
SIDEWALK TORONTO
BREAKOUT 4
Sustainability

Breakout Agenda

5 mins	**Waterfront Toronto**
15 mins	**Sidewalk Labs**
10 mins	**Q & A**
15 mins	**Table Discussion**
5 mins	**Report Back**

WATERFRONToronto

Roundtable 4 - December 8, 2018

Sustainability

Breakout Room

Aaron Barter, Innovation and Sustainability Manager

Waterfront Toronto Quayside RFP Objectives

WATERFRONToronto

1. Sustainability, Resiliency and Urban Innovation:

Create a globally significant demonstration project that advances a new market model for climate-positive urban developments.

2. Complete Communities:

Establish a complete community that emphasizes quality of place, and provides a range of housing types for families of all sizes and income levels within a robust mix of uses, including public open space, culture, recreation, vibrant retail, education-related activities and offices.

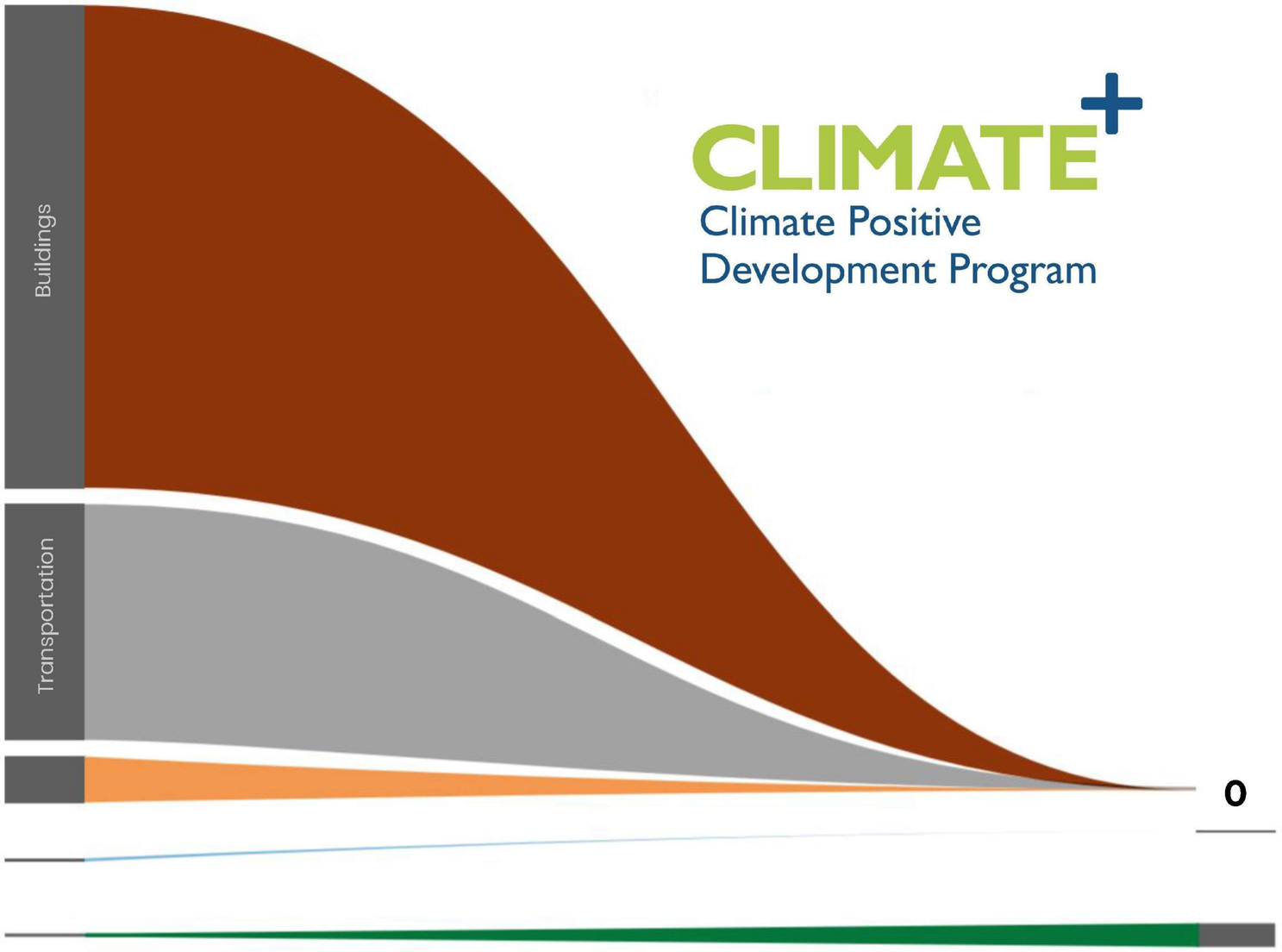
3. Economic Development and Prosperity:

Provide a testbed for Canada's cleantech, building materials and broader innovation-driven sectors to support their growth and competitiveness in global markets.

4. Partnership and Investment:

Develop a new partnership model that ensures a solid financial foundation, manages financial risk and secures revenue that funds future phases of waterfront revitalization.

What is ‘Climate Positive’ urban development?



CLIMATE+
Climate Positive
Development Program

The Climate Positive Development Program supports the development of urban projects that seek to meet an emissions target of **net-negative operational greenhouse gas (GHG) emissions** associated with energy, waste and transportation.

This ambitious outcome is achieved by **reducing emissions on-site, and offsetting emissions by reducing carbon** in neighbouring communities.

What is ‘Climate Positive’ urban development?

- Aiming to create **replicable models** for large-scale urban communities that reduce GHG emissions to greatest possible extent.
- Seeking to **achieve the highest standards of sustainability** and deploy innovate climate resilient solutions.
- Projects often include **close collaboration with the public sector and private sector** to enable holistic planning and development.
- Currently 18 projects across six continents including the **Stockholm Royal Seaport** in Sweden, **Barangaroo** in Sydney, Australia, and **Elephant & Castle** in London, UK.

Interested in learning more?

