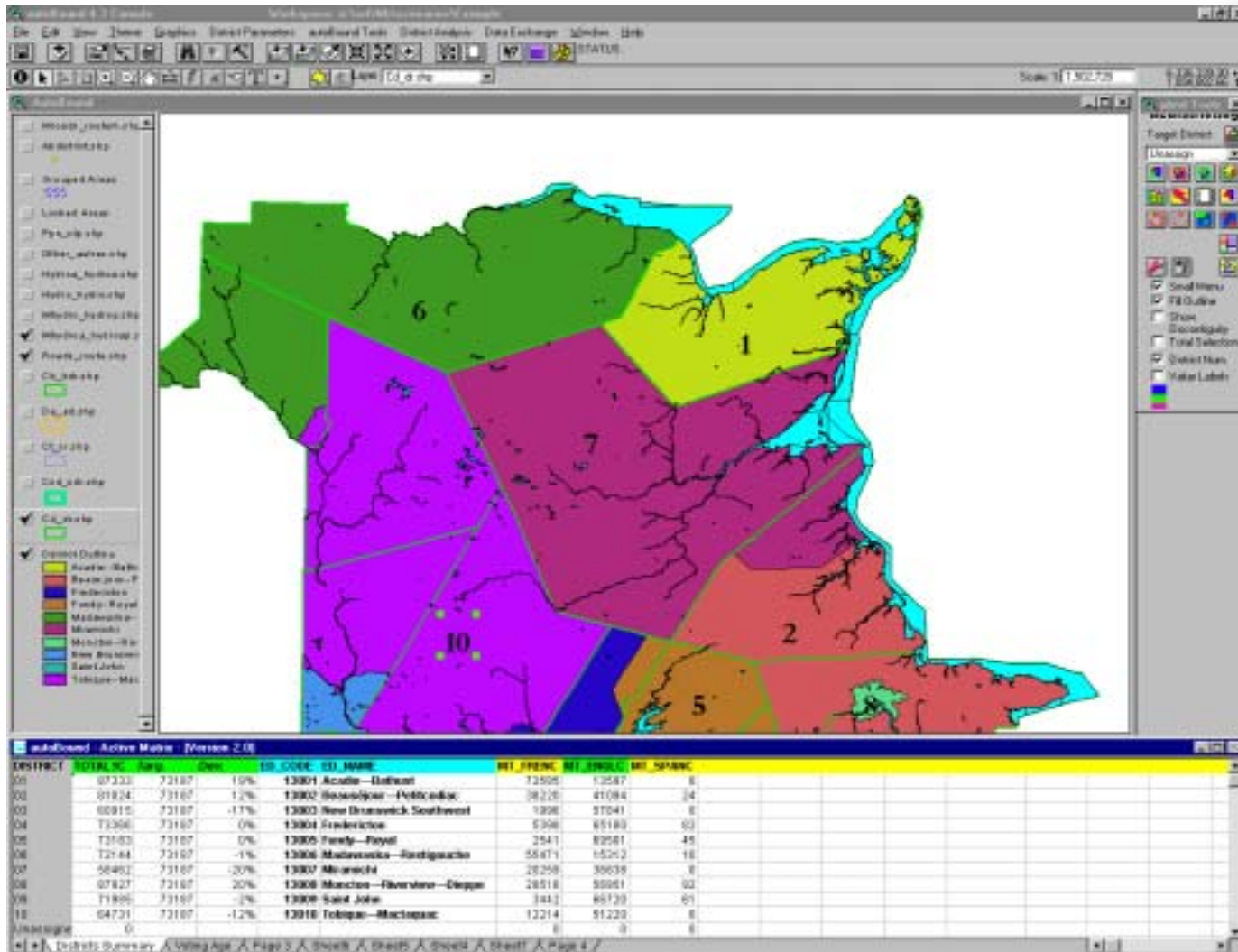
DEMOGRAPHIC DATA

- ❖ Statistics Canada Data
 - ❖ 2001 population figures
 - ❖ 1996 demographic data projected to 2001 population figures
 - ❖ 87 variables describing 13 demographic characteristics
 - ❖ mother tongue, ethnicity, knowledge of official language, etc.

Commission Redistricting Tool



CRT In Action





On to the Polls....

Polling Divisions

- ❖ Polling Divisions are the geographical administrative sub-units which make up an electoral district.

Used by

- ❖ Returning Officers to organize elector registration and voting.
- ❖ Political parties and candidates to organize their campaigns.

