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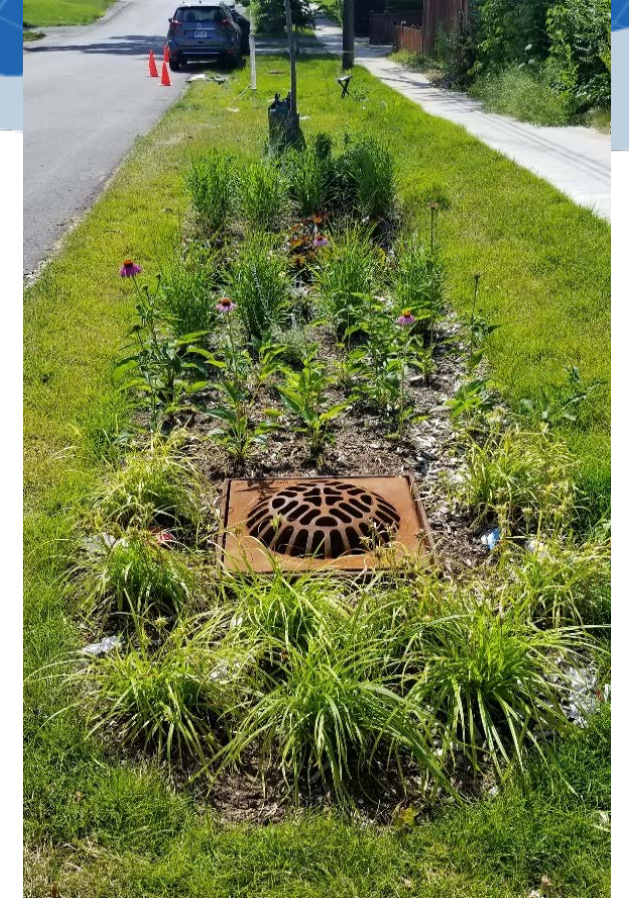
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# Green Infrastructure within City of Toronto Right-of-Way From Council Direction to Implementation



**Niloufar Mohajerani, M.Sc.,P. Eng.**

**Source to Stream Conference**

**March 2023**

# Toronto Council Direction

City Council consideration on October 8, 2013

## **PW25.7 - Impact of July 8, 2013 Storm on the City's Sewer and Stormwater Systems**

**Decision Type:** ACTION

**Status:** Adopted

**Wards:** All

### **City Council Decision**

City Council on October 8, 9, 10 and 11, 2013, adopted the following:

1. City Council request the General Manager, Toronto Water, to report back during the 2014 budget process on the capital and operating budget impacts of expanding the Basement Flooding Protection Program on a City-wide basis beyond the existing 34 priority study areas, including methodologies for setting priorities and resource implications, so that the program continues to address urban flooding risks in a fair, well-organized, and efficient manner.
2. City Council request the General Manager, Toronto Water, to report through the 2014 budget process with a plan for enforcement of the Mandatory Downspout Disconnect Program Phase 1 (combined sewer areas) and implementation of Phase 2 (basement flooding areas) as set out in Municipal Code Chapter 681, as part of the Basement Flooding Protection Program.
3. City Council request the General Manager, Toronto Water, to report through the 2014 budget process with a multi-year capital plan to meet the Green Parking lot standards for Toronto Water properties.
4. City Council request the General Manager, Toronto Water, the General Manager, Transportation Services, the Executive Director, Engineering and Construction Services, and the Chief Planner and Executive Director, City Planning to work together to develop "green infrastructure" standards for the public right-of-way for implementation in Transportation Services and Toronto Water capital projects with a target implementation date for the 2015 construction season.
5. City Council request the Toronto and Region Conservation Authority to forward to the General Manager, Toronto Water, information on houses within the flood plain that are most vulnerable to flooding from the Black Creek Watershed and request the General Manager, Toronto Water to provide this information in a report to the Public Works and Infrastructure Committee in February 2014.

