Appendix B CCTV REPORT

Living Arts

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		1

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.1-MH.2	20170613	09:43	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START MH.1			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.2				Stormwater	Downstream		675

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	RCP		2.4		37.5			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.1
0.0	MWL						5				MWL@0			
6.0	MGO										MGO@6			GOING DOWNSTREAM NOT UPSTREAM
37.5	AMH										AMH@37.5			FINISH MH.2

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
09 43-20170613-START MH.1-FINISH MH.2	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

This report is for Living Arts drive and not Speakman Dr

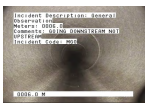
PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.1	FINISH MH.2	675	Reinforced Concrete Pipe		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	09:43	37.5

Additional Information

	Ftg.	Code	Description	Position	Comment
	0.0	AMH	Access Point - Manhole		Starting Manhole: START MH.1
	0.0	MWL	Water Level		
	6.0	MGO	General Observation		GOING DOWNSTREAM NOT UPSTREAM
	37.5	AMH	Access Point - Manhole		FINISH MH.2

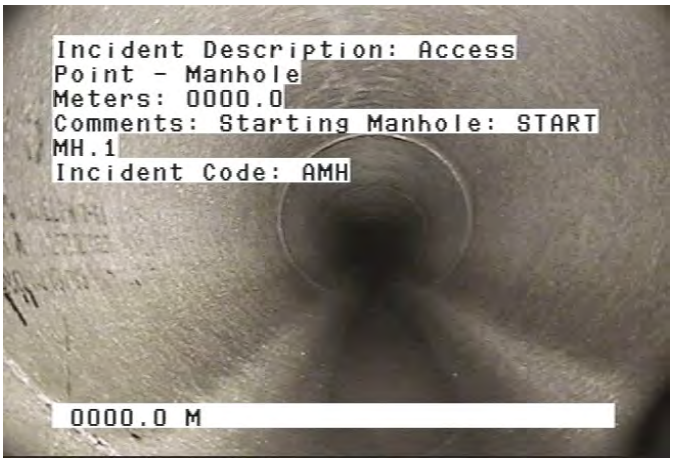
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.1	FINISH MH.2	675	Reinforced Concrete Pipe		MISSISSAUGA

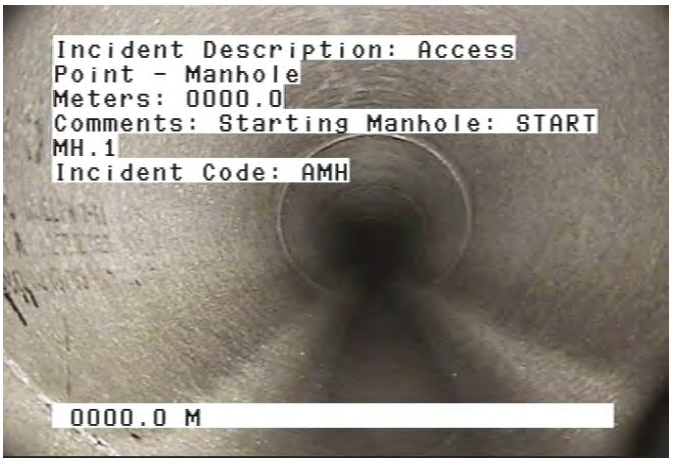
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	09:43	37.5

