



# Collaborating to protect municipal infrastructure and restore Redside Dace habitat

Presented by  
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Toronto and Region Conservation Authority

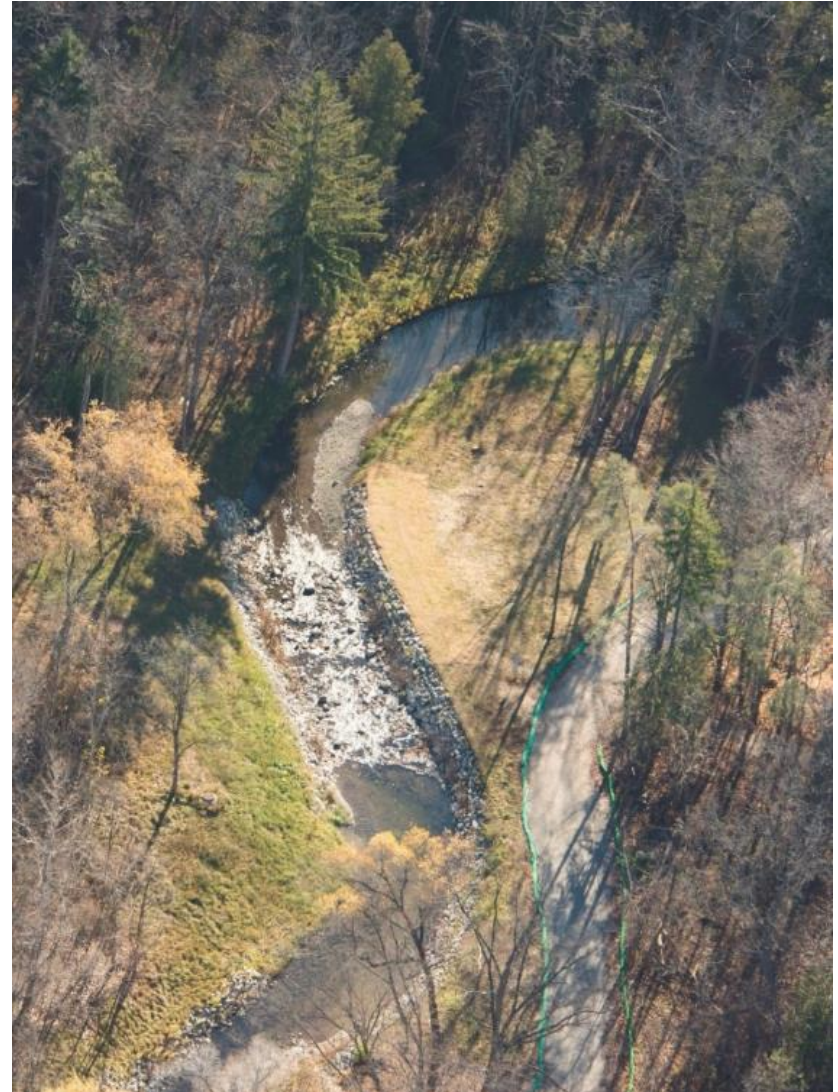






# PRESENTATION OVERVIEW

- TRCA's Erosion Risk Management program
- Patterson Creek – Project Introduction
- Patterson Creek – Site Overview
- Collaboration Opportunities
- Construction Challenges





# EROSION RISK MANAGEMENT

- 30+ years monitoring & mitigating erosion hazards on public and private lands

➤ 1000+ erosion control structures monitored along stream corridors and the Lake Ontario Waterfront



- Proficient in planning, design, and construction of in-stream and steep slope stabilization works







# INFRASTRUCTURE HAZARD MONITORING

Infrastructure Hazard Monitoring Program formed in 2011 as a partnership between the Region's Infrastructure Asset Management Branch and TRCA's Engineering Projects Group



