Data needs and sources

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As previously stated, the computation of accessibility metrics requires data pertaining to six distinct categories. These data sets are essential to calculate the accessibility measures accurately. Canada boasts a plethora of data sources, ranging from national to regional and urban levels, which provide the necessary data required for the calculation of accessibility measures. One of the existing data sources that can be utilized for data needs is the household travel survey, which has been conducted in various regions throughout Canada. This survey provides access to relevant data pertaining to travel, users, and origin-destination, which are essential for calculating accessibility measures accurately. The household travel survey is a valuable resource for transportation planners, policymakers, and researchers who seek to gain a comprehensive understanding of travel behavior patterns and the factors that influence them. In a household travel survey, several variables are collected such as household levels, person level for each person in the household, and trip level for each trip made by each household member. The General Social Survey (GSS) is another data source that can be utilized at the national level to extract information on travel behavior. The GSS is a comprehensive survey that collects data on a range of topics, including transportation and travel patterns, social trends, and attitudes. The survey is conducted regularly by Statistics Canada.

The following is an overview of the categories of data that are obtained through the households travel surveys:

` Table 6, shows various data in Household travel survey.

| Household.levels | Person.level | Trip.level |
| --- | --- | --- |
| Home location | Gender | Origin location |
| Dwelling type | Age | Destination location |
| Household size (# people) | Driver’s licence | Trip departure time (start and end time) |
| Number of vehicles | Transit pass | Purpose of travel (destination activity) |
| Number of bicycles | Student status | Mode(s) of travel (up to 5) |
| Household income | School level | Number of vehicle occupants (if driver or passenger) |
| Home parking (#off-street spots) | School location | Employment status |
|  |  | Workplace location |
|  |  | Parking at work and school(free or pay) |
|  |  | Other occupational status |
|  |  | Location of residence |
|  |  | Frequency of cycling, walking, and other active mode use |

# General social survey (GSS)

The General Social Survey (GSS) is a ***national*** survey conducted by Statistics Canada that collects information on the social trends and attitudes of Canadians. The survey has been conducted since 1985 and is conducted every two years, making it one of the longest-running surveys of its kind in Canada. This Survey (GSS) in Canada covers a wide range of topics related to social trends and attitudes. Some of the major topics covered by the survey include:Social well-being, Health, Education, Work, Family, Social networks, Crime and justice, and Time use. The survey is designed to provide a snapshot of social trends and attitudes in Canada, and is used by researchers, policy-makers, and the general public to gain a better understanding of the social issues facing Canadians.

The Time Use Survey is a component of the General Social Survey (GSS) that has been conducted since 1986.This survey is conducting every 5 years (1986, 1992, 1998, 2005, and 2015) and continued until 2020. However, the information related to the 2020 census has not been released yet. So, The most recent survey was released in 2015. It is designed to provide information on how Canadians allocate their time on a daily basis activities such as paid work, household chores, leisure activities, caregiving activities, and travel trips. Time Use Survey collects data on how individuals travel from one location to another during their daily activities. This includes modes of transportation such as walking, cycling, driving, and taking public transit.The survey collects information on the start and end time of each trip, the mode of transportation used, the purpose of the trip (e.g. work, shopping, leisure), and the distance traveled. In addition, This dataset contains travel time data for people in many of the Census Metropolitan Areas (CMAs) and non-CMA areas all over Canada. CMAs are including St. John’s, Halifax, Saint John, Montreal, Quebec City, Toronto, Ottawa, Hamilton, Winnipeg, Regina, Saskatoon, Calgary, Edmonton, and Vancouver. and the non-CMA areas of each of the ten provinces were also grouped to form ten more strata.The survey also collects information on the characteristics of individuals and their households such as age, sex, education, employment status, family composition, and income.

Based on the categories of data mentioned above, this database includes the following data:

* Travel data (trips) Travel data provides information about the trips, including the mode of travel, duration of travel, and trip origins and destinations. This dataset contains 301 bicycle and 4236 walking trips in 2015. Each trip contains pumID, start time, end time, duration, origin and destination.
* Users data (Socio-economic and personal data)

Demographic variables of pedestrian and cycling users including age, gender, and the number of households can be obtained from this Survey.

* Origin- destination data

In the GSS database, different travel destinations and locations are considered and each location is identified with a specific code, as follows: home or on the property, someone else’s home or property, work or school, in the neighbourhood, Outdoors, Grocery store, other stores or mall, Library, museum or theatres, Sports center, field or arena, Restaurant, bar or club, Place of worship, medical, dental or another health clinic, and Elsewhere.

# Transportation Tomorrow Survey survey (TTS)

The Transportation Tomorrow Survey (TTS) is a comprehensive survey (a series of population-based cross sectional travel surveys) that gathers information about how and where people travel. The survey aims to gather detailed information about the travel patterns of households and individuals.Since 1986, the Greater Toronto Area (GTA) has been implementing the Transportation Tomorrow Survey (TTS) program every five years, which has proven to be a highly effective means of collecting data on travel behavior. The Transportation Tomorrow Survey (TTS) are parts of an ongoing data collection program by the Transportation Information Steering Committee (TISC). The survey data (2016, 2011, 2006, 2001, 1996, 1991 and 1986) are currently under the care of the Data Management Group. This group is responsible for maintaining the TTS databases and making available appropriate travel information for any urban transportation study in the area.

