

Can-BICS THE CANADIAN BICYCLE INFRASTRUCTURE CLASSIFICATION SYSTEM

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WHAT'S IN A NAME?

Many cities compile datasets of their cycling infrastructure, and increasingly these are publicly available through open data initiatives; however, there is no standard naming convention for cycling infrastructure. Our aim was to develop a common nomenclature for cycling infrastructure in Canada to improve the operationalization of metrics used in cycling, physical activity, and public health research and surveillance.



HIGH COMFORT

These bicycle facilities are low stress routes comfortable for most people. People prefer to cycle on lower-stress routes with bicycle-specific infrastructure. This preference is consistent across cyclist types, including the stronger preference for separation from cars expressed by women and those cycling with children. High comfort bikeways minimize exposure to motor vehicle and pedestrian traffic to make them comfortable for people of 'All Ages and Abilities' (AAA). Route types include cycle tracks on busy roads, local street bikeways, and off-road bike paths.



An off-road paved path exclusively for cyclists located on independent corridors away from a road. Often adjacent to a walking path and separated by a painted line, curb, or planted buffer.

BIKE PATH

AKA
•Bicycle Path
•Off-Street Pathway
•Cycle Path



A roadway lane exclusively for cyclists and physically separated from cars and pedestrians by horizontal and vertical elements. Facility may be at roadway level, sidewalk level, or between the two.

CYCLE TRACK

AKA
•Protected Bicycle Lane
•Segregated Cycle Path
•Separated Bicycle Lane



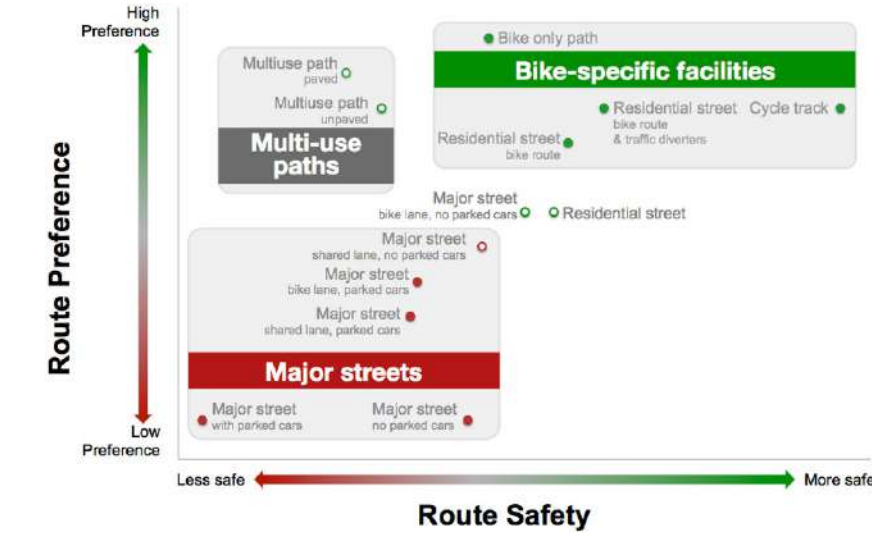
A local street where cyclists share the roadway with cars. Traffic calming and diversionary elements limit motor vehicle speeds and volumes. Cyclists' crossings of major roads are facilitated.

LOCAL STREET BIKEWAY

AKA
•Shared Roadway
•Bicycle Boulevard
•Bicycle Street

COMFORT & SAFETY

Cycling infrastructure has an important role in creating safe, comfortable, and direct travel by bicycle. Based on practice guidelines and public health considerations, we propose the Can-BICS classification system that groups five common bicycle facilities into three broad categories, based on the facility's capacity to both motivate cycling and keep people safe.



Bicycle facility type is a strong determinant of safety and comfort. Bike-specific facilities are the safest and most comfortable.

MEDIUM COMFORT

These are low to medium stress routes which can be considered comfortable for some people. Off-road Multi-Use Paths (MUP) fit in this category. MUPs are shared with pedestrians and other active modes and can be located in the street boulevard of a road or along independent corridors. Without careful design, this facility can be associated with a higher injury risk. Safety and comfort can be comprised when the frequency of conflicts is high: where there are frequent driveway, alleyway, or street crossings; where there are bollards or other obstructions; or where cyclist volumes exceed ~250 per day.



A two-way paved path shared by cyclists, pedestrians, and other active modes. May be located along solo corridors away from a road or next to a roadway and physically segregated from motor vehicles.