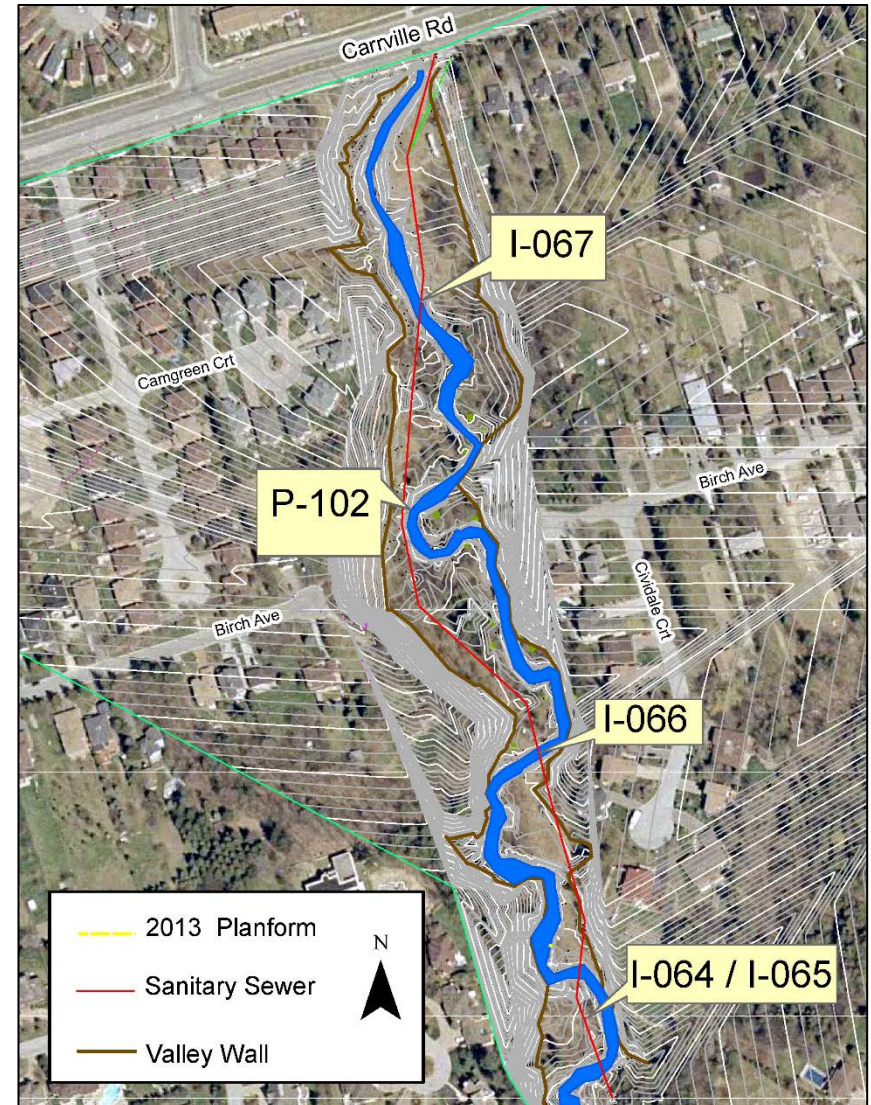
# YR infrastructure sites  
TRCA is currently monitoring:  
**528**

# of high priority sites  
recommended for  
remedial work: **47**



# PROJECT LOCATION AND SITE DETAILS

- Approximately 700 meter section of the East Don River
- Bathurst Street & Carrville Road (Richmond Hill)
- Ravine has a mix of private/public landowners with a non-ideal easement
- Identified as highest priority site in the first monitoring year (2011)
- Geomorphic assessment and detailed design completed by Parish Aquatic Services
- TRCA led project management and construction







# GEOMORPHIC ASSESSMENT

## Changes in Land Use

### 1954

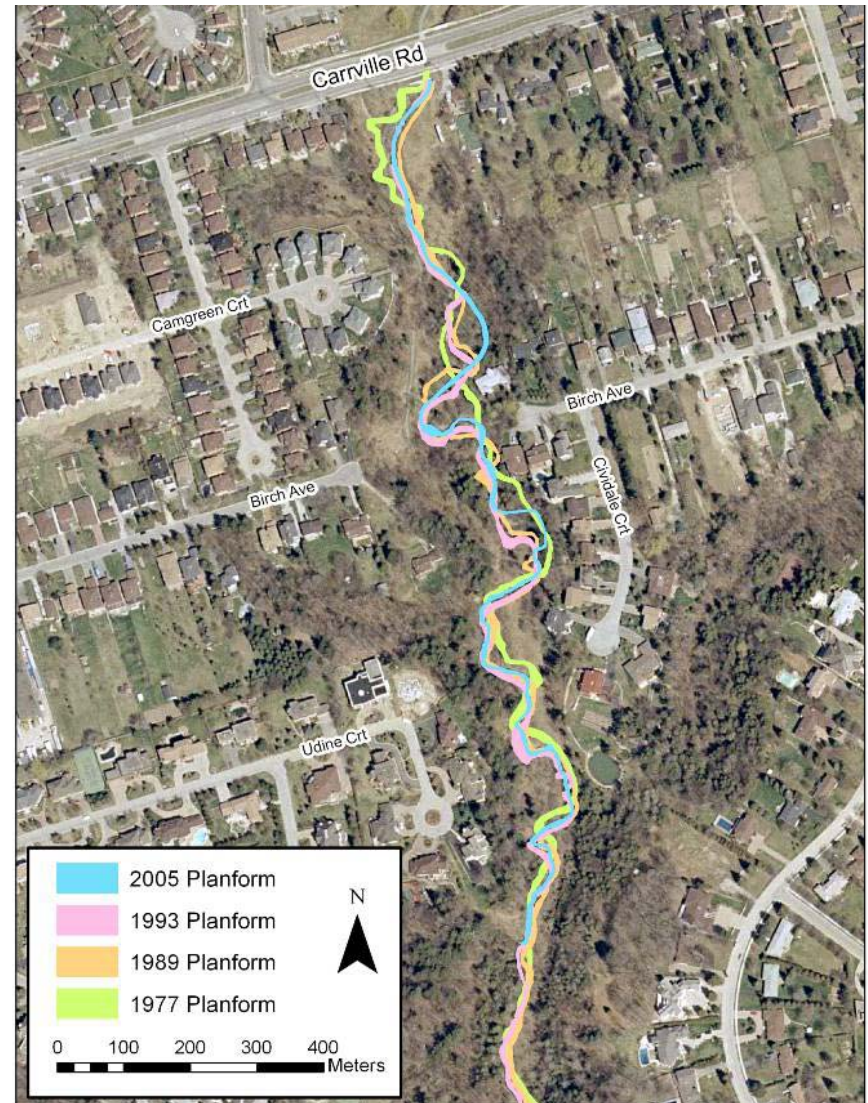
- Wooded valley
- Tributary to west is wooded
- Surrounding land use limited to fields and low residential housing