They Organize

- ❖ Voting (the list) and Results (the count)

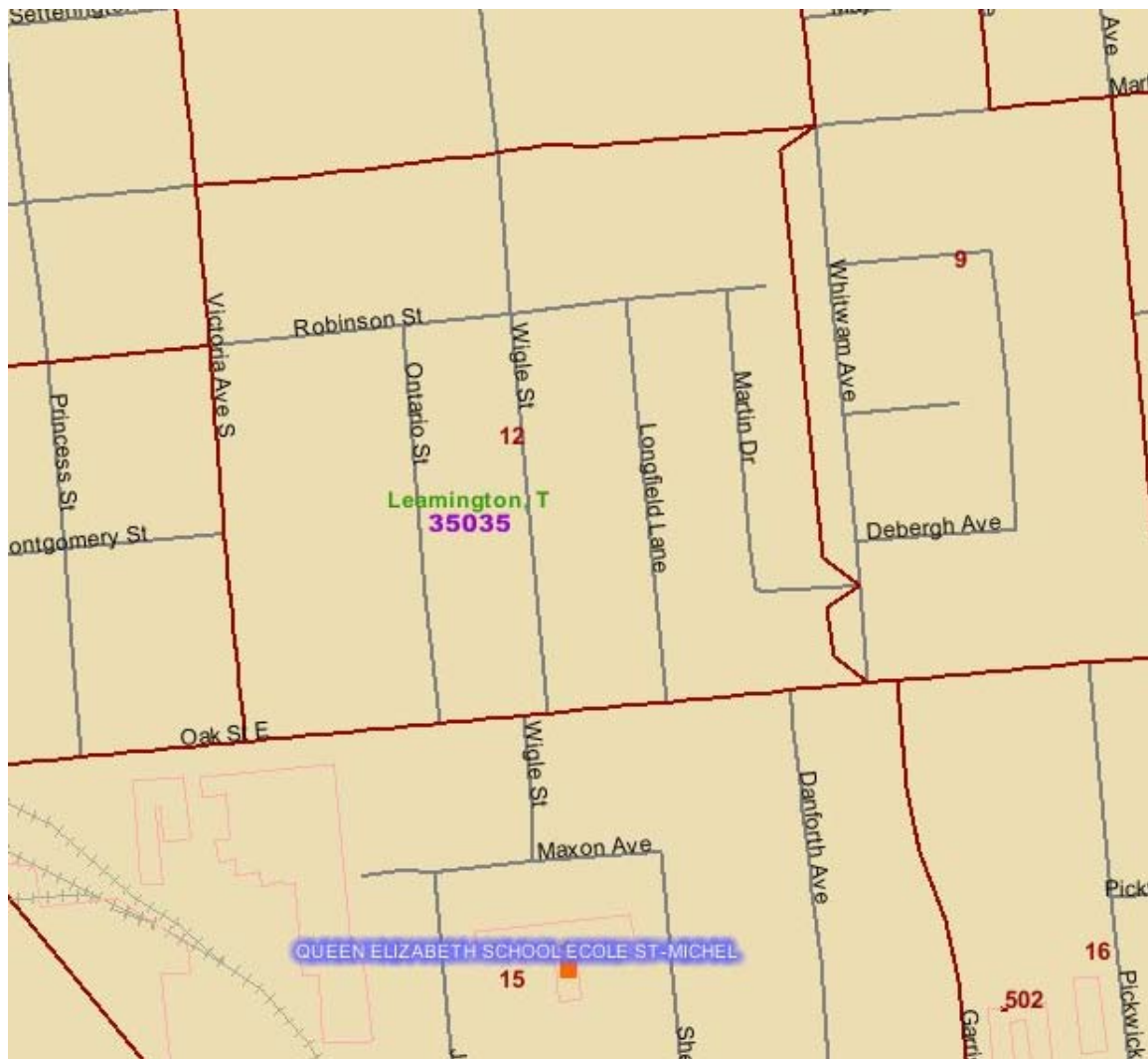
They Determine

- ❖ Supplies
- ❖ Staffing
- ❖ Etc...

Types of Polling Divisions

- ❖ Ordinary Polling Division (PD)
- ❖ Single Building Polling Division (SBPD)
- ❖ Mobile Poll (MP)
- ❖ Advance Poll (ADV)