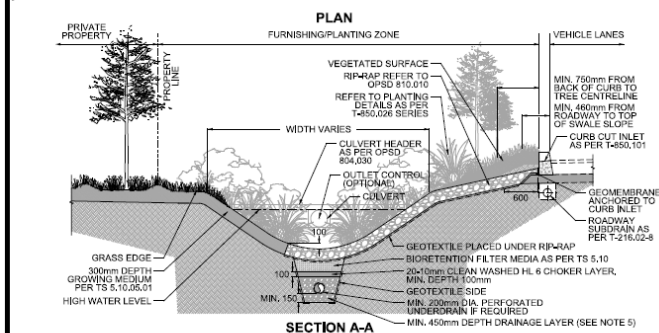
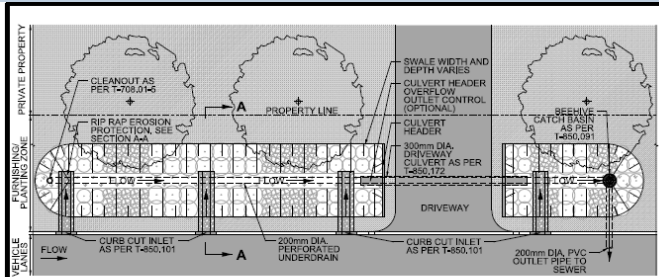
# Overview

- Documents developed
  - **80** Standard Drawings
  - **8** Construction Specifications
  - **3** Guidelines:
    - Lifecycle Activities Guideline
    - Design Criteria Guideline
    - Public Notification & Engagement
  - Retrofit Design Options for Trees in the Right-of-Way along with the Associated Details for Construction



FAIRFORD & COXWELL AVENUE BIORETENTION

# Green Infrastructure Standard Drawings and Construction Specifications in the Right-of-Way



- NOTES:
- BIOSWALE WIDTH AND DEPTH VARIES BASED ON DESIRED STORAGE CAPACITY. MAXIMUM PONDING DEPTH FROM SWALE SURFACE TO TOP OF DRIVEWAY CULVERTS TO BE 300mm. MINIMUM LENGTH BETWEEN DRIVEWAYS IS 5m.
  - SIDE SLOPES OF SWALE SURFACE 3H:1V MAXIMUM, 4H:1V PREFERRED.
  - LONGITUDINAL SLOPE DESIGNED TO ALLOW A MAXIMUM VELOCITY OF 1.5m/s, BEYOND WHICH SPECIFIC EROSION CONTROL MEASURES ARE REQUIRED (CHECK DAMS AS PER T-850.031, T-850.032, T-850.033 AND QPSD 219.210). SLOPE RANGE FROM 0.5% TO 4%.
  - CL BANDS TO BE CONNECTED TO PERFORATED UNDERDRAIN WITH 30 OR 45 DEGREE ELBOW ORIENTED TOWARDS THE MONITORING WELL. CLEANOUTS TO BE PROVIDED AT MAX. 30m SPACING. UNDERDRAIN TO BE MIN. 200mm DIA. HDPE OR EQUIVALENT, SMOOTH INTERIOR WALLED PERFORATED PIPE. PERFORATIONS TO BE ON THE BOTTOM SIDE OF THE PIPE. ANY PERFORATIONS ON THE TOP SIDE OF THE UNDERDRAIN PIPE TO BE TAPE D OFF WITH MEMBRANE STRIPS.
  - GRAVEL USED FOR DRAINAGE LAYER TO BE 20 TO 50mm, UNIFORMLY-GRADED, CLEAN (MAXIMUM WASH LOSS OF 0.5%), CRUSHED ANGULAR STONE THAT HAS A POROSITY OF 0.4.

All dimensions are in millimetres unless otherwise shown.

ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING	REV 0	JUNE 2021
	T-850.111	
	SCALE NTS	SHEET 1



