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# Final Report to CCJS

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## ***Police Geocoding Standards***

Police Geocoding Standards  
Feasibility Study

Prepared by

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May 2001

The Canadian Centre for Justice Statistics (CCJS) and the Police Information and Statistics (POLIS) committee, a standing committee of the Canadian Association of Chiefs of Police (CACP), do not endorse products or manufacturers. Trade or manufacturers' names appear in this report only because they are essential to its objectives.

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Ce document est également disponible en français : «*Étude de faisabilité : Normes de geocoding de police*».

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## Glossary

CACP	The Canadian Association of Chiefs of Police.
CAD	Computer aided dispatch system.
CCJS	The Canadian Centre for Justice Statistics.
Decimal degrees	Longitude and latitude expressed as degrees and a decimal fraction of a degree. The longitude or 'X coordinate' of a position where east longitudes are positive, west longitudes negative. The latitude or 'Y coordinate' of a position where north latitudes are positive; south latitudes negative.
Floating decimal field	A database field to store values with a variable number of decimal points of precision.
Geocoding	<p>The activity of defining the position of geographical objects relative to a standard reference grid.</p> <p>Geocoding is vitally important for crime mapping since it is the most commonly used way of getting crime or crime-related data into a GIS. Crime records almost always have street addresses or other locational attributes, and this information enables the link between the database and the map. When crime occasions are geocoded, the address is represented by the x-y coordinates, usually either in longitude and latitude decimal degrees or in State-plane x-y coordinates identified by feet or meter measurements from a specific origin (Crime Mapping Research Center, 1999).</p>
GIS	<p>Geographic information system.</p> <p>Typical GIS applications involve taking a geo-referenced crime database, filtering the data as needed, and mapping it over a street database to put the crime data in its spatial context. Other data layers may be used, such as census tracts (see Appendix A), ZIP codes, or council districts, but the most frequent underlying context is city streets (Crime Mapping Research Center, 1999).</p>
GPS	Global positioning system.

PID	Property identification description. Used by assessment authorities to provide a unique property identifier for taxation management.
POLIS	Police Information and Statistics committee
RMS	Record management system.
SNF	Street network file. A digital street map where a single line segment represents a block and the odd and even address range for the block is attached to the segment.
UCRII	An incident based uniform crime reporting survey (see Appendix A, Figure 2).

## 1.0 Introduction

### 1.1 *Background*

In the spring of 1999, the Steering Committee on Integrated Justice Information introduced its report *Integrated Justice Information Action Plan 1999-2004* intended to improve information sharing between criminal justice agencies. The report identified a disparity between public perception of the capabilities of police to share information and the reality. The issues raised affect the implementation strategy of any change in technology or business practice such as the development of national geocoding and mapping standards for police.

A gap exists between expectations of Canadians regarding information sharing, and the reality, a gap that manifests itself as decreasing public confidence with each incident where information is not utilized effectively. Canadians expect police, prosecution, courts, corrections, and parole authorities to work in concert with one another, using and sharing the most current, most relevant, and most reliable information available.

Independence, interdependence, and reciprocity characterize the relationship among the agencies. Independence, in that each agency has unique legislated mandates, needs, priorities, and structures. Interdependence in that no single agency has within its own boundary access to all the relevant information needed. Reciprocity, in that each agency depends on the give and take of information exchange in order to maximize effectiveness and efficiency.

This situation also creates a problem with the quality of data available to the Canadian Centre for Justice Statistics and other agencies for use in supporting policy development and program evaluation activities. Significant technology and "people" barriers exist which inhibit the sharing of justice information between agencies.

Information sharing among agencies and across jurisdictions is a critical function to ensure the integrated delivery of criminal justice programs, and, in particular, to ensure that decision-making and judgments by criminal justice agencies fully promote the objectives of criminal justice. (Steering Committee on Integrated Justice Information, 1999).

### 1.1.1 CRIME MAPPING

It has been suggested that criminals do not respect police boundaries, often crossing multiple jurisdictions in pursuit of their endeavours and that information sharing is paramount to proactive crime prevention. Criminals are often sophisticated enough to recognize the benefits of conducting activities which cross police boundaries. The sharing of information, beyond the traditional boundaries, in a mapped format assists in the detection of patterns and cross-jurisdictional crime.

The production and standardization of geocoded incident data, therefore, is a key step in enhancing crime analysis and information sharing. The implementation of appropriate technology, however, remains a critical issue in an environment with lower software costs but greater choice and potential for pitfalls. Geocoding incident data is viewed by many as a manual task using specialized software to process incident records, many of which may require manual intervention to correct address information. However, most current CAD systems are capable of automatically geocoding incidents and updating the RMS as locations are changed or verified.

A brief explanation is in order. GPS, cadastral map, or street network files are used to populate a police *geofile* which provides longitude and latitude coordinates to addresses. When incidents are reported, the CAD system can automatically associate an X and Y reference point from within the *georeferenced database* to the call, based on the location provided to the operator. Locational attributes of incidents, however, may be amended after the initial entry. In such instances, reports can be “flagged” to be rerun by the *geocoder*, or can be automatically regeocoded, depending on the preference of the individual department and technology sophistication. A similar process can be implemented in the RMS, if address locations of incidents are changed after export to this database.

Once incident data are geocoded, barriers in its use include the comparability of classifications used between agencies and the ability of the operational member to access mapped information in a timely manner. Mapping software, once the domain of the crime analyst, has been customized by police agencies to enable access to members. However, these proprietary solutions have difficulties providing the appropriate information to members in a timely manner. Many of these applications require significant keyboard input to develop a query which is time consuming and prone to

error. Such inefficiencies render many of these programs underutilized. Few programs exist to provide configurable mapping solutions where no keyboard input is required to execute a query.

### **1.1.2 DEMOGRAPHIC ANALYSIS**

Over the last decade, the national crime rate has been on a constant decline. Reasons are varied, but a common thread is clear; the demographics of the country are changing. A reduced population of youths, an increasing population of seniors, a strong economy; each contribute to a reduction in crime. Integration of demographic information with UCRII survey information would allow reporting agencies to react with appropriate resource allocations, prepare for future trends, and identify potential high risk areas.

Most police agencies view demographic information as a valuable resource. While it is feasible that UCRII be modified to accept geocoded coordinate information, it will be necessary to coordinate the provision of geocoded data by UCRII suppliers. The provision of geocoded rural incident information is an even greater challenge, and it is not yet clear if the geocoding of rural incidents is an effective risk mitigation strategy. Full investigation as to the completeness of street and highway maps used for geocoding in rural areas in addition to the potential benefits are required. Encroachment of urban populations into rural areas implies increased urban crimes, such as property crimes or violent crimes. This suggests that a feasibility study of the benefits of geocoding to rural policing is necessary.

## **1.2 Objective**

The objective of the study is to provide recommendations to the CCJS and the POLIS committee on the feasibility of implementing a national police geocoding standard to assist with crime analysis in addition to providing geocoded data to the UCRII incident based survey (see Appendix A, Figure 2).

## **2.0 Methodology**

### **2.1 Requirements**

The feasibility study will identify existing geocoding standards or practices in use in the North American police community. The study will recommend existing or new geocoding standards for consideration by Canadian police forces. The standards to be considered will be suitable for both crime analysis as well as statistical reporting.

Specific requirements include:

- To identify the cost, benefits, constraints, and high level strategies that would support recommendations.
- To determine the feasibility of obtaining geocoded co-ordinates, on an incident by incident basis
- To identify viable interim strategies to provide geocoded data.
- To identify the requirements for the inclusion of geocoded data fields in the UCRII environment.

### **2.2 Data gathering**

A web questionnaire form was created and an email request was distributed to crime analysts nationally and in the United States to gather information on the status of geocoding. Telephone interviews were conducted with Canadian police stakeholders to enhance the response rate and quality of input. Data gathered was consolidated in an MS Access database for analysis. A literature survey was conducted to identify additional information to support the investigation.