In 1986, the survey covered the Greater Toronto and Hamilton Area (GTHA), which included the Municipality of Metropolitan Toronto and the Regional Municipalities of Durham, York, Peel, Halton, and Hamilton. In 1991, the survey area was expanded to include the municipalities adjacent to the GTHA boundary, known as the ‘fringe area.’ The 1996 survey included all of the GTHA, plus several additional regions, including Peterborough County, City of Peterborough, Victoria County, Town of Orangeville, Simcoe County, City of Barrie, Wellington County, City of Guelph, Waterloo Region, and Niagara Region. In 2001, the survey area changed again, with the addition of the whole of Simcoe County, the City of Orillia, and the exclusion of the Regional Municipality of Waterloo and Northumberland County. The 2006 survey area included the Regional Municipality of Waterloo, the City of Brantford, and Dufferin County, with interviews conducted in Brant County during interviewer training. The survey area in the 2011 and 2016 TTS was the same as in 2006, with the inclusion of Brant County.

TTS database includes ***Household attributes*** (such as Regional municipality of household, geocode of household, UTM X and Y coordinate of the household, Type of dwelling unit, Number of persons in the household, Day of week trip data, Number of vehicles, Number of persons possessing a driver’s licence in the household, Number of full or part time workers in the household, Number of full or part time students in the household, Number of household trips on trip day, and Household’s total income), ***Person attributes*** (such as person number within the household, age, gender, possession of a driver’s licence, possession of a transit pass, employment status of the person, person’s occupation type, student status of person, school codes (Starting from 2001), regional/Local municipality of person’s usual place of work, UTM X and Y coordinate of person’s usual place of work, geocode person’s usual place of work, number of trips made by the individual on trip day, and number of trips made by individual on trip day with primary mode being public transit), ***Trip attributes*** (such as trip number for persons in household, start time of the trip, Primary mode of the trip (public transit, bicycle and walking), purpose of the trip (home-based work (i.e. home-to-work or work-to-home), home-based-school, home-based-discretionary, non-Home-based), origin purpose of the trip, Regional municipality of trip origin, planning district of trip origin, 2001 and 2006 traffic zone of trip origin, UTM X and Y coordinate of trip origin, Method used to geocode trip origin, destination purpose of the trip (second and subsequent school trips, daycare (not in 1986), entertainment (1986 only), facilitate passenger, home, linked trip (1991 only), marketing/ Shopping (not in 1991), second and subsequent work trips, first school trip of the day, first work trip of the day and others), regional municipality of trip destination, planning district of trip destination, 2001 and 2006 traffic zone of trip destination, UTM X and Y coordinate of trip destination, method used to geocode trip destination, straight line trip length in kilometres, manhattan distance trip length in kilometres).

The information collected through the TTS provides valuable insights into travel patterns in a given region. It can help transportation planners and policymakers better understand the needs of travelers and make informed decisions about transportation infrastructure and services. By analyzing the data collected through the TTS, planners can identify trends and patterns in travel behavior, such as the most popular modes of transportation and the busiest travel times, and use this information to develop more effective transportation policies and programs.

# Autorité régionale de transport métropolitain survey (ARTM)

The Montreal OD (Origin-Destination) survey is a large-scale cross-sectional household travel survey conducted every five years since 1970 in the Montreal metropolitan area (1970, 1974, 1978, 1982,1987, 1993, 1998, 2003, 2008, 2013, and 2018). The survey covers 5% of the population residing in the Montreal metropolitan area and is conducted by the Autorité Régionale de Transport Métropolitain (ARTM).

Its purpose is to provide an accurate picture of all the trips made by residents of the region during an average weekday, for all modes of transportation used such as walking, cycling, bus, metro, train, and car. . They are descriptive surveys that provide a statistical portrait of the different characteristics of people’s trips. For each documented trip, the surveys identify the origin, destination, purpose, departure time, and all the different modes of transport used. Other socio-demographic variables are also collected. This is primarily a survey conducted through telephone interviews that aims to provide a general overview of all trips made by residents of the region, regardless of the mode of transport used. For the first time, the 2018 OD survey included a web questionnaire component.In addition, this survey cover an increasingly larger territory that spans the entire metropolitan region, from the major cities of Montreal, Laval, and Longueuil, to the north and south crowns.

The survey collects detailed information on each trip made by all individuals in ***each surveyed household*** (such as home location, size,vehicle ownership, and number of cars), **each person in the household** (age, gender,income,education level, driving license ownership, main occupation, public transit monthly pass ownership), and **each trip** made by each person of 5 years and older ( such as departure time, origin and destination locations, trip purpose, mode sequence, and others).

# Vancouver panel survey (VTS) [https://vancouver.ca/streets-transportation/annual-transportation-survey.aspx]

The 2020 Vancouver Panel Survey is a longitudinal survey of households living in the city of Vancouver, British Columbia, Canada (Vancouver’s nine transportation zones). The survey is conducted annually, and its primary goal is to provide a comprehensive picture of travel behavior and trends over time, as well as the impact of policies and interventions on these trends.The primary component of this survey is a travel diary in which individuals record the details of the trips that they make on an assigned weekday. This trip data is then compared to the previous panel surveys conducted from 2018 to 2019 (2008,2011, 2013 and 2019), allowing analysis of transportation trends.

The survey collects detailed information on personal and household characteristics, including age, gender, income, education, and employment status. It also gathers information on travel behavior, including trip purpose (such as work, school, recreational/social/entertainment, home, work business trip, shopping, personal business, restaurant, drop off/pick up, and drive someone ), mode of transportation (Auto, transit,cycling, walking, and other), travel distance,start time for each of their recorded trips, travel time ,trip rates, VKT, origin-destination patterns (The daily origin and destination (O-D) patterns for Vancouver residents based on geocoded trip-end coordinates), average trip distances (Trip lengths were estimated using the distance matrix from TransLink’s Regional Transportation Model’s shortest distance assignment) and trip frequency.

One of the unique features of the survey is the collection of data on active transportation, such as walking and cycling. This data is used to evaluate the effectiveness of policies and interventions aimed at promoting sustainable transportation modes.

In addition to travel behavior and personal characteristics, the survey also collects information on attitudes and perceptions related to transportation and the built environment. This information is used to inform policies and interventions aimed at improving transportation options and promoting sustainable and healthy communities.