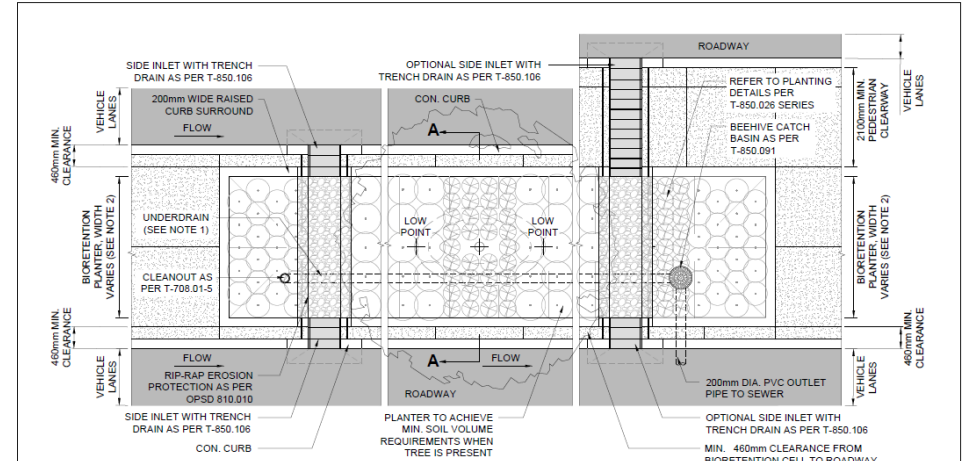
Engineering & Construction Services Division  
Standard Specifications for Road Works

TS 857  
September 2021

## Construction Specification for Inlets in Green Infrastructure

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- NOTES:
- UNDERDRAIN IS REQUIRED WHERE NATIVE SOIL INFILTRATION RATES ARE LESS THAN 15mm/yr, WHEN TREE PLANTINGS ARE PRESENT, OR WHEN GREEN INFRASTRUCTURE SYSTEM IS MEMBRANE LINED. UNDERDRAIN TO BE 200mm DIA. SMOOTH INTERIOR WALLED PERFORATED PIPE WRAPPED IN GEOTEXTILE FABRIC, INSTALLED 150mm MIN. ABOVE BASE OF GREEN INFRASTRUCTURE SYSTEM.
  - BIORETENTION PLANTER WIDTH TO BE MIN. 3500mm WHERE TREES ARE PROPOSED AND MIN. 1850mm WITHOUT TREES.
  - FOR TREE HEALTH, LOCATE INLETS AWAY FROM ROOT BALLS TO MINIMIZE POTENTIAL DAMAGE.
  - LOW POINT TO BE MIN. 75mm BENEATH OVERFLOW RIM ELEVATION. WITHOUT TREES, CENTRALLY LOCATE THE LOW POINT. WITH TREES, POSITION LOW POINTS ON EITHER SIDE OF ROOT BALLS MOUND AND GRADE ACCORDINGLY.
- All dimensions are in millimetres unless otherwise shown.

ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING	REV 0	JUNE 2021
	T-850.051-1	
	NTS	SHEET 1



BIORETENTION PLANTER  
IN MEDIAN  
LAYOUT AND MATERIALS PLAN



# Guideline for Lifecycle Activities & Practices for Green Infrastructure in the Right-of-Way (Maintenance and Monitoring)

## **Part 1- Maintenance of Green Infrastructure**

- Ch1: Types of Maintenance
- Ch2: Maintenance Indicators
- Ch3: Maintenance Practices
- Ch4: Resident Engagement Protocol

## **Part 2 – Monitoring of Green Infrastructure**

- Ch5: Monitoring Inspection Type
- Ch6: Water Quality Parameters
- Ch7: Water Quantity Parameters
- Ch8: Tree Health & Tree Growth
- Ch9: Soil Health
- Ch10: Vegetation Growth
- Ch11: Monitoring FAQ
- Ch12: Health & Safety

# Guideline for Green Infrastructure Design in the Right-of-Way

- **Chapter 1: Policies, Regulations and Guidelines**

- Federal regulations
- Provincial regulations
- Municipal regulations

- **Chapter 2: Toronto's Physical Characteristics**

- **Chapter 3: Green Infrastructure Planning and Siting**

- New Construction
- Retrofit

- **Chapter 4: General Design Considerations**

- Cold weather considerations
- Water quantity and quality targets
- Urban Integration & available space

- **Chapter 5: Common Design Criteria**

- Vegetation & planting
- Growing media & soil amendment
- Hydrologic considerations
- Inlets, outlets, overflows & underdrains

- **Chapter 6: Green Infrastructure System Design Criteria**

*Included with Each System*

1. *Description*
2. *Design Considerations & Site Characteristics*
  - *Site topography*
  - *Soil/filter media*
  - *Groundwater buffer*
  - *Utility coordination*
  - *Contributing drainage area*
  - *Geometry*
  - *Pre-treatment*
  - *Underdrain*
  - *Overflow*
  - *Drain-down Time*