### **3.0 Existing geocoding practices in the police community**

#### **3.1 *Evolution of geocoding and mapping***

Geocoding of crime incidents and spatial analysis of data is still a developing process among Canadian police agencies. Those who have developed or are using geocoding systems are primarily metropolitan or major urban agencies.

Among the agencies that have implemented the technologies, a common pattern was evident. An individual within the agency recognized the benefits of mapping, and that individual investigated the most efficacious method of introducing it to the department. Over time, the project grew such that others recognized the merits thereof. Frequently, the mapping functions are performed from within the crime analysis department, with maps and information provided to members upon request.

Some of these agencies geocode the results of a particular query, whereas others automatically geocode all incidents. Many indicated their geocoding project was a work in progress. Other respondents identified a desire to map but noted a lack of resources as the reason for not mapping. Others, primarily from rural detachments, indicated they did not perceive a benefit to them to implement a mapping system.

#### **3.2 *Geocoding process and technical resources***

Of the respondents who are currently mapping, most are using common methods of geocoding incident locations to provide the X-Y coordinates used to map incident records.

Typically, municipal cadastral maps or street network files (SNF) are used as the geocoding source and incidents are matched to exact addresses or interpolated addresses in the source file. The use of GPS to obtain X-Y coordinates is not common. (see Figures 1 and 2).

Approximately one-half of these respondents use their CAD system to geocode in real-time. Geocoding is a standard, but underutilized feature of CAD and RMS installations. Concerns regarding geocoding in CAD were noted; the main issue raised was that all too often, the true location of the incident differs from that given to the CAD operator. This change of location, however, does not

preclude linking the CAD to the RMS to provide for geocoding the updated incident.

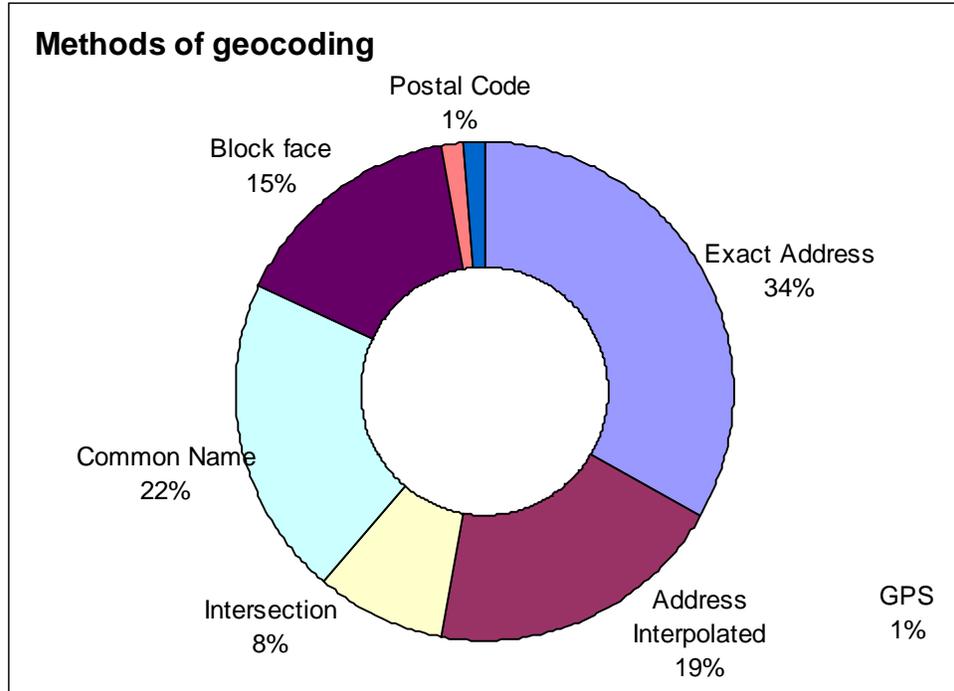


Figure 1 Georeferencing feature

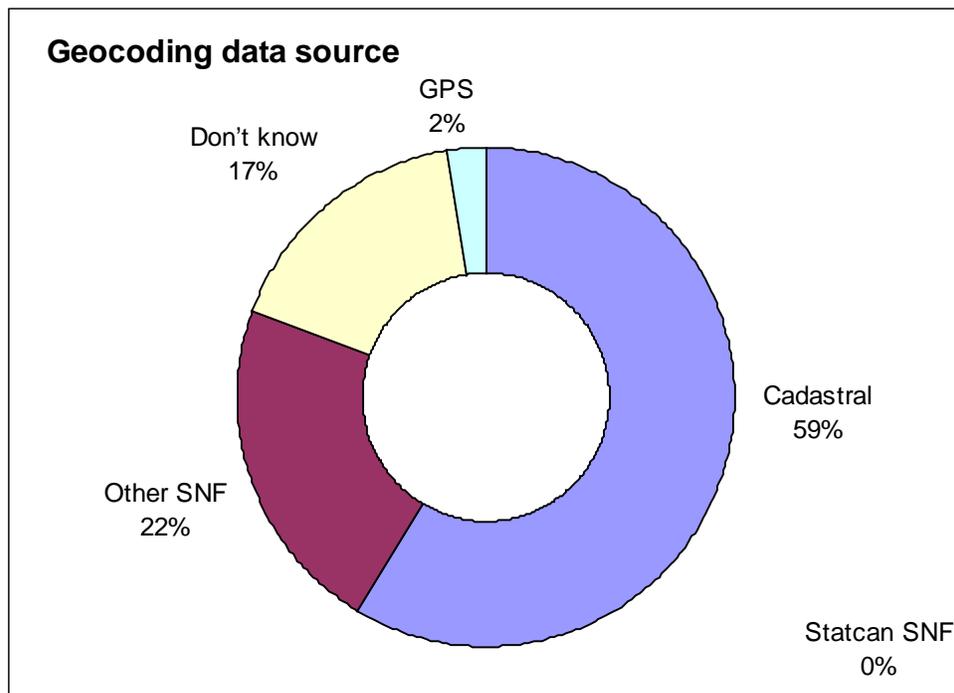


Figure 2 Geocoding source file

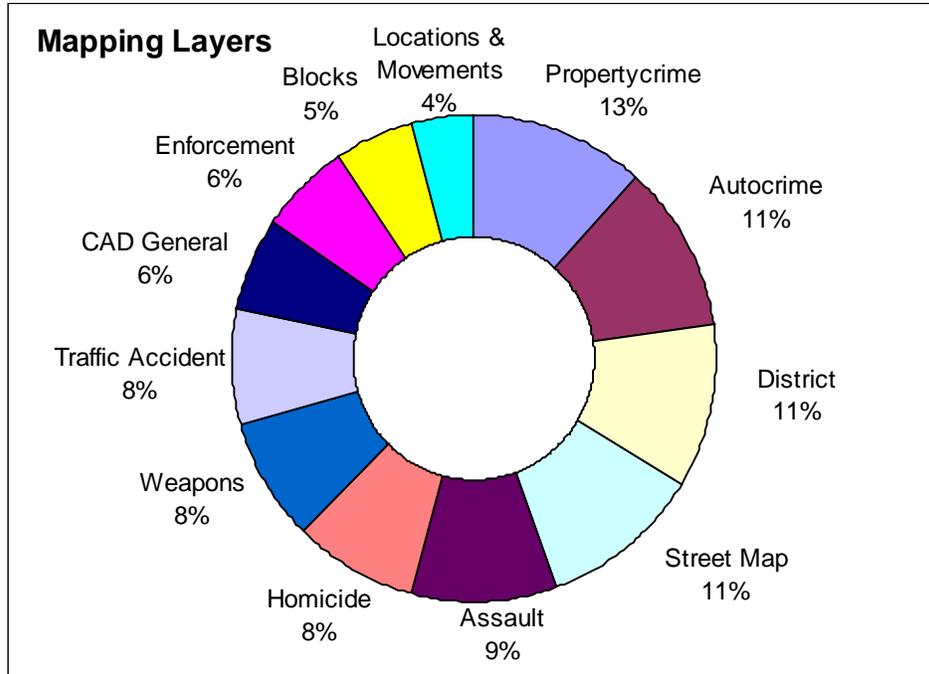
There is no minimum standard for geocoding and a portion of incident records may be missed when mapped. Such a map would represent only a small fraction of all incidents, and may obscure emerging patterns. The pitfalls of geocoding query results have been noted by the US Department of Justice, Crime Mapping Research Center, "The missing data may not be randomly distributed, thus possibly concealing a critical part of the database. Given that there is no minimum standard, the issue becomes: What hit rate is acceptable? Low hit rates indicate that the base maps in use and/or incoming data are seriously deficient." (Crime Mapping Research Center, 1999).