### 1978

- Clearance of riparian zone although valley sides remain wooded
- Increase in residential land use
- Widening of Birch Ave
- Partial construction of housing to west

### 2002

- Sparse tree cover in valley and sides
- Increase in housing density, including top-of-valley housing to west

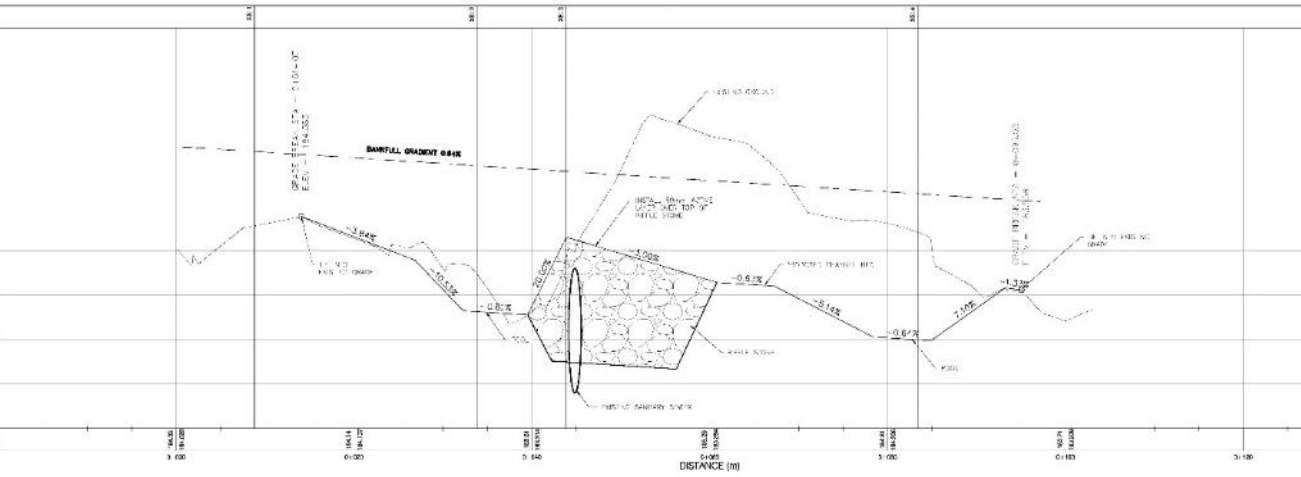
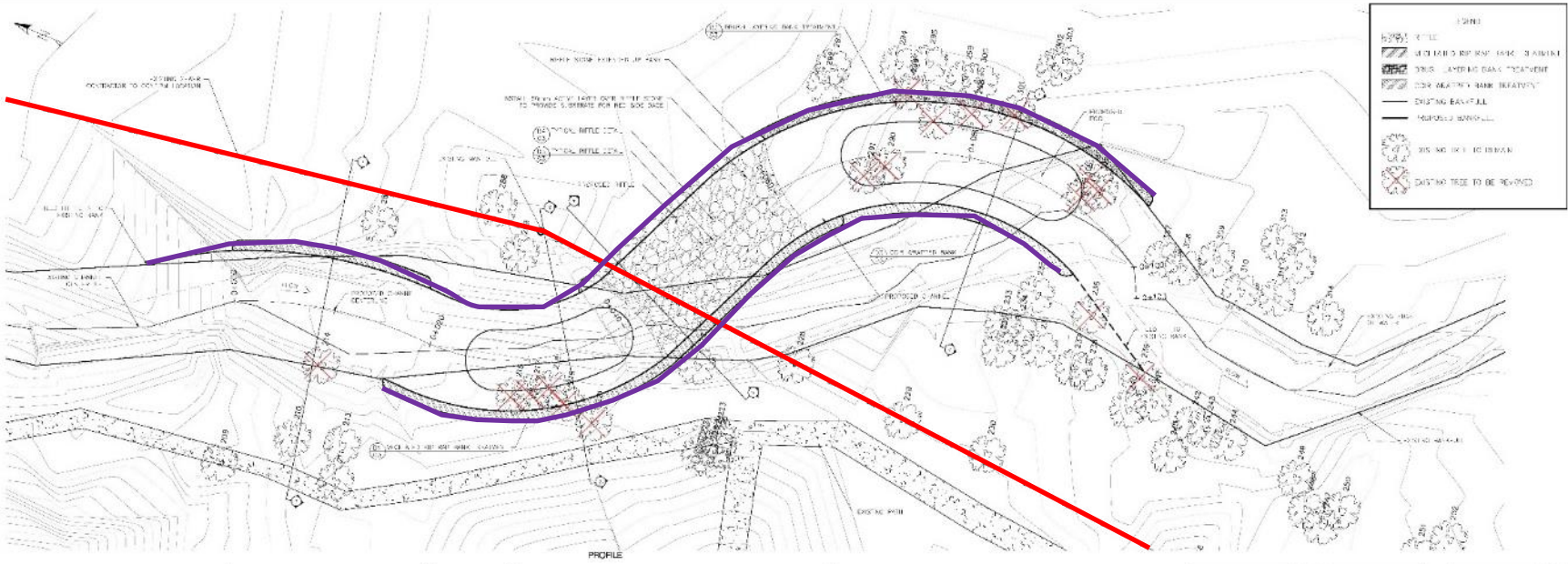