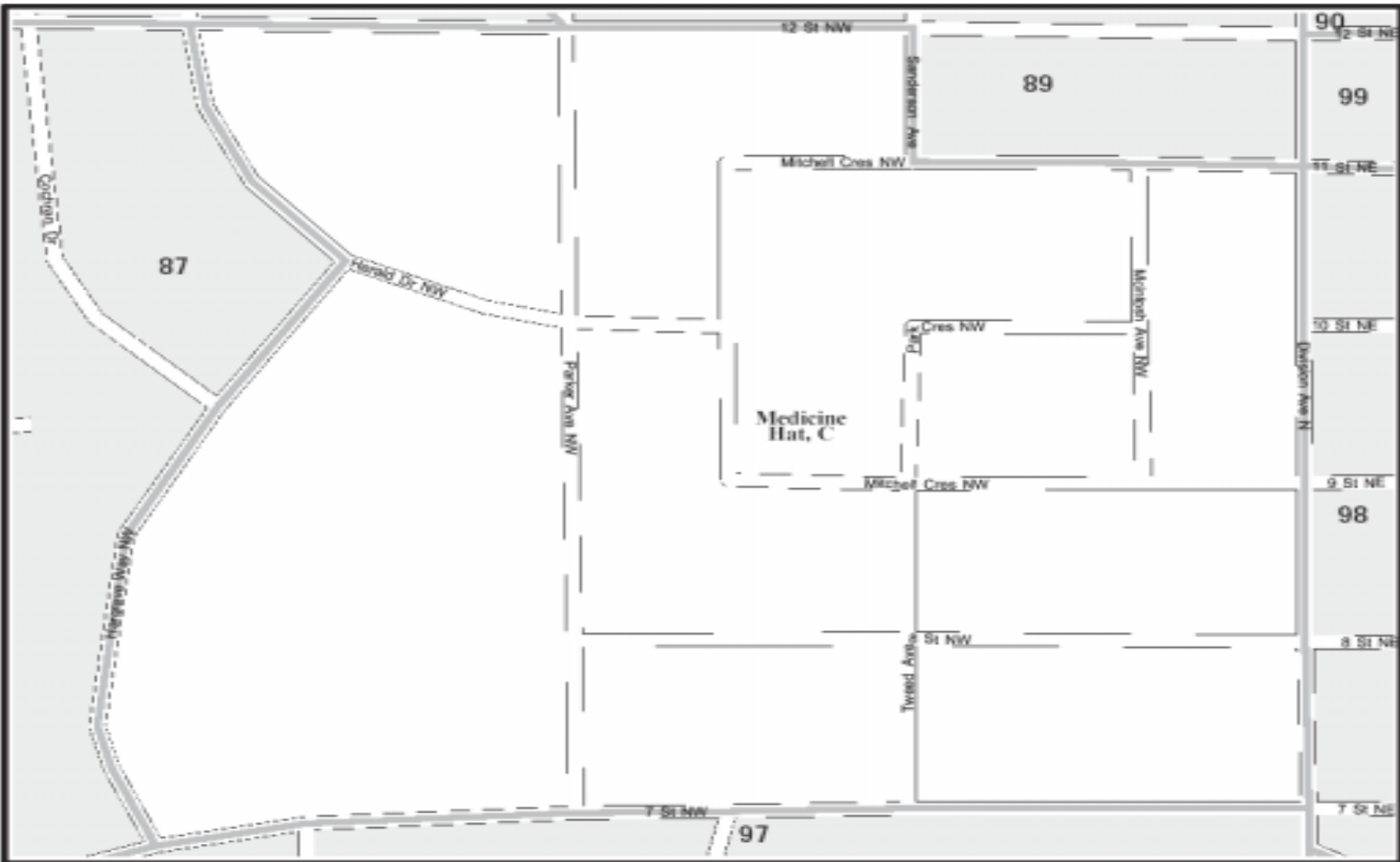
Ordinary Polling Division



Ordinary Polling Division

- ❖ Numbered between 1 and 399
- ❖ An average of 200 polling divisions per electoral district
- ❖ An average of 375 electors per polling division

Ordinary Polling Division PD Map



Medicine Hat

Fed. No.
48021
N^o circons.