# Origin- Destination survey of National Capital Region [http://www.ncr-trans-rcn.ca/surveys/o-d-survey/]

The Origin-Destination (OD) survey of National Capital Region (NCR) in Canada is a comprehensive travel survey that aims to gather detailed information on the travel behavior of residents in the region. This survey has been conducted in the years 1986, 1995, 2005 and 2011, and it is currently being conducted again in 2022.The Origin-Destination (O-D) Survey examines the “who, where, why, when, and how” of trips made by residents of the National Capital Region (NCR) resulting in extensive, up-to-date information on current daily trip patterns of area residents in rural areas, growing suburbs, mature neighbourhoods and downtown areas alike. The survey is a joint project of the TRANS Committee, made up of the National Capital Commission, the City of Ottawa, the City of Gatineau, the Ontario and Quebec Ministries of Transportation, and the transit agencies of Ottawa and Gatineau.

Total trip numbers account for the population of age 5 and older for the 2011 O-D survey and age 11 and older for the 2005 O-D survey. In addition, The survey did not capture commercial trips or trips generated outside of the National Capital Region. The survey is designed to capture all trips made by residents in the NCR, including the trip origin and destination (includes different districts in this region such as Ottawa Inner Area, Ottawa West, Merivale, Ottawa East, Alta Vista), purpose (such as home, work, school, shopping, leisure, personal and others(include visiting friends and family, health-related trips, and other), and pick up or drop off), time of travel, distance of travel, and mode of transportation. The survey covers a wide range of transportation modes, such as walking, cycling, public transit, and driving.

The survey also collects personal and household information such as age, gender, income, education, household size, driver’s licence, household vehicle availability and employment status. These variables are used to understand how travel behavior varies by demographic groups and to identify potential disparities in access to transportation.

# Origin- Destination survey of Capital Regional District (CRD) [https://www.crd.bc.ca/project/regional-transportation/origin-destination-household-travel]

The Capital Regional District (CRD) conducted a comprehensive trip diary (origin-destination, or O-D) survey. The survey profiles residents’ travel behavior. The profile will aid the CRD in its Regional Growth Strategy, the Regional Transportation Plan, and other ongoing sustainable planning initiatives. The 2017 survey updates surveys that were conducted in 2011, 2006, and 2001.

The 2017 study area of the survey consisted of all 13 incorporated municipalities in the CRD, the Juan de Fuca Electoral Area and Salt Spring Island. Most of the reporting described below covers the 13 incorporated municipalities and the Juan de Fuca Electoral Area: this area corresponds to the area that is covered by the Regional Growth Strategy and is defined as the “Regional Planning Area” (RPA). Households from Salt Spring Island were included in order to build a better picture of travel between these regions and the RPA, and of the travel patterns of Salt Spring Island residents. The Southern Gulf Islands and the CVRD were not included.

Demographic variables

The demographics of the RPA’s residents are important indicators of travel. The key factors are population (trips are made by people), households (members of households coordinate their trips includes households size, age, employment, type of dwelling ) and the vehicle available to each household.

Travel variables

The survey collects information on trip origins and destinations, travel modes used, trip purposes (such as Work / work-related, Post-secondary school , School, Personal business , Recreation / social , Dining / restaurant, Shopping, Pick-up / drop-off passengers, home, and others), and the time of day that trips are taken

# Origin- Destination survey of Nanaimo City

The City of Nanaimo recently initiated the Nanaimo Transportation Master Plan (NTMP) process. In preparation for the development of the NTMP, the City undertook a Pre-Plan Consultation Process in 2011, which included open houses and surveys to identify key themes and priorities to be considered during the development of the NTMP.

The Origin-Destination (OD) survey of Nanaimo City collects data on daily travel patterns of residents and visitors in the city. The survey covers a wide range of travel-related information, including the purpose of the trip (Commute, Exercise, Recreation, Shopping/Errands and others), mode of transportation, trip distance, trip duration, and demographics of the travelers.

The survey provides detailed information on the different modes of transportation used by travelers, including driving, walking, cycling, and public transit. It also documents the frequency and duration of each mode of transportation, as well as the distance traveled.

In addition to travel-related data, the survey also collects information on demographic factors such as age, gender, education level, income, and employment status. This data provides insights into how different groups of people travel within the city and helps identify any disparities in transportation access and mobility.

# Edmonton and Region Household Travel Survey (ERHTS)[https://www.edmonton.ca/transportation/traffic\_reports/travel-pattern-analysis]

The Edmonton and Region Household Travel Survey (ERHTS) is a comprehensive travel survey conducted in the Edmonton Metropolitan Region, Alberta, Canada in 1994, 2005 and 2015.The ERHTS was conducted using a combination of online and paper-based surveys, with participants randomly selected from over 46,000 residential addresses in the Edmonton region.the report describes the weekday travel patterns of residents of the Edmonton Capital Region and travel between the Region and the City of Edmonton The survey collected data on travel behavior over a 24-hour weekday period, with participants being asked to report all trips taken, including their purpose, mode of transportation, and time of travel.

The survey aims to collect data on travel behavior patterns of households residing in the region, and demographic characteristics of the population.The travel variables collected in the survey include the number of trips made, trip duration, distance traveled (The length of trips taken is an indicator of the spatial characteristics of travel and the extent to which people are willing to or forced to travel to complete activities), mode of transportation (car driver, car passenger, walk, transit,school bus, bicycle, and other), travel purpose (such as Work, Post-Secondary, School, Shopping, Social / Recreation, Personal Business, Pick up/Drop off, and other), and travel time. Personal variables collected include age, gender, education level, employment status, and household income. In addition to travel and personal variables, the survey also collected information on household characteristics, including the number of household members, number of vehicles owned, and housing type.