A photograph of a stream in a forest. The stream flows through a rocky and debris-filled channel. Several orange survey stakes are placed along the banks. A black tarp is draped over a structure on the right bank, with an orange life preserver hanging from it. The surrounding forest is dense with green trees and undergrowth. The water in the foreground is murky and reflects the sky and trees.

I-067





Tree Survey			
Tag #	Common Name	Species	DIB#
206	American maple	Acer glaberrimum	35
207	American sycamore	Ulmus americana	36
211	Black walnut	Juglans nigra	47
212	Crack willow	Salix fragilis	62
213	Crack willow	Salix fragilis	40
214	Little leaf willow	Salix cordata	11.5
215	Black walnut	Juglans nigra	35
216	Green ash	Fraxinus pennsylvanica	20
217	Black walnut	Juglans nigra	33.5
218	Little leaf willow	Salix cordata	13.5
219	Basswood	Tilia americana	27
220	Basswood	Tilia americana	11.5
221	Crack willow	Salix fragilis	56/36
222	Basswood	Tilia americana	18.5/17.5
223	Black gum	Nyssa sylvatica	30
224	Sugar maple	Acer glaberrimum	29.5
225	Sugar maple	Acer saccharinum	18
226	White sycamore	Ulmus americana	31
227	Sugar maple	Acer saccharinum	25
228	Black walnut	Juglans nigra	25.5
229	Green ash	Fraxinus pennsylvanica	20
230	American maple	Acer glaberrimum	35/36
231	White cedar	Thuja occidentalis	41
232	White cedar	Thuja occidentalis	34
233	Sugar maple	Acer saccharinum	24
234	Sugar maple	Acer saccharinum	22
235	Sugar maple	Acer saccharinum	28
236	Sugar maple	Acer saccharinum	21
237	Black walnut	Juglans nigra	56
238	White cedar	Thuja occidentalis	34
239	White cedar	Thuja occidentalis	28
240	Sugar maple	Acer saccharinum	24
241	Sugar maple	Acer saccharinum	20
242	White sycamore	Ulmus americana	42
243	White cedar	Thuja occidentalis	48
244	White cedar	Thuja occidentalis	40

Tree Survey			
Tag #	Common Name	Species	DIB#
205	White cedar	Thuja occidentalis	30
206	Black walnut	Juglans nigra	17/19
207	Black walnut	Juglans nigra	37
208	Black walnut	Juglans nigra	11
209	White cedar	Thuja occidentalis	27
210	Black walnut	Juglans nigra	21
211	Black walnut	Juglans nigra	46/48
212	Basswood	Tilia americana	13
213	Norway spruce	Picea canadensis	12
214	Black walnut	Juglans nigra	28
215	Black walnut	Juglans nigra	28
216	Crack willow	Salix fragilis	91
217	Little leaf willow	Salix cordata	10/11
218	White cedar	Thuja occidentalis	52
219	Black walnut	Juglans nigra	41
220	Crack willow	Salix fragilis	31/29
221	White cedar	Thuja occidentalis	52
222	Black walnut	Juglans nigra	41
223	Crack willow	Salix fragilis	31/29
224	Sugar maple	Acer saccharinum	15.5
225	White pine	Pinus strobus	30
226	Basswood	Tilia americana	20
227	Basswood	Tilia americana	36
228	White cedar	Thuja occidentalis	23
229	Basswood	Tilia americana	41
230	White cedar	Thuja occidentalis	36
231	Basswood	Tilia americana	19
232	Crack willow	Salix fragilis	40
233	Green ash	Fraxinus pennsylvanica	35.5
234	Black walnut	Juglans nigra	21.5
235	Black walnut	Juglans nigra	48
236	White cedar	Thuja occidentalis	55
237	Sugar maple	Acer saccharinum	34
238	Black walnut	Juglans nigra	36
239	Black walnut	Juglans nigra	25
240	Crack willow	Salix fragilis	42

REVISED	DATE	BY
1	06/10/2016	J.P.

