Vancouver Bikeway Data Management Protocols:

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# About Data Source:

It appears that the following data source originated from the Municipality of Vancouver’s Open Data Portal.

* <https://opendata.vancouver.ca/explore/dataset/bikeways/information/?disjunctive.bike_route_name&disjunctive.bikeway_type&disjunctive.subtype&disjunctive.year_of_construction>

The following data were then filtered to only include cycling tracks and on-street bike lanes, with shapefiles, cycling route names, and street names included.

# Data Manipulation Requirements:

**The original data included the following variables:**

* **Bike Route Name**: Name of bike route ***[Categorical]***
* **Street Name**: Name of the street that the bikeway was located on ***[Categorical]***
* **Bikeway Type**: bikeway type at time of data publication (Either “Painted Lane” or “Protected Bike Lane”) ***[Categorical]***
* **Status**: Is the bikeway active at the time of publication? (Only “Active” Included”) ***[Categorical]***
* **Year of Construction**: Year that the bikeway was originally installed ***[Integer]***
* **Construction Note**: Accompanying notes from the open data portal for a given observation ***[Free Text]***
* **Upgrade Year**: The year that the infrastructure was upgraded ***[Integer]***
* **Found Dates**: The previous student added a variable to get a more specific implementation date (such as month or season) ***[Free Text]***
* **Notes**: Other notes, sources, etc. ***[Free Text]***
* **Geom**: coordinates ***[Coordinates]***

# Data Manipulation Goals:

**The creation of this document, and associated data manipulation work, were pursued to help achieve the following goals:**

1. Create new variables that enable the collection of more granular data (listed later) following pre-defined decision structures and protocols.
   1. Develop a process to group and analyze observations.
      1. ***Categorize by installation date and street*** -> ROUTE\_INST\_ID based on the same installation year (if later than 2009), installation type, upgrade year, upgrade type, and adjacency of routes.
      2. ***Create a process for quickly visualizing routes or groups of routes*** -> GEOJSON\_INDIV, GEOJSON\_GROUP
   2. Verify installations and installation years:
      1. ***Verify installation type*** -> INSTALL\_TYPE – using street view data, this also included making sure that no prior infrastructure was present prior to installation. The purpose of this verification will also support the collection of more granular information on the bikeway type beyond the binary classification of “Painted Lane” and “Protected Bike Lane”.
      2. ***Verify installation year*** -> INSTALL\_YR – using a combination of street view data and other municipal sources. The following project was only interested in verifying installation years and installation types that occurred in 2010 or later.
      3. ***Input installation date*** -> INSTALL\_DATE – only included if this occurred in 2013 or later and if a source was available.
      4. ***Document sources and decisions*** -> INSTALL\_NOTES – links to google street view data, documents, and comments.
   3. Verify upgrades and upgrade years:
      1. ***Verify upgrade type*** -> UPGRADE\_X\_TYPE (where X denoted the number of the upgrade occurrences following installation) – using street view data and other sources. The latest upgrade should match the bikeway type reported at the time of dataset publication. The purpose of this verification will also support the collection of more granular information on the bikeway type beyond the binary classification of “Painted Lane” and “Protected Bike Lane”.
      2. ***Verify upgrade year*** -> UPGRADE\_X\_YR - – using a combination of street view data and other municipal sources. The following project was only interested in verifying upgrades that occurred later than 2013.
      3. ***Input upgrade date*** -> UPGRADE\_X\_DATE – only included if this occurred in 2013 or later and if a source was available.
      4. ***Document sources and decisions*** -> UPGRADE\_X\_NOTES – links to google street view data, documents, and comments.
      5. ***Evaluate the presence of other upgrades:*** to be included as another upgrade entry.

# Protocol for Data Collection (Observations by Cycling Route):

1. **Route ID Categorization**
   1. If a given cycling route contains more than one entry, the ***first goal will be to create a route installation/upgrade variable (route placement)***. The following variable will denote groups of bikeway sections that can be joined based on having the same features: installation year (if 2010 or later), installation date, installation type, upgrade year, upgrade date, upgrade type, and adjacency of location.
      1. **Adjacency Condition:** Input GEOJSON\_GROUP entries for the entire cycling route on geojson.tools/ in between the square brackets [] that automatically appear as part of the “FeatureCollection” type. If all segments of this route are adjacent, then the adjacency condition is met. If parts of the route are separated (denoted as a route that is disconnected for any length of distance from half a block to several blocks) then the adjacency condition is not met.
         1. **Adjacency Condition Met -**> Verify other grouping variables.
         2. **Adjacency Conditions Not Met -**> Determine the location of each entry, and do preliminary grouping by adjacent regions in the route. Example of Case: entries for Route A are located at different parts across the city, they occur on the same street and it is likely that the regions in between these entries contain local roadways or sharrows that are not captured in this dataset. There are 10 entries for this route, and 2 non-adjacent street regions that are captured in this data for this particular route. Determine which entries belong to which non-adjacent route. You can determine and categorize adjacent segments in “geojson.tools” by clicking on a particular section:

A map of a city

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Instances such as a bifurcation remain adjacent:

A map of a city

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* 1. Once all routes have been categorised based on adjacency, installation, and upgrade interventions, you can use GeoJSON to confirm that all segments in a given *route placement* are adjacent. It may also be helpful to note the start and end location of the given route placement. Installation dates and infrastructure types will later be verified in future steps.
  2. GEOJSON INTRODUCTION: See appendix for introduction to GEOJSON.