Polling Division
88
Section de vote

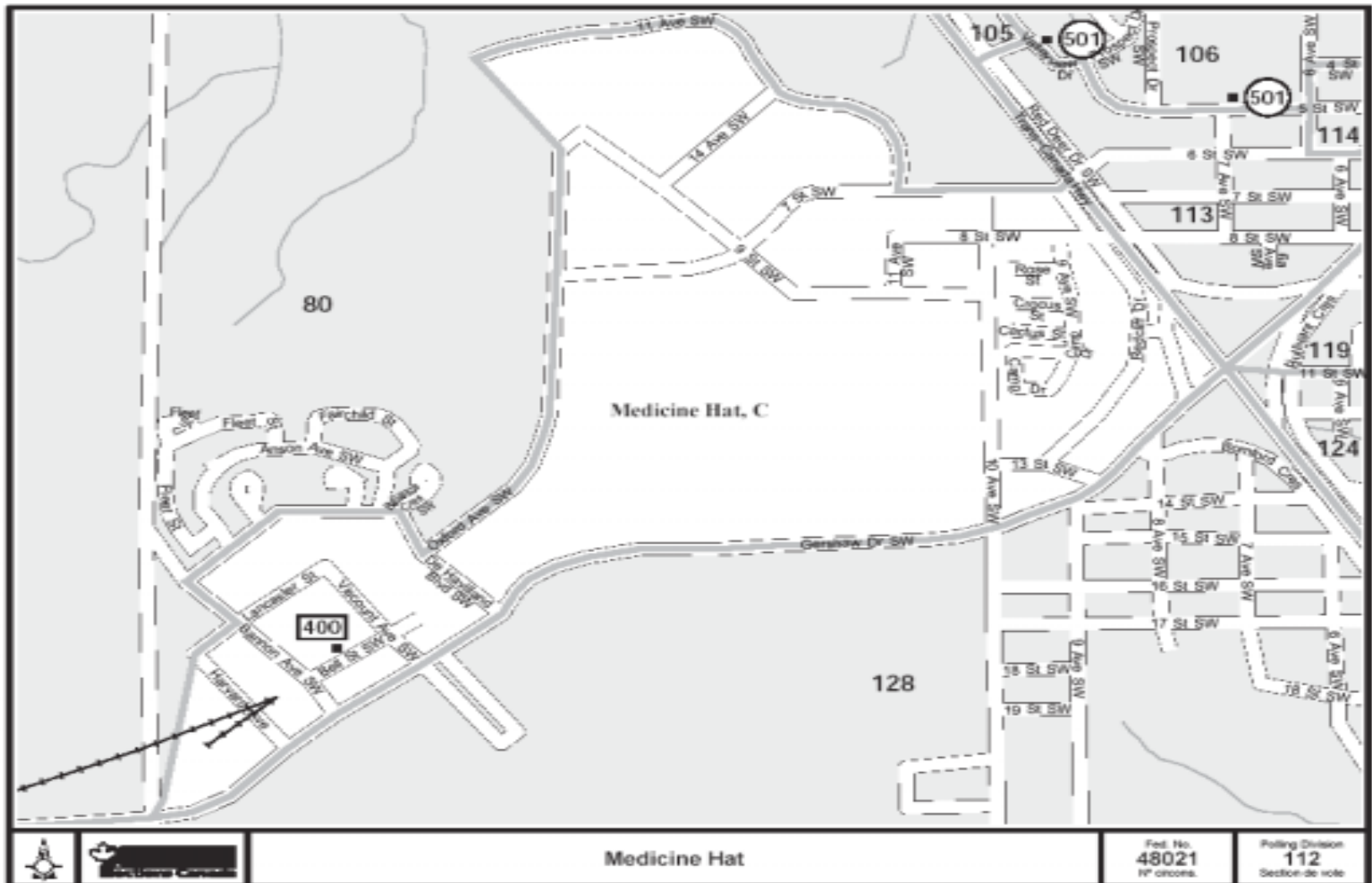
Single Building Polling Divisions



Single Building Polling Division

- ❖ A single address that contains enough electors to constitute it's own polling division
- ❖ An average of 150 to 400 electors
- ❖ Numbered in the 400 series
- ❖ Represented by a point on the map and description (attribute detail)