# Public Notification & Engagement Guideline for Green Infrastructure in the ROW

*Internal  
Use*

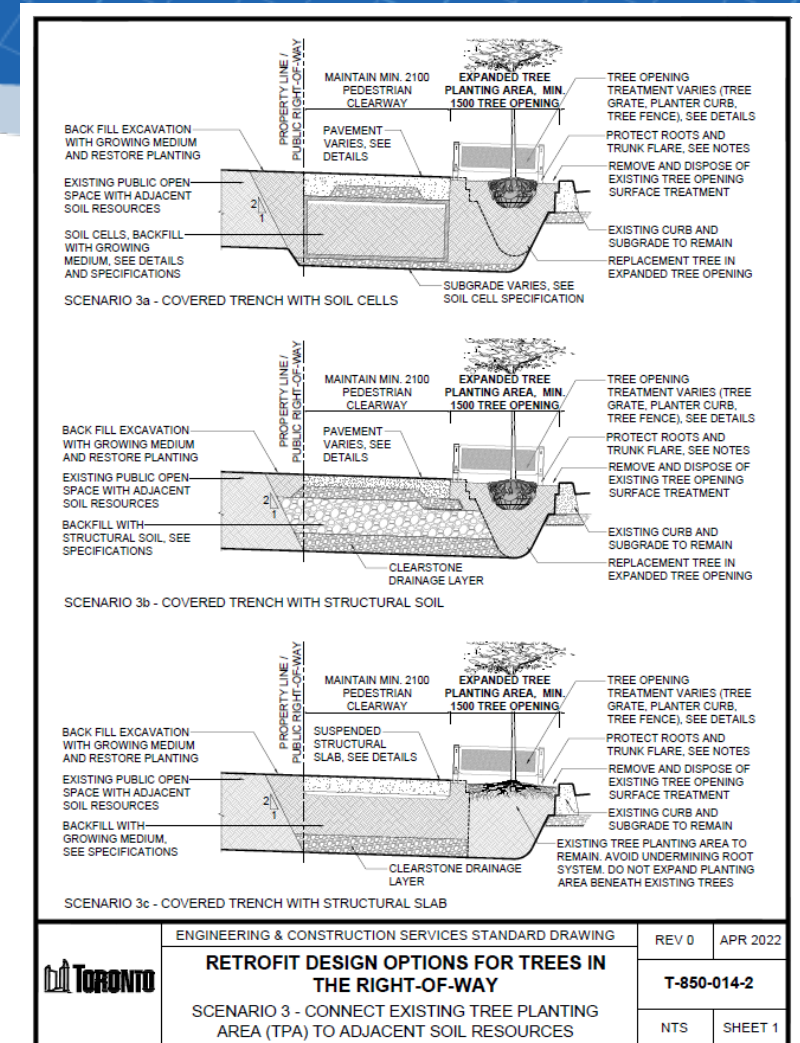
- **Chapter 1: Introduction to Green Infrastructure**
  - High level overview
- **Chapter 2: Public Notification & Engagement Activities**
  - Rationale for public engagement
  - Communication and engagement activities
- **Chapter 3: Notification Guidelines**
  - Steps to follow for notifying the public and the affected property owners
- **Chapter 4: Green Infrastructure Project Descriptions**
  - Simple descriptions
- **Chapter 5: FAQ**



# Retrofit Design Options for Trees in the ROW

Internal  
Use

- Drawing series and a specification
  - Enlarge/expand existing tree planting area
  - Connect multiple existing tree planting areas
  - Connect existing tree planting area to adjacent soil resources
  - Increase water to existing planting area
  - Reduce compaction in existing tree planting area
  - New tree planting in constructed/ narrow existing sidewalk



# City of Toronto Green Infrastructure Standards Webpage

- The new GI Standard Drawings, Construction Specifications, Lifecycle Activities and Design Criteria manuals can be found at:

[www.toronto.ca/services-payments/building-construction/infrastructure-city-construction/construction-standards-permits/standards-for-designing-and-constructing-city-infrastructure/?accordion=green-infrastructure-standards](http://www.toronto.ca/services-payments/building-construction/infrastructure-city-construction/construction-standards-permits/standards-for-designing-and-constructing-city-infrastructure/?accordion=green-infrastructure-standards)