The survey found that the most common mode of transportation for all trip purposes was driving, with 78% of all trips being made by private vehicle. Walking was the second most common mode of transportation, accounting for 10% of all trips. Public transportation was used for only 6% of all trips, and cycling for 3% of all trips. The survey also found that the average trip distance was 8.7 km, and the average travel time was 29 minutes.

# Calgary and Region Travel and Activity Survey (CARTAS) [https://www.calgary.ca/planning/transportation/surveys.html?redirect=/travelsurveys]

the Calgary and Region Travel and Activity Survey (CARTAS) conducted in 2012. Household travel surveys have been conducted approximately every 10 years since 1964 and provide key information to decision makers on how travel behavior and influences are changing over time. The CARTAS study area includes The City of Calgary, the Municipal District of Foothills, Rockyview County, Wheatland County, and all the towns and villages within those boundaries including: Airdrie, Chestermere, Cochrane, High River, Okotoks, Nanton, and Strathmore. The primary purpose for the survey is to collect information to update the Regional Transportation Model (RTM), but these surveys offer a unique insight in the characteristics of travel in Calgary and the surrounding region.

The travel data collected in the survey include information on the frequency of travel, the length of trips, and the types of transportation used, such as walking, cycling, public transit, and private vehicles. The survey also collected information on the number of people traveling together, the trip purpose, and the time of day the trip was made.

The personal variables collected in the survey include demographic information, such as age, gender, income, education level, and employment status. The survey also collected information on household characteristics, such as the number of people living in the household, the number of vehicles owned by the household, and the availability of alternative modes of transportation, such as bicycles and public transit.

The survey data were used to analyze travel patterns and trends, assess transportation infrastructure needs, and evaluate the effectiveness of transportation policies and programs. The data have been made available to the public and can be used by researchers, policymakers, and other stakeholders to inform decision-making and planning related to transportation and urban development in Calgary and the surrounding areas.

# City of Saskatoon Household Travel Survey

The 2013 Saskatoon Travel Survey is a comprehensive study of travel behavior in the city of Saskatoon, Canada. The survey was conducted in order to gather information about residents’ travel habits, including mode choice, trip purposes, and travel times.

The survey collected data from households within the city limits of Saskatoon through telephone interviews, asking questions about each individual’s travel on a typical weekday and weekend day. In addition to travel data, personal characteristics such as age, gender, employment status, and household size were also collected.

The travel data collected in the survey includes trip purpose, mode of transportation, origin and destination, time of travel, and travel distance. The survey also collected data on the frequency of travel, such as the number of trips taken by each individual in a week, and the types of destinations visited.

The survey also included a mode choice analysis to better understand the factors that influence people’s travel choices, such as personal characteristics and trip characteristics.

The data collected from the survey has been used to inform transportation planning and policy in Saskatoon, as well as to better understand the travel behavior of residents in the city. The information has been used to identify areas where improvements to the transportation system could be made, such as increasing transit service or building new cycling infrastructure.

# Okanagan Travel Survey (OTS)

The City of Kelowna, City of Vernon, Regional District of Central Okanagan, West Kelowna, Lake Country, Peachland, and Westbank First Nation, along with the BC Ministry of Transportation and Infrastructure, have collaborated to conduct the Okanagan Travel Survey (OTS). The smartTRIPS program, which is a part of the Sustainable Transportation Partnership of the Central Okanagan (STPCO), supported the survey’s execution. The OTS employs a methodology that involves conducting a household travel survey every five years in the Central Okanagan and City of Vernon region. This type of survey gathers information on the daily travel patterns of each household member who is five years of age or older, based on their travel on the previous day. This survey was conducted in 2007, 2013 and 2018. Like the objectives of the previous Okanagan Travel Surveys conducted in 2007 and 2013, the data collected through the 2018 OTS creates a repository of the travel habits of residents. This data can serve as a foundation for developing policies and transportation plans in the Central Okanagan and The City of Vernon. Additionally, the 2018 OTS contributes to the larger aim of tracking regional travel trends and establishing a regional transportation demand model for the area.

The Okanagan Travel Survey conducted in 2018 recorded the journeys taken by individuals within a specific region during a regular working day that lasted 24 hours. The survey measured the number of person-trips made for different reasons from one location to another. These trips were taken at a specific time of day and made using any of the five available modes of transportation.

The 2018 survey was a household-based survey that collected demographic information on all household members and travel characteristics. data is as follow:

* household data includes address, dwelling type, number of householders, number of vehicles available to householders, number of working bicycles available to householders, household Income.
* Person level data for each person in the household includes gender, age, driver’s license, student status, school level, employed, employment status, workplace location, and type of occupation.
* Trip level data for each trip made by each household includes origin (Geocode origin XY coordinates), destination (Geocode destination XY coordinates), trip departure time, trip arrival time, trip purpose (or activity at destination location such as travel to Work, post-Secondary School, school, restaurant, recreation (gym, swimming, etc.), social outing / meet friends, shopping, personal business, pick up and drop off a passenger, home and others ), mode of travel (such as auto driver, auto passenger, public transit, school bus, bicycle, walked, motorcycle or moped/scooter), transit route(s), number of vehicle occupants, vehicle availability for trip (if not by automobile and household has vehicles), and additional information about trip (open-ended response).

# Winnipeg Area Travel Survey (WATS)

the Winnipeg Area Travel Survey (WATS)is a travel ‘origin-destination’ survey that was conducted in autumn 2007. The survey covered the entire City of Winnipeg and all of the surrounding area within a 100-km radius of downtown Winnipeg. The 2007 WATS is the first all household based trip survey ever done in Winnipeg. In combination with traffic counts, on-board transit ridership counts and demographic and employment data from the Census of Canada and other sources, the 2007 survey provides both a reliable profile of current conditions and a means to measure trends in local travel.

