

Exploring Open Data

The ODB - an experimental Open Database of Buildings *Metadata document: concepts, methodology and data quality*

Version 1.0



Data Exploration and Integration Lab (DEIL)
Centre for Special Business Projects (CSBP)

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1. Overview

For the purpose of exploring open data for official statistics and to support geospatial research across various domains, work was undertaken to create an accessible and harmonized database of building footprints released as open data by various levels of government within Canada¹. This document details the process of collecting, compiling, and standardizing the individual datasets of building footprints that were used to create the experimental *Open Database of Buildings* (ODB), which is made available under the *Open Government License - Canada*².

In its current version (version 1.0), the ODB contains approximately 4.3 million building footprints. The database is expected to be updated periodically as new open datasets on buildings from government sources become available. This vector dataset is provided as a zipped shapefile at the provincial or territorial level.

Access to the dataset is available through the Statistics Canada website and can be found at:

<https://www.statcan.gc.ca/eng/open-building-data/index>

2. Data Sources

Multiple data sources were used to create the ODB. The data providers, which include municipal, regional, and provincial levels of government, are shown in Table 1. Attribution to each of these data sources is listed, as per the license requirements, in Appendix A. Where applicable, license versions are also shown. For further information on the individual licenses, users should consult directly with the information provided on the open data portals for the various data providers.

Table 1: Listing of data providers included in the current version of the Open Database of Buildings (ODB)

Alberta	British Columbia		New Brunswick	Northwest Territories
1. Banff 2. Canmore 3. Chestermere 4. Cochrane 5. Edmonton 6. Grande Prairie 7. Lethbridge 8. Strathcona County	1. Chilliwack 2. Kamloops 3. Kelowna 4. Nanaimo 5. New Westminster 6. North Vancouver	7. Prince George 8. Saanich 9. Squamish 10. Surrey 11. Vancouver 12. Victoria 13. White Rock	1. Fredericton 2. Moncton 3. Saint John	1. Yellowknife
Nova Scotia	Ontario		Quebec	Saskatchewan
1. Cape Breton 2. Halifax 3. Nova Scotia	1. Barrie 2. Brampton 3. Brantford 4. Burlington 5. Caledon 6. Cambridge 7. Durham Region 8. Guelph 9. Hamilton 10. Huron County 11. Kingston 12. Kitchener 13. Muskoka	14. Newmarket 15. Niagara Falls 16. Niagara Region 17. Norfolk County 18. Oakville 19. Ottawa 20. St. Catharines 21. Toronto 22. Waterloo 23. Waterloo Region 24. Welland 25. York Region	1. Longueuil 2. Montreal 3. Québec 4. Repentigny 5. Rimouski 6. Shawinigan 7. Sherbrooke	1. Regina

¹ This includes municipal, regional, and provincial.

² See: <https://open.canada.ca/en/open-government-licence-canada>

3. Reference Period

Ideally, the reference period would be the period from which the underlying building data refers to. Such information, however, was usually not available from the open data portals. In lieu of this, Appendix A provides the date each municipal dataset used in the ODB was downloaded. Data were gathered between January 2018 and August 2018 from open data portals. Users are cautioned that the download date should not be used to indicate the reference period of the data. If specific information concerning the reference period of data is required, users should contact the appropriate data providers shown in Appendix A.

4. Target Population

The goal of the ODB is to create a centralised and harmonized repository of building footprints available from government open data sources across Canada. Emphasis was placed on compiling buildings where substantial activity (e.g., economic activity) may occur. For this reason, footprints smaller than 10m² were removed as they were deemed too small to be of interest for most users. As work on the experimental ODB progresses, definitions and thresholds will evolve. Users are reminded that unedited data can always be obtained directly from the open data portals of the various data providers.