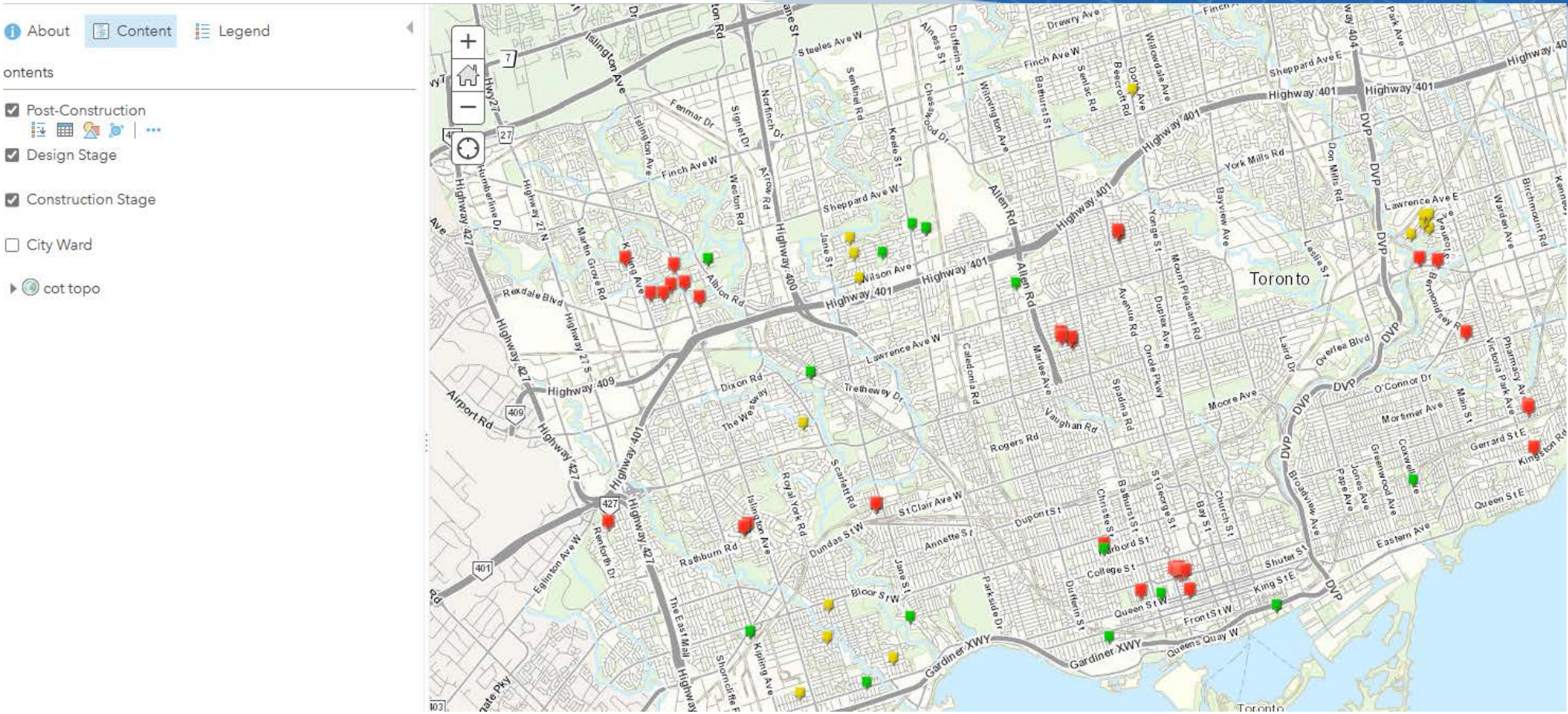
# Implementation

- Capital Projects
  - GI screening
  - Bundle with road rehabilitation
- Development Applications
  - Toronto Green Standard (TGS) V4
- KPIs
- Growing Green Streets
- GI Neighbourhood Study
  - Opportunities and Constraints



RYERSON AVENUE – NEIGHBOURHOOD PROJECTS

# GI Facilities Map



# *Thank You*

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