Typical of origin-destination surveys, there are three categories: household data, person data and trip data. As noted, trip data were collected only for household members 11 years of age and older.The 2007 survey was a travel survey that collected demographic information on all household members and travel characteristics. dataset is as follow:

Household data consists of location, household size, number of vehicles, type of dwelling, and household income.

person data includes age, gender, driver’s license, occupation status (worker, student, retiree, etc.), usual place of work or school, long-term physical disability, labour force status, hours of work and education.

Trip data includes origin, destinations, purpose of travel(such as work, work-related, school, shopping, social / recreational, restaurant, medical / dental visit, drive someone somewhere / go pick someone up, return home), mode(s) of travel (such as car driver, car passenger, Winnipeg Transit, intercity bus, other transit, private transportation service, school bus, water taxi3 / ferry, taxi, handi-Transit, bicycle, walk, and motorcycle / moped), departure time, arrival time, If transit: use of park and ride lot, line(s) used, transfer point(s).

# The London Household Travel Survey

In 2016, the London Household Travel Survey was carried out to offer an in-depth understanding of the travel patterns of individuals residing in the City of London and the nearby Census Metropolitan Area. Vital data concerning travel making, preferences, and attitudes was collected during the survey to support the development of infrastructure and services for road users, public transport passengers, cyclists, and pedestrians. Earlier editions of this survey were conducted in 1987, 2002, and 2009. This Survey collected data on various variables related to households, persons, and trips.

For households, the survey collected data on location of residence, the number of people living in the household, driver’s license, their age and gender, their employment status, and their income. It also gathered data on the type of dwelling, such as whether it was a single-family home or an apartment, and the availability of cars and bikes in the household.

For persons, the survey collected data on their age, gender, and employment status, as well as their level of education and income. It also asked about their travel behavior, such as how often they traveled, what modes of transportation they used, and their travel purposes.

For trip data, the survey collected data on location of origin and destination for each trip, the purpose of the trip (work, post-secondary school, school, shopping/recreational, other discretionary), the mode of transportation used (such as auto driver, auto passenger, transit, walk/cycle and others), the time of day, the distance traveled, and the duration of the trip. It also gathered information on the origins and destinations of the trips, such as the home address and the location of the destination.

# Kingston Household Travel Survey

The 2019 Kingston Household Travel Survey (KHTS) was undertaken with a random sample of households in the City of Kingston. Previous household travel surveys of Kingston residents were conducted in 2002 and 2008. The 2019 survey builds on the legacy of the previous surveys while expanding the depth of the data collected and providing more detailed reporting on travel patterns captured by the survey. The survey gathered information on household and demographic characteristics relevant to understanding travel patterns. It also captured detailed trip information for residents aged 5+ years, providing a snapshot of the 24-hour travel patterns over the course of a typical fall weekday.

The objectives of the survey were to gather information to assist the City of Kingston in transportation planning and to promote the use of sustainable modes of transportation, such as walking, cycling, and public transit. The survey aimed to identify travel patterns and behavior and to identify opportunities to reduce the reliance on single-occupancy vehicles.

This survey collected information on various aspects of travel and socio-demographic characteristics, such as:

* Household data consists of age, gender, income, student number in a household, type of dwellings, access to car, access to bicycle,transit Passes and employment status.
* Trip data includes frequency and purpose of trips (such as usual work, work related, post-secondary school, attend K-12 school, shopping, personal business, restaurant, recreation, social, serve passenger, return home, and other), modes of transportation used (such as auto Driver, auto Passenger, Kingston transit, School Bus, Walk, Bicycle, and others), trip distances, and travel times.

# North Shore Transportation Survey

The North Shore Transportation Survey (NSTS) 2019 is a biennial survey of residents of the North Shore that tracks key transportation metrics associated with residents’ travel patterns. The survey is an initiative of the City of North Vancouver (CNV), District of North Vancouver (DNV), and District of West Vancouver (DWV). This Survey collected data on various variables related to households, persons, and trips are as follows:

* Participant Characteristics: describes the characteristics of North Shore residents and their households, as captured by the survey, including age, gender, household, employment, health status, occupation, bike access, and vehicle access characteristics. The purpose of capturing these characteristics is to better understand travellers’ needs, challenges, and patterns. The results are based on the survey sample with selected information from the 2016 census.
* Daily trip characteristics: provides a snapshot of daily (24-hour) travel patterns from the trips reported by survey participants and includes location, trip demand, purpose (such as usual work, work related, school, personal business, restaurant, recreation, social, serve passenger, return home and others ), mode share (Auto Driver, Auto Passenger, Transit, Walk, bicycle, and others), and distribution (include the trip origin and destinations).

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Table 7, available data in different households travel surveys.