### **3.3 Data classification standards**

The Canadian Association of Chiefs of Police has adopted the National Data Standards (see Appendix A, Figure 1) for police electronic information exchange and urges the adoption of these standards by all Canadian Police Services. The National Data Standards recognize that CAD systems include elements such as location nodes specific to mapping and provide fields to link records to geographic *areas*. However, the standard does not require longitude and latitude fields of the incident address. Such fields are necessary to share incident records mapped to an exact location.

It may be appropriate to amend the current national standard to include numeric longitude and latitude fields in decimal degrees to accept a minimum of three decimal points of precision (see Section 4.0 Recommendations).

The survey revealed several mapping layers were commonly used. The typical base mapping layers were streets and districts with the following layers being most frequently overlaid: property crime, auto crime and violent crime (see Figure 3). A common set of map layers aids in consistent day to day analysis, as well as crime analysis among jurisdictions. It does not, however, preclude crime analysts performing detailed or individualized queries. The use of common map layers deemed most appropriate by Canadian police agencies is suggested as the subject of further investigation.



**Figure 3 Typical map layers**

### **3.4 Human resources and costs**

Most municipal police agencies do not have the resources, manpower or technical capability to geocode or analyze incident data. Many respondents indicated mapping is too labour intensive or insufficient resources are available. Other respondents indicated they had formed partnerships with complimentary organizations to acquire or develop the necessary technology. For example, city planning, engineering, fire departments and utility companies often require or have geocoding source files. Collaboration among these agencies for the purchase of the data sets allows for increased affordability, as well as providing an opportunity to pool intellectual and technical resources.

A few respondents indicated they have developed unique ‘in-house’ mapping applications to meet specific agency requirements, however, these agencies were, for the most part, major metropolitan centers.

The survey indicated that Crime Analysts were the primary users of mapping, with relatively few patrol officers involved in the process. Several agencies employed civilian personnel to assist with

technical processes but few were able to identify budgetary requirements specific to geocoding.

### 3.5 Demographic data

Numerous factors contribute to a decrease in the crime rate. Some of the possible explanations include the aging of the population, a healthy economy, and new approaches to both preventing and solving crimes. Police agencies need to know what is going on demographically in their communities to react appropriately. Mapping demographics and related factors may also translate into better community relations.

With few exceptions, all respondents indicated that integration with demographic data would be useful. Respondents indicated integration of incident data and demographics would best serve their needs if done at the police district level. Figure 4 illustrates the most common geographic areas used in demographic analysis by police (see Appendix A for descriptions of common statistical areas).

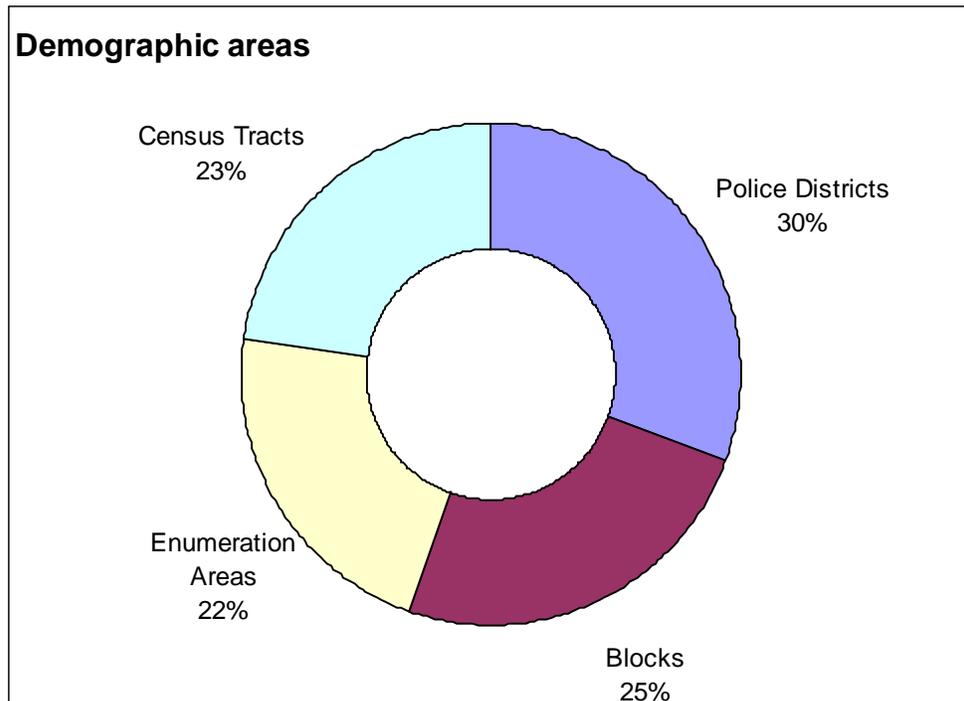


Figure 4 Typical areas used in demographic analysis by police

### **3.6 *Different urban/rural needs and technology imbalance***

A survey of police departments conducted in 1997-1998 (Mamalian and la Vigne in Crime Mapping Research Center, 1999) showed that only 13 percent of 2,004 responding departments used computer mapping in the United States. Slightly more than one-third of large departments (those with more than 100 officers) did so, but only three percent of small units did (Crime Mapping Research Center, 1999).

This imbalance can be attributed to the different nature of policing in metropolitan, urban, suburban and rural areas, and the resources available to each. Crime is often a regional problem crossing multi-jurisdictional boundaries. Urban regions have significant change in population during the day and week due to the transit of commuters from suburban communities which is not seen by rural agencies.

The majority of the UCRII data is provided from urban municipal police forces, with the province of Quebec being the only major supplier of rural incident data. Analysis of the UCRII data may benefit from an expanded contribution from rural police agencies in the future.

Geographic representation may be skewed to urban areas. Many of the contributing police agencies have GIS technology available or in place whereas rural geocoding processes continue to be problematic.

## 4.0 Recommendations

- **The National Data Standards should include GEO\_XCOORD and GEO\_YCOORD entities as float type variables.**
- **Geocoding of longitude and latitude should be done at the local level where possible, by the best practical means.**
- **UCRII should be enhanced to include numeric longitude and latitude fields in decimal degrees to accept a minimum of three decimal points of precision (preferably a floating decimal value) to support this recommendation.**

### 4.1 *Rationale*

#### 4.1.1 CRIME MAPPING

The National Data Standards currently in place recognize georeferencing features but do not specify longitude or latitude fields. The inclusion of coordinates, stored in decimal degrees, would allow for varying measures of locational accuracy in analysis. Three or more decimal points of precision are necessary to provide an accuracy for an incident within 120 metres of the point location in the source map used for geocoding. Floating decimal fields permit the entry of precision appropriate to the geocoding source file. For example, Cadastral maps are more precise than street network files (SNFs) in that they provide an exact geographic X-Y coordinate for each unique address, whereas SNFs estimate the X-Y position by interpolating an address within a range for each city block.

When X-Y coordinates are added to an RMS and incident records are mapped, spatial patterns emerge which may have been previously unnoticed. For example, mapping allows for a direct observation of the relationship between property crimes and the location and movement of known offenders.

#### 4.1.2 DEMOGRAPHIC ANALYSIS

Provision of longitude and latitude (x-coordinate, y-coordinate) floating decimal fields in the UCRII database would enable spatial analysis and the integration of demographic data.