5. Compilation Methodology

Individual building datasets were downloaded from their respective government open data portals. Within the 61 datasets obtained, each data provider attached a different set of variables to the building footprints. Only variables common across all data sources were included in the final output. Prior to merging, datasets were standardised and cleaned to ensure consistency in measurements and units. In the few cases where geographical coverage of municipal datasets intersected each other, a five meter buffer was applied to one dataset, and buildings within that buffer from the other datasets were removed.

6. Data Dictionary

This data dictionary below describes the variables contained within the exploratory ODB.

Variable - Object ID	
Name	OBJECTID (alias FID)
Format	Object ID (specific to ArcGIS)
Source	Internally generated during data processing
Description	Unique object or field ID automatically generated during data processing
Variable - Shape	
Name	Shape
Format	Geometry (specific to ArcGIS)
Source	Automatically generated from the geometric properties of the polygon datasets
Description	Describes the type of vector data in the dataset
Variable - Longitude	
Name	Longitude
Format	Double
Source	Generated from the centroid of the building polygon
Description	The longitude in decimal degrees of the centroid of the building polygon
Variable - Latitude	
Name	Latitude
Format	Double
Source	Generated from the centroid of the building polygon
Description	The latitude in decimal degrees of the centroid of the building polygon

Variable - Census subdivision unique identifier	
Variable Name	CSDUID
Data Format	Integer
Source	Canadian census subdivision boundaries 2016 (Statistics Canada GeoSuite product)
Description	The census subdivision ID where the building is located

Variable - Census subdivision name	
Name	CSDNAME
Format	String
Source	Canadian census subdivision boundaries 2016 (Statistics Canada GeoSuite product)
Description	Name of census subdivision

Variable - Data Provider	
Name	Data_prov
Format	Text (String)
Source	Created based on origins of input dataset
Description	Name of the municipality, region, or province/territory that provided the dataset

Variable - Building Unique ID	
Name	Build_ID
Format	Text (String)
Source	Generated by concatenating the census subdivision unique identifier with a sequential 6-digit code that is unique to each building in that census subdivision
Description	A unique identification for each building based on the census subdivision in which it resides

Variable - Perimeter	
Name	Shape_Length
Format	Float
Source	Calculated from the geometric attributes of the building polygon
Description	The perimeter of the building in units of metres (name specific to ArcGIS)

Variable - Area	
Name	Shape_Area
Format	Float
Source	Calculated from the geometric attributes of the building polygon
Description	The area of the building in units of square metres (name specific to ArcGIS)

7. Record Layout

An example of the record layout in table format is reported below.

OBJECTID*	Shape*	Longitude	Latitude	CSDUID	CSDNAME	Data_prov	Build_ID	Shape_Length	Shape_Area
1	Polygon	-115.561757	51.18907	4815035	Banff	Banff	48150350000001	16.560241	16.963528
2	Polygon	-115.569331	51.171372	4815035	Banff	Banff	48150350000002	87.531972	330.625531
3	Polygon	-115.569616	51.178173	4815035	Banff	Banff	48150350000003	104.044015	573.938947

Items marked with an asterisks represent fields indexed automatically by the GIS software used during processing.

8. Data Accuracy

All building footprints in the ODB were collected from government sources of open data. In general, other than the processing required to harmonize the different sources into one database, the underlying datasets obtained from the various open data portals were taken “as-is”. Users are advised that the individual methodologies used, as well as

the amount of information describing these methodologies, varied by data provider. For more information on an individual data provider's methodologies, please follow the links to their website found in Appendix A.

During the processing stage to create the ODB, several steps were taken to improve accuracy and to standardize the output. A small number of building geometries that had improbable shapes were removed. Variables calculated by the data providers were recalculated based on the underlying geometries to ensure consistency in measurements and units (specifically, the measures for building area and perimeter, and in some cases, for latitude and longitude as well). Where geographical coverage of input datasets intersected each other, users are advised that the choice of buffer size applied (five metres was chosen) and which overlapped segments of buildings to be removed will impact the results. The choice of which segments to keep was based on several heuristic factors, specifically preference was given to datasets that appeared to have more detailed polygons and/or a higher number of building counts.