| Survey | Year of Survey | Household Data | Person Data | Trip Data |
| --- | --- | --- | --- | --- |
| General social survey (GSS) | 1986 | Dwelling type | Gender | Mode(s) of travel |
|  | 1992 | Household size | Age | Purpose of travel |
|  | 1998 | Household income | Student status | Start Time |
|  | 2005 |  | School level | End Time |
|  | 2015 |  | Employment status |  |
| Transportation Tomorrow Survey survey (TTS) | 1991 | Regional municipality of household | person number within the household | trip number for persons in household |
|  | 1996 | geocode of household | Age | start time |
|  | 2001 | Type of dwelling unit | Gender | End Time |
|  | 2006 | Number of persons in the household | Transit pass | Mode of the trip |
|  | 2011 | Number of vehicles | employment status of the person | Purpose of the trip |
|  | 2016 | driver’s licence in the household | person’s occupation type | Geocode of origins and destinations |
|  |  | Household’s total income | student status of person |  |
|  |  |  | school codes |  |
| Autorité régionale de transport métropolitain survey (ARTM) | 1970 | home location | Age | Origins location |
|  | 1974 | size of household | Gender | Destination location |
|  | 1978 | vehicle ownership | Income | Trip purpose |
|  | 1982 | number of cars in households | Education level | Mode of transportation |
|  | 1987 |  | Driving license ownership | Start time |
|  | 1993 |  | Main occupation | End time |
|  | 1998 |  | Public transit monthly pass ownership |  |
|  | 2003 |  |  |  |
|  | 2008 |  |  |  |
|  | 2013 |  |  |  |
|  | 2018 |  |  |  |
| Vancouver panel survey (VTS) | 2008 | Home location | age | trip purpose |
|  | 2011 | Size of household | gender | mode of transportation |
|  | 2013 | vehicle ownership | income | travel distance |
|  | 2019 |  | education | Start Time |
|  |  |  | employment | End time |
|  |  |  |  | geocoded origin and destination |
|  |  |  |  | trip frequency |
| Origin- Destination survey of National Capital Region | 1986 | Size of household | age | Trip origion and destination |
|  | 1995 | household vehicle availability | gender | purpose of trip |
|  | 2005 | vehicle ownership | Income | Time of travel |
|  | 2011 |  | Education | mode of transportation |
|  |  |  | driver’s licence |  |
|  |  |  | employment status |  |
| Origin- Destination survey of Capital Regional District (CRD) | 2001 | Households size | age | trip origins and destinations |
|  | 2006 | type of dwelling | Gender | travel modes |
|  | 2011 | vehicle available to each household | employment | trip purposes |
|  | 2016 |  |  | Start time |
|  |  |  |  | End Time |
| Origin- Destination survey of Nanaimo City | 2011 | Household size | age | purpose of the trip |
|  |  | Type of Dwelling | gender | mode of transportation |
|  |  | Number of vehicle | education level | trip distance |
|  |  |  | income | trip duration |
|  |  |  | employment status |  |
| Edmonton and Region Household Travel Survey (ERHTS) | 1994 | household income | age | number of trips |
|  | 2005 | number of household members | gender | trip duration |
|  | 2015 | Type of dwelling | education level | distance traveled |
|  |  | Number of vehicle | employment status | mode of transportation |
|  |  |  |  | travel purpose |
|  |  |  |  | travel time |
| Calgary and Region Travel and Activity Survey (CARTAS) | 2012 | number of people in the household | age | frequency of travel |
|  |  | number of vehicles | gender | length of trips |
|  |  | Household income | income | Mode of transportation |
|  |  | Number of vehicle | education level | trip purpose |
|  |  |  | employment status | Start time |
|  |  |  |  | End time |
| City of Saskatoon Household Travel Survey | 2013 | household size | age | trip purpose |
|  |  | Household income | gender | mode of transportation |
|  |  | Number of vehicle | employment status | origin and destination |
|  |  |  |  | time of travel |
|  |  |  |  | travel distance |
| Okanagan Travel Survey (OTS) | 2007 | Location | gender | Geocode origin and destination coordinates |
|  | 2013 | dwelling type | age | Trip departure time |
|  | 2018 | number of householdes | driver’s license | trip arrival time |
|  |  | number of vehicle | student status | trip purpose |
|  |  | number of bicycle | school level | mode of travel |
|  |  | household Income | employment level |  |
|  |  |  | workplace location |  |
|  |  |  | type of occupation |  |
| Winnipeg Area Travel Survey (WATS) | 2007 | household size | age | origin and destinations |
|  |  | number of vehicles | Gender | purpose of travel |
|  |  | type of dwelling | driver’s license | mode(s) of travel |
|  |  | household income | occupation status | departure time |
|  |  |  | usual place of work or school | arrival time |
|  |  |  | labor force status |  |
| The London Household Travel Survey | 1987 | location of residence | driver’s license |  |
|  | 2002 | number of people living in the household | age | modes of transportation |
|  | 2009 | type of dwelling | gender | travel purposes |
|  | 2016 | availability of cars | employment status | Start time |
|  |  | availability of bicycle | Income | End time |
|  |  |  |  | location of origin and destination |
|  |  |  |  | distance traveled |
| Kingston Household Travel Survey | 2002 | type of dwellings | age | frequency of trip |
|  | 2008 | student number in a household | gender | purpose of trips |
|  | 2019 | access to car | income | modes of transportation |
|  |  | access to bicycle | employment status | trip distances |
|  |  | transit Passes |  | travel times |
| North Shore Transportation Survey (NSTS) | 2019 | household employment | age | location of origin and destination |
|  |  | health status | gender | trip demand |
|  |  |  | occupation | purpose of travel |
|  |  |  | bike access | mode of travel |
|  |  |  | vehicle access | origin and destination |

# The Linkable Open Data Environment (LOD)

the Linkable Open Data Environment (LODE) is an exploratory initiative that aims at enhancing the use and harmonization of open microdata primarily from municipal, provincial and federal sources. It has been compiled by the Centre for Special Business Projects (CSBP) at Statistics Canada in 2020.

This database includes variables such as address, postal code, city, province and latitude and longitude of each facility and includes a Canada-wide Open Database of educational facilities (this database covers facilities such as ***early childhood education, kindergarten, elementary, secondary, and post-secondary institutions***, and ***specific vocational training centers***. The database does not include virtual educational institutions.), healthcare facilities (including ambulatory health care services, hospitals, and nursing and residential care facilities), cultural and art facilities (such as arts or cultural centers, artists, festival sites, galleries, heritage or historic site, library or archive, museum, theatre/performance and concert hall, and miscellaneous), and recreational and sports facilities (including trails(such as urban and rural trails or pathways for walking, hiking, or biking), sports fields, arenas (facilities where sports and/or recreational activities take place), athletic parks, beaches, casinos, community centers, gyms, marinas, parks and green spaces, playgrounds, pools, race tracks, ice rinks, skate parks, splash pads, stadiums, miscellaneous), and Businesses (this database contains addresses of business, name, type of business and locations).