In the longer term, obtaining geocoded co-ordinates, on an incident by incident basis, would permit the CCJS to report crime related data using standard Statistics Canada definitions. This enhanced UCRII database would enable demographic data to be linked to incident records. CCJS could then analyze crime in the context of demographics, enriching the understanding and identifying trends.

If a map shows only crime locations, in-depth explanation of pattern is next to impossible. But if other elements of context are included, such as the socio-economic environment or locations of drug markets or of abandoned housing, (any elements that theory would lead us to expect to be linked to crime pattern in some way), then understanding is likely to be enriched (Crime Mapping Research Center, 1999).

A police agency can draw upon the experiences of other municipalities that have experienced demographic changes predicted for the community in question. Analysis of these demographic trends and the associated changes in criminal activity, therefore, is a useful means of predicting future policing requirements. For example, City A has an aging population. It is experiencing reduced crime but increasing strains on its traffic and emergency medical services. The courthouse is fully staffed but operating well below maximum capacity. City B is anticipating a similar demographic profile in the next five years. Using comparative analysis, councils have an opportunity for a proactive response to the predicted change based on the experiences of City A. Resources allocated for a possible courthouse expansion could be reallocated to traffic engineering or additional emergency care facilities. Consistent analysis at the regional and national level allows for ongoing comparison between communities.

Interim or long term solutions to increase the use of geocoded data, may include the establishment of provincial organizations by police chiefs with a mandate to consolidate police information, and provide consistent analysis and support to police agencies with the added value of demographic data. This would assist those municipal police agencies not participating in a regional police information technology sharing initiative.

## **4.2 Implementation Strategy**

### **4.2.1 OBJECTIVE**

To enable police forces to generate geocoded data to the CCJS for demographic analysis. In the short term, this geocoded data could be provided for special purpose studies for those police services with the capacity to generate the geocoded data. In the longer term, the UCR II data records could be expanded to include data fields for geocoded UCR II incident data. This would allow for demographic and trend analysis on an ongoing basis for those police services able to provide the data.

### **4.2.2 PROCESS**

A steering committee comprising of members of the CACP and CCJS should be formed to consider the scope and structure of the following implementation strategy.

CCJS should consult with their information systems personnel to address issues related to the preparation of a requirements/specifications document used to outline the steps necessary to modify the UCR II to include longitude and latitude fields as described.

CCJS should consult with police agencies information systems personnel to address issues related to the preparation of a requirements/specifications document.

CCJS should prepare requirements/specifications documentation to enable participating police agencies to modify their UCR II data extraction process to include the new longitude and latitude entities in the format required to import into UCR II.

CCJS request participating agencies provide longitude and latitude information with the monthly UCR II data export, as described by requirements/specifications documentation. The provision of data can occur as each agency adopts geocoding technologies in accordance with their strategic plan.

Participating CACP members recommend to CCJS the type of demographic relationship and trend analysis required to assist with future policing and resource requirements. Demographic analysis can be supplied to contributing agencies as a special study until such time as UCR II is modified or when requested.

### 4.2.3 COSTS

For those police agencies already geocoding their incident data, the cost to provide the additional longitude and latitude entities required is limited to the labour to modify the UCRII export query. Each police force will require their information systems staff to modify the existing queries that create UCRII files in a machine-readable format. This task would take several days to complete, depending on the technical abilities of the personnel.

If the police agency does not geocode incident data, then the costs are more involved. They are dependent upon the complexity and capability of the CAD/RMS application, availability of a geocoder and geocoding source maps, and availability of staff with appropriate technical skills. Manual use of geocoders is labour-intensive. A more sophisticated solution is less labour-intensive but includes a higher software cost and technological capability. Each agency providing UCRII data would be required to determine the most appropriate course of action depending on the resources available.

An example of a *typical* installation and evolution follows. The costs are based on the development of geocoding within the Victoria Police Department, a municipal agency comprising approximately 100 members.

### 4.2.4 CASE STUDY

The purpose of this implementation and cost analysis is to provide strategic guidance to police departments at differing stages of mapping implementation and system development. Since police departments will differ in their requirements and mapping implementations, only three stages of implementation are described to provide an executive overview rather a detailed cost analysis. These stages are:

- Stage 1 - Initial Installation
- Stage 2 - Extended Access, and
- Stage 3 - Total Access

\*Unless otherwise noted, the costs provided are estimates and do not reflect discounted costs offered to VPD in exchange for testbed services.

#### **Stage 1 – Initial Installation:**

## **Paper Maps to Digital Maps**

### **Total Cost \$8,000 plus 60 person-days**

Initially, a strategic goal was accepted to introduce crime and incident mapping capabilities to the department. A project officer was tasked with reporting on the benefits and costs of alternative off-the-shelf GIS/desktop mapping programs. A budget of approximately \$4,000 was accepted to cover the purchase of a single mapping program software license, a digital centreline street network map and all necessary training. Information systems personnel provided instruction on the process to export data from the RMS and the crime analyst was tasked with learning how to import, geocode and map incident records. This officer then created adhoc pin maps which provided useful information for crime prevention and response. Issues raised included:

- #1 quality of map presentation,
- #2 geocoding hit rate and speed, and
- #3 format and timeliness of the delivery of mapped results to the police organization.

These issues were resolved prior to proceeding to Stage 2 of the implementation.

**Issues #1 and 2.** The issues of map presentation and geocoding were resolved with a single approach. The centerline street network file, used to geocode incident records and provide the map context for viewing and printing, was replaced by a customized cadastral map produced by the city engineering department. This map showed street and property boundaries and provided exact address information for each lot in a typical GIS format. This provided both a more precise viewing context and geocoding capability with a hit rate of 95% at an additional cost of about \$4000 for the programming and consulting services. The cadastral map was then used to populate the RMS geofile with longitude and latitude coordinates resulting in a more efficient system. When data was exported from the RMS, it no longer required geocoding; incident records could be mapped directly because of the included X –Y coordinates.

**Issue #3.** The format and timeliness of the delivery of mapped results required an immediate solution and plans for a longer-term solution. The immediate solution to enable members to view crime maps on the local area network was to purchase a single site

license for a viewer tool and produce maps in a raster image format.

The image format of crime maps enabled an increase in accessibility to information, but the information was static and required updates by the crime analyst. Furthermore, the static, non-interactive nature of the map image could not meet the increasing demand for unique map information. This necessitated the development of a strategy to implement a dynamic mapping system. Considerable effort was used to survey members on user requirements and develop a request for proposal.

## **STAGE 2 – EXTENDED ACCESS:**

### **Single workstation to client-server system.**

#### **Total Cost \$100,000 plus 90+ person-days**

Pursuant to the RFP, software was installed on a server and 10 workstations to provide a mapping capability accessible to all members. The system uses a customized preprocessor to convert RMS data into a mapped format, stores it in a data warehouse, and makes this information accessible to multiple workstations concurrently on the local area network. Members received training on the system to allow for full operational ability. Total training involved less than one half day per member. The cost of software purchase, PC leases and installation was approximately \$80,000.

Usage was monitored and a steady increase by a group of members in support of investigation and briefing was evident. The application and system was also well received by senior staff. To enable an on-line dynamic briefing, the briefing room was fitted with a projector and computer system at an additional cost of approximately \$20,000. Issues raised included:

- #1 accessibility to remote community police stations and mobile data terminals, and
- #2 enhancements for canned briefings.

These issues are unresolved at the time of writing; VPD has not entered Stage 3 of the implementation.

## **Stage 3 – Total Access**

### **Total Cost \$170,000 plus 250+ person-days.**

This stage describes moving from a limited access mapping system to a system accessible to an unlimited number of PCs and Mobile Data Terminals by members with varying requirements for information access.

**Issue #1.** The issue of offsite accessibility to the mapping server is bandwidth. Options include:

1. increasing the speed of the network to enable real-time access of large map data files,
2. automatically transferring a replication of the data warehouse offsite to the community police stations and mobile data terminals (MDT's),
3. installing Microsoft Terminal Server to minimize data transfer to commands and images, or
4. installing an interactive web imaging application to minimize data transfer to commands and images.