The experimental ODB represents the government open data that was found at the time of compilation and should thus not be interpreted as a complete or objective "ground-truth" of what buildings actually exist in Canada. The current coverage across Canada of the ODB is incomplete with data primarily existing for larger cities. The gaps in the database reflect areas where open data on buildings from government sources was not found.

9. Geographic Representation

The Open Database of Buildings is available on the Statistics Canada website in the following geographic representation:

- Projection: Lambert conformal conic
- False easting: 6200000.000000
- False northing: 3000000.000000
- Central meridian: -91.866667
- Standard parallel 1: 49.000000
- Standard parallel 2: 77.000000
- Latitude of origin: 63.390675
- Linear unit: metre (1.000000)
- Datum: North American 1983 (NAD83)
- Prime meridian: Greenwich
- Angular unit: degree
- Spheroid: GRS 1980

The North American Datum of 1983 (NAD83) is an adjustment of the 1927 datum (NAD27) that reflects the higher accuracy of geodetic surveying.

Appendix A: License Attributions

Municipality/ Region/ Province	Province/ Territory	License Version (if provided)	Link to Data License	Date of Data Download	Attribution Statement (in language of origin)
Banff	Alta/Alb.	2.0	http://banffopendata.cloudapp.net/Home/About	22/01/2018	Contains information licensed under the Open Government Licence – Banff.
Barrie	Ont./Ont.	1.0	https://www.barrie.ca/Online%20Services/PublishingImages/OpenData/Images/COB_DataLicense.pdf	24/01/2018	Contains information licensed under the Open Government Licence – Barrie.
Brampton	Ont./Ont.		http://www.brampton.ca/EN/City-Hall/OpenGov/Open-Data-Catalogue/Pages/Terms-of-Use.aspx	22/01/2018	Copyright © 2012, The City of Brampton (All rights reserved.) All intellectual property and other rights in and to the Dataset belong to the City of Brampton.
Brantford	Ont./Ont.	1.0	http://data-brantford.opendata.arcgis.com/pages/licence	22/01/2018	Contains information licensed under the Open Government Licence – Brantford.
Burlington	Ont./Ont.		https://www.burlington.ca/en/services-for-you/resources/Ongoing_Projects/Open_Data/OpenDataBurlingtonTermsOfUseSeptember192011.pdf	22/01/2018	Contains information provided by the City of Burlington under Terms of Use for Open Data Burlington.
Caledon (Region of Peel)	Ont./Ont.	1.0	http://opendata.peelregion.ca/terms-of-use.aspx	24/01/2018	Contains public sector Information made available under The Regional Municipality of Peel's Open Data Licence - Version 1.0.
Cambridge	Ont./Ont.	2.0	https://www.cambridge.ca/en/your-city/resources/Open-Data-Licence-Version-2.pdf	24/01/2018	Contains information licensed under the Open Government Licence City of Cambridge.
Canmore	Alta/Alb.		https://s3.amazonaws.com/canmoregis/OpenData/Town+of+Canmore+Open+Data+Licence.pdf	22/01/2018	Contains information licensed under the Town of Canmore Open Data Licence.
Cape Breton	N.S./N.-É.	1.0	https://www.pvsc.ca/site/media/PVSC/Documents/Open%20Data%20and%20Information%20Government%20Licence%20-%20PVSC%20and%20Participating%20Municipalities.pdf	07/02/2018	Contains information licensed under the Open Data & Information Government Licence PVSC & Participating Municipalities.
Chestermere	Alta/Alb.		https://www.arcgis.com/home/item.html?id=9c7e78869ef141dcb4339d6c52574ddf	22/01/2018	Contains information made available by the city of Chestermere.
Chilliwack	C.-B./B.C.		http://www.chilliwack.com/main/page.cfm?id=2391	22/01/2018	All right, title and interest (including all copyright, patent, and other intellectual property rights) remain vested in the City of Chilliwack at all times.
Cochrane	Alta/Alb.		http://cochrane.ca/947/Open-Data-Licence	22/01/2018	Contains information licensed under the Open Data Licence – Town of Cochrane.
Durham Region	Ont./Ont.	1.0	https://www.durham.ca/en/regional-government/resources/Documents/OpenDataLicenceAgreement.pdf	21/03/2018	Contains public sector Information made available under The Regional Municipality of Durham's Open Data Licence.
Edmonton	Alta/Alb.	2.1	https://www.edmonton.ca/city_government/documents/Web-version2.1-OpenDataAgreement.pdf	22/01/2018	Contains information provided by the city of Edmonton under the City of Edmonton Open Data Terms of Use.
Fredericton	N.-B./N.-B.		http://www2.gnb.ca/content/dam/gnb/Departments/gsq/pdf/OpenDataPolicy.pdf	22/01/2018	Contains information made available by the city of Fredericton.