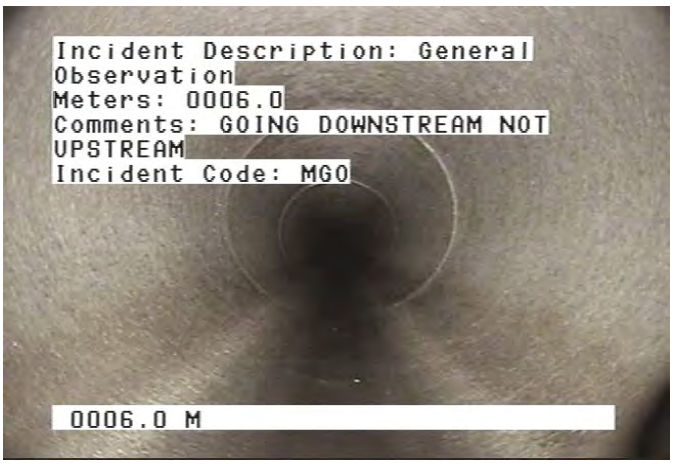
Additional Information



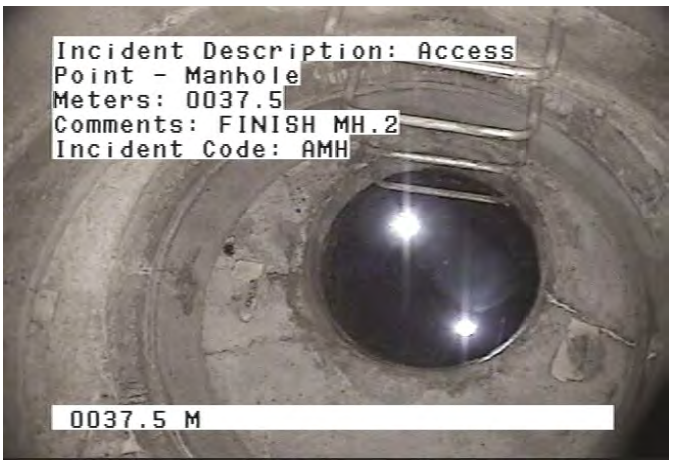
AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.1



MWL - Water Level @ 0.0 m.



MGO - General Observation @ 6.0 m.
GOING DOWNSTREAM NOT UPSTREAM



AMH - Access Point - Manhole @ 37.5 m.
FINISH MH.2

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		4

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.2-MH.3	20170613	09:49	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START MH.2			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.3				Stormwater	Downstream		675

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	RCP		2.4		37.5			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.2
0.0	MWL						5				MWL@0			
37.5	AMH										AMH@37.5			FINISH MH.3

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
09 49-20170613-START MH.2-FINISH MH.3	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.2	FINISH MH.3	675	Reinforced Concrete Pipe		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	09:49	37.5

Additional Information

Ftg.	Code	Description	Positio n	Comment
	0.0	AMH Access Point - Manhole		Starting Manhole: START MH.2
	0.0	MWL Water Level		
	37.5	AMH Access Point - Manhole		FINISH MH.3

Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.2	FINISH MH.3	675	Reinforced Concrete Pipe		MISSISSAUGA

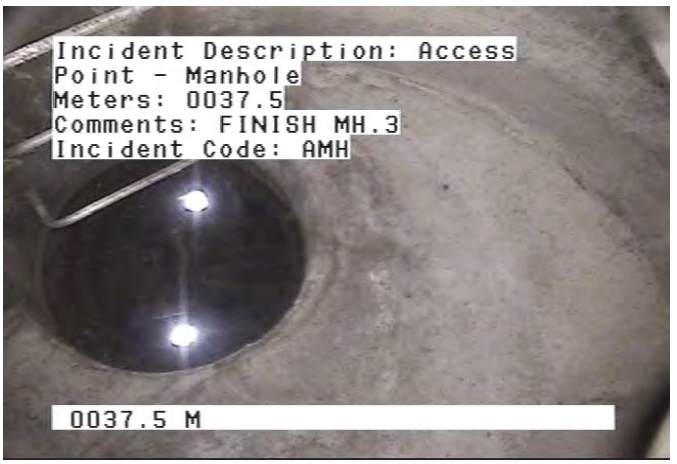
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	09:49	37.5

Additional Information

AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.2

MWL - Water Level @ 0.0 m.



AMH - Access Point - Manhole @ 37.5 m.
FINISH MH.3

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		7

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.3-MH.4	20170613	10:00	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START MH.3			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.4				Stormwater	Downstream		825

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	RCP		2.4		77.1			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.3
0.0	MWL						5				MWL@0			
12.3	TF				250				10		TF@12.3			
77.1	AMH										AMH@77.1			FINISH MH.4

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
10 00-20170613-START MH.3-FINISH MH.4	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

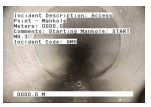
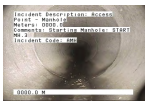
PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.3	FINISH MH.4	825	Reinforced Concrete Pipe		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	10:00	77.1

Additional Information

	Ftg.	Code	Description	Position	Comment
	0.0	AMH	Access Point - Manhole		Starting Manhole: START MH.3
	0.0	MWL	Water Level		
	12.3	TF	Tap, Factory Made	10	
	77.1	AMH	Access Point - Manhole		FINISH MH.4