* The Open Database of Buildings [https://www.statcan.gc.ca/en/lode/databases/odb]

The inputs for the ODB are datasets provided by municipal, regional or provincial sources available to the general public through open government portals under various types of open data licenses. The current version of the database (version 2.0) contains approximately 4.4 million records and includes provinces and territories where open building footprints were found during the collection period.Within the original datasets, each data provider attached a different set of variables to their building footprints.The variables included in the ODB are as follows:Latitude,Longitude,Area,Perimeter, Data provider, Census subdivision unique identifier, Census subdivision, name, Unique building ID

* The Open Database of Educational Facilities [https://www.statcan.gc.ca/en/lode/databases/odef]

The Open Database of Educational Facilities (ODEF) is a collection of open data containing the names, types, and locations of education facilities across Canada, and is made available under the Open Government Licence - Canada.The inputs for the ODEF are primarily datasets provided by municipal, regional or provincial sources available to the general public through open government portals under various types of open data licences, or otherwise published on their webpages and released under an open licence with their permission.The variables included in the ODEF are as follows: Facility Name, Facility Type, Authority Name, International Standard Classification of Education (ISCED) ,Level, Official Language Minority School Status, Address, Unit, Street Number, Street Name, Municipality Name, Province, Postal Code, Province Unique Identifier, Census Subdivision Name, Census Subdivision Unique Identifier, Census Metropolitan Area Name, Census Metropolitan Area Unique Identifier, Longitude, Latitude, Geocoding Source, Source ID, Unique ID.

* The Open Database of Healthcare Facilities [https://www.statcan.gc.ca/en/lode/databases/odhf]

The inputs for the ODHF are datasets whose sources include regional health authorities, provincial, territorial and municipal governments, and public healthcare and professional healthcare bodies. These datasets were available either under one of the various types of open data licences, e.g., in an open government portal, or as publicly available data. In certain cases, data were obtained directly from administrative sources. Details of the sources used are available in the ODHF metadata. This dataset includes ambulatory health care services, hospitals, and nursing and residential care facilities.The variables included in the ODHF are as follows: Index, Facility Name, Source Facility, Type, ODHF Facility Type, Provider, Unit, Street Number, Street Name, Postal Code, City, Province or Territory , Source-Format Street Address, Census Subdivision Name, Census Subdivision Unique Identifier, Province or Territory Unique Identifier, , Latitude ,Longitude.

* The Open Database of Cultural and Art Facilities [https://www.statcan.gc.ca/en/lode/databases/odcaf]

The Open Database of Cultural and Art Facilities (ODCAF) is a collection of open data containing the names, types, and locations of cultural and art facilities across Canada.This dataset includes arts or cultural centers, artists, festival sites, galleries, heritage or historic site, library or archive, museum, theatre/performance and concert hall, and miscellaneous.

* The Open Database of Recreational and Sport Facilities [https://www.statcan.gc.ca/en/lode/databases/odrsf]

The Open Database of Recreational and Sport Facilities (ODRSF) is a collection of open data containing the names, types, and locations of recreational and sport facilities across Canada. recreational and sports facilities includes trails(such as urban and rural trails or pathways for walking, hiking, or biking), sports fields, arenas (facilities where sports and/or recreational activities take place), athletic parks, beaches, casinos, community centers, gyms, marinas, parks and green spaces, playgrounds, pools, race tracks, ice rinks, skate parks, splash pads, stadiums, miscellaneous).

* The Open Database of Businesses

The Open Database of Businesses contains addresses of business name and locations. It also includes information on the type of business and legal nature of business, when supplied by the data providers.

* The Open Database of Infrastructures

The Open Database of Infrastructure contains the name and location of major transport and physical infrastructures such as airports, railway stations, bridges and elevated roads, etc. Infrastructures are classified by type. Records are compiled from both open sources and from publicly available data (with permission from the data owners).

# Can-BICS

* Cycling and walking networks

Can-BICS is a classification system of five broad bicycle facilities assigned to three categories: high, medium, and low comfort, based on the facility’s contribution to user safety and comfort while cycling. 1) High comfort includes low-stress routes that are comfortable for most people, including those of all ages and abilities, with a record for best safety. for example, cycle track, local street bikeway, and bike path. 2) medium comfort is low- or medium-stress routes that are comfortable for some people, but whose safety requires careful design, such as multi-use paths (A two-way paved path shared by cyclists, pedestrians and other users). 3) low comfort bikeways are high-stress routes that are comfortable for few people, with little or no additional safety, compared to no bicycle facility, such as painted bike lanes that are designated by bicycle and diamond pavement markings and signs as exclusively for cyclists. And 4) non-conforming bicycle facilities do not meet minimum Can-BICS standards, such as non-conforming - trail (these are multi-use trails with unpaved surface), non-conforming – major road (shared lanes on major roads provide connectivity), and non-conforming - other.

# OpenStreetMap (OSM)

* Cycling and walking networks

Another source for obtaining cycling and walking networks is OpenStreetMap (OSM). This dataset is a collaborative global map that using for active transportation researches. OSM considered cycle lanes, tracks and sidewalks. A cycle lane lies within the roadway itself (on-road), whereas a cycle track is separate from the road (off-road). Tracks are typically separated from the road by e.g. curbs, parking lots, grass verges, trees, etc. as well, trails line that indicates the paths or routes suitable for walking, hiking, bicycling, and other outdoor activities from 2015 to 2019 can be obtained from scholars Geoportal.

# Municipal open data

Municipal open data is a standard source of bicycling infrastructure data that city governments are making this spatial data for bicycling infrastructure. In Canada, some cities have this dataset such as Toronto, Montreal, Vancouver, etc. However, open data of different cities use different definitions for bicycling infrastructure, and they may have different levels of timeliness, completeness, and documentation (Schoner and Levinson 2014). For example, bicycle facilities the City of Toronto Open Data portal consists of a high-resolution geospatial data set with attributes accumulated from several sources of cycle tracks or bike lanes, road classification (local, collector, minor arterial, etc.), number of lanes, directions, stop signs and signalized intersections. (City of Toronto, 2017).