Option #1, installing a private fibre-optic network to the community stations, is both cost prohibitive for most agencies, and would not solve the issue of access by MDT's.

Option #2, automatically transferring replicated data, would be more cost effective but would require an on-going commitment of resources. Initially, several days would be required to program a data transfer utility, with continual daily costs of data transmission to the MDT's.

A more viable solution to effect Intranet mapping would involve Option #3 or 4.

Option #3, is a cost effective but short-lived solution. The support of Terminal Server by Microsoft is likely to be limited as applications devolve into server-based 'pay as you go' applets.

Option #4, requires the purchase and installation of an unlimited user web version of a viewer tool. This option would provide access to community stations, MDT's and, with appropriate authorization, interested stakeholders such as insurance corporations. These applications are available at a cost of approximately \$170,000.

**Issue #2.** Watch commander briefings were to have used the viewer tool's capability to display standardized maps of incidents over the previous three days at the click of a button. However, in practice, a canned map with a data table and description of the

data would be more beneficial. Again, web pages were viewed as a user interface of choice.

Whatever report creation technology is implemented, these custom reports require on-going contracting for development and maintenance unless an in-house programming capability by Information Systems is expanded with an expected annual cost of \$70,000.

### **4.3 Long Term Opportunity to Expand Geocoding**

#### **4.3.1 OBJECTIVE**

To increase the participation by the police community in supplying geocoded UCRII data to CCJS and improve the geocoding process, given the varying technological and resource capabilities affecting crime mapping across Canada.

#### **4.3.2 REQUIREMENTS**

UCRII data is primarily obtained from urban agencies, with minimal data from rural detachments provided. The requirements for complete crime mapping and geocoding depend on the availability of resources (financial and technical) as well as the perceived benefit to crime reduction. The opportunity to expand the UCRII database and improve national crime analysis, however, is not anticipated to be realized overnight. Several issues, not only technical limitations and procedures, must be examined prior to any implementation.

For example, there are problems geocoding in rural areas where there is incomplete coverage by digital maps. Improvements in the quality and completeness of digital maps and alternate means of geocoding are necessary to include rural police information in a regional, provincial or national database. In addition, these agencies have very different policing requirements; there may be a different perception of the benefits for mapped incident information from that of their urban counterparts.

Further, crime mapping is a risk control measure. An assessment of the value of crime mapping in rural areas versus the costs of implementation should be conducted in a risk management framework to identify and evaluate the benefit of reduced risk.

Also, different regions are implementing different RMS and CAD systems. The question is raised “How well are these database systems conforming to the National Data Standard?” The implementation of new technology and sharing agreements is a gradual process. Since there are disparities between agencies, those without sufficient resources to participate in a ‘group’ or regional CAD/RMS may have difficulty sharing mapped information and contributing geocoded incident data.

Rural and smaller police agencies may wish to expand existing partnership arrangements to achieve the desired result and achieve economies of scale. It is unclear, however, if the addition of rural data to the UCRII from all of Canada would benefit policing. The benefits of introducing rural geocoding on a national scale for contribution to the UCRII survey would be the subject of additional study.

## References

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## **Appendix A**

**Figure 1. Common Police Environment Group:  
National Data Standards, Geographic Entities**

ENTITY	NAME	TYPE	LEN	DESCRIPTION
FRAUDULENT_DOCUMENT	DESCRIPTION	VARCHAR	2048	Further free form description of this fraudulent document.
FRAUDULENT_DOCUMENT	REMARKS	VARCHAR	2048	Remarks pertaining to this record.
<b>GEO_AREA</b>	<b>Geographical areas of interest to a police service.</b> <b>NOTE:</b> <b>It is understood that any police dispatch system must have a well developed geographical information system which includes many elements not covered here to support routing, area definitions (polygons, lines or edges), nodes, defined objects of interest such as hydrants and many more elements specific to locations and mapping.</b>			
GEO_AREA	GEO_AREA_ID	INTEGER	20	Unique identifier of a geographical area.
GEO_AREA	ORGANIZATION_ID	INTEGER	20	Unique identifier for the organization that uses this designated affiliation. This will aid in the dispatch of other emergency services where their service areas are defined differently than the police service definition.
GEO_AREA	AREA_TYPE	VARCHAR	100	Type of a geographical area. Examples of these are: Atoms Block parent area Building complex Common Place Name Neighborhood watch Patrol zones Problem location...
GEO_AREA	AREA_NAME	VARCHAR	50	Name of this area.
GEO_AREA	START	DATETIME	17	Start of this area definition. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA	END	DATETIME	17	Expiry of this area definition.
				Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA	REMARKS	VARCHAR	2048	Free form remarks for this record.
<b>GEO_AREA_ADDRESS</b>	<b>Affiliations of geographical areas of interest to a police service and the addresses contained within. This structure allows the linking of physical addresses to atoms, block parent areas, patrol zones, common names... and allows for a history of these affiliations to be maintained.</b>			
GEO_AREA_ADDRESS	GEO_AREA_AREA_ID	INTEGER	20	Unique identifier of a geographical area, address affiliation.
GEO_AREA_ADDRESS	GEO_AREA_ID	INTEGER	20	Unique identifier of a geographical area.
GEO_AREA_ADDRESS	PHYSICAL_ADDRESS_ID	INTEGER	20	Unique identifier of a physical address.
GEO_AREA_ADDRESS	START	DATETIME	17	Start date and time of this affiliation. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA_ADDRESS	END	DATETIME	17	Expiry of this affiliation. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA_ADDRESS	AFFILIATION_TYPE	INTEGER	1	Type of a affiliation. 1. Contains 2. Other
GEO_AREA_ADDRESS	REMARKS	VARCHAR	2048	Free form remarks for this record.
<b>GEO_AREA_AREA</b>	<b>Affiliations of geographical areas of interest to a police service. This allows for the grouping of areas into patrol zones, the tracking of changing area borders...</b>			
GEO_AREA_AREA	GEO_AREA_AREA_ID	INTEGER	20	Unique identifier of a geographical area affiliation record.
GEO_AREA_AREA	GEO_AREA_ID_FR	INTEGER	20	Unique identifier (GEO_AREA_ID) of a

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ENTITY	NAME	TYPE	LEN	DESCRIPTION
	OM			geographical area that this relationship is from.
GEO_AREA_AREA	GEO_AREA_ID_TO	INTEGER	20	Unique identifier (GEO_AREA_ID) of a geographical area that this relationship is to.
GEO_AREA_AREA	START	DATETIME	17	Start of this area definition. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA_AREA	END	DATETIME	17	Expiry of this area definition. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA_AREA	AFFILIATION_TYPE	INTEGER	1	Type of a affiliation. 1. Contains 2. Is the same as 3. Other
GEO_AREA_AREA	REMARKS	VARCHAR	2048	Free form remarks for this record.
<b>GEO_AREA_PERSON</b>	<b>Affiliations between people and areas such as participants in block parent programs and neighborhood watch programs.</b>			
GEO_AREA_PERSON	GEO_AREA_PERSON_ID	INTEGER	20	Unique identifier of GEO_AREA_PERSON records.
GEO_AREA_PERSON	PERSON_ID	INTEGER	20	PERSON_ID of PERSON affiliated with this geographical area.
GEO_AREA_PERSON	GEO_AREA_ID	INTEGER	20	Unique identifier of the geographical area in this relationship.
GEO_AREA_PERSON	AFFILIATION_TYPE	INTEGER	1	Type of a affiliation. 1. Other 2. Program coordinator for area 3. Program participant
GEO_AREA_PERSON	START	DATETIME	17	Date and time that the affiliation began. Rules: CCYYMMDDHHMMSS.SSS
GEO_AREA_PERSON	END	DATETIME	17	Date and time that the affiliation ended.