1. **Bikeway Type Categorization (Pre and Post):** 
   1. The next goal is to input/verify the bikeway type prior to and following an upgrade. To do this, you can utilize google street view’s history function. Input a street name/intersection on google maps, and then select the street view option. You can then select “street view history” and explore how a bikeway has changed over time. If there are not enough street view dates on a given segment of roadway, you can also try viewing the route from an adjacent intersection (sometimes, major roads that intersect your roadway of interest may be imaged more frequently). Google street view typically provides street images once every 1-3 years beginning from 2009. Once you have a good image through google street view, you can highlight and copy the website link so that you can get back to this image and location in the future.
   2. For bikeway categorizations, you can utilize the CanBICS categorization system. Painted lanes can include solid painted lines or buffered lanes. Any on-street cyclist route that includes a form of vertical barrier (e.g., plants, plastic posts, curbs) will be categorized as cycle tracks (protected bike lanes). See appendix for additional information on bikeway categorization and help with ambiguous cases.
      1. CANBICS Classifications (including images) can be found here: <https://www.canada.ca/content/dam/phac-aspc/documents/services/reports-publications/health-promotion-chronic-disease-prevention-canada-research-policy-practice/vol-40-no-9-2020/hpcdp-40-9-04-eng.pdf>
   3. **Installation and Upgrade Dates:** 
      1. To determine installation dates, several sources are available. In ambiguous cases where multiple dates are possible, the most recent date or the earliest date where a bikeway was open for use can be utilized in most cases. The only time a later date can be considered is if the earlier date was an approximation that occurred before construction was finished (e.g., a construction notice or budget document stating intended completion date) and the later date closer indicates the completion date of the project. Sources to determine dates can include news articles, blogs, google earth historical satellite imagery, construction notices, website constriction updates, and even mixed media.
         1. **Searching the web:** to search the web, you can include the suspected year of construction completion, the street name, city, and any other identifying information, such as a local street intersection. If there are too many results, you can narrow your search down by including quotation marks around key words you would like to filter by, for example the year of completion. In the case where a result shows up but the actual content is missing once you click on it, you can view the cached version of it, or use webarchive.
            1. ***To view a cached version of a website, see the following images for guidance:***
            2. A screenshot of a computer

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            3. A screenshot of a search engine

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         2. ***Below are some examples of general google searches and their keywords***. Typically construction notices, policy articles, cyclist/neighborhood blogs, and news articles are helpful resources to consult.
            1. "rupert" street vancouver road construction new bike lane may 2018 (more specific, more key words, filter out any results that do not contain the word “rupert”)
            2. rupert street 2018 vancouver road construction (less specific, less key words)
         3. ***Searching municipal sites or searching within site in general:*** you can also you a web browser feature to search for results current available within a given website, such as a municipal website. To do this, you can structure your search in the same manner as above, but include a “site:” term.
            1. Example of searching within a site: Grandview Hwy North and clark bike fall "2021" construction site: vancouver.ca
         4. ***Searching archived content using webarchive***: webarchive is helpful if you know of a dedicated website page that may likely hold information on construction updates or completion dates, but may be updated to only reflect recent information. An example of this is Vancouver’s construction notice website, which lists current construction projects and their completion phases. However, once a certain period of time has passed, a construction project may be removed from the website. In this case, you can input the website link in the following page, and look for times when the website was archived: <https://web.archive.org/> .
            1. You can follow along with this example: [https://web.archive.org/web/20230000000000\*/https://vancouver.ca/streets-transportation/roadwork.aspx](https://web.archive.org/web/20230000000000*/https://vancouver.ca/streets-transportation/roadwork.aspx)
            2. After inputting the intended website where you would like to access archived content, you can then select a date when it was archived:

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* + - * 1. Once you select a time, you can access the content that was available at that site during that time. For example:

A screenshot of a calendar

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* + - * 1. You can then view the website as it was published during that time. This can be helpful for sites that show current construction projects or provide other forms of updates:

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# Appendix

## A - Introduction to GeoJSON

Routes can be easily visualized using an online tool such as “geojson.tools”. In this format, an ***individual route*** can be visualized given the following format:

|  |
| --- |
| { "type": "LineString", "coordinates": [[-114.0615073,50.9149625],[-114.0615205,50.9149592],[-114.0615338,50.914956],[-114.0616664,50.9149235],[-114.0616796,50.9149202],[-114.0616875,50.9149183]] } |

Visualizing a ***group of routes*** can also be performed by creating aa feature collection

|  |
| --- |
| {  "type": "FeatureCollection",  "features": []  } |

and then inputting features within the square brackets in the following format, with each entry separated by a comma at the end

|  |
| --- |
| {"type": "Feature", "geometry": {"type": "LineString", "coordinates": [[-114.0615073,50.9149625],[-114.0615205,50.9149592],[-114.0615338,50.914956],[-114.0616664,50.9149235],[-114.0616796,50.9149202],[-114.0616875,50.9149183]]}}, |

In cases where there are consecutive segments of bikeways, the group feature may be helpful in identifying relevant features (e.g., start and end of the route, confirming adjacency of segments, etc.)

## B – Bikeway Classifications