Grande Prairie	Alta./Alb.	1.0	http://www.cityofgp.com/index.aspx?page=2332	22/01/2018	Contains information licensed under the Open Data License – City of Grande Prairie.
Guelph	Ont./Ont.	1.0	http://data.open.guelph.ca/pages/open-government-licence	22/01/2018	Contains information provided by the City of Guelph under an open government license.
Halifax	N.S./N.-É.	1.0	https://www.halifax.ca/home/open-data/open-data-license	24/01/2018	Contains information licenced under the Open Government Licence – Halifax.
Hamilton	Ont./Ont.	1.1	https://www.hamilton.ca/city-initiatives/strategies-actions/open-data-licence-terms-and-conditions	22/01/2018	Contains public sector Data made available under the City of Hamilton's Open Data Licence.
Huron County	Ont./Ont.	1.0	https://www.arcgis.com/home/item.html?id=2b3c6868201545b1a50f87ee2b4d937	20/03/2018	Contains information licensed under the Open Government Licence – The County of Huron.
Kamloops	C.-B./B.C.	1.0	https://www.kamloops.ca/node/29807	18/07/2018	Contains information licensed under the Open Government Licence - Kamloops.
Kelowna	C.-B./B.C.	2	http://apps.kelowna.ca/images/pendata/OpenGovernmentLicence.pdf	22/01/2018	Contains information licensed under the Open Government Licence City of Kelowna.
Kingston	Ont./Ont.	1.0	https://www.cityofkingston.ca/documents/10180/144997/GIS_OpenDataLicense.pdf/72f5a9ac-a5bc-4fe3-959d-9111c9393bfa	22/01/2018	Contains information licensed under the Open Data Licence – City of Kingston.
Kitchener	Ont./Ont.	1.0	https://www.kitchener.ca/en/city-services/open-data.aspx#ODLicence	24/01/2018	Contains information licensed under the Open Government Licence - The Corporation of the City of Kitchener.
Lethbridge	Alta./Alb.	1.0	http://www.lethbridge.ca/Pages/OpenDataLicense.aspx	22/01/2018	Contains information licenced under the City of Lethbridge – Open Data License.
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Muskoka	Ont./Ont.	1.0	http://map.muskoka.on.ca/expose/Open_Data/Open%20Government%20Licence_District%20Municipality%20of%20Muskoka%20GIS_2014.pdf	24/01/2018	Contains information provided by the District Municipality of Muskoka under licence.
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York Region	Ont./Ont.	1.0	http://findit.york.ca/yorkod/navigation/?jsessionid=1p3ea5ubcoi3f1lc2n78383mzh#/show/e0e4418f5366bdc1?disp=ace4bb77&shard=findit.york.ca%2Fyorkod%2Fsolr%2Fv0	24/01/2018	Contains public sector Information made available under The Regional Municipality of York's Open Data Licence.