SCALE
1" = 100'



**PARISH**  
aquatic services

1815 Bayou du Nord  
Suite 200  
Baton Rouge, LA 70802  
504.782.1111  
www.parishaquatics.com

**EXPOSED INFRASTRUCTURE  
CHANNEL REALIGNMENT I-067  
PLAN AND PROFILE**

**PATTERSON CREEK DESIGN  
TRCA**





I-067



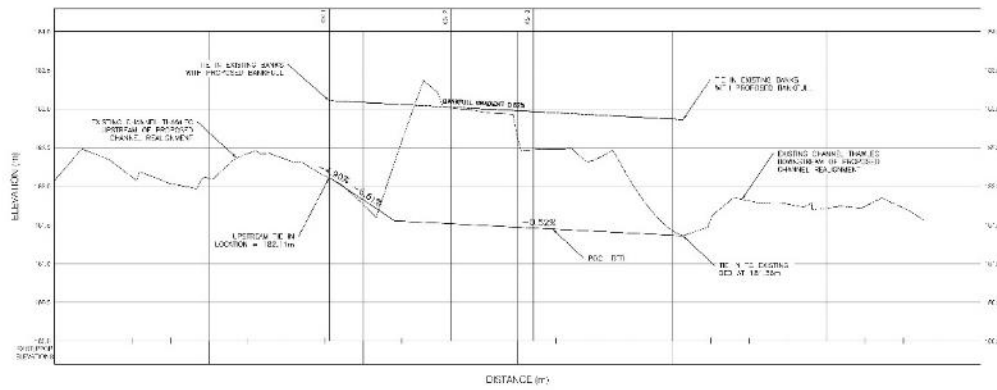
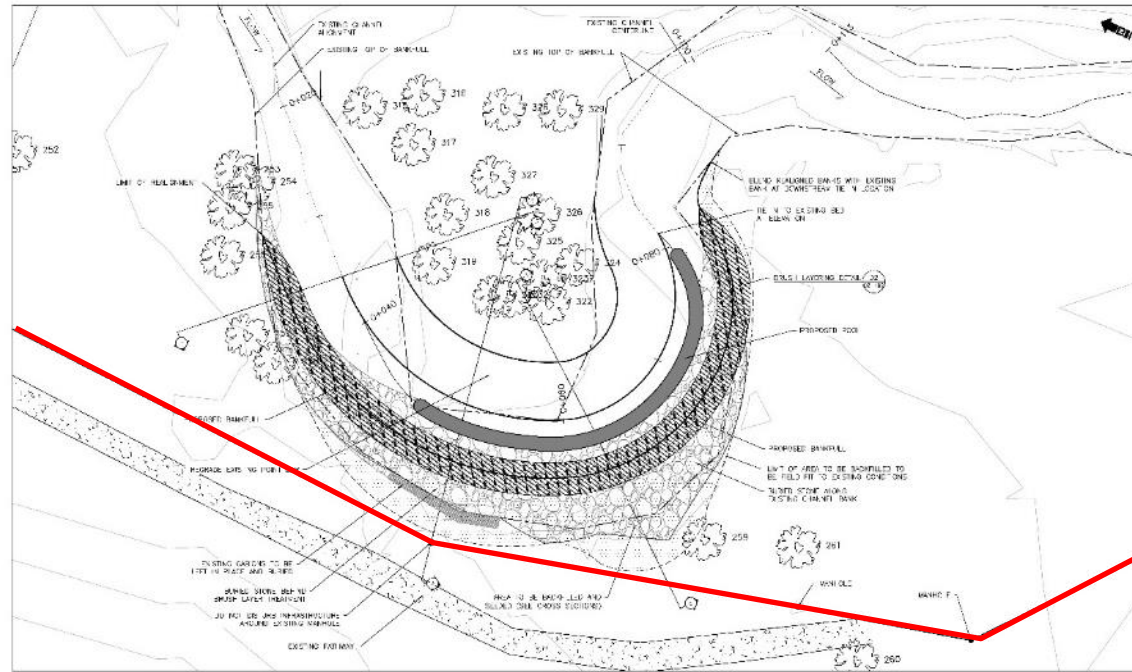


P-102





Tree Survey			
Tag #	Common Name	Species	DBH
203	Black walnut	Juglans nigra	40
204	Black willow	Salix fragilis	34
205	Black walnut	Juglans nigra	45
206	Black walnut	Juglans nigra	40
207	White cedar	Thuja occidentalis	41/30
208	Basswood	Tilia americana	20/24/17
209	Sugar maple	Acer saccharum	66
210	Black walnut	Juglans nigra	35
211	Black walnut	Juglans nigra	31
212	Basswood	Tilia americana	39/5
213	White cedar	Thuja occidentalis	34
214	Black walnut	Juglans nigra	32
215	White cedar	Thuja occidentalis	50
216	Black walnut	Juglans nigra	21
217	White cedar	Thuja occidentalis	11.5
218	Basswood	Tilia americana	22
219	Sugar maple	Acer saccharum	14.5
220	Basswood	Tilia americana	30
221	White cedar	Thuja occidentalis	36/30/20
222	White cedar	Thuja occidentalis	34
223	Sugar maple	Acer saccharum	14.5
224	Black willow	Salix fragilis	4/2/3
225	Black walnut	Juglans nigra	48



REV	DATE	DESCRIPTION
1	2010-10-15	ISSUED FOR PERMITTING
2	2010-10-15	REVISED PERMITTING

SCALE
1:200 HORIZ.
1:50 VERT.