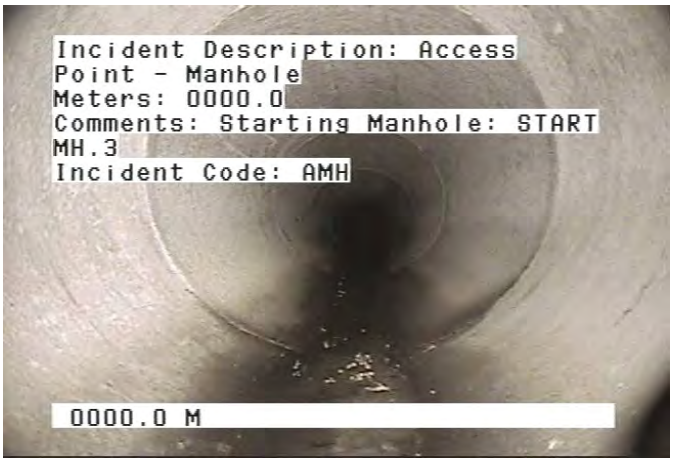
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.3	FINISH MH.4	825	Reinforced Concrete Pipe		MISSISSAUGA

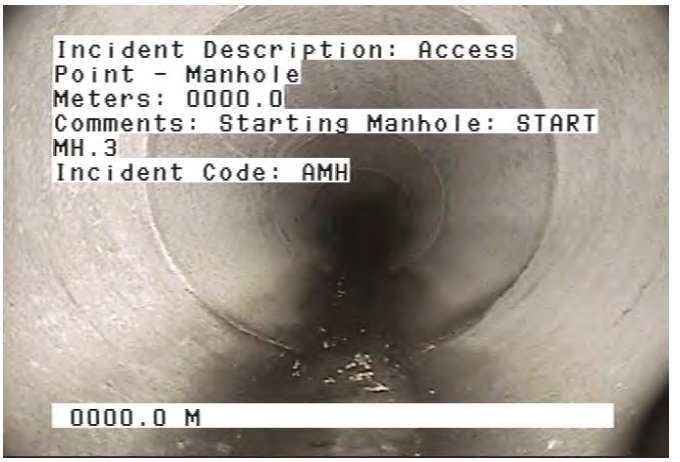
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	10:00	77.1

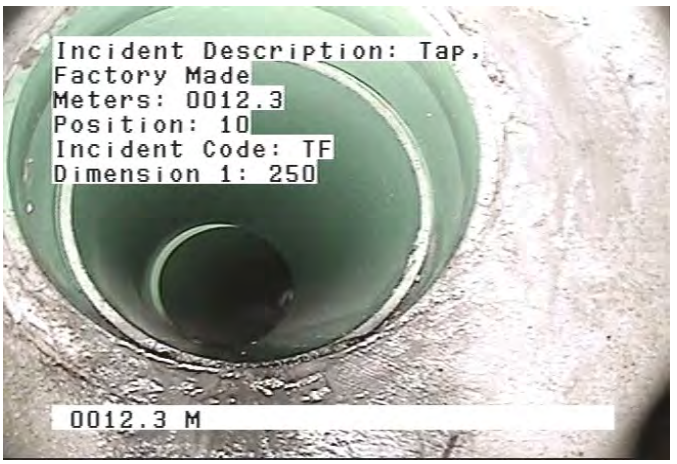
Additional Information



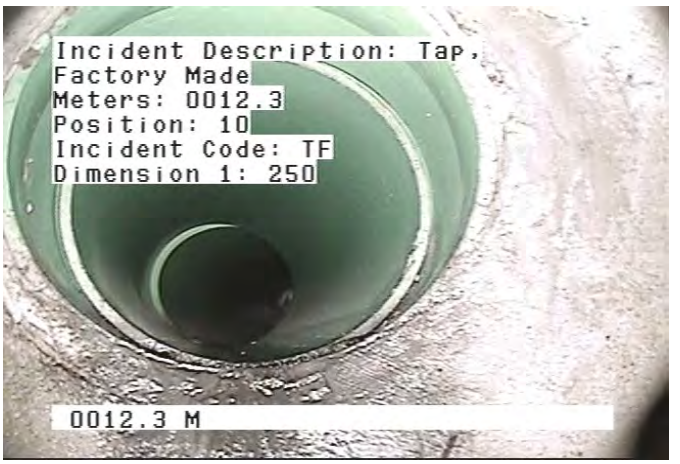
AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.3



MWL - Water Level @ 0.0 m.



TF - Tap, Factory Made @ 12.3 m.