MULTI-USE PATH

AKA
•Shared-Use Path
•Off-Street Pathway
•Urban Trail

COMPARING CITIES' DATA

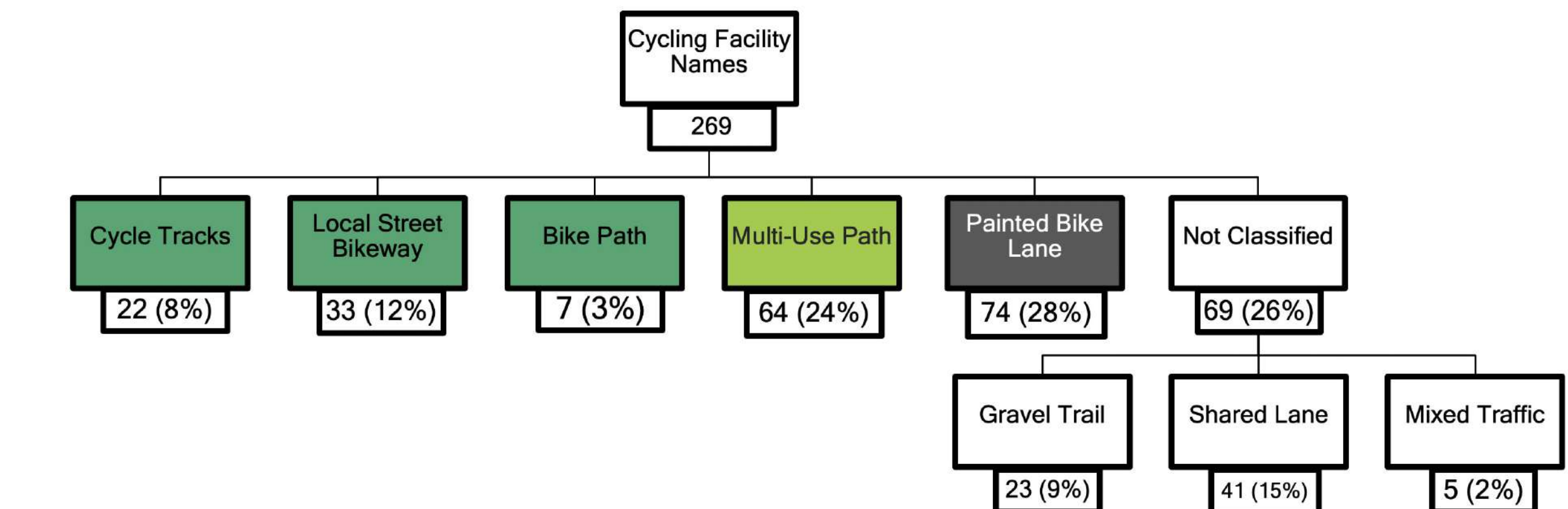
We aimed to sample municipalities from every province and territory, maximizing population coverage. Thus, we selected the largest 10% of communities, stratified across the 13 provinces and territories of Canada, for a total of 44 cities.

We searched municipal open data catalogues for bikeway datasets. 89% had 269 facility names 44 Canadian communities 50.4% of Canada's population

We used cycle maps to supplement open data when necessary. We extracted 269 facility names used in the 44 communities (range: 2-14 per city). Open data and cycling maps were published between 2005 and 2019.

PROVINCE or TERRITORY	CMA / CA	CSD	OPEN DATA CATALOGUE	BIKEWAY DATASET	BIKE MAP	DATA YEAR
Alberta	Calgary	Calgary	Y	Y	N/A	2018-2019
Alberta	Edmonton	Edmonton	Y	Y	N/A	2017
Alberta	Lethbridge	Lethbridge	Y	Y	N/A	2015
British Columbia	Burnaby	Burnaby	Y	Y	N/A	2017-2019
British Columbia	Vancouver	Surrey	Y	Y	N/A	2018
British Columbia	Vancouver	Vancouver	Y	Y	N/A	2018
Manitoba	Winnipeg	Winnipeg	Y	Y	N/A	2019
New Brunswick	Moncton	Moncton	Y	Y	N/A	2018
Ontario	Hamilton	Hamilton	Y	Y	N/A	2019
Ontario	Kitchener-Cambridge-Waterloo	Kitchener	Y	Y	N/A	2018
Ontario	London	London	Y	Y	N/A	2013-2017
Ontario	Toronto	Markham	Y	Y	N/A	2019
Ontario	Ottawa-Gatineau	Ottawa	Y	Y	N/A	2019
Ontario	Richmond Hill	Richmond Hill	Y	Y	N/A	2017
Ontario	Toronto	Toronto	Y	Y	N/A	2018
Ontario	Vaughan	Vaughan	Y	Y	N/A	2017
Ontario	Windsor	Windsor	Y	Y	N/A	2017
Quebec	Ottawa-Gatineau	Gatineau	Y	Y	N/A	2019
Quebec	Montreal	Laval	Y	Y	N/A	2019
Quebec	Montreal	Montreal	Y	Y	N/A	2018
Quebec	Quebec	Quebec City	Y	Y	N/A	2018
Quebec	Quebec	Quebec	Y	Y	N/A	2018
British Columbia	Abbotsford Mission	Abbotsford	Y	Y	Y	2016 & 2018
Northwest Territories	Yellowknife	Yellowknife	Y	Y	Y	Open Data: 2018 / Map: 2013
Ontario	Toronto	Brampton	Y	Y	Y	Open Data: 2019 / Map: 2018
Ontario	Greater Sudbury	Sudbury	Y	Y	Y	Open Data: 2017 / Map: 2016
Quebec	Montreal	Longueville	Y	Y	Y	2019 & 2019
Quebec	Shenbrooke	Shenbrooke	Y	Y	Y	Open Data: 2019 / Map: 2018
Saskatchewan	Saskatoon	Saskatoon	Y	Y	Y	Open Data: 2017 / Map: 2018
Nova Scotia	Halifax	Halifax	Y	Y	Y	2018 & 2018
Yukon	Whitehorse	Whitehorse	Y	Y	Y	2018
Alberta	Red Deer	Red Deer	Y	N	Y	2014
Alberta	Sheraton County	Sheraton County	Y	N	Y	2017
British Columbia	Coquitlam	Coquitlam	Y	N	Y	2017
British Columbia	Vancouver	Vancouver	Y	N	Y	2017
British Columbia	St. John's	St. John's	Y	N	Y	2010
Newfoundland and Labrador	St. John's	St. John's	Y	N	Y	2010
Ontario	Toronto	Toronto	Y	N	Y	2018
Ontario	Oshawa	Oshawa	Y	N	Y	2017
Prince Edward Island	Charlottetown	Charlottetown	Y	N	Y	2018
Quebec	Quebec	Quebec	Y	N	Y	2017
Quebec	Saguenay	Saguenay	Y	N	Y	2012
Quebec	Tremblaine	Tremblaine	Y	N	Y	2016
Quebec	Trois-Rivières	Trois-Rivières	Y	N	Y	2016
Nunavut	N/A	N/A	N	N	N	N/A