**PARISH**  
aquatic services

200 HURONTARIO ST. TORONTO, ONT. M5S 2S4  
416-923-8111  
WWW.PARISHAQ.com

**PATTERSON CREEK CHANNEL  
ENHANCEMENT  
P-102 REALIGNMENT  
PLAN AND PROFILE**

**PATTERSON CREEK DESIGN  
TORONTO AND REGION  
CONSERVATION AUTHORITY**





P-102





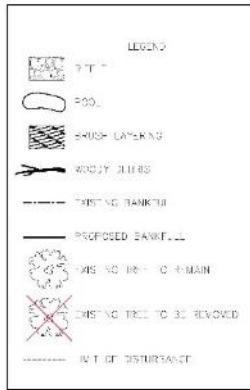
P-102



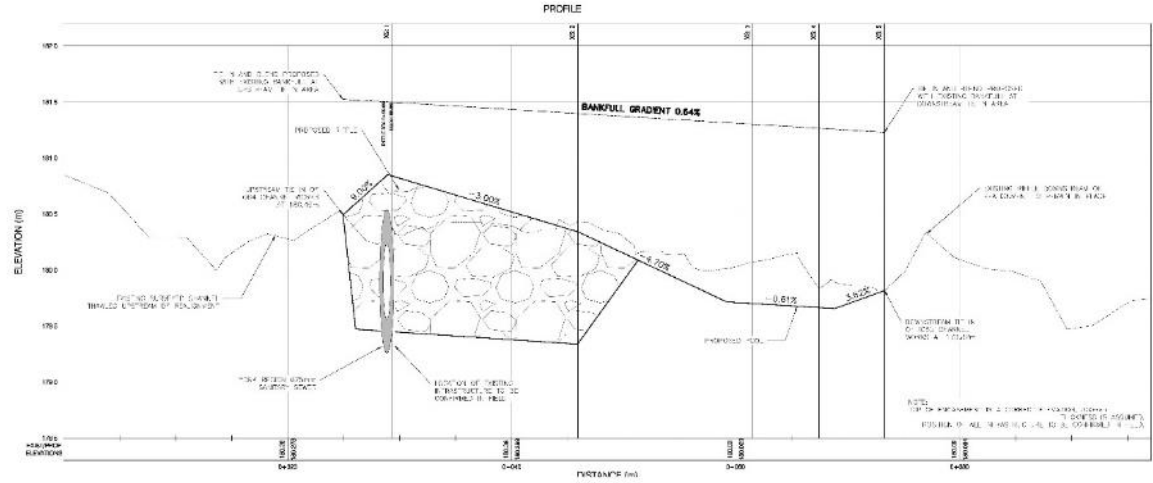
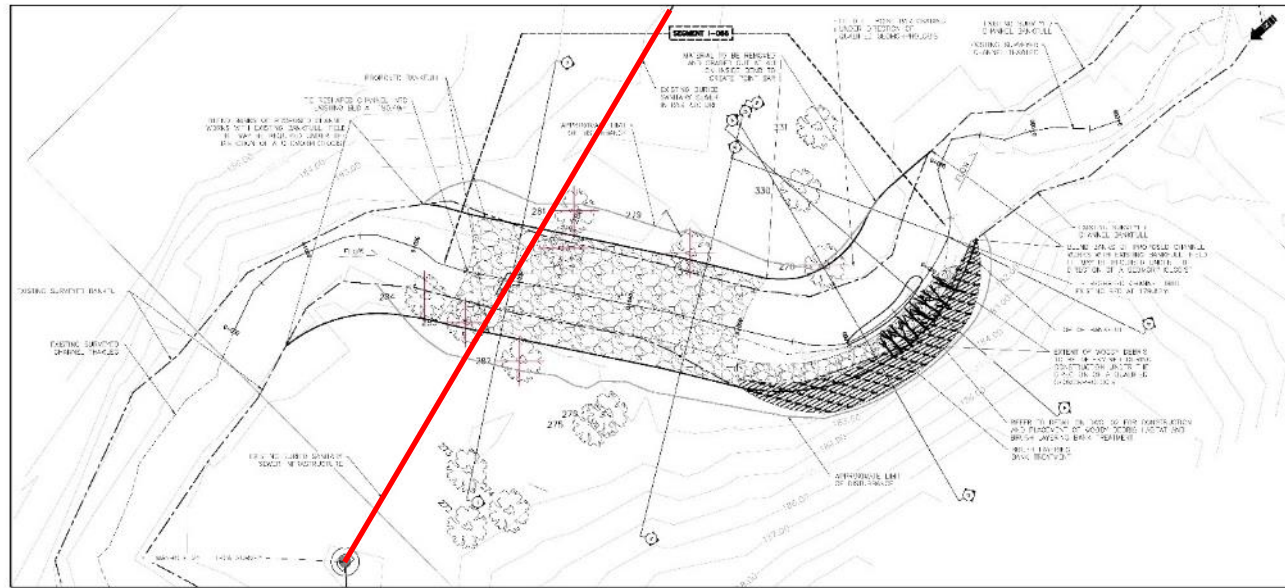


I-066





Tag #	Common Name	Species	DBH
273	Paper Birch	<i>Betula papyrifera</i>	17
274	Black Walnut	<i>Juglans nigra</i>	32
277	Sugar maple	<i>Acer saccharum</i>	62
278	Green ash	<i>Fraxinus pennsylvanica</i>	38
275	Black walnut	<i>Juglans nigra</i>	30
276	Black walnut	<i>Juglans nigra</i>	30
280	Black walnut	<i>Juglans nigra</i>	39
281	Black walnut	<i>Juglans nigra</i>	14
282	Black walnut	<i>Juglans nigra</i>	39
283	Black walnut	<i>Juglans nigra</i>	25
284	Black walnut	<i>Juglans nigra</i>	17
330	Crossed tree	<i>Populus sp.</i>	15



- CENTRAL CONSTRUCTION NOTE**
1. ALL INFRASTRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE CANADIAN STANDARD CODES OF PRACTICE.
  2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SURVEY AND LOCATION OF THE WORK AND SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.
  3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.
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  11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.