AMH - Access Point - Manhole @ 77.1 m.
FINISH MH.4

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		10

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.4-MH.5	20170613	10:20	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START MH.4			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.5				Stormwater	Downstream		825

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	RCP		2.4		12.1			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.4
0.0	MWL						5				MWL@0			
12.1	AMH										AMH@12.1			FINISH MH.5

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
10 20-20170613-START MH.4-FINISH MH.5	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.4	FINISH MH.5	825	Reinforced Concrete Pipe		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	10:20	12.1

Additional Information

	Ftg.	Code	Description	Position	Comment
	0.0	AMH	Access Point - Manhole		Starting Manhole: START MH.4
	0.0	MWL	Water Level		
	12.1	AMH	Access Point - Manhole		FINISH MH.5

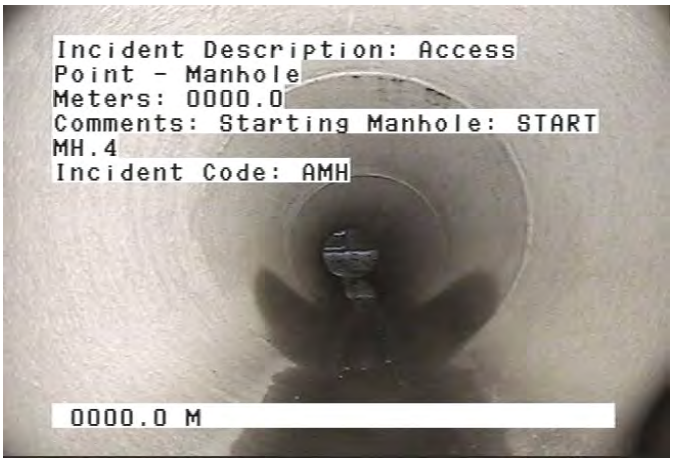
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.4	FINISH MH.5	825	Reinforced Concrete Pipe		MISSISSAUGA

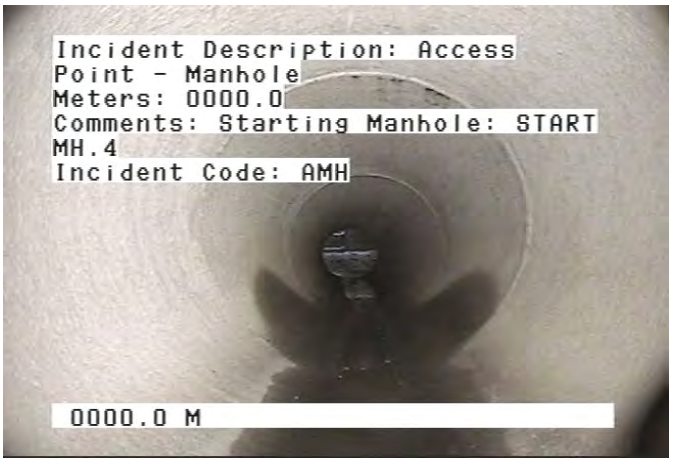
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	10:20	12.1

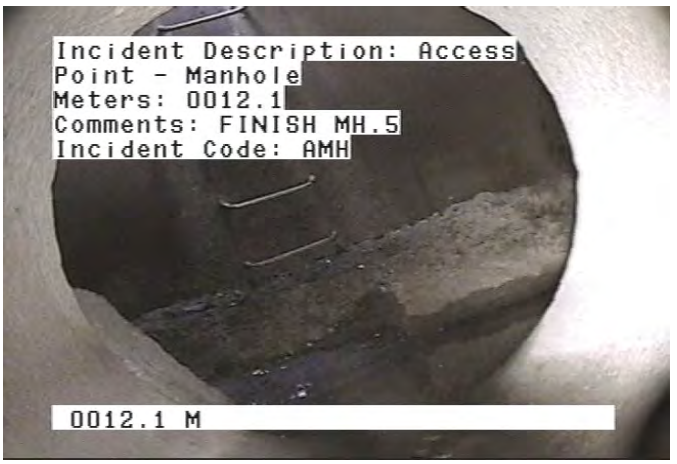
Additional Information



AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.4



MWL - Water Level @ 0.0 m.