PD Map Showing SBPD



Insight

CALLING POLLS THIS
ELECTORATE

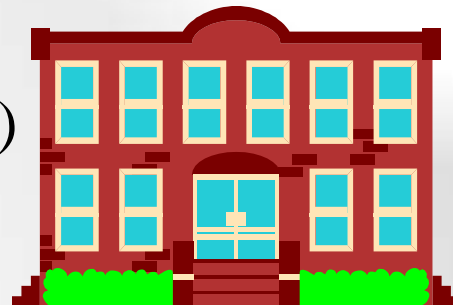


Mobile Polls

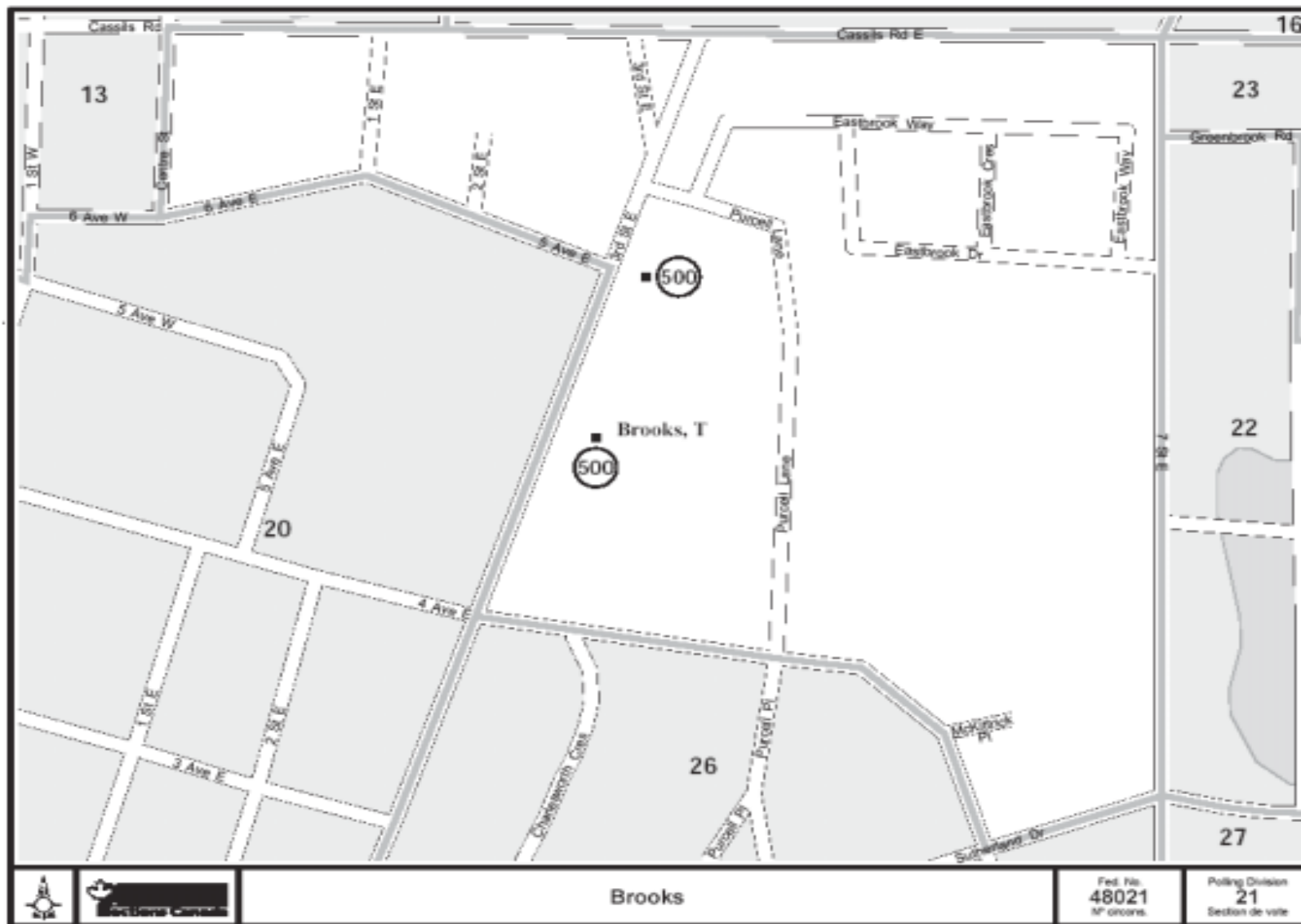
- ❖ Used to give electors the opportunity to vote in the location where they live
- ❖ Which Electors can vote under a Mobile Poll
 - ❖ Nursing homes
 - ❖ Chronic care institutions
 - ❖ Senior residences
 - ❖ Hospitals (long term only)
 - ❖ Psychiatric Institutions

MOB Guidelines

- ❖ Numbered within the 500 series
- ❖ At least 2 institutions per Mobile Poll
- ❖ Reasonable driving distance between each institution
- ❖ Should have more than 75 but less than 150 electors
- ❖ Each Institution must have a minimum capacity of 10 electors
- ❖ An Institution with more than 150 electors should be a SBPD
- ❖ Combined voting hours
- ❖ (same as Ordinary Polls)