Figure 2. UCRII Uniform Crime Reporting Survey



**Appendix A**  
Canadian Centre for Justice Statistics  
**Uniform Crime Reporting Survey**

**Annexe A**  
Centre Canadien de la Statistique juridique  
**Déclaration uniforme de la criminalité**

OFFENCES INFRACTIONS	Reported or known to police Communiquées à la police ou connues d'elle	Un-founded Affaires non fondées	Actual Number Nombre réel d'infractions	OFFENCES CLEARED INFRACTIONS CLASSÉES		PERSONS DATA DONNÉES SUR LES INDIVIDUS				
				By charge Par mise en accusation	Otherwise Sans mise en accusation	Adults Adultes		Young persons Jeunes gens		
						Charged Inculpées		Charged Inculpées		Not Charged Aucune inculpation
						Male Hommes	Female Femmes	Male Hommes	Female Femmes	
1	2	3	4	5	6	7	8	9	10	11

**Incident-based Uniform Crime Reporting Survey**

**Déclaration uniforme de la criminalité fondé sur l'affaire**

<b>Incident record – Enregistrement de l'affaire</b>		<b>Clearance date – Date du classement</b>	
<b>Data Element – Éléments d'information</b>		<b>1st most serious violation (msv) – 1ère infraction plus importante (ipi) attempted/completed – tentative/consommée</b>	
<b>Respondent code – Code du déclarant</b>		<b>2nd most serious violation (msv) – 2ème infraction plus importante (ipi) attempted/completed – tentative/consommée</b>	
<b>Incident number – Numéro de dossier de l'affaire</b>		<b>3rd most serious violation (msv) – 3ème infraction plus importante (ipi) attempted/completed – tentative/consommée</b>	
<b>Report date – Date du rapport</b>		<b>4th most serious violation (msv) – 4ème infraction plus importante (ipi) attempted/completed – tentative/consommée</b>	
<b>Update status – État de l'affaire</b>		<b>Location – Lieu</b>	
<b>Incident date – Date de l'affaire</b> from – de	<b>Incident date – Date de l'affaire</b> to – à	<input type="radio"/> unknown – inconnu <input type="radio"/> 1 single home, house – maison unifamiliale <input type="radio"/> 2 apartment unit – unité d'habitation <input type="radio"/> 3 commercial "residence" – unité d'habitation commerciale <input type="radio"/> 4 commercial/corporate places – immeuble commercial ou abritant une société <input type="radio"/> 5 parking lot – parc de stationnement <input type="radio"/> 6 school – école <input type="radio"/> 7 public institution – établissement public <input type="radio"/> 8 public transportation & connected facilities – installations de transport public et attenantes <input type="radio"/> 9 streets, roads, highways – rues, routes, autoroutes <input type="radio"/> 10 open areas – zones ouvertes	
<b>Incident time – Heure de l'affaire</b> from – de	<b>Incident time – Heure de l'affaire</b> to – à	<b>Occupancy – Occupation</b>	
<b>Clearance status – État du classement</b>		'blank' not applicable – 'blanc' sans objet <input type="radio"/> 1 joint occupancy/victim and accused – occupation conjointe par la victime et l'accusé <input type="radio"/> 2 occupied by the victim – occupation par la victime <input type="radio"/> 3 occupied by the accused – occupation par l'accusé <input type="radio"/> 4 occupied by the victim/accused unknown – occupation par la victime (donnée inconnue pour l'accusé) <input type="radio"/> 5 not occupied by the victim/accused unknown – inoccupation par la victime (donnée inconnue pour l'accusé) <input type="radio"/> 6 not occupied by the victim or the accused – inoccupation par la victime et par l'accusé	
<input type="radio"/> a unfounded – affaire non-fondée <input type="radio"/> b not cleared – affaire non-classée <input type="radio"/> c cleared by charge – classement par mise en accusation <input type="radio"/> d suicide of accused – suicide de l'accusé <input type="radio"/> e death of accused – décès de l'accusé <input type="radio"/> f death of complainant/essential witness – décès du plaignant ou d'un témoin essentiel <input type="radio"/> g reason beyond control of police – raison indépendante de la volonté du service de police <input type="radio"/> h diplomatic immunity – immunité diplomatique <input type="radio"/> i accused less than 12 years of age – accusé âgé de moins de douze ans <input type="radio"/> j accused admitted to mental hospital – admission de l'accusé dans un hôpital psychiatrique <input type="radio"/> k accused in foreign country – accusé se trouvant dans un pays étranger <input type="radio"/> l complainant declines to lay charges – plaignant refusant qu'une accusation soit portée <input type="radio"/> m accused involved in other incidents – accusé ayant pris part à d'autres affaires criminelles <input type="radio"/> n accused already incarcerated – accusé déjà incarcéré <input type="radio"/> o departmental discretion – pouvoir discrétionnaire du service de police <input type="radio"/> p diversionary program – programme de déjudiciarisation			

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<b>Data Element (continued) – Éléments d'information (suite)</b>		<b>Weapon status – Nature de l'arme la plus dangereuse</b>	
<b>Target person – L'intention de l'acte criminel (personne)</b> 'blank' not applicable – 'blanc' sans objet <input type="radio"/> person – personne		'blank' not applicable – 'blanc' sans objet <input type="radio"/> unknown – inconnue <input type="radio"/> real – arme véritable <input type="radio"/> facsimile – imitation d'arme (fausse arme)	
<b>Target place – L'intention de l'acte criminel</b> 'blank' not applicable – 'blanc' sans objet <input type="radio"/> residence (dwelling house) – résidence (logement) <input type="radio"/> private property/structures – construction ou propriété privée <input type="radio"/> motor vehicle – véhicule à moteur <input type="radio"/> armoured vehicle – véhicule blindé <input type="radio"/> car dealerships – concessionnaire d'automobiles <input type="radio"/> bank/other financial institution – banque ou autre établissement financier <input type="radio"/> convenience store – dépanneur <input type="radio"/> gas station – station-service <input type="radio"/> storage and transport – transport et entreposage <input type="radio"/> other commercial/corporate establishment – autre entreprise commerciale ou société <input type="radio"/> non-commercial enterprise – entreprise non commerciale		<b>Vehicle types – Genre de véhicule</b> 'blank' not applicable (not traffic) – 'blanc' sans objet (il ne s'agit pas d'une infraction aux règlements de la circulation) <input type="radio"/> unknown – inconnu <input type="radio"/> automobile – automobile <input type="radio"/> truck, van, bus, recreational vehicle – camion, fourgonnette, autobus véhicule de plaisance <input type="radio"/> tractor-trailer – semi-remorque <input type="radio"/> motorcycle – motocyclette <input type="radio"/> other motorized land vehicle – autre véhicule à moteur terrestre <input type="radio"/> construction/farm equipment – machine agricole et machine servant à la construction <input type="radio"/> boat, vessel, other equipment – bateau, navire et autre embarcation <input type="radio"/> aircraft – aéronef <input type="radio"/> bicycle – bicyclette	
<b>1 property stolen – 1er bien volé</b>	<b>2 property stolen – 2ième bien volé</b>	<b>Accused record – Enregistrement de l'accusé</b>	
<b>3 property stolen – 3ième bien volé</b>	<b>4 property stolen – 4ième bien volé</b>	<b>Data Element – Éléments d'information</b>	
<b>5 property stolen – 5ième bien volé</b>		<b>Respondent code – Code du déclarant</b>	
<b>Modus operandi – Modus operandi</b> 'blank' not applicable to the incident – 'blanc' sans objet <input type="radio"/> shoplifting – vol à l'étalage <input type="radio"/> purse snatching – vol de sac à main <input type="radio"/> pick-pocketing – vol à la tire <input type="radio"/> forced entry – introduction avec recours à la force <input type="radio"/> unforced entry – introduction sans recours à la force		<b>Incident number – Numéro de dossier de l'affaire</b>	
<b>Fraud type – Genre de fraude</b> 'blank' not applicable – 'blanc' sans objet <input type="radio"/> credit card – carte de crédit <input type="radio"/> cheque – chèque <input type="radio"/> other fraud – autre fraude		<b>Date of birth – Date de naissance</b>	<b>Apparent age – Âge approximatif</b>
<b>Fraud counter – Compte des fraudes</b>	<b>\$ value stolen – Valeur des biens volés (\$)</b>	<b>Sex – Sexe</b> <input type="radio"/> unknown – inconnu <input type="radio"/> female – féminin <input type="radio"/> male – masculin <input type="radio"/> company – société	<b>Aboriginal Indicator – Indicateur d'origine Autochtone</b> <input type="radio"/> unknown – inconnue <input type="radio"/> aboriginal peoples – origine autochtone <input type="radio"/> other – autre origine
<b>\$ value damaged – Valeur des biens endommagés (\$)</b>	<b>\$ value drugs – Valeur des stupéfiants illicites (\$)</b>	<b>Alcohol/drugs – Consommation d'alcool ou de stupéfiants</b> 'blank' not applicable – 'blanc' sans objet <input type="radio"/> unknown – inconnu <input type="radio"/> consumption of alcohol only – consommation d'alcool seulement <input type="radio"/> consumption of drugs only – consommation de stupéfiants seulement <input type="radio"/> consumption of both alcohol and drugs – consommation d'alcool et de stupéfiants	
<b>Most serious weapon – Arme la plus dangereuse</b> 'blank' not applicable to the incident – 'blanc' sans objet <input type="radio"/> unknown – inconnue <input type="radio"/> fully automatic firearm – arme entièrement automatique <input type="radio"/> sawed off rifle/shotgun – carabine ou fusil à canon scié <input type="radio"/> handgun – arme de poing <input type="radio"/> rifle/shotgun – carabine ou fusil <input type="radio"/> other firearm like weapons – autre arme similaire à une arme à feu <input type="radio"/> knife – couteau <input type="radio"/> other piercing/cutting instrument – autre instrument tranchant ou pointu <input type="radio"/> club/blunt instrument – objet contondant <input type="radio"/> explosives – explosifs <input type="radio"/> fire – feu <input type="radio"/> physical force – force physique <input type="radio"/> other weapon – autre arme <input type="radio"/> threat – menace <input type="radio"/> no weapon – aucune arme		<b>Accused ID – Identification de l'accusé</b>	
		<b>Accused status – Statut de l'accusé</b> <input type="radio"/> charged/charges recommended – accusations portées ou recommandées <input type="radio"/> processed by other means – traitement par d'autres moyens	
		<b>Date charged – Date des mises en accusation</b>	
		<b>1st charge – 1ière mise en accusation</b>	
		<b>2nd charge – 2ième mise en accusation</b>	
		<b>3rd charge – 3ième mise en accusation</b>	
		<b>4th charge – 4ième mise en accusation</b>	

