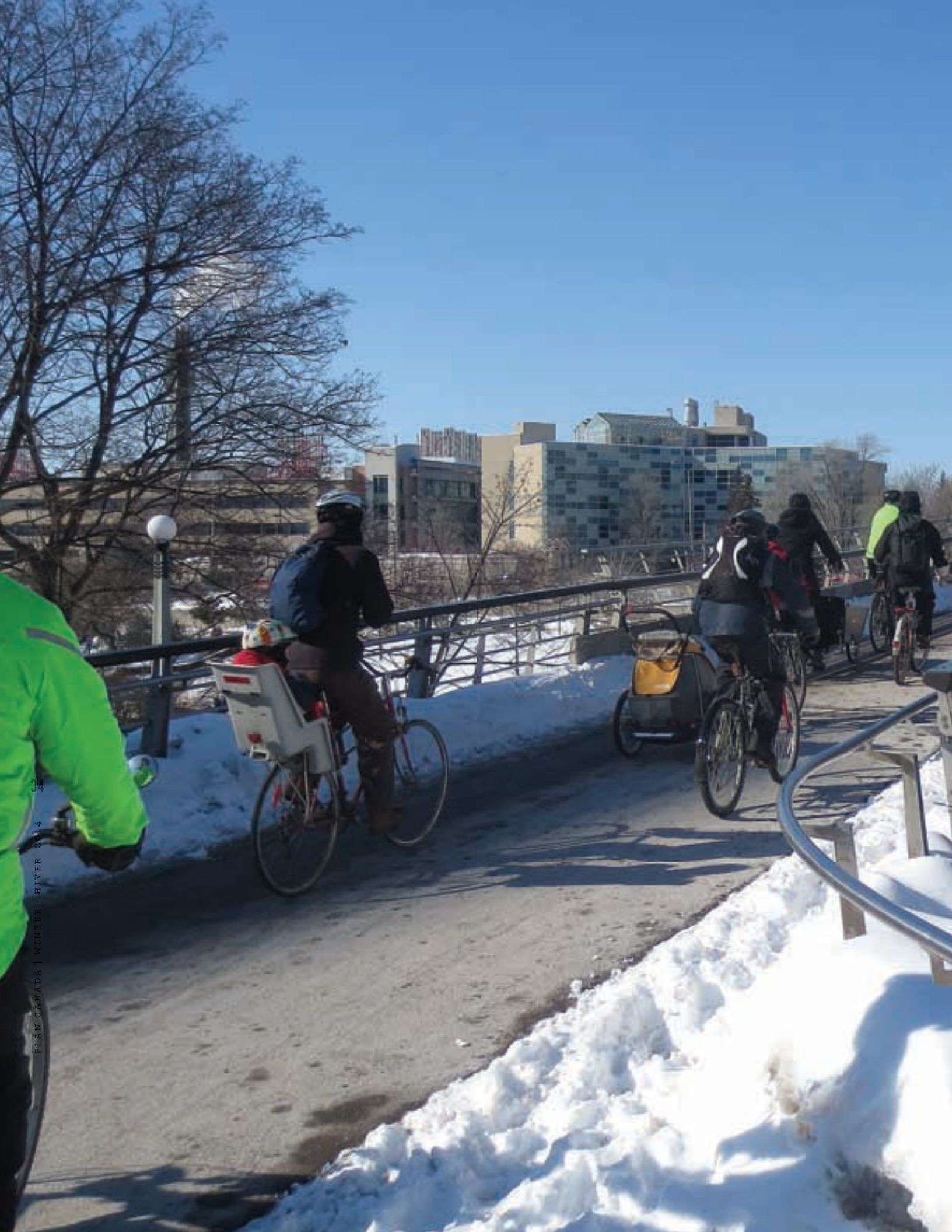