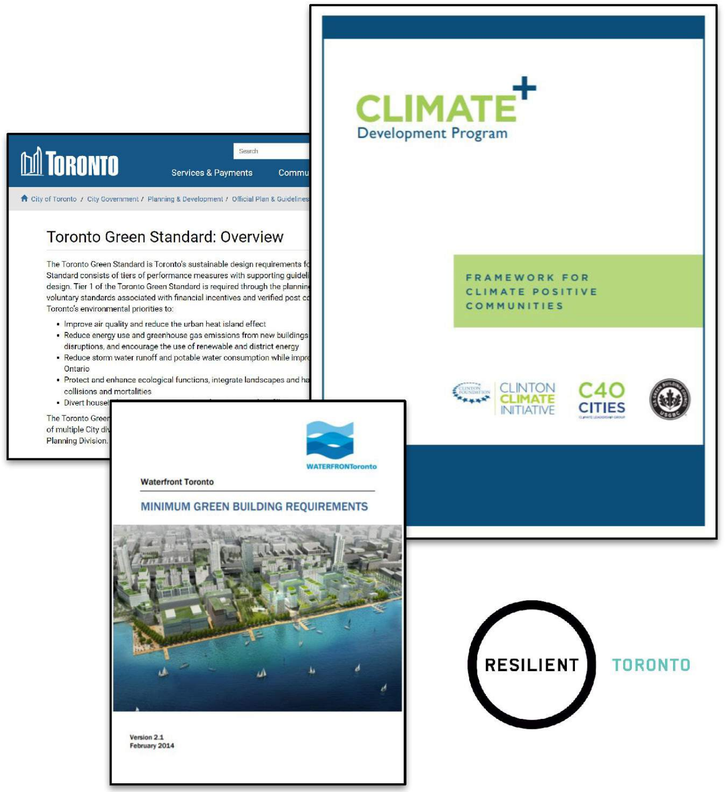
Published May 31, 2017

Waterfront Toronto Priority Objectives

Sustainability and Climate Positive Development

Enable the development of a neighborhood with below-zero annual greenhouse gas emissions at full build-out, as defined by the C40 Climate Positive Framework, with a further focus on:

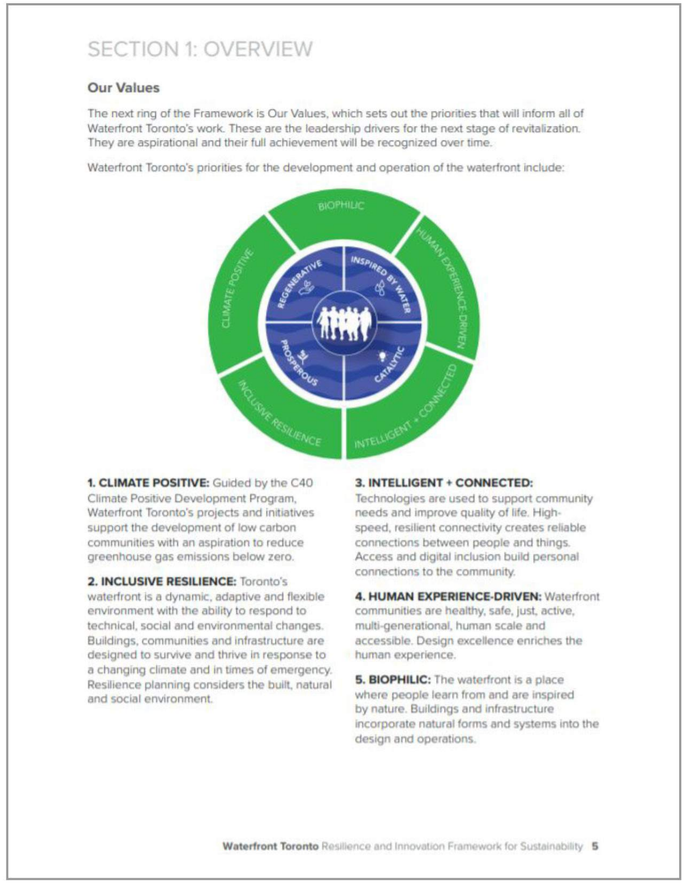
- ✓ **Exemplary Building Standards** - Building design that supports Waterfront Toronto's climate positive aspirations, including aligning with the highest tier of the latest Toronto Green Standard. Buildings represent 60% of GHG emissions in Toronto.
- ✓ **Sustainable Mobility** - Infrastructure and policies that enable carbon emitting vehicles to be replaced with electric vehicles to achieve zero emissions and climate positive targets. Transportation represents 32% of GHG emissions in Toronto.
- ✓ **Affordable Utilities** - Ensure levels of affordability comparable to the average cost of utilities in Toronto.
- ✓ **Circular Economy** - Accelerate a local transition towards a circular economy that establishes a pathway to zero operational waste.
- ✓ **Resilient Infrastructure** - Address the Resilient TO initiative by better preparing buildings and infrastructure to survive and thrive in response to a changing climate and in emergencies.



Waterfront Toronto Priority Objectives

Sustainability and Climate Positive Development

More background in our 2017 Resilience and Innovation Framework for Sustainability:



SECTION 1: OVERVIEW

Our Values

The next ring of the Framework is Our Values, which sets out the priorities that will inform all of Waterfront Toronto's work. These are the leadership drivers for the next stage of revitalization. They are aspirational and their full achievement will be recognized over time.

Waterfront Toronto's priorities for the development and operation of the waterfront include:

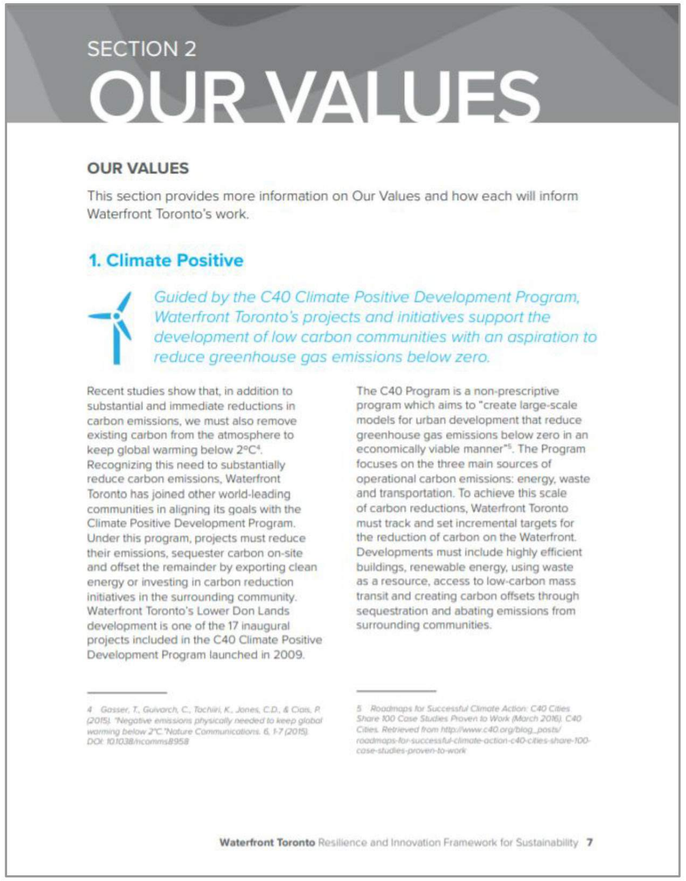
1. CLIMATE POSITIVE: Guided by the C40 Climate Positive Development Program, Waterfront Toronto's projects and initiatives support the development of low carbon communities with an aspiration to reduce greenhouse gas emissions below zero.

2. INCLUSIVE RESILIENCE: Toronto's waterfront is a dynamic, adaptive and flexible environment with the ability to respond to technical, social and environmental changes. Buildings, communities and infrastructure are designed to survive and thrive in response to a changing climate and in times of emergency. Resilience planning considers the built, natural and social environment.

3. INTELLIGENT + CONNECTED: Technologies are used to support community needs and improve quality of life. High-speed, resilient connectivity creates reliable connections between people and things. Access and digital inclusion build personal connections to the community.

4. HUMAN EXPERIENCE-DRIVEN: Waterfront communities are healthy, safe, just, active, multi-generational, human scale and accessible. Design excellence enriches the human experience.

5. BIOPHILIC: The waterfront is a place where people learn from and are inspired by nature. Buildings and infrastructure incorporate natural forms and systems into the design and operations.



SECTION 2

OUR VALUES

OUR VALUES

This section provides more information on Our Values and how each will inform Waterfront Toronto's work.

1. Climate Positive

Guided by the C40 Climate Positive Development Program, Waterfront Toronto's projects and initiatives support the development of low carbon communities with an aspiration to reduce greenhouse gas emissions below zero.

Recent studies show that, in addition to substantial and immediate reductions in carbon emissions, we must also remove existing carbon from the atmosphere to keep global warming below 2°C[4]. Recognizing this need to substantially reduce carbon emissions, Waterfront Toronto has joined other world-leading communities in aligning its goals with the Climate Positive Development Program. Under this program, projects must reduce their emissions, sequester carbon on-site and offset the remainder by exporting clean energy or investing in carbon reduction initiatives in the surrounding community. Waterfront Toronto's Lower Don Lands development is one of the 17 inaugural projects included in the C40 Climate Positive Development Program launched in 2009.

The C40 Program is a non-prescriptive program which aims to "create large-scale models for urban development that reduce greenhouse gas emissions below zero in an economically viable manner"[5]. The Program focuses on the three main sources of operational carbon emissions: energy, waste and transportation. To achieve this scale of carbon reductions, Waterfront Toronto must track and set incremental targets for the reduction of carbon on the Waterfront. Developments must include highly efficient buildings, renewable energy, using waste as a resource, access to low-carbon mass transit and creating carbon offsets through sequestration and abating emissions from surrounding communities.

4 Gasser, T., Guivarch, C., Tachiiri, K., Jones, C.D., & Ciais, P. (2015). "Negative emissions physically needed to keep global warming below 2°C."Nature Communications. 6, 1-7 (2015). DOI: 10.1038/ncomms8958

5 Roadmaps for Successful Climate Action: C40 Cities Share 100 Case Studies Proven to Work (March 2016). C40 Cities. Retrieved from http://www.c40.org/blog_posts/roadmaps-for-successful-climate-action-c40-cities-share-100-case-studies-proven-to-work