AMH - Access Point - Manhole @ 12.1 m.
FINISH MH.5

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		13

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.1-MH.7	20170613	10:26	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	FINISH MH.7			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
START MH.1				Stormwater	Upstream		600

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	PVC		4		33.9			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.1
0.0	MWL						5				MWL@0			
33.9	AMH										AMH@33.9			FINISH MH.7

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
10 26-20170613-FINISH MH.7-START MH.1	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
FINISH MH.7	START MH.1	600	Polyvinyl Chloride		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Upstream	Routine Assessment	Dry	20170613	10:26	33.9

Additional Information

	Ftg.	Code	Description	Position	Comment
	0.0	AMH	Access Point - Manhole		Starting Manhole: START MH.1
	0.0	MWL	Water Level		
	33.9	AMH	Access Point - Manhole		FINISH MH.7

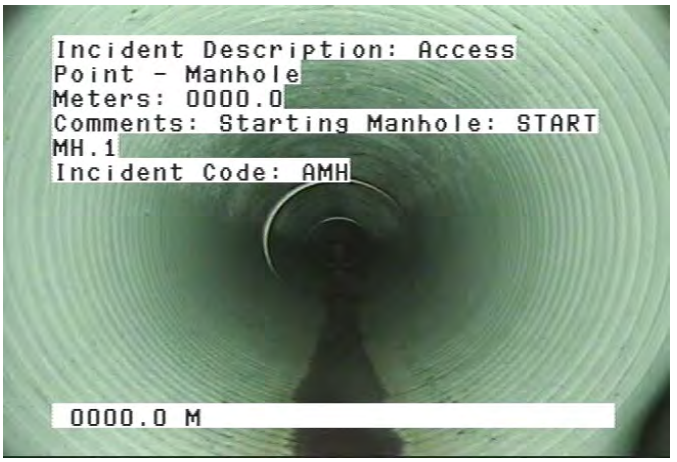
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
FINISH MH.7	START MH.1	600	Polyvinyl Chloride		MISSISSAUGA

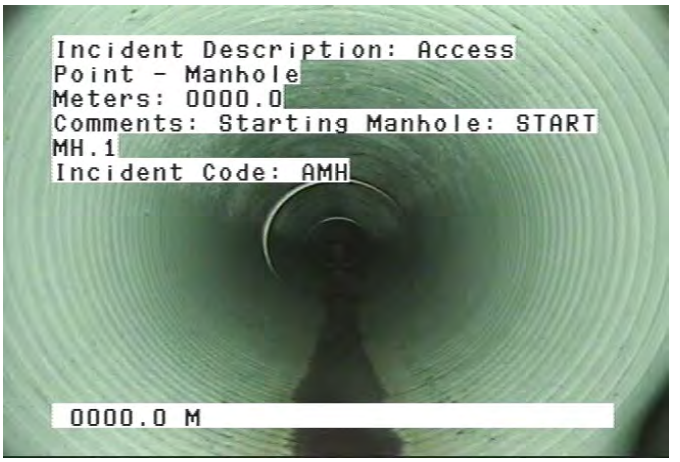
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Upstream	Routine Assessment	Dry	20170613	10:26	33.9

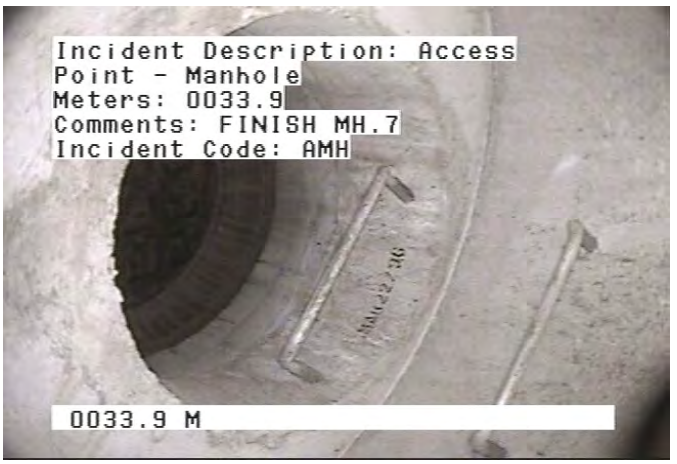
Additional Information



AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.1



MWL - Water Level @ 0.0 m.



AMH - Access Point - Manhole @ 33.9 m.
FINISH MH.7

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		16

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	CB.3-MH.3	20170613	12:00	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START CB.3			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.3				Stormwater	Downstream		450

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	PVC		4		45.5			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START CB.3
0.0	MWL						5				MWL@0			
37.4	TF				250				9		TF@37.4			
45.5	AMH										AMH@45.5			FINISH MH.3

Segment	Structural								O & M								Overall							
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
12 00-20170613-START CB.3-FINISH MH.3	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