REV	DATE	BY	CHKD BY	DESCRIPTION
1	2016-04-14	ER	ER	ISSUED FOR PERMITTING

SCALE	PROFILE HORIZONTAL	PROFILE VERTICAL
1:200	1:200	1:20



**EXPOSED INFRASTRUCTURE REPAIR IN PLACE I-066 PLAN AND PROFILE**

**PATTERSON CREEK DESIGN TORONTO AND REGION CONSERVATION AUTHORITY**





I-066





I-066





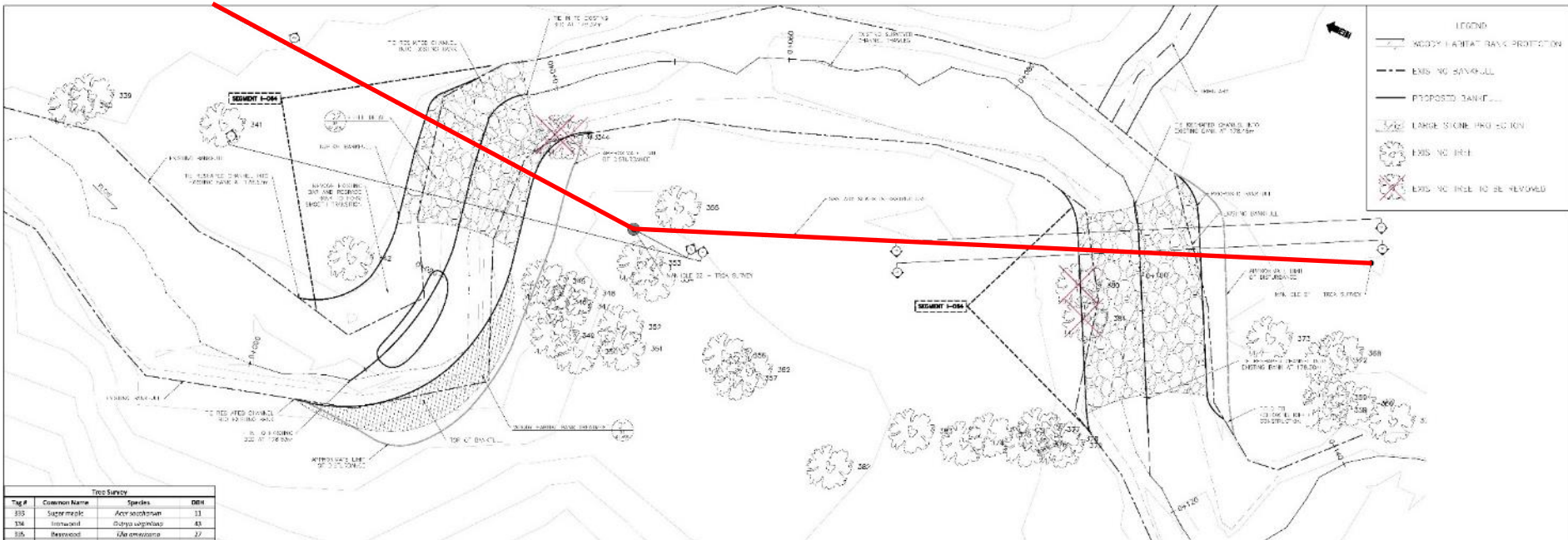
I-065





I-064

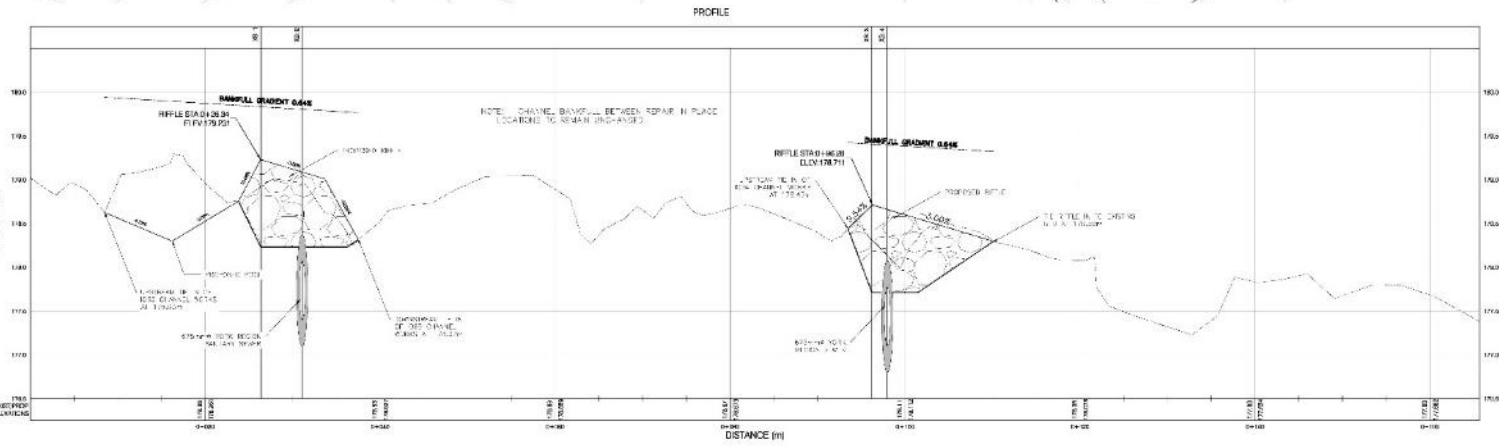




LEGEND

- EXISTING BANK LINE
- PROPOSED BANK LINE
- LARGE STONE RIPRAP SECTION
- EXISTING TREE
- ⊗ EXISTING TREE TO BE REMOVED

Tag #	Common Name	Species	DBH
333	Sugar maple	Acer saccharum	13
334	Ironwood	Odontaspis virginiana	43
336	Redwood	Liquidambar styraciflua	27
336	Redwood	Liquidambar styraciflua	25
337	Black walnut	Juglans nigra	33.5
338	Sugar maple	Acer saccharum	29
339	Sugar maple	Acer saccharum	30.75
340	Sugar maple	Acer saccharum	29
341	Black walnut	Juglans nigra	76
342	Treeing aspens	Populus tremuloides	21
345	Black walnut	Juglans nigra	39
346	Redwood	Liquidambar styraciflua	26
347	Treeing aspens	Populus tremuloides	25
348	Treeing aspens	Populus tremuloides	17.5
349	Treeing aspens	Populus tremuloides	25
349	Treeing aspens	Populus tremuloides	25
350	Sugar maple	Acer saccharum	25
351	Sugar maple	Acer saccharum	25
352	Treeing aspens	Populus tremuloides	31
353	Sugar maple	Acer saccharum	19
354	Treeing aspens	Populus tremuloides	27
356	Treeing aspens	Populus tremuloides	12
357	Treeing aspens	Populus tremuloides	21
358	Black walnut	Juglans nigra	38
359	Treeing aspens	Populus tremuloides	19
360	Treeing aspens	Populus tremuloides	22
361	Treeing aspens	Populus tremuloides	20
362	Treeing aspens	Populus tremuloides	22
363	Black walnut	Juglans nigra	26
364	Treeing aspens	Populus tremuloides	12
373	Treeing aspens	Populus tremuloides	31
374	White oregon	Thuja occidentalis	35
375	Redwood	Liquidambar styraciflua	23.5
376	Pawnee oak	Quercus macrocarpa	38