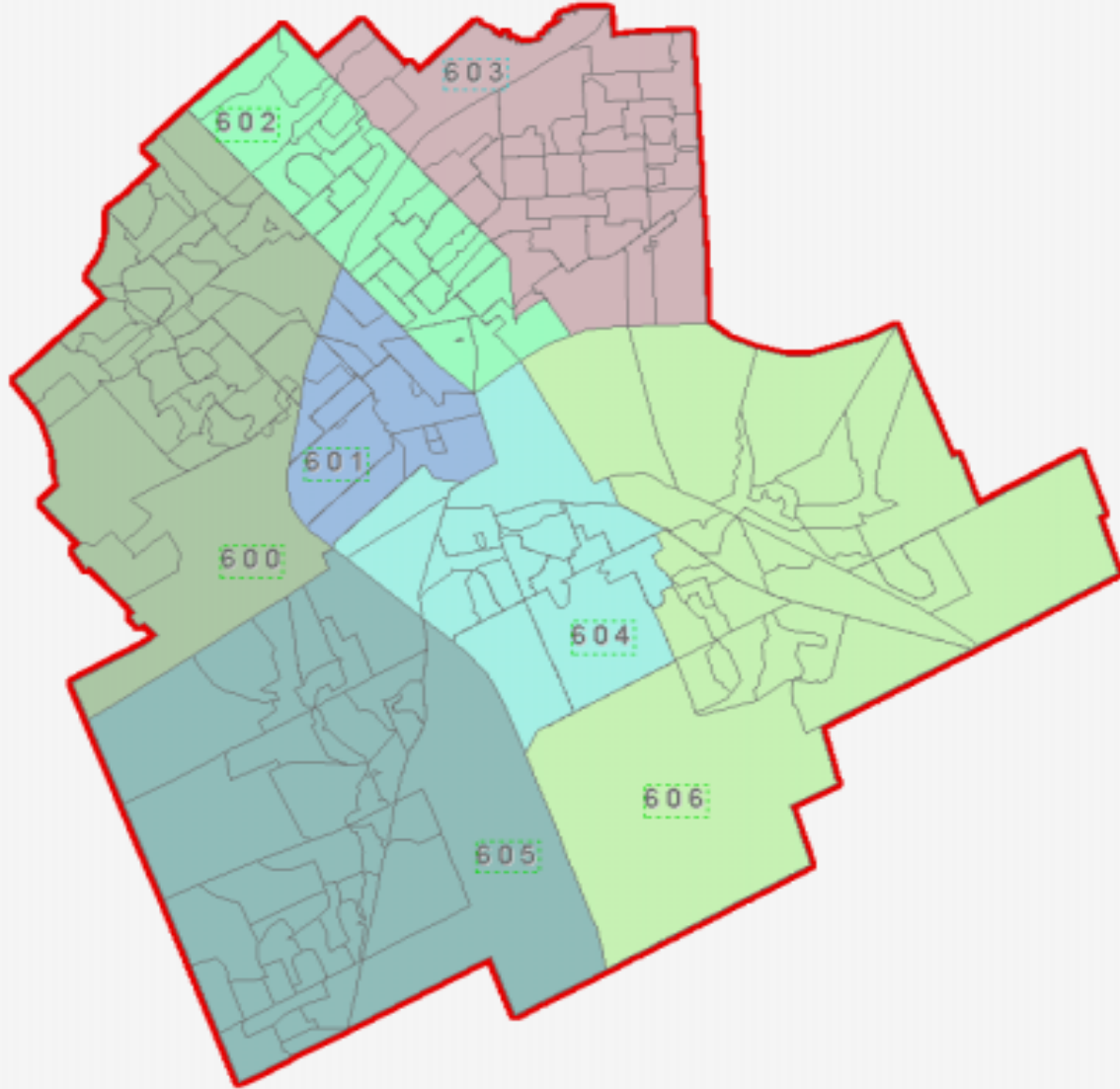


Map showing Mobile Poll



Insight

CALLINGCARD
ELECTORAL



Advance Polling Districts

Advance Polls

- ❖ For electors who have the intention of voting before polling day
- ❖ Numbered within the 600 series
- ❖ Only an attribute at this time, no spatial definition