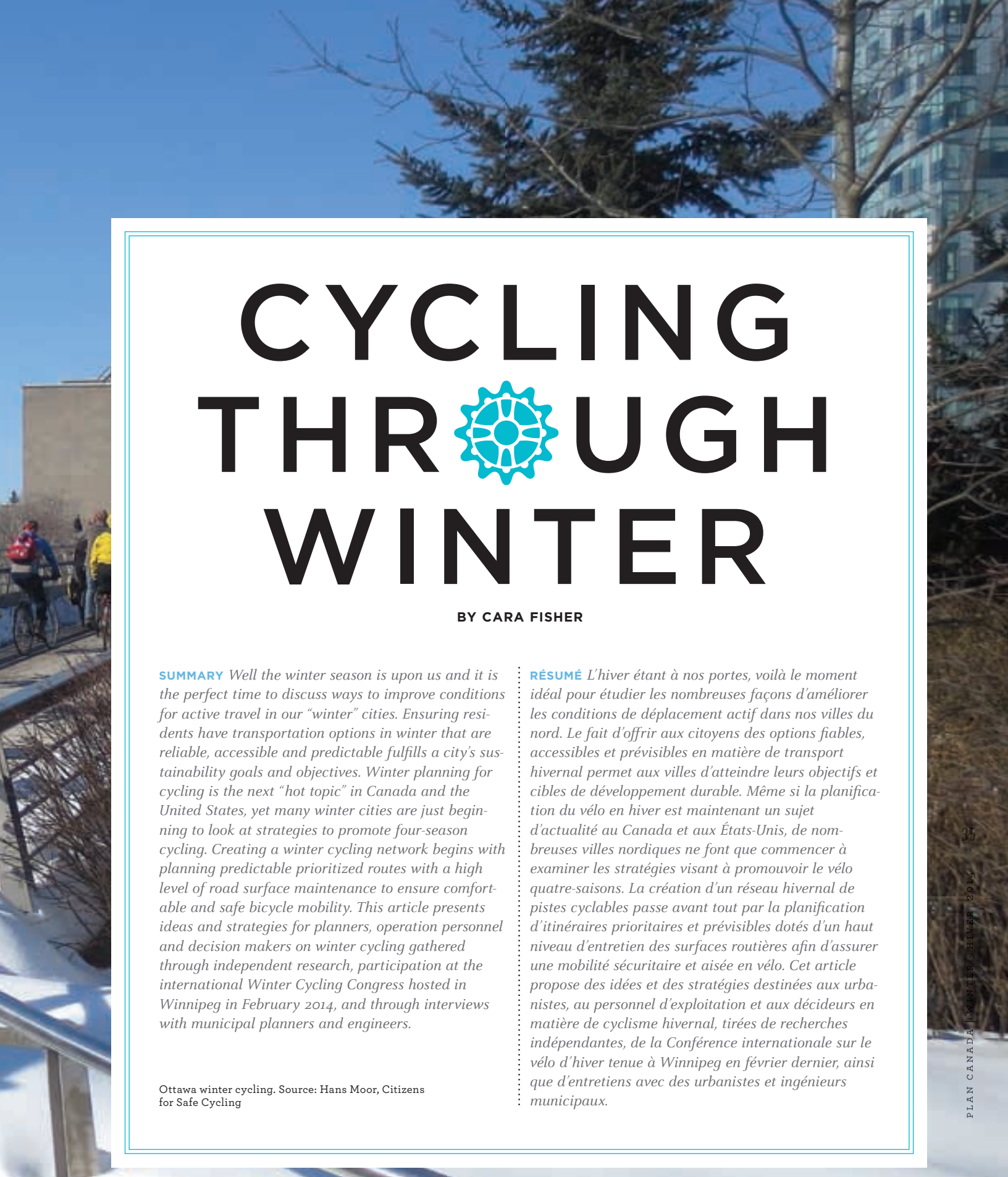