Waterfront Toronto Priority Objectives

Snapshot: Alignment with City of Toronto Policy Priorities

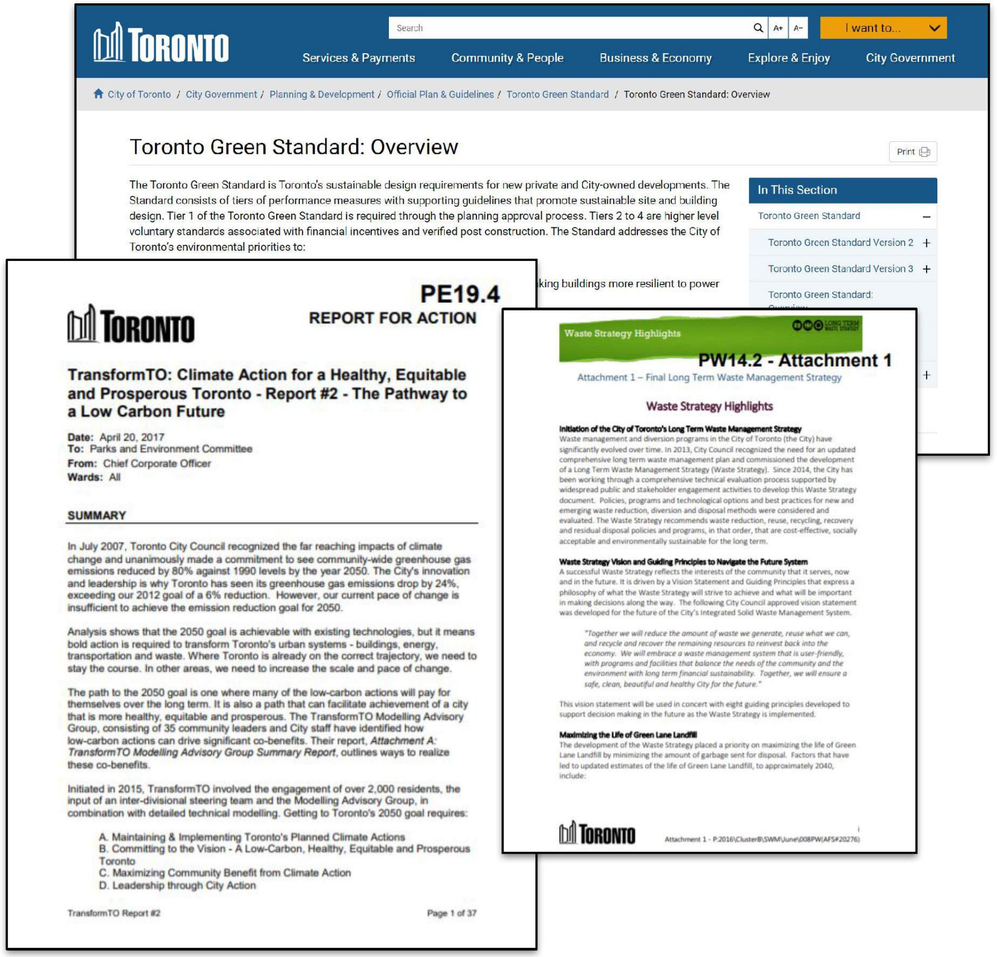
Toronto Green Standard Version 3

Toronto Green Streets Technical Guidelines

Long Term Waste Management Strategy

TransformTO

Wet Weather Flow Management Guidelines



Waterfront Toronto Priority Objectives

Snapshot: Alignment with City of Toronto Policy Priorities

Toronto Green Standard Version 3	The new **TGS Version 3** builds upon City leadership since 2006 on green building standards, featuring TEUI, TEDI, and GHG targets, as MNECB-based codes (e.g. TGS V2, MGBR V2.1) may not deliver reductions needed for City climate change goals.
Toronto Green Streets Technical Guidelines	**Version 1.0 of GSTG** from November 2017 highlights the importance of utilizing the 'treatment train' of green infrastructure for managing runoff, using tools such as permeable pavers and tree trenches, and refers to operations and maintenance.
Long Term Waste Management Strategy	**The 2016 LTWM Strategy** targets 70% reduction by 2026 on a City-wide path to zero waste, considering "waste tracking technology to provide data and statistics for MURBs" as well as live tracking of waste, recycling, organic waste volumes.
TransformTO	**Report #2: Part E (Urban System Transformation)** from April 2017 includes expanding low-carbon mobility and electrification, building energy performance, renewable and community energy approaches, and virtual waste elimination.
Wet Weather Flow Management Guidelines	The **WWF Master Plan** prioritizes re-establishing a natural hydrologic cycle with green infrastructure, improving water quality in Lake Ontario, water and sediment quality, and eliminating CSO sewage, as well as other key City objectives.

BREAKOUT 4

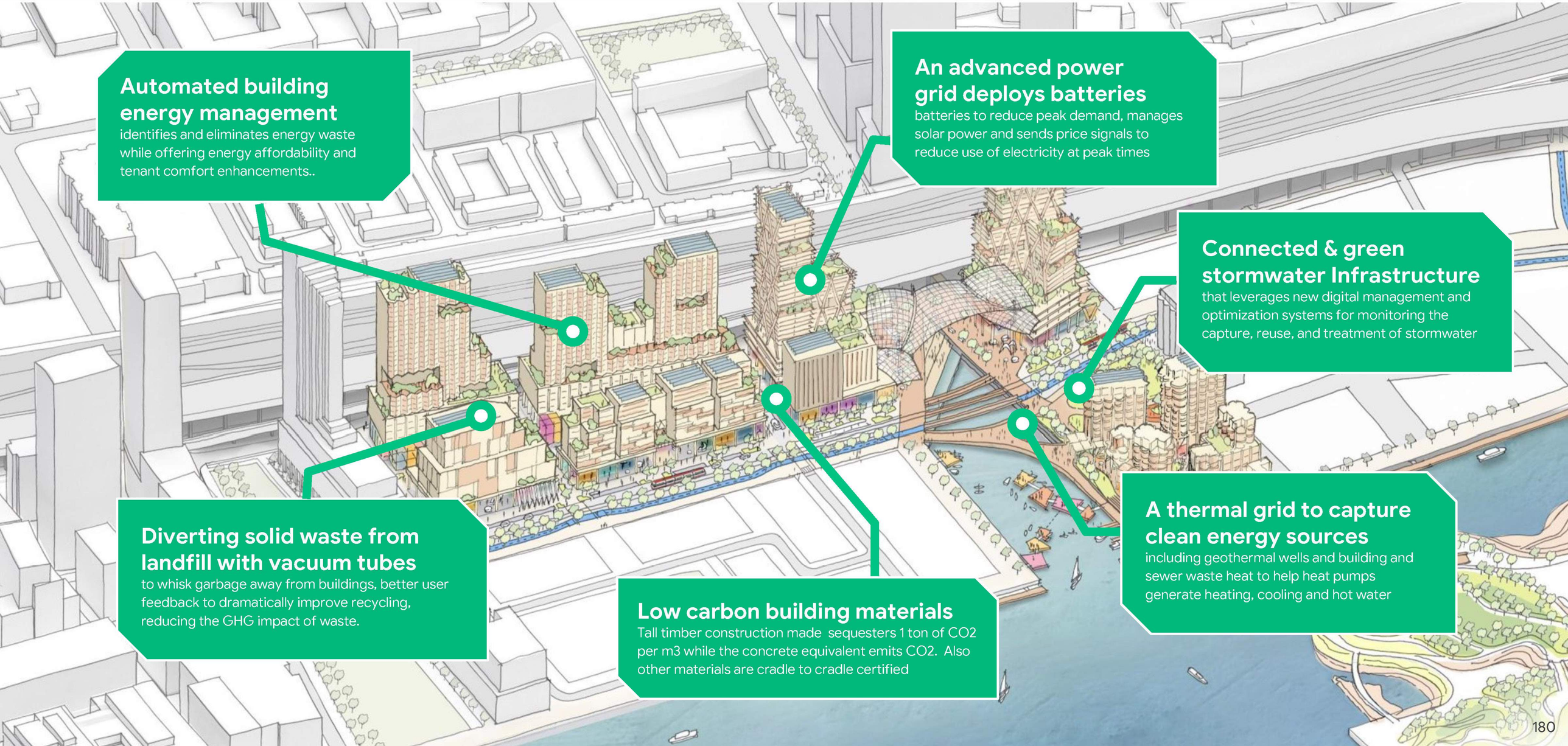
Charlotte Matthews

SIDEWALK LABS

Sidewalk Toronto: Our Vision for Sustainability

A new standard of sustainability that builds on the leadership of the City of Toronto and Waterfront Toronto to create **a blueprint for climate-positive communities**.

Creating a Blueprint Climate Positive Neighbourhood



Electrification & Clean Energy

Using clean electricity for heating and hot water is a crucial step to achieving climate positive, but to be replicable throughout Toronto, it must also be affordable.

60%

Percentage of Toronto's GHG emissions from buildings, similar to other dense urban environments globally

GTHA GHG Inventory. TAF, 2017

87%

Percentage of building GHG emissions in Toronto are from the combustion of natural gas for heating and hot water

GTHA GHG Inventory. TAF, 2017

5x

Electricity prices are 5x as much as natural gas, but clean electricity is critical to GHG reductions

Published rates, Ontario. 2017

Sidewalk Toronto's Approach to Affordable Electrification

No Natural Gas Infrastructure

Use heat pumps and fossil-fuel free thermal grid in lieu of boilers

Manage Electrical Demands

To fit within within existing power grid capacity, by low load buildings and dynamic utility pricing

Eliminate Energy Waste

Weed out the electricity use no one cares about, to reduce cost

= Affordable Electrification

Our Approach to Affordable Electrification

Technologies & Infrastructure

Toronto Hydro distribution as the primary source of electricity

Rooftop solar PV will provide 9% of neighbourhood peak demand

Energy storage to cover up to 60% of peak demand for 2 hours

Infrastructure to support electric vehicles and light rail (LRT)

Space & hot water heating with heat pumps tied into thermal grid w/ geothermal wells and sewer heat recovery

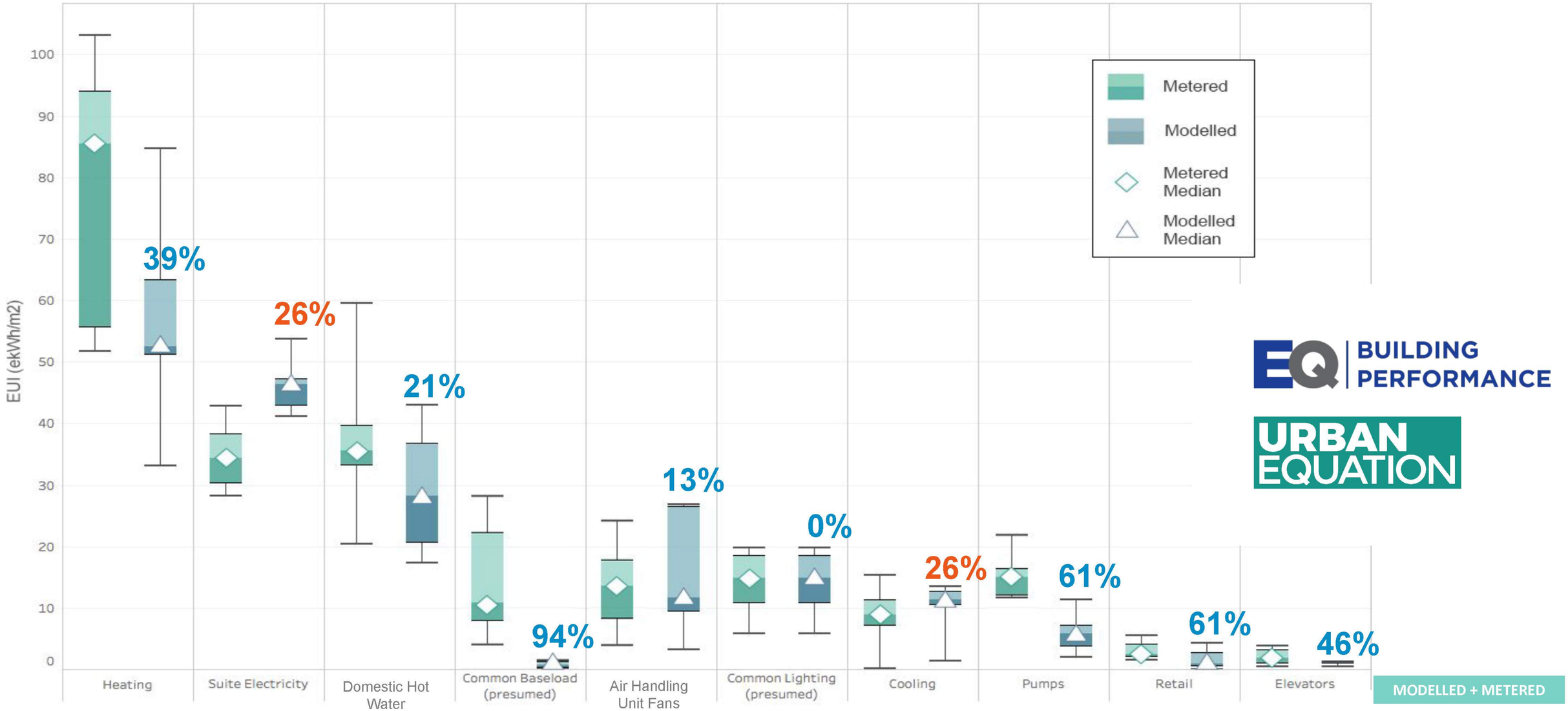
Toronto Green Standards V3 Tier 3 buildings retain heat through 3-day power outage

New rates to reward load-shifting and use of renewable energy and storage

Automated response to energy rates, saving money and reducing GHGs

Modelled vs. Metered Energy Use of Recent Toronto Multifamily Projects

On average, the studied multifamily buildings used 13% more energy than models predicated.



What Makes Reducing Building Energy Demands So Hard

Our strategy includes technology development to address these four challenges in delivering energy and utility cost efficiency.

Developers Demonstrate Code Compliance with Energy Models

Studies show that buildings generally use more energy than their code compliance models and green building ratings predict and energy use intensity (kWh/m2) varies widely between buildings, even those of a similar age and rating.

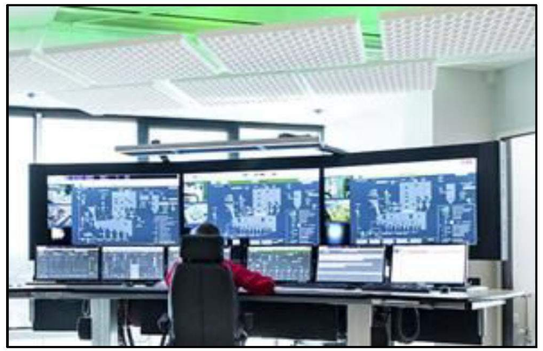
Tenants Do Not Respond to Utility Price Signals without Automation

Time-of-use utility rate pilots with automated control of thermostats, water heaters and appliances show significantly greater peak demand reductions and customer cost savings than those without.

Tenants are Not Actively Controlling the Energy Uses Under Their Control

Well over half of building energy use is attributable to tenant space temperature, hot water, lighting, and plug loads. No one in the office is actively controlling these uses with an eye to waste or cost.

So Much Equipment Is Operated According to a PreSet or Left On

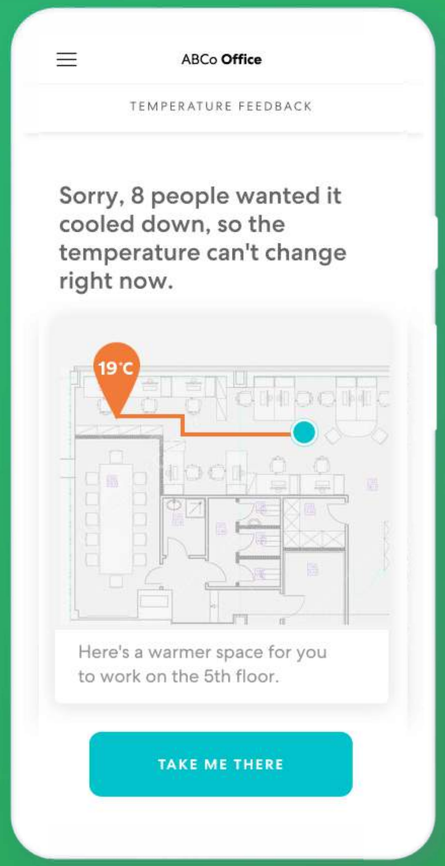


Most equipment is run with a “set it and leave it” approach. This wastes energy and can even degrade comfort in the gap between the programmed setting and schedule and what tenants want and when they want it.

A New Tool to Eliminate Energy Waste in the Office and Core Systems

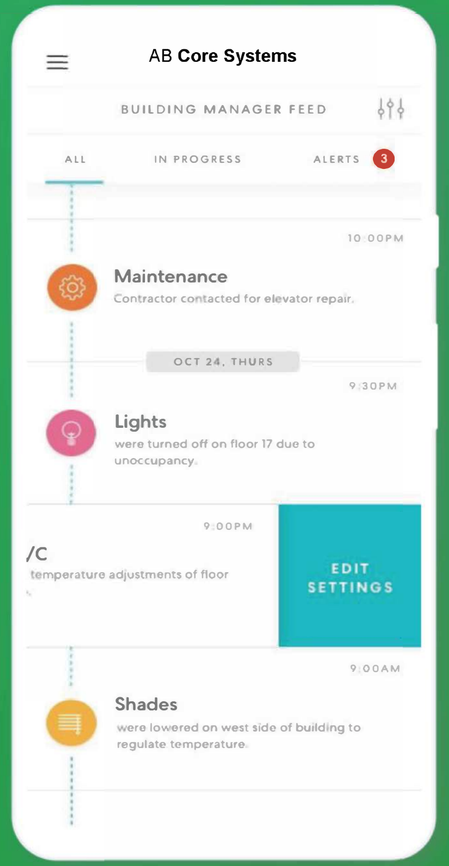
More comfortable, responsive office spaces with improved energy efficiency and less effort to control building systems.

Fully Responsive Spaces



AB Office responds fully and fairly to tenant comfort requests

Operational Efficiencies



AB Core Systems handles a lot of the nuisance in managing a building.

Sustainable Buildings are About More Than Energy

New materials and technologies to create more livable spaces

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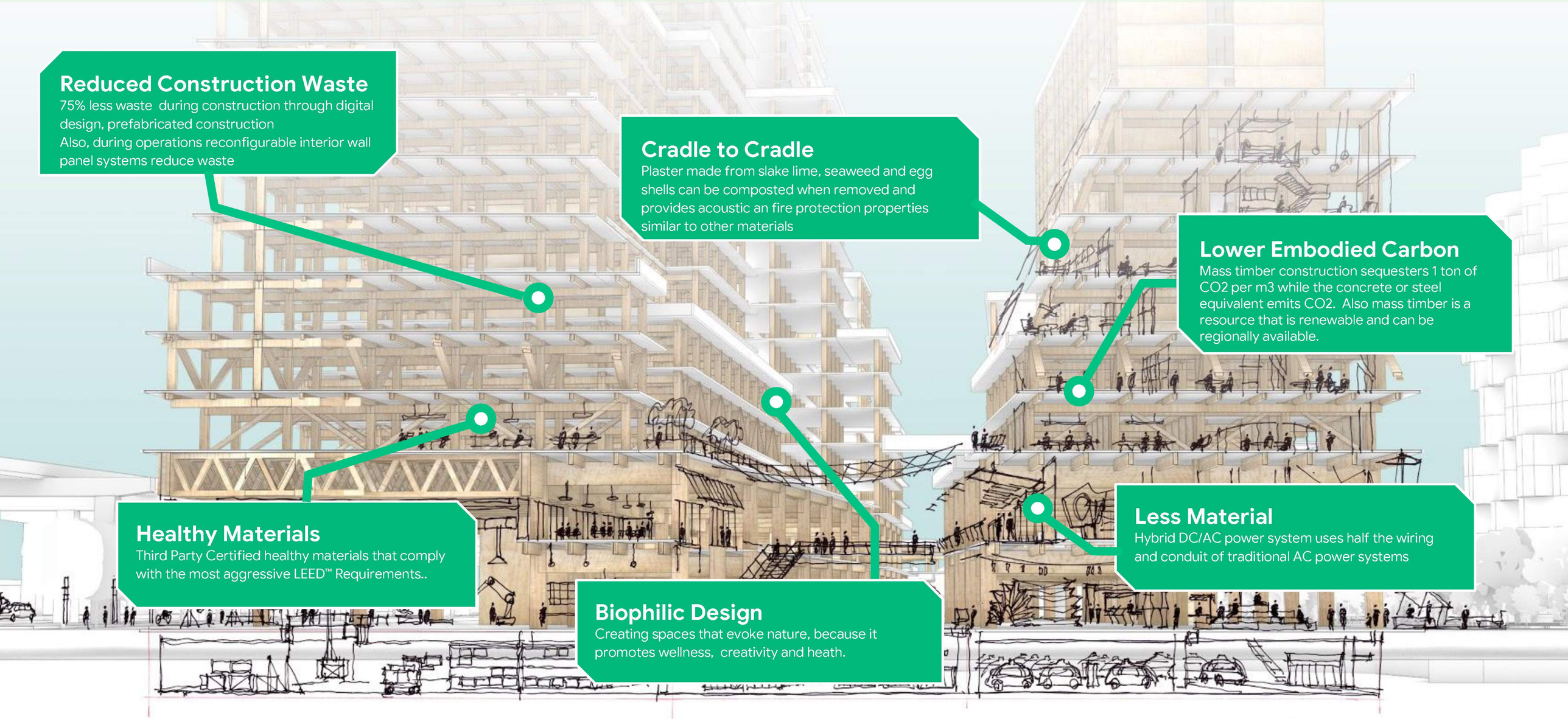


Reduced Construction Waste

75% less waste during construction through digital design, prefabricated construction
Also, during operations reconfigurable interior wall panel systems reduce waste

Cradle to Cradle

Plaster made from slake lime, seaweed and egg shells can be composted when removed and provides acoustic an fire protection properties similar to other materials

Lower Embodied Carbon

Mass timber construction sequesters 1 ton of CO_2 per m3 while the concrete or steel equivalent emits CO_2. Also mass timber is a resource that is renewable and can be regionally available.

Healthy Materials

Third Party Certified healthy materials that comply with the most aggressive LEED™ Requirements..

Biophilic Design

Creating spaces that evoke nature, because it promotes wellness, creativity and heath.

Less Material

Hybrid DC/AC power system uses half the wiring and conduit of traditional AC power systems

Synergistic Benefits of “Green Infrastructure” for Stormwater

Our Approach to Stormwater Management

Reduce Heat Island Effect
Plants shade surfaces, reflect radiation, and release moisture to cool the urban environment

Enhance Biophilia
Natural landscapes improve health and well being in the built world while embracing the seasons

Reconnect with Lake Ontario
Land-Water Scapes direct the public to the waterfront with the natural flow of streams

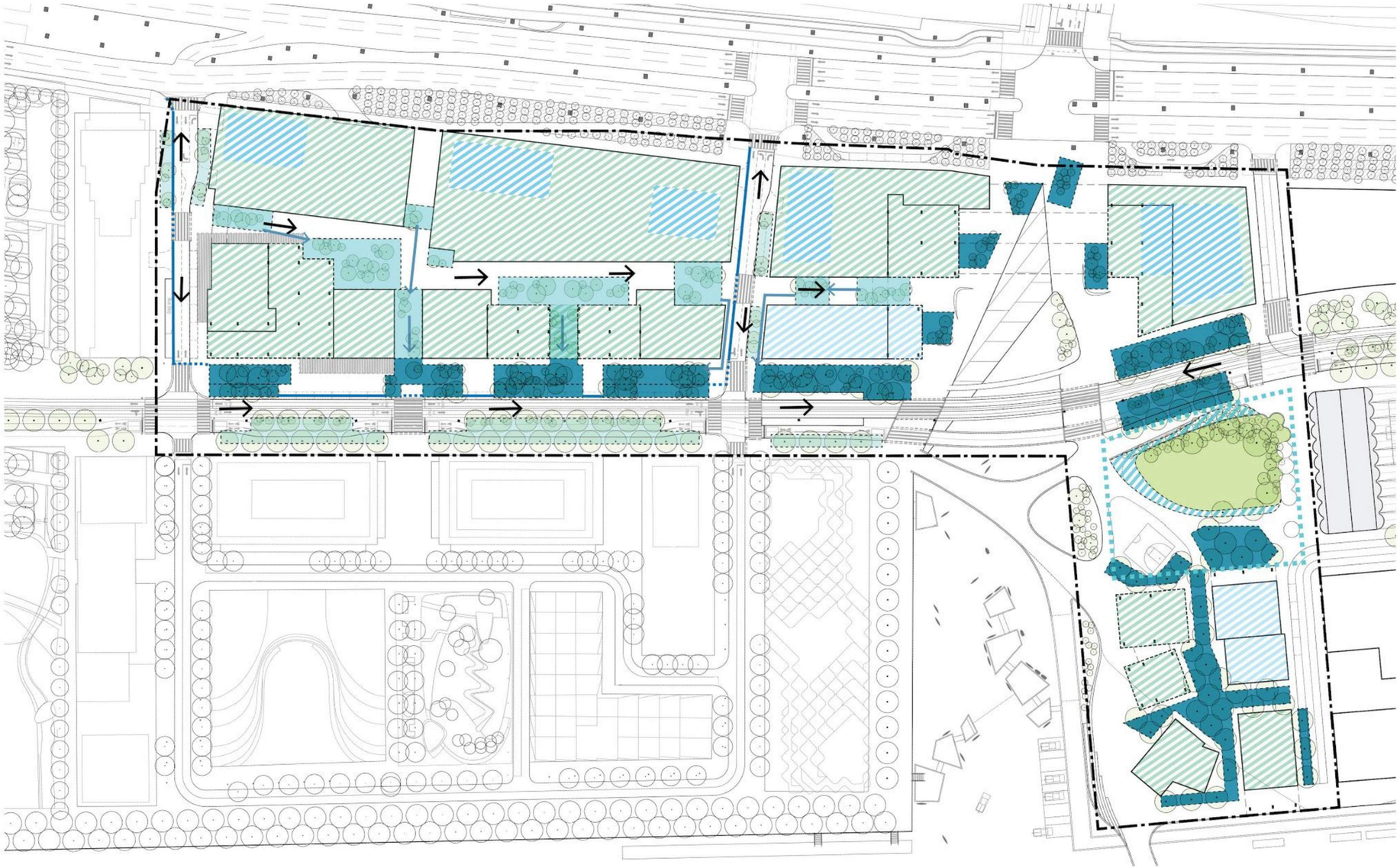
Design for Tomorrow
Permeable modular paving melds the artistry of the street with sustainable water treatment

Toronto gets about 10 percent more rain per year than it did in the mid-20th century.

And in the past five years, Toronto has endured two 100-year storms.

Site Plan of Green Infrastructure for Stormwater and Tree Canopy

Stormwater Strategy: Our Approach to Stormwater Management



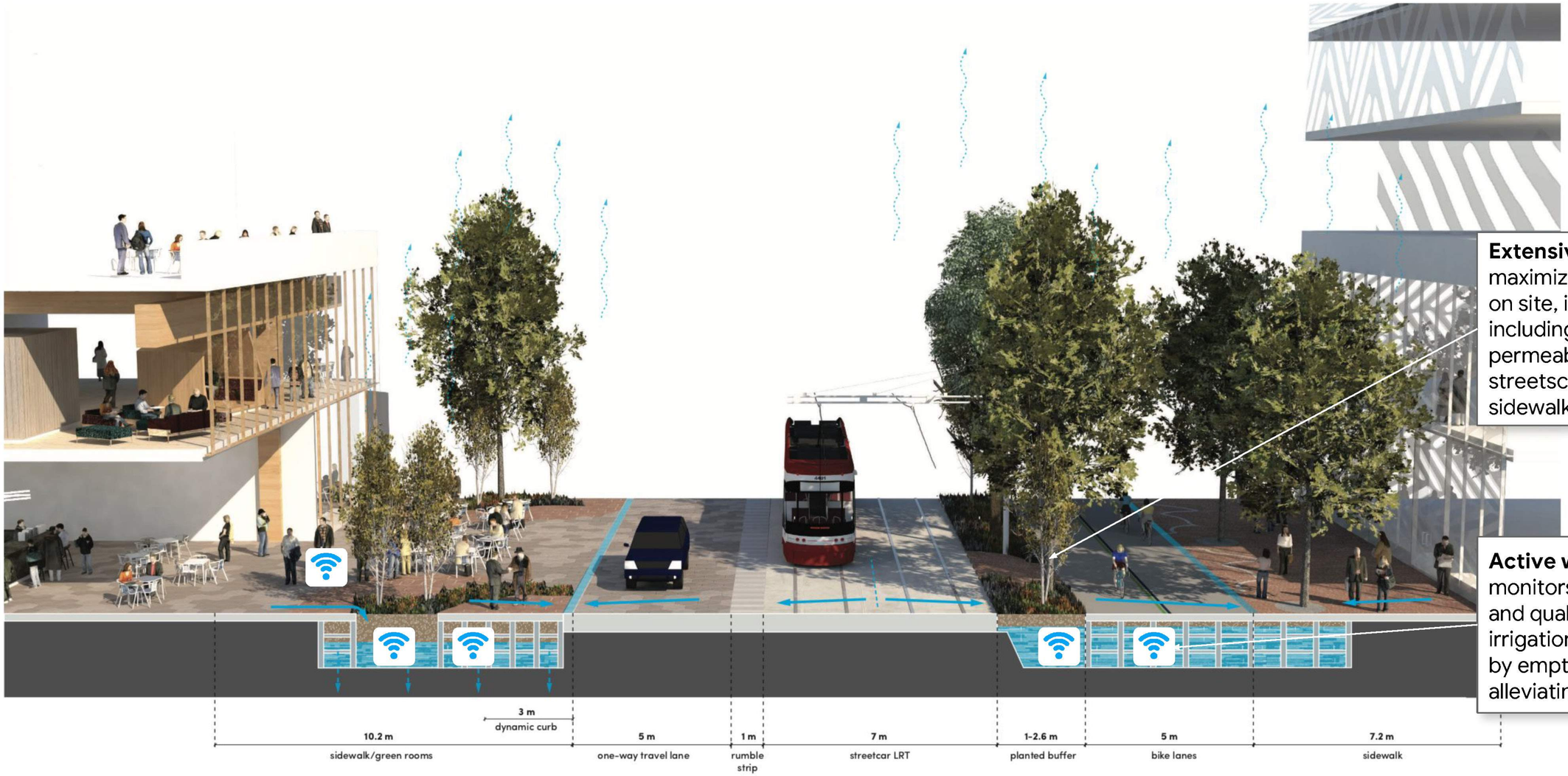
- Quayside Boundary
- **Bio-Retention Type1**
  - mixed open planters and paving on soil cells
  - promotes infiltration
- **Bio-Retention Type2**
  - planters on podium
  - no infiltration
  - connected to type 1 where possible for infiltration
- **Bio-Retention Type3**
  - street trees in soil cell
  - infiltration only possible on small street
- **30-50% Green Roof**
- **80% Blue Roof**
- **Open Runnel**
- **Covered Runnel (Accessible)**
- **Planted Stormwater Channel**
- **Direction of Overland Flow**
- **Subsurface Connection**
- **Opportunity for Below Grade Infiltration**

N

Scale 1:1000

Queens Quay East Section of Green Infrastructure

Our Approach to Stormwater Management



Extensive green infrastructure maximizes capture of stormwater on site, in roadways and plazas, including increased vegetation, permeable paving in the streetscapes, and voids under the sidewalk or soil cells.

Active water management monitors stormwater quantities and qualities, utilizes water for irrigation, and anticipates storms by emptying detention tanks alleviating city storm drains.

Bike Rack of Topics for Future Discussion

Aspects of Sidewalk Toronto's Sustainability Plan that we did not have time to cover in depth today

- Building studies
- More energy Management technologies
- Solid waste diversion strategy
- Fossil-fuel free thermal grid
- Ecosystems and biodiversity

BREAKOUT 4

Q & A

BREAKOUT 4

Table Discussion

BREAKOUT 4

Reporting Back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TORONTO