Advance Polls Guidelines

URBAN AREAS

- ❖ Group of 20 to 25 polling divisions

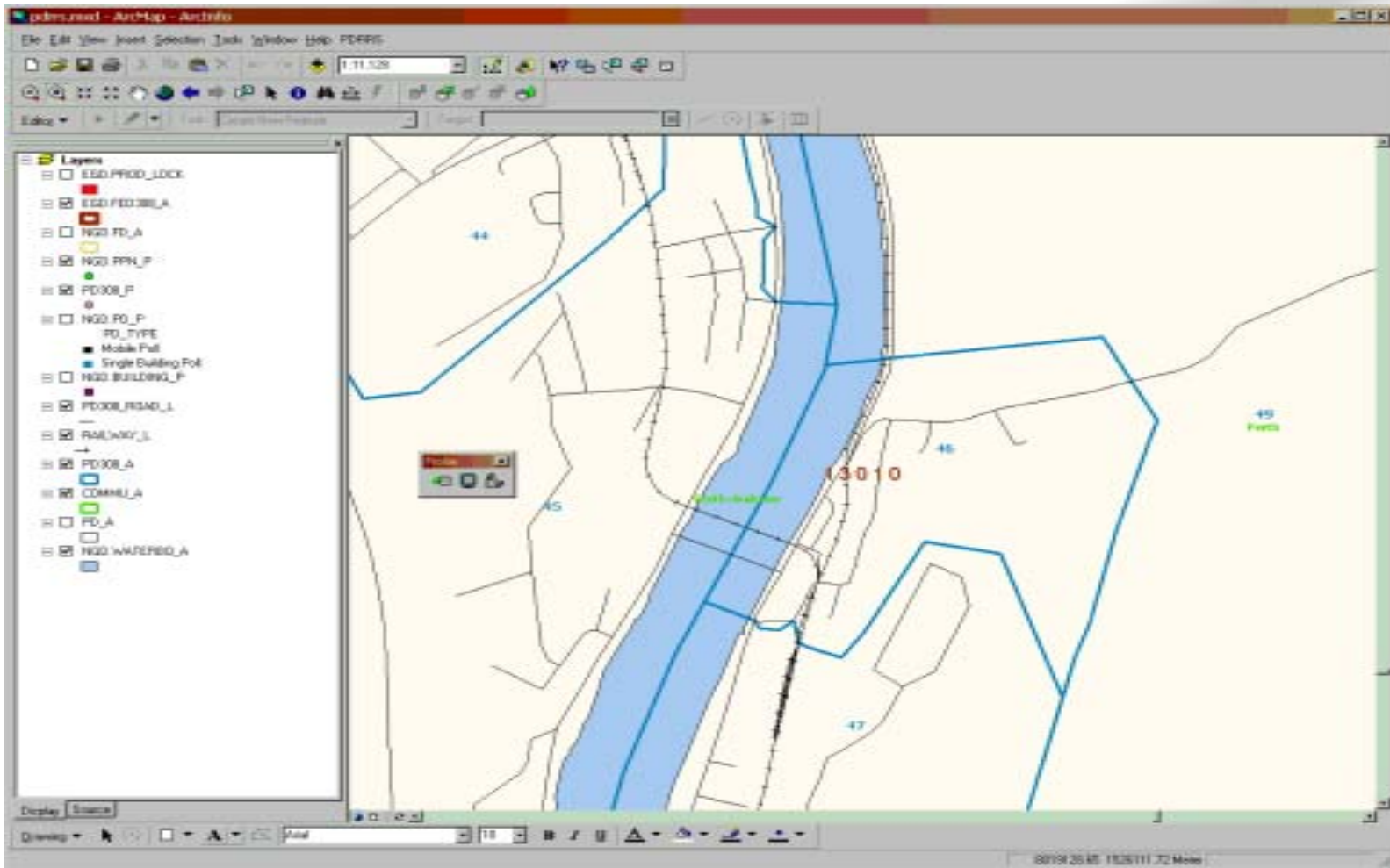
RURAL AREAS

- ❖ Group of polling divisions within a 30 km radius

PDRRS

- ❖ Polling Division Redistricting and Revision System
- ❖ ArcGIS system using ArcSDE and personal GDB
- ❖ Manages all aspects of Spatial data editing for all polls
- ❖ Uses a profile of valid ranges for poll attributes
- ❖ On and off line validation of all spatial and attribute data for the polls

PDRRS System



PDRRS – What is tracked

- ❖ Number of Electors attached to a poll
- ❖ Number of Electors attached to an address within a poll
- ❖ Number of “floating” Electors
- ❖ Number of Street segments within a poll
- ❖ Number of addresses from our List of Electors
- ❖ Number of addresses attached to streets within the ArcSDE layer
- ❖ Number of valid address ranges on the street
- ❖ Does it cross a municipality
- ❖ And even more.....

PDRRS PD Profiles

pd_num	pd_nbr_sfx	Nb_elct_list	Nb_elct_geo	Nb_elct_float	Pctg_elct_geo	Nb_addr_float	Pctg_addr_gec	Nb_name	Nb_range	Urban_ind	Csd_split_ind
43	0										
44	0	315	149	166	47.30159	173	41.75084	15	34	R	N
45	0	316	242	74	76.58228	59	75.51867	24	52	R	Y
46	0	300	178	122	59.33333	160	55.67867	10	22	R	N
47	0	325	252	73	77.53846	99	69.15888	13	30	R	Y
48	0										
49	0	341	125	216	36.65689	214	31.84713	11	24	R	Y
50	0										
51	0										
52	0										
53	0										

Export Close

PDRRS PD

Profiles Administration

Configure PD profile display

Profile data

Selected Fields

Columns	Fields
1	nb_elct_list
2	nb_elct_geo
3	nb_elct_float
4	pctg_elct_geo
5	nb_addr_float
6	pctg_addr_geo
7	

Available Fields

- csd_chng_ind
- nb_addr_geo
- nb_addr_list
- nb_elct_estm
- nb_named_str
- nb_part
- nb_total_str
- profile_dte
- profile_type
- str_split_ind

Sort

Close

PDRRS PD Validation

Validation [X]

Current FED: **13010**

Validate

- Horizontal integration
- Vertical integration
- Elector counts
- Multi part PDs
- Synchronicity

Generate Report

- Validation report

Cancel Run

PD Validation Error Review

Review errors [X]

Selection

Validation type:
 Elector counts

Error type:
 Number below the minimum limit

PDs

0 1 8 9

Nbr	Sfx	Cd.
28	0	1
29	0	1
43	0	1
48	0	1
52	0	1
64	0	1
69	0	1
83	0	1
105	0	1
116	0	1
122	0	1
123	0	1
125	0	1

Navigation

Information

Action

Validation Type Selection

Review errors

Selection

Validation type

Elector counts

Horizontal integration

Vertical integration

Elector counts

Multi part PDs

Synchronicity

PDs

0 1 8 9

Nbr	Sfx	Cd.
28	0	1
29	0	1
43	0	1
48	0	1
52	0	1
64	0	1
69	0	1
83	0	1
105	0	1
116	0	1
122	0	1
123	0	1
125	0	1

Navigation

Information

Action

PD Validation – User defined tolerances

Save edits

Current FED : 13010

Urban

Number of electors

	Nb PD	Total	Avg	Default		User-defined		Variance	
				Min	Max	Min	Max	Min	Max
Ordinary	0	0	0	0	0	250	575	0 %	0 %
Mobile	0	0	0	75	225			0 %	0 %
Single Bldg	0	0	0	125	400			0 %	0 %

Rural

Number of electors

	Nb PD	Total	Avg	Default		User-defined		Variance	
				Min	Max	Min	Max	Min	Max
Ordinary	143	45464	318	238	397	200	575	-38 %	80 %
Mobile	0	0	0	75	225			0 %	0 %
Single Bldg	0	0	0	125	400			0 %	0 %

Validate Cancel

Production Tracking

Microsoft Excel

File Edit View Insert Format Tools Data Window Help

prof_tracking_13010_2004_06_22_15_03

Elections Canada

Tracking report

New Brunswick

FED #13010 (Tobique-Mactaquac)

List of extractions:

User	Date / Time	Date / Time	Duration (h)
garberandrea	21/05/2004 02:48 PM	s/a	n/a
Total :			0.0

List of operations:

Operation	User	Date / Time
Correspondance Profile	n/a	n/a
Horizontal V	garberandrea	22/05/2004 07:53 AM
Vertical V	garberandrea	Failed to run
Elector counts V	garberandrea	22/05/2004 02:55 PM
Multi-paths V	garberandrea	22/05/2004 02:55 PM
Synchronicity V	garberandrea	22/05/2004 02:55 PM

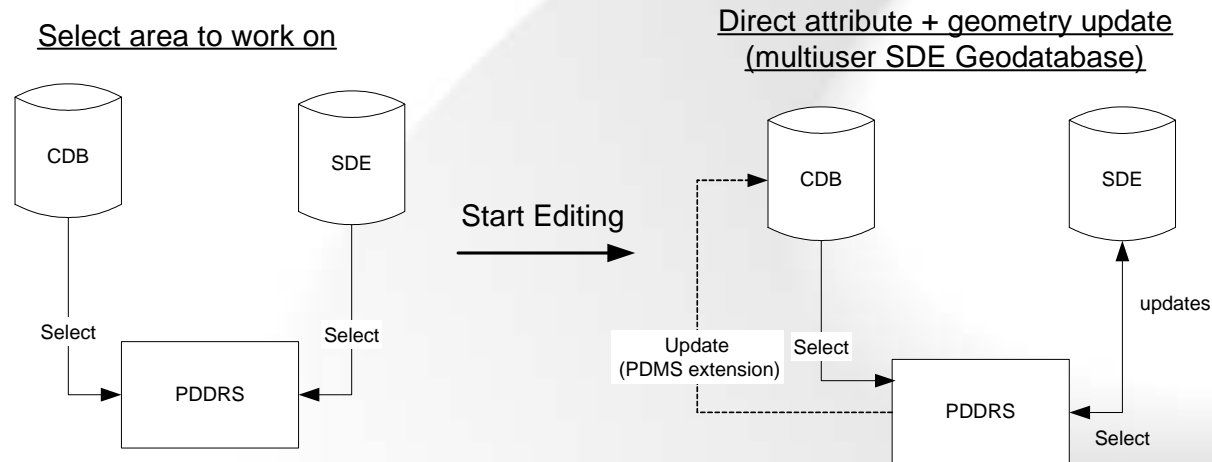
Ready

PDRRS What is Next

- ❖ Redistricting phase completed
- ❖ Revision phase next
 - ❖ Implement a before and after scenario analysis system
 - ❖ Allows “What If” Analysis
- ❖ Integration with our Poll attribute maintenance system
 - ❖ PDMS is a VB application that direct edits the corporate data base polling division attributes (Oracle data base)

PDRRS What is Next

- ❖ Investigate move to ArcSDE Geodatabase direct editing (at version 9)



PDRRS the Future

- ❖ Field editing of data directly (in the RO office)
 - ❖ Tech in the field
 - ❖ Replace RO Paper edit sent back to main office
 - ❖ Direct access of RO to knowledgeable technician
 - ❖ Proven effective with CRT (but on a smaller scale)
 - ❖ Disconnected editing
 - ❖ Challenge to synchronize with Corporate Database

Disseminating the Data

- ❖ Currently use ArcIMS and Dissemination database
 - ❖ Aids in answering event related questions
 - ❖ **Where do I vote?????**
 - ❖ Maintained within Elections Canada
 - ❖ Dial up connection only due to security requirements
 - ❖ Servers Returning Officers, Political Parties, Members of Parliament

Disseminating the Data

- ❖ Next version of the ArcIMS software will
 - ❖ Be maintained at an ISP
 - ❖ Allow high speed access where available
- ❖ Planning to
 - ❖ Serve all current clients and the Public (??)
 - ❖ Redlining Capable for Returning officer field updates
 - ❖ ArcIMS with an ArcGIS Server / Engine set up
 - ❖ Alternative to disconnected editing



The End

Unless you have Questions ??
And We have Time.....

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References

Geography for ECSN (Luc Lepine, March 2004)

Electoral Geography and Demographics

(Andre Cyr and Chantal Raby, June 2003)

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