MAPPING FACILITY NAMES



We mapped 60% of the 269 cycling facility names to the five Can-BICS facility types by name alone (e.g., 'bike lanes' were categorized as 'Painted Bike Lane'). The remaining 40% (n=108) of facility names required spot checking using Google Maps Street View to categorize the facility. We found that 23% of names related to high comfort routes: 8% cycle tracks, 12% local street bikeways, and 3% bike paths. Overall, 24% related to medium comfort

(multi-use paths) and 28% were low comfort (painted bike lanes). Of note, the proportions represent the frequency of facility name use and not the proportion of the total cycling network represented by the facility, on the ground. One-quarter (26%) of named facilities were not considered a cycling facility in the Can-BICS classification system. These routes comprised three broad types: 'Gravel Trail', 'Shared Lane', and 'Mixed Traffic' street.



Gravel trails are accessible to a narrower range of bicycle types, major street shared curb lanes are uncomfortable for most people, and mixed traffic local streets do not constitute cycling infrastructure.

DESIGN GUIDES

To inform our approach, we reviewed six transportation engineering design guides for cycling infrastructure:

1. TAC Geometric Design Guide (2017)
2. Vancouver Transportation Design Guidelines (2017)
3. CROW Design Manual for Bicycle Traffic, 2nd Edition (2016)
4. NACTO's Urban Bikeway Design Guide, 2nd Edition (2014)
5. NACTO's Designing for All Ages & Abilities (2017)
6. The MassDOT Separated Bike Lane Planning & Design Guide (2015)

Facility Names (Guidance Document)	Consolidated Category
Bike Lanes [1, 4] Painted Bicycle Lane [2] Cycle Lane [3] Buffered Bicycle Lane [5] Bicycle Accessible Shoulders [1] Painted Buffered Bicycle Lane [2] Advisory Bicycle Lanes [1]	Painted Bicycle Lane
Bicycle Boulevards [1, 4, 5] Local Street Bikeway [2] Bicycle Street [3] Shared Roadway [1] Mixed Traffic Street [3] Service Road [3] Low-Speed Shared Street [5]	Local Street Bikeway
Protected Bicycle Lanes [1, 2] Segregated Cycle Path [2] Cycle Track [4] Protected Bicycle Lane [5] Segregated Bicycle Lane [5]	Cycle Track
Bike Paths [1] Off-Street Pathway* [2] Solitary Cycle Path [3] Bicycle Paths [5]	Bike Path
Multi-Use Paths [1] Shared-Use Paths [5] Off-Street Pathway [2] Major Street Shared Use Lane [2] Shared Lanes [1]	Multi-Use Path
	Not Classified

LOW COMFORT

This bicycle facility is a high stress route comfortable for few people. The facility within this category is a painted bike lane. Painted bike lanes offer a marginal improvement in safety compared to cycling on major roads without a bikeway. This facility is characterized by people cycling on busy roadways: in a painted bike lane exclusively for cyclists; in an advisory lane with dashed lane markings on roadways too narrow to provide exclusive cycling space; or in a bicycle accessible shoulder on roads without a curb. Cycling facilities sited next to parked cars have a higher injury risk compared to no parked cars on the roadway.



A painted lane along a busy roadway that is designated by road markings and signs as only for cyclists. Includes advisory bike lanes and bicycle accessible paved shoulders on roads without a curb.

PAINTED BIKE LANE

AKA
•Bicycle Lane
•Bicycle Accessible Shoulder
•Conventional Bicycle Lane