377	White oregon	Thuja occidentalis	41
378	Sugar maple	Acer saccharum	19
380	Black walnut	Juglans nigra	38
381	Black walnut	Juglans nigra	30
382	Treeing aspens	Populus tremuloides	24
383	White oregon	Thuja occidentalis	42



No. 1 DRAFT FOR REVIEW 2 ISSUED FOR PERMITTING	REVISED	DATE	BY
	01-10-20	DESIGN BY: TO	
	06-10-20	DRAWN BY: DS	
		CHECKED BY: JF	
	DATE: 06-10-2020		

SCALE

1" = 10' PLAN  
1" = 10' VERT

**PARISH**  
aquatic services

3075 Woodbine Ave. Unit 100  
Markham, ON L3R 9W3  
905.947.1474  
www.parish-aquatic.com

**PATTERSON CREEK CHANNEL  
ENHANCEMENT  
I-065 AND I-064 REPAIR IN PLACE**

**PATTERSON CREEK DESIGN  
TORONTO AND REGION  
CONSERVATION AUTHORITY**

PROJECT NO. 21004  
SHEET NO. 01 - 64/68





I-065





I-064







# Collaboration opportunities

- Town of Richmond Hill – Valleyland Capital Plan
- Town of Richmond Hill – long term trail connection
- Region of York – long term access/maintenance route
- Coordinated works allows for shorter-term disturbance and comprehensive restoration to take place











# Construction Challenges

- Trying a new cofferdam product (AquaBarrier) and dealing with numerous rainfall events (2015)







# Construction Challenges

- Maintaining bypass pump intake and preventing debris from clogging the fish screens







# Construction Challenges

- Encountering unexpected site conditions during construction requiring design modifications







# Construction Challenges

- Deficiencies affecting critical infrastructure along the construction access route

Incident Code: FC  
Incident Description: Fracture  
Circumferential  
Meters: 0015.7  
Position: 3 to 5  
Joint Number: J

0015.7 M

0000.0 m







# Construction Challenges

- Encasements originally sized for channel conditions present in early 1970s and didn't extend far enough based on the new channel width







Q&A