

Reimagining the Complete Street

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There are 5,600 kilometres of streets in the City of Toronto accounting for approximately one-quarter of land use in the City (City of Toronto, n.d.). This is roughly equivalent to the distance between Toronto and Whitehorse, Yukon.

Toronto's streets vary in size and use, from local neighbourhood roads to wide arterials for fast moving vehicles. Many of Toronto's streets prioritize the movement of private automobiles over other road uses such as transit, walking and cycling. Through various design interventions, there exists an opportunity to create complete and green streets that contribute to the City's ecological resilience and promote sustainable lifestyles across our communities.

Complete Streets are designed to be safe for everyone: people who walk, bicycle, take transit, or drive, and people of all ages and abilities. Instead of singularly prioritizing the movement of vehicles, they prioritize multiple street uses and modes of transportation (Complete Streets for Canada, n.d.).

Green Streets incorporate green infrastructure, including natural and human-made elements such as trees, green walls, stormwater management systems and other low impact development (LID) interventions that provide ecological and hydrological functions (City of Toronto, n.d.).

In their current form, many Toronto streets negatively contribute to urban water management, ecology, air quality and public safety. For example:

- **Runoff** occurs when stormwater cannot be absorbed by **impervious surfaces**, including pavement, shingled roofs, cement surfaces and more. Runoff often carries toxic chemicals which end up in our river systems, and eventually, Lake Ontario (Environment and Climate Change Canada, 2013).
- **Transportation** accounts for 36% of total **greenhouse gas** (GHG) emissions in Toronto. Emissions from passenger vehicles, commercial vehicles and busses account for 97% of transportation emissions (City of Toronto, 2019). GHG emissions contribute to climate change, reduce air quality and are harmful to public and environmental health.
- **Increasing** the proportion of trips made by **cycling and walking** can help reduce carbon emissions and improve population health. In many of Toronto's streets, missing or narrow sidewalks, a lack of protected cycling infrastructure, and the risk of being hit by motorists make these mobility choices unattractive. As the COVID-19 pandemic has made clear, sidewalks are often too narrow to enable safe physical distancing. For more people to feel comfortable walking or biking, streets need to be fundamentally redesigned.

We have evaluated how these issues manifest in a local context, and propose interventions to transform a streetscape into a complete and green street that can serve as a model to be scaled across the City. **The Queensway** is an approximately 18-kilometre east-west arterial road in the Cities of Toronto and Mississauga. Our analysis focuses on an approximately 250 metre section

of the roadway between the commercial plaza at 125 The Queensway and the intersection at Smithfield Drive. The right of way width in this section is 30 metres (City of Toronto, 2010). There are four bi-directional vehicular lanes, and dedicated turning lanes in some sections. The street is lined by low-rise commercial buildings, parking lots, and the Ontario Food Terminal. The City of Toronto has proposed some upgrades to The Queensway to reflect a Complete Street model, however our proposed interventions advance the Complete Street idea to integrate Green Street features that contribute to resilience and sustainability. Our proposal includes:

- **Rain Gardens:** Landscaped gardens for stormwater collection to limit water flow into drainage systems and waterways, reducing the risk of drainage problems, flooding, erosion, and contaminants entering natural habitats (Siwiec, Erlandsen & Vennemo, 2018; TRCA, 2016).
- **Bioswales:** Shallow, narrow, landscaped depressions meant to capture stormwater runoff, filtering pollutants, and redirecting the runoff on a desired path (Anderson et al, 2016; NACTO, n.d.).
- **Urban Forest:** Trees in cities offer GHG emission sequestration, air pollution filtration, stormwater management and flood mitigation. They also introduce wildlife habitats, offer heat protection and cool the air (Alvey, 2006)
- **Silva Cells:** Flexible and modular soil containment systems that transfer the weight of heavy surface loads to a deeper layer belowground, providing space for lightly compacted soil enabling root growth under favourable conditions (Deep Root, n.d.)
- **Multi-Modal Transportation:** Allows street users to choose a variety of mobility types that are accessible and effective for moving through the City, including dedicated transit lanes, cycle lanes and wide sidewalks. Safety for these users is improved by narrowing vehicle lanes and introducing buffers to better separate vehicles from other road users.
- **Intensification:** Low-density lands can be redeveloped for enhanced use, and in support of multi-modal transportation and a stronger community.

We identify that streetscape redesign can present challenges. A cultural change among road users is required, particularly when reducing automotive space. Furthermore, redesign can be costly, especially when emerging technologies are integrated. Finally, it is vital to ensure that street transformation is prioritized and sequenced in a way that is equitable and deliberate so as to ensure that certain communities do not disproportionately receive benefits over others.

As a major city on the international stage and the most populated city in Canada, Toronto has a responsibility to lead by example as it develops for the future. Green and Complete streetscape redesign, as exemplified on The Queensway, showcases how interventions can be scaled across the City to integrate resilient infrastructure. We hope that this work provides an example of how United Nations Sustainable Development Goals can be advanced at a practical urban scale, and inspire change in the built environment for improved places for people and the planet.

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