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Victim record – Enregistrement de la victime	Weapon – Arme ayant causé les blessures
<b>Data Element – Éléments d'information</b>	'blank' not applicable – 'blanc' aucune arme utilisée
<b>Respondent code – Code du déclarant</b>	<input type="radio"/> 0 unknown – inconnue
<b>Incident number – Numéro de dossier de l'affaire</b>	<input type="radio"/> 1 fully automatic weapon – arme entièrement automatique
<b>Date of birth – Date de naissance</b>	<input type="radio"/> 2 sawed off rifle/shotgun – carabine ou fusil à canon scié
<b>Apparent age – Âge approximatif</b>	<input type="radio"/> 3 handgun – arme de poing
<b>Sex – Sexe</b>	<input type="radio"/> 4 rifle/shotgun – carabine ou fusil
<input type="radio"/> 0 unknown – inconnu	<input type="radio"/> 5 other firearm like weapon – autre arme similaire à une arme à feu
<input type="radio"/> 1 female – féminin	<input type="radio"/> 6 knife – couteau
<input type="radio"/> 2 male – masculin	<input type="radio"/> 7 other piercing/cutting weapon – autre instrument tranchant ou pointu
<b>Aboriginal Indicator – Indicateur d'origine Autochtone</b>	<input type="radio"/> 8 club/blunt instrument – objet contondant
<input type="radio"/> 0 unknown – inconnue	<input type="radio"/> 9 explosives – explosifs
<input type="radio"/> 1 aboriginal peoples – origine autochtone	<input type="radio"/> 10 fire related – feu
<input type="radio"/> 2 other – autre origine	<input type="radio"/> 11 physical force – force physique
<b>Alcohol/drugs – Consommation d'alcool ou de stupéfiants</b>	<input type="radio"/> 12 other weapon – autre arme
'blank' not applicable – 'blanc' sans objet	<b>Relationship – Nature de la relation</b>
<input type="radio"/> 0 unknown – inconnu	'blank' not applicable – 'blanc' sans objet
<input type="radio"/> 1 consumption of alcohol only – consommation d'alcool seulement	<input type="radio"/> 0 unknown – inconnue
<input type="radio"/> 2 consumption of drugs only – consommation de stupéfiants seulement	<input type="radio"/> 1 spouse (including common-law) – conjoint (y compris les conjoints de fait)
<input type="radio"/> 3 consumption of both alcohol and drugs – consommation d'alcool et de stupéfiants	<input type="radio"/> 2 ex-spouse – ex-conjoint
<b>Most serious violation – Infraction la plus importante contre la victime</b>	<input type="radio"/> 3 parent – parent
<b>Attempted/completed – Tentative/consommée</b>	<input type="radio"/> 4 child – enfant
<b>Level of injury – Gravité des blessures</b>	<input type="radio"/> 5 other immediate family – autre membre de la famille immédiate
'blank' not applicable – 'blanc' sans objet	<input type="radio"/> 6 extended family – parent éloigné
<input type="radio"/> 0 unknown – inconnue	<input type="radio"/> 7 close friend – ami intime
<input type="radio"/> 1 no injuries – aucune blessure	<input type="radio"/> 8 business relationship – relation d'affaires
<input type="radio"/> 2 minor physical injury – blessures physiques légères	<input type="radio"/> 9 casual acquaintance – connaissance
<input type="radio"/> 3 major physical injury – blessures physiques graves	<input type="radio"/> 10 stranger – étranger
<input type="radio"/> 4 death – mort	<b>Cohabitation – Cohabitation</b>
	<input type="radio"/> 0 unknown – inconnu
	<input type="radio"/> 1 yes – oui
	<input type="radio"/> 2 no – non
	<b>Officer status – Statut de l'agent de la paix</b>
	'blank' not a peace-public officer – 'blanc' il ne s'agit pas d'un agent de la paix ou d'un fonctionnaire public
	<input type="radio"/> 1 police – police
	<input type="radio"/> 2 correctional officer – agent correctionnel
	<input type="radio"/> 3 sheriff/bailiff – shérif ou huissier
	<input type="radio"/> 4 customs-excise officer – agent des douanes ou de l'accise
	<input type="radio"/> 5 fisheries/games officer – garde-pêche ou garde-chasse
	<input type="radio"/> 6 other federal appointed peace/public officer – autre agent de la paix ou fonctionnaire public nommé par l'administration fédérale
	<input type="radio"/> 7 other provincially appointed officer – autre agent nommé par l'administration provinciale
	<input type="radio"/> 8 other peace-public officer – autre agent de la paix ou fonctionnaire public

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### ***Statistics Canada Geographic Areas***

Census data are disseminated for a number of standard geographic areas. These areas are either administrative or statistical. Administrative areas are defined, with a few exceptions, by federal and provincial statutes. These include:

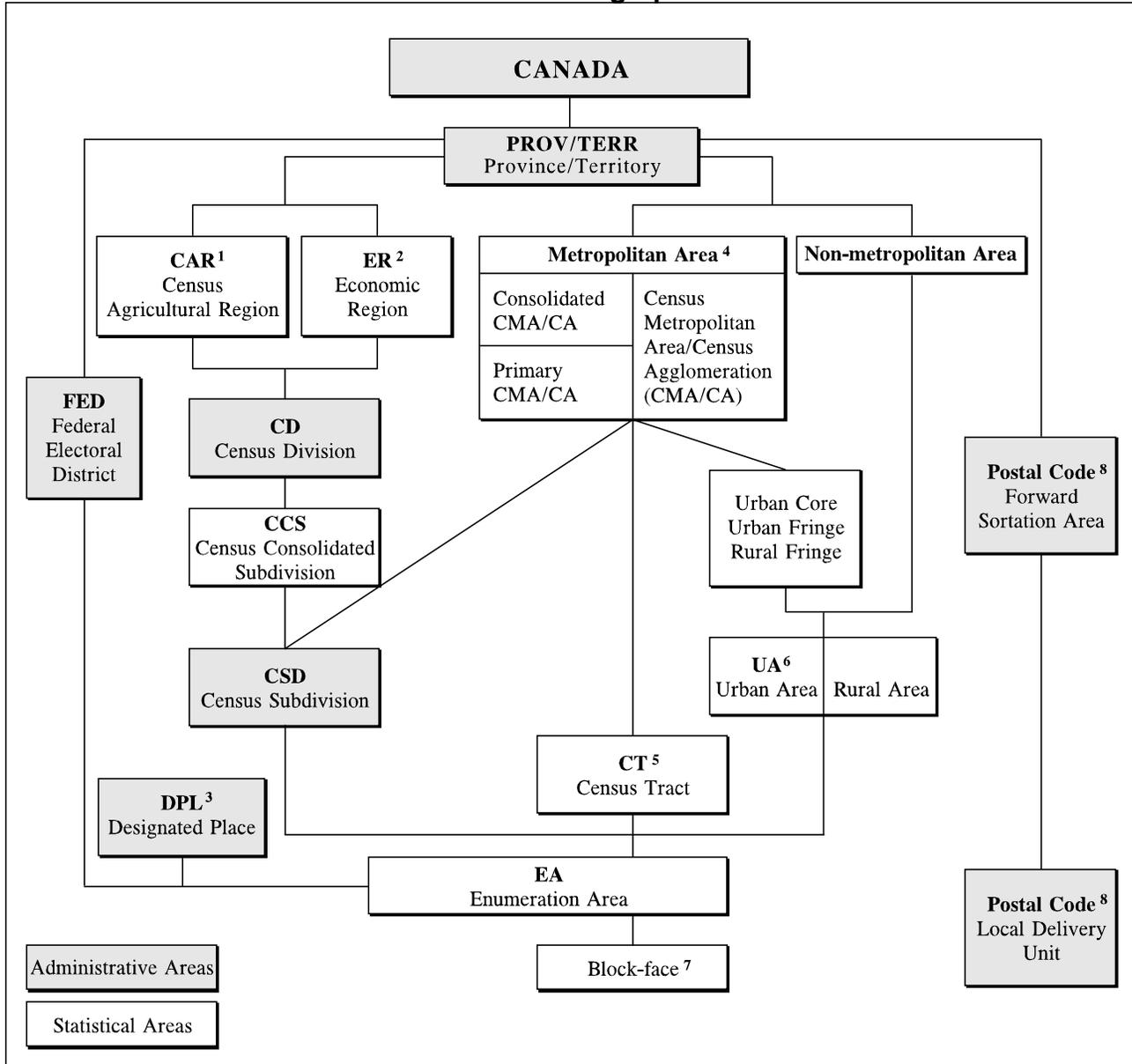
- Provinces and territories
- Federal electoral districts (FEDs)
- Census divisions (CDs)
- Census subdivisions (CSDs)
- Designated places (DPLs)
- Postal codes

Statistical areas are defined by Statistics Canada as part of the spatial frame used to collect and disseminate census data. These include:

- Census agricultural regions (CARs)
- Economic regions (ERs)
- Census consolidated subdivisions (CCSs)
- Census metropolitan areas (CMAs)
- Census agglomerations (CAs)
- Consolidated census metropolitan areas
- Consolidated census agglomerations
- Primary census metropolitan areas (PCMAs)
- Primary census agglomerations (PCAs)
- Census tracts (CTs)
- Urban core, urban fringe and rural fringe
- Urban areas (UAs)
- Rural areas
- Enumeration areas (EAs)

The hierarchy of standard geographic areas is presented in Figure 3.

**Figure 3. Hierarchy of National, Metropolitan and Postal Code Geographic Units**



<sup>1</sup> Census agricultural regions in Saskatchewan are made up of census consolidated subdivisions.

<sup>2</sup> Economic regions in Ontario are made up of municipalities (census subdivisions).

<sup>3</sup> Currently there are no designated places in Prince Edward Island, Quebec, Yukon Territory and Northwest Territories.

<sup>4</sup> Five CMAs/CAs cross provincial boundaries.

<sup>5</sup> All CMAs and only CAs with urban core population of 50,000 or more at the previous census have census tracts.

<sup>6</sup> Five UAs cross provincial boundaries.

<sup>7</sup> Only in areas covered by street network files (SNFs).

<sup>8</sup> The postal code is captured as provided by the respondent on all the questionnaires for 1996. Although shown and treated as part of the geography hierarchy, strictly speaking, it is not a geographic unit and, therefore, there is no exact relationship between postal codes and enumeration areas.

## **Geocoding at the Geography Division of Statistics Canada**

Geocoding is the process of assigning geographic identifiers (codes) to map features and data records. The resulting geocodes permit data to be linked geographically. Any feature such as a dwelling or business may be assigned a geographic identifier and in turn census information about the area around the feature may be obtained. These areas are referred to as client specified areas for the use of data retrieval.

The Geography division offers geocoding services for the creation of client-specified areas and for address matching. There are two types of client-specified areas, areas which are user-defined amalgamations of standard areas and custom defined areas which may cross the boundaries of these standard areas.

### **Amalgamation of Standard Areas**

Standards Areas adopted by the Geography Division include Provinces, Federal Electoral Districts, Enumeration Areas, Census Divisions, Census Subdivisions, Census Metropolitan Areas/Census Agglomerations, Census Tracts and Urban Areas. Standard Areas are fixed areas and cannot be modified except through amalgamation to create derived areas. The client-defined areas created by the amalgamation of standard areas are used to extract census data through the geocoding process.

### **Custom Areas**

Custom Areas are defined by the client and may cross the boundaries of standard areas. Examples of custom areas include Traffic Zones, Planning Districts, School Districts, Hospital Zones and other special purpose area sets. Clients may request that census data be extracted for these areas through the custom geocoding process.

Note: Any client-specified area, whether it is an amalgamation of standard areas or custom defined, can be added to the Permanent Area file. Permanent areas are designated for long-term retention and can be used over several Census Years to compare change over time for the same area.

### **Address matching**

Locating a specific point of interest for a client is a form of geocoding, which assigns a real world coordinate to a point feature. This function is performed by matching the postal code of an address to a point feature. Spatial coordinates for each postal code in Canada are stored within the Geography Division spatial

data holdings. The linkage between a postal code and a point feature is performed using the Postal Code Conversion File (PCCF)<sup>1</sup>.

### **Geocoding for retrieval of Census Data**

Depending on the nature of the client request, there are a number of methods used to retrieve Census Data.

### **Representative Points**

Representative points are used to compile data for client specified areas. All census households are linked to Geography Division's spatial database through a representative point. Each representative point contains a pointer to the census data records. Client-specified areas are overlaid on these representative points and census data is retrieved for all points, which fall within the client-specified area. The corresponding data points are aggregated and a custom tabulation is created for each client-specified area.

### **Point in Polygon Analysis (PIPA)**

A PIPA is used to retrieve standard area data, which corresponds to client-specified selected points of interest. The client-specified point coordinates are then overlaid with standard area polygons. Census data may be retrieved for any standard area in which the client-specified point falls.

For example, a coffee shop may want to study the demographics of the surrounding neighbourhood for a potential location. The postal code for the potential site is assigned a point location using the PCCF and then a PIPA is performed to determine within which census tract the potential site resides. The census data for all standard geographic areas is published and can be made available to the client.

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<sup>1</sup> The PCCF is a digital file, which provides a correspondence between the six character postal code and Statistics Canada's standard geographical areas. The geographic co-ordinates attached to each postal code on the PCCF are commonly used for address matching. Cat. No 92F0027XDB.