CYCLING THROUGH WINTER

BY CARA FISHER

SUMMARY *Well the winter season is upon us and it is the perfect time to discuss ways to improve conditions for active travel in our "winter" cities. Ensuring residents have transportation options in winter that are reliable, accessible and predictable fulfills a city's sustainability goals and objectives. Winter planning for cycling is the next "hot topic" in Canada and the United States, yet many winter cities are just beginning to look at strategies to promote four-season cycling. Creating a winter cycling network begins with planning predictable prioritized routes with a high level of road surface maintenance to ensure comfortable and safe bicycle mobility. This article presents ideas and strategies for planners, operation personnel and decision makers on winter cycling gathered through independent research, participation at the international Winter Cycling Congress hosted in Winnipeg in February 2014, and through interviews with municipal planners and engineers.*

Ottawa winter cycling. Source: Hans Moor, Citizens for Safe Cycling

RÉSUMÉ *L'hiver étant à nos portes, voilà le moment idéal pour étudier les nombreuses façons d'améliorer les conditions de déplacement actif dans nos villes du nord. Le fait d'offrir aux citoyens des options fiables, accessibles et prévisibles en matière de transport hivernal permet aux villes d'atteindre leurs objectifs et cibles de développement durable. Même si la planification du vélo en hiver est maintenant un sujet d'actualité au Canada et aux États-Unis, de nombreuses villes nordiques ne font que commencer à examiner les stratégies visant à promouvoir le vélo quatre-saisons. La création d'un réseau hivernal de pistes cyclables passe avant tout par la planification d'itinéraires prioritaires et prévisibles dotés d'un haut niveau d'entretien des surfaces routières afin d'assurer une mobilité sécuritaire et aisée en vélo. Cet article propose des idées et des stratégies destinées aux urbanistes, au personnel d'exploitation et aux décideurs en matière de cyclisme hivernal, tirées de recherches indépendantes, de la Conférence internationale sur le vélo d'hiver tenue à Winnipeg en février dernier, ainsi que d'entretiens avec des urbanistes et ingénieurs municipaux.*

Table 1: Peer City Comparison and Profile, 2014

CITY	POPULATION	AVERAGE JANUARY HIGH TEMPERATURE (°C)	AVERAGE JANUARY LOW TEMPERATURE (°C)	AVERAGE SNOWFALL (CM)	BICYCLE MODE SHARE PEAK SEASON	BICYCLE MODE SHARE REPORTED (*) AND ESTIMATED LOW SEASON
BOULDER, COLORADO	98,000	7°	-5°	200	9%	2.25%
SALT LAKE CITY, UTAH	200,000 †	2°	-6°	147	3.5% to 4.8%	0.8% to 1.2%
VIENNA, AUSTRIA	1.7 million	2°	-4°	35	6%	1.5%
COPENHAGEN, DENMARK	570,000	2°	-2°	No Record ‡	36%	9% *
CHICAGO, ILLINOIS	2.7 million	0°	-7°	120	1.3%	0.3%
TORONTO, ONTARIO	2.6 million	-1°	-6°	120	2.2%	0.5%
HAMILTON, ONTARIO	500,000	-2°	-9°	118	0.8%	0.2%
CALGARY, ALBERTA	1.1 million	-1°	-13°	126	1.8% to 2.5%	0.4% to 0.6%
MINNEAPOLIS, MINNESOTA	380,000	-4°	-13°	126	4%	1% *
MONTREAL, QUEBEC	1.6 million	-5°	-12°	200	3.1%	0.7%
OULU, FINLAND	190,000	-7°	- 5°	n/a	33%	9% *
WINNIPEG, MANITOBA	704,800	-10°	- 20°	100	2.1%	0.5%

† (1.1 million metro area) ‡ (61 cm precipitation annual—no record of snowfall)

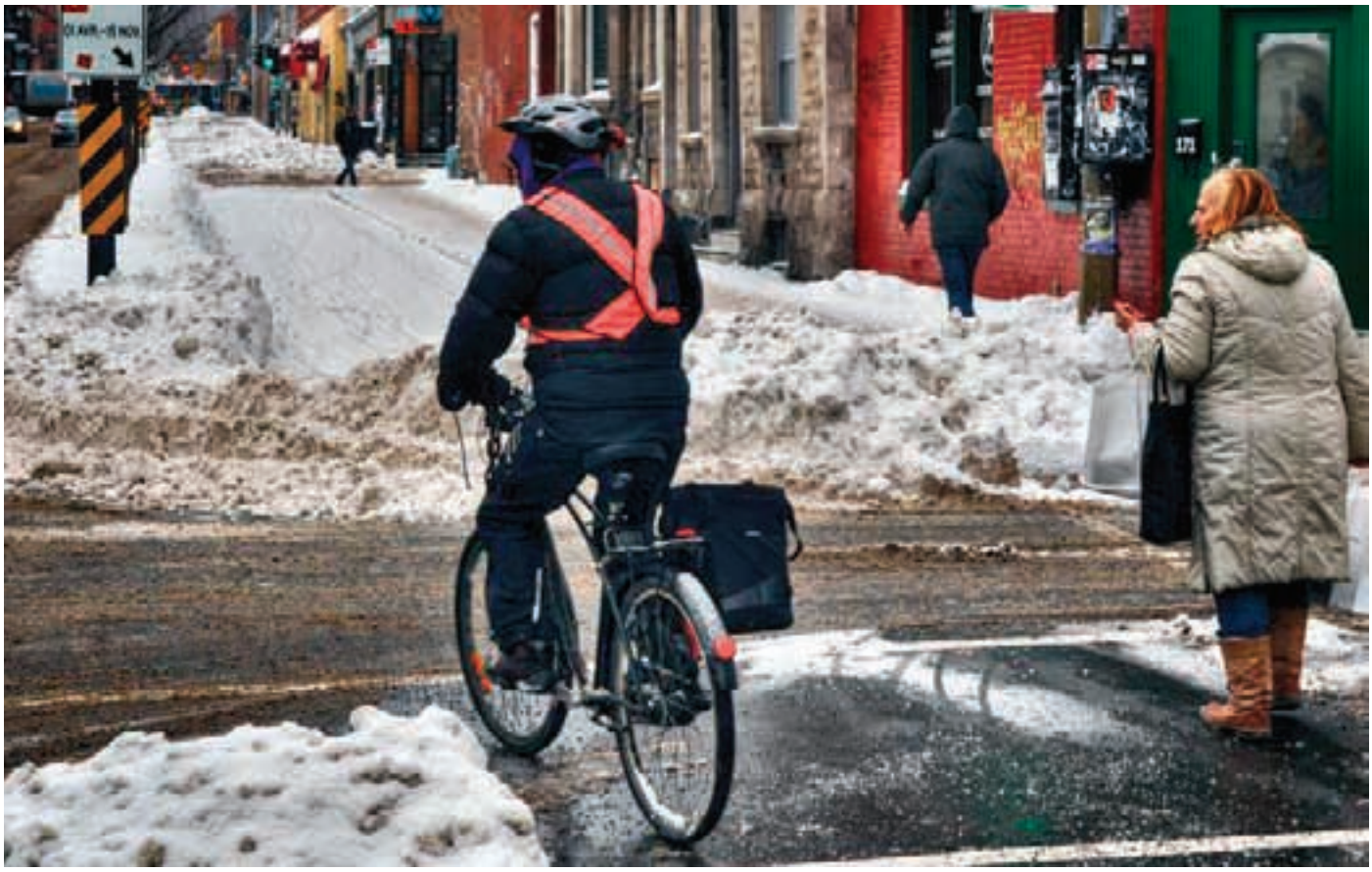
Cycling has experienced a renaissance in cities across North America over the last decade as it is embraced by urbanites for its convenience and affordability, and by governments to mitigate road congestion and climate change. Significant government investments in bicycle infrastructure, as well as complementary policies and programs are transforming the landscape of Canadian and U.S. cities into bike-friendly urban spaces. Evident in the mode share increases in cities such as Vancouver from 1.7% in 1996 to 4.3% in 2014, and from 1% in Montreal to 3.1% in 2012 (up to 9% in central city neighbourhoods), and in the city of Minneapolis from 1.6% to 4% over a 15-year period.[1–5] As cities around the world undertake sustainable transportation initiatives to reduce greenhouse gas emissions, these strategies often have a limited seasonal approach that does not extend to winter. During winter many people shift from active transportation modes to motorized vehicle modes simply to cope with conditions of constrained sidewalks and roadways, and to avoid the elements. As cycling has become a popular urban transportation choice, a portion of the population is adapting to winter weather and continuing to cycle year round.

Cities in Canada and the northern United States have winter climates with snowfall, ice, and freezing temperatures for significant periods of the year. The more you discuss winter weather the more it is apparent winter is not a single phenomenon; conditions vary distinctly between geographic regions, with weather characteristics fluctuating based on temperature, daylight or precipitation (snow). Planning in cold climates must factor in seasonal variation and local weather. As a result, there are different classifications for "winter" cities, as seen in Table 1, such as mild (i.e., Hamilton), moderate (i.e., Calgary, Toronto) and severe (i.e., Montreal, Winnipeg). The purpose of classifying winter cities is to tailor planning, design and maintenance approaches based on local conditions.

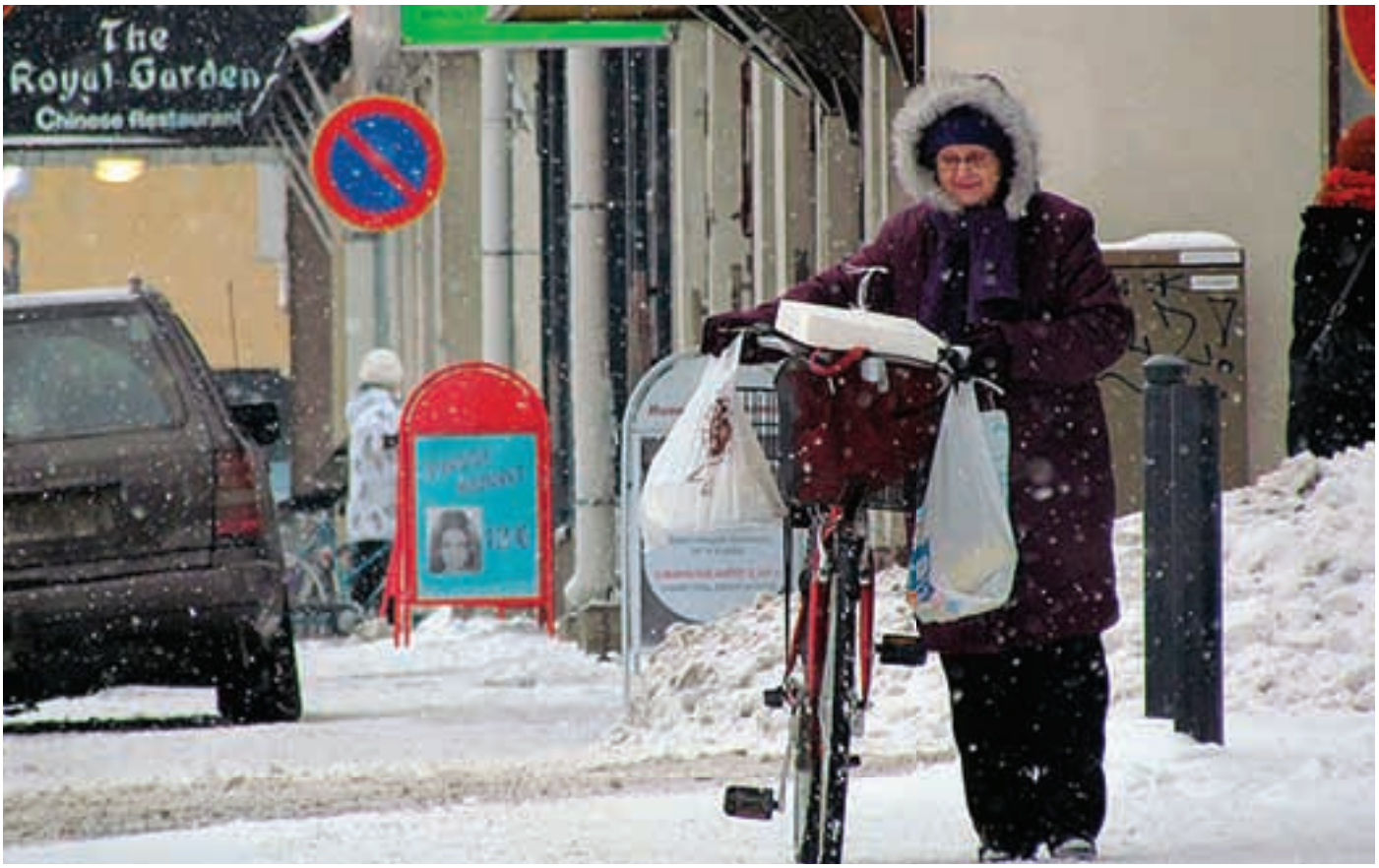
Research into the relationship between winter climate and cycling is limited, yet similar conclusions have been found. Individuals that cycle in winter are dedicated and confident, and the primary trip purpose is commuting to work or for utilitarian purpose. Targeted surveys of winter cyclists concur that a lack of road surface maintenance is the primary deterrent to cycling, not temperature or weather specifically.[6,7,8] Cyclists prefer to travel in dedicated bicycle facilities separated or protected from motor vehicles. However, as most bicycle facilities are not maintained in winter, cyclists change their travel patterns and routes to major arterial or collector roads for more predictable road surface conditions. A major finding from studies in Sweden, Montreal, Minneapolis and Calgary is that an estimated one-quarter or 20 to 25% of the existing cycling population continues to cycle in winter (Table 1), and improved surface maintenance could lead to an additional 12% to 24% mode share retention.[1,6,7,8]

Above: Snow storage area included between roadway and elevated/raised cycle track and sidewalk, Copenhagen, Denmark. Source: Karhula K, 2014.

Below: Winter cycling in Montreal. Source: Vélo Québec.



City of Oulu winter cyclists—young and old cycle through winter. Source: Anders Swanson, 2013.



North American cities are catching up to what is commonplace in some European cities - maintaining bicycle accessibility and mobility during winter. Establishing prioritized routes that are predictable and comfortable leads to higher rates of winter cycling. Oulu, Finland is a severe winter city with a similar climate to Winnipeg. The winter cycling mode share is 9% and people of all ages and abilities continue to cycle year round (the peak season mode share is 33%). Winter cities with high cycling mode share, such as Montreal and Minneapolis, have a responsibility to create a supportive safe environment for year-round cycling. The following conceptual framework is suggested in order to prepare a winter cycling network and maintenance strategy. Examples from cities in Canada, the United States and Europe offer ideas for improving conditions for cycling in winter.

PLAN AND PRIORITIZE

Planning for winter cycling falls within existing transportation goals of improved safety and maintenance. Prioritize bicycle facilities and routes within a snow removal by-law or specific winter maintenance plan. The criteria for identifying priority routes begin with: analysis of origin and destination patterns; identifying a combination of off-street and on-street bicycle facilities, including existing paths or multi-use trails maintained in winter; and consideration of operation and maintenance procedures. The final step is to overlaying the existing road priority snow removal routes with the recommended winter routes to determine a pilot or priority network.

Montreal, Minneapolis, and Vienna, Austria have priority bicycle networks in winter with a high level of surface maintenance. Hamilton and Edmonton have piloted projects with select segments of the network given priority route status and maintenance service.

DESIGN AND PROCEDURES

Future bicycle facilities and general land use planning must factor in snow storage and removal. Adding space to sidewalks or boulevards for snow storage is one lesson from European cities. Coordinating efforts and operations between roads, parks, and active transportation departments will lead to more efficient operations and cost savings. Different maintenance procedures will be

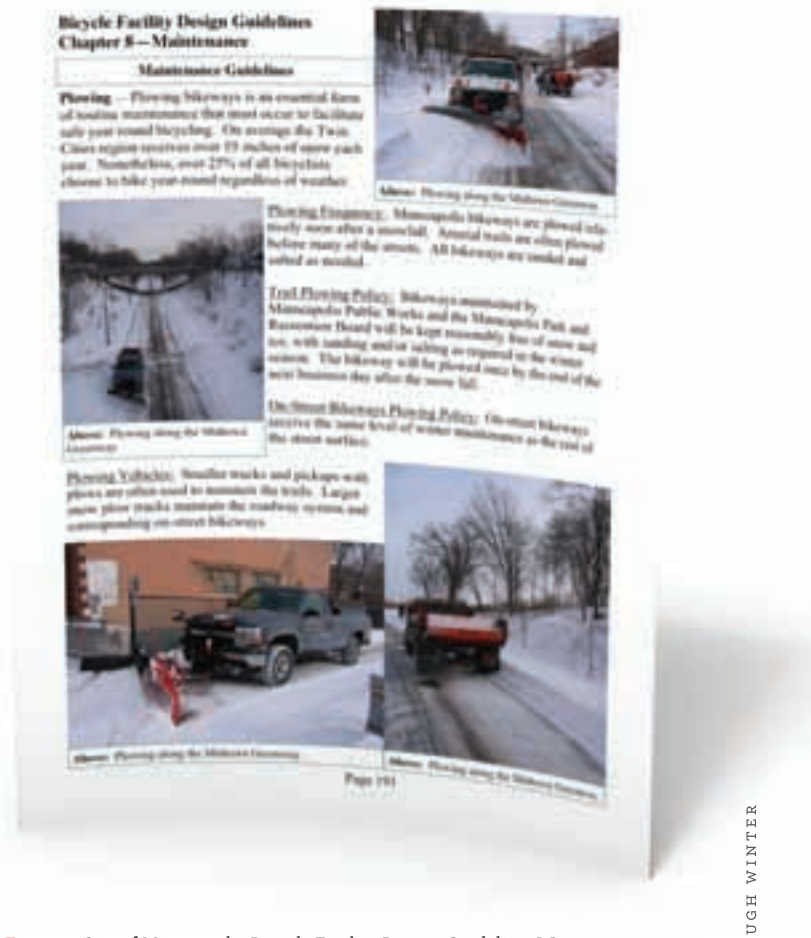
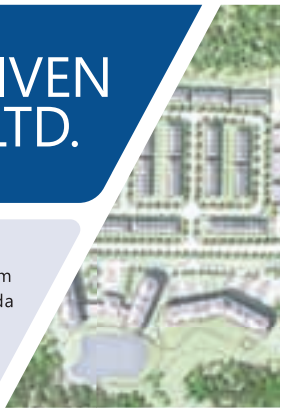


Figure 1: City of Minneapolis Bicycle Facility Design Guideline, Winter Maintenance Section. Source: City of Minneapolis, 2010.

needed based on the route selected and the type of bicycle facility. Operation and maintenance personnel are experts in vehicle requirements, scheduling and surface applications, and their input is valuable in designing a cost-effective and efficient strategy for the bicycle network. Building relationships between planning and public works/operations and getting buy-in is essential for success. Winter cities need to factor winter weather and maintenance procedures into the design of future bicycle facilities (and all transportation infrastructure).

Both Chicago and Salt Lake City have adjusted the design and type of cycle tracks (separated bike lanes) to accommodate maintenance vehicles and winter weather. Copenhagen, Denmark factors snow storage into the design of sidewalks, adding 0.5m space between cycle track and sidewalk for snow.

Calgary uses broom snow sweepers for paved off-street multi-use paths; Montreal and Salt Lake City use pick-up truck plows for cycle tracks and Hamilton uses snowplows and de-icing surface treatments for on-street bike lanes.



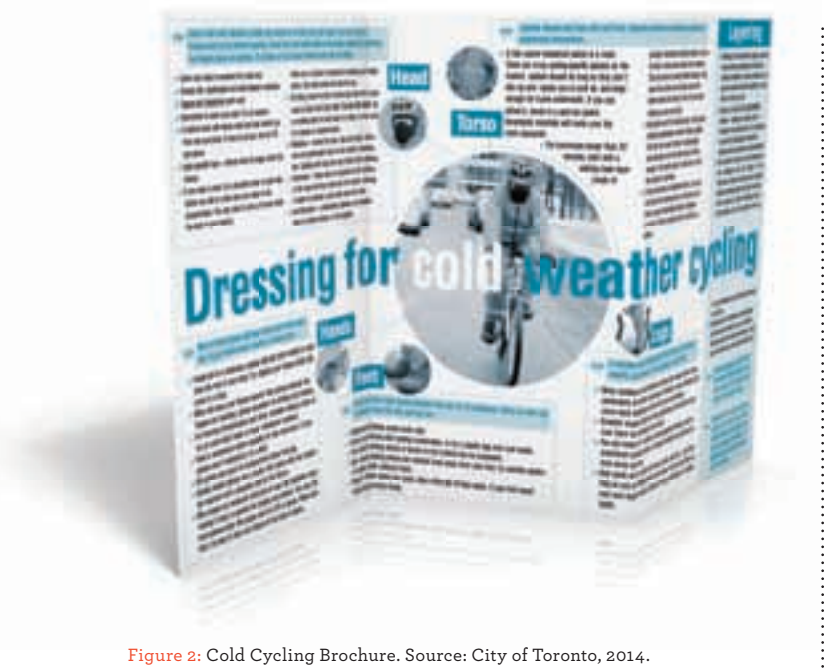


Figure 2: Cold Cycling Brochure. Source: City of Toronto, 2014.

PROMOTION

Communication is essential to informing cyclists and all road users about bicycle programs of the city. Create a winter route map and make information available on the city website, including safe riding tips. A "winter" city can promote a positive attitude towards winter by highlighting its efforts to improve conditions for cycling and this contributes to normalizing winter bicycle commuting and shifts the public perception that winter cyclists are 'crazy'.

Toronto and Whitehorse have a webpage dedicated to winter cycling resources.

Boulder has automated pavement counters that run year-round.

Hamilton conducted one-day manual bike counts to evaluate the winter pilot project. Umeä, Sweden prefers to do in-house maintenance of the bicycle network, while multiple competing contractors maintain the bicycle facilities in Copenhagen.

MONITOR AND EVALUATE

Bicycle counts, local or national censuses, and travel surveys are used to monitor and evaluate transportation mode share levels and travel patterns. Many transportation surveys are conducted in April or May, the beginning of the cycling season. Expanding data collection and travel surveys to occur throughout the year help planners and decision makers better understand the impact of weather and climate on cycling, as well as monitor investments in bicycle infrastructure. Operation and maintenance crews (and contractors) also need monitoring, such as site visits to evaluate maintenance procedures. Specific attention is needed for bridges, underpasses and access points between off-street paths and on-street bicycle facilities to remove gaps in maintenance.

CHALLENGES AND ISSUES

Planning for a winter cycling network needs to address the fact that cyclists often prefer to travel routes that are removed from traffic on bicycle facilities, yet in winter cyclists travel on major arterial or collector roads as they are maintained and predictable. Cyclists do not want to mix with motor vehicle traffic due to constrained roadways and real safety concerns, yet there are no other alternatives. Conversely, motorists do not want to mix with cyclists and tensions between road users increase during winter. Low volume residential streets are good parallel alternatives for cycling, such as bike boulevards or bikeways. However these streets are often designated a low priority for snow clearing or winter maintenance.

Another challenge is on-street bike lanes, a common utilitarian bicycle facility in North American cities. Bike lanes appear to be an easy facility to maintain as they are often on high priority roads. However, bike lanes require a "second pass" or second trip to plow or remove snow. A second pass requires additional operation costs and also requires lower maintenance vehicle speeds (i.e., 30 km versus 50 km per hour). Parked vehicles adjacent to bike lanes can also be a barrier to maintenance, and seasonal restrictions may be necessary to manage on-street parking to facilitate removal of snow and regular maintenance. As bike lanes are so prevalent in Canadian and U.S. cities there is a growing market for innovation, such as designing equipment that can attach to standard snow plow vehicles to reduce the need for a second pass. An additional consideration in cities with high snow accumulation is pavement markings, such as bike lane demarcation, bike boxes, or contra-flow bike lanes which become invisible. The addition of street-level signage may be necessary for dedicated winter routes.

Bicycle parking in Amsterdam. Source: istockphoto/dennisvdw.

CONCLUSION

Equitable transportation planning recognizes that all transportation users—transit riders, pedestrians, motorists and bicyclists– require an accessible transportation system that is available seven days a week, 24 hours a day, 365 days per year. Extending policies, programs and planning to adopt a four-season year-round approach is the next step in sustainable and climate responsive planning. Determining what practices and policies are best suited is based on political will, local weather conditions and the local cycling environment.

The overall goal of supporting winter cycling is to ensure cycling continues to be a safe, viable and comfortable transportation option throughout the winter season. **Plan** a winter cycling network and maintenance strategy with pilot phases that can expand each year.

Prioritize bicycle routes and corridors within the existing network to create comfortable, safe and predictable routes to popular destinations.

Recommendations:

- Engage and involve maintenance workers and operation departments in the planning and implementation of the winter cycling network.
- Update snow removal and clearing by-laws defining the level of service for bicycle facilities for peak commuter travel times.
- Factor winter maintenance into the design of future bicycle facilities.

Establish winter maintenance **PROCEDURES** for bicycle facilities to match operational capabilities

- Experiment and test maintenance procedures for different bicycle facility types.
- Consider independent contracts for the bicycle network.
- Encourage businesses or commercial property owners to maintain (clear) bicycle parking.

PROMOTE the city's efforts to improve maintenance for winter cycling and road safety

- Create a dedicated page or area on a city website for winter cycling.
- Establish a "cold line" or encourage reporting on 311.

MONITOR and evaluate maintenance procedures, contractors and local cycling levels

- Expand monitoring to include a low-season count or automated counters.
- Establish a winter maintenance committee or advisory group.

Adopting four-season transportation policies and climate responsive strategies are the next steps for winter cities as they strive to meet climate change targets and sustainability objectives. Winter planning and design requires context sensitive application to find suitable winter maintenance solutions. What works in Montreal will not necessarily work in Calgary, and what works in Winnipeg will not necessarily work in Toronto. Winter strategies can be integrated into transportation plans, snow removal policies or by-laws, or in bicycle facility design guidelines. Winter cities, especially bike-friendly winter cities, have a responsibility to provide predictable, safe, prioritized winter cycling networks. ■

CARA FISHER is an Associate of the Winter Cities Institute. Share your "winter" city ideas, interests and examples with her at: cara.gn.fisher@gmail.com

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