## City of Toronto

**Cycling Network**

The Toronto bikeways dataset illustrates the existing cycling network across the city, including both shared and dedicated bikeways. The Toronto bikeways dataset contains the following types of bikeways: cycle tracks, bicycle lanes (including buffered bike lanes and contra-flow bike lanes), neighbourhood routes with sharrows (including wayfinding sharrows), multi-use trails (including off-road and in-boulevard), as well as signed cycling routes.

**Property Boundaries**

This data is a GIS file that outlines the geographical area of all properties in the City of Toronto. While every attempt is made to keep this dataset up to date, it has been compiled over many years, from numerous records of varying age and reliability. As such, the resulting accuracy of the boundary mapping information renders it suitable for general planning purposes only and is not a substitute for a plan of survey.

**Pedestrian Network**

The Pedestrian Network (pednet) was created by the DAV team at the City of Toronto, and it is based on the sidewalk inventory from Transportation Services, Toronto road centrelines, and manual collection from aerial imagery. Pednet is integrated with centerline intersections, traffic signals, pedestrian crosswalks and crossovers, traffic signal data from Transportation Services as well as other City of Toronto datasets.

## City of Hamilton

**Recreational Pathways**

Pathway is defined as: land dedicated to pathway use, pathway is mapped, signage exists, and have a recreational purpose. Pathways may support a range of non-motorized recreational uses such as walking, hiking, and bicycling. It includes the length (kilometers) of all paved and unpaved maintained recreational pathways that fall under municipal responsibility or control and if the municipality incurs costs to maintain those pathways. This data excludes non developed footpaths, sidewalks, and pathways that link to roadways and does not include unpaved trails maintained by others, such as the Bruce Trail and other similar trail systems.

**Trails** This dataset includes location of recreational trails that are either owned or maintained by City of Hamilton, includes both walking/hiking trails and off-street bikeways. Types include:

Multi-Use Path Paved Multi-Use Recreational Trail Unpaved (Stone) Multi-Use Recreational Trail Stairs (with or without Bicycle troughs) Trail/Cycling Networks (Trans Canada, Waterfront, others)

**Census Population, Age and Gender**

In the 2021 Census, Statistics Canada introduced the concept of gender. Given that the non-binary population is small, data aggregation to a two-category gender variable was necessary to protect the confidentiality of responses provided. In these cases, individuals in the category “non-binary persons” are distributed into the other two gender categories and are denoted by the “+” symbol.

Data is derived from custom tabulations of Statistic Canada’s Census obtained by the City of Hamilton as a consortium member of the Canadian Community Economic Development Network (CCEDNet) Community Data Program.

**Housing Placements**

Housing Placements depicted are the initial occurrence that housing has been secured for unique individuals participating in a City-funded homelessness program: Intensive Case Management (ICM), Rapid Re-housing (RRH), and Transitional Living Program (TLP).

## City of Vancouver

**Bikeways** [https://opendata.vancouver.ca/explore/dataset/bikeways/information/?disjunctive.bike\_route\_name&disjunctive.bikeway\_type&disjunctive.subtype&disjunctive.year\_of\_construction]

This dataset contains information about bikeways in City of Vancouver. These bikeways follow street centrelines so their placement in the street right of way is approximate. This dataset is maintained manually.This dataset includes data on shorter bikeway segments which can be different than how the bikeways are dispayed in the Vancouver Cycling Map.

**Property addresses**

The property addresses dataset contains addresses used for parcel polygon display. Please note: these addresses are the primary addresses displayed in VanMap and do not represent a complete set of all addresses. Some addresses are duplicated because they appear more than once on VanMap.

**Property parcel polygons**

The property parcel polygons are assessment based land polygons.

## City of Halifax

**Bike Infrastructure and Suggested Routes**

Line representation of existing and suggested bike routes and infrastructure within the Halifax Regional Municipality. This dataset includes Bike Facility ID, Bike Facility Type, Bike Facility Name, Street Name, Bike Facility Implementation, Pilot Project or Permanent, One Side Only, Direction, Install Year,Physical Protection.

**Active Travelways**

Active Travelways is a Linear representation of assets that includes trails, sidewalks, walkways, pathways and Multi-Use Pathways.

**Zoning Boundaries 2021**

Land use zone applied to a particular area of land within a land use by-law (LUB) area. The zone value of each polygon corresponds with a zone in the associated land use by-law, which lists permitted or prohibited uses for each zone.

Land use zones differ between LUB areas, so each zone must be interpreted within the context of the LUB area in which it is applied. Complete information for each land use by-law is available from HRM Development Approvals.

## City Of Waterloo [https://rowopendata-rmw.opendata.arcgis.com/]

**Active Transportation**

Active Transportation represents active transportation infrastructure includes: cycling, sidewalks, walkways and pathways (trails).

**Trail and Sidewalk Clearing**

This dataset provides Sidewalks and Trails plowed or shovelled by the City.

**Walkability**

This dataset is a combination of sidewalks, trails and links forming a continuous network. To be used in conjunction with the road network. Walkability is a measure of how accommodating the built environment is to walking. This dataset is a work-in-progress and will be updated as new information becomes available.

**Uptown BIA Boundary**

The ‘Business Improvement Area’ boundary represents the properties in the Uptown Waterloo area that contribute a levy to the association in order to be a part of a cohesive marketing strategy.

Schoner, Jessica E, and David M Levinson. 2014. “The Missing Link: Bicycle Infrastructure Networks and Ridership in 74 US Cities.” *Transportation* 41 (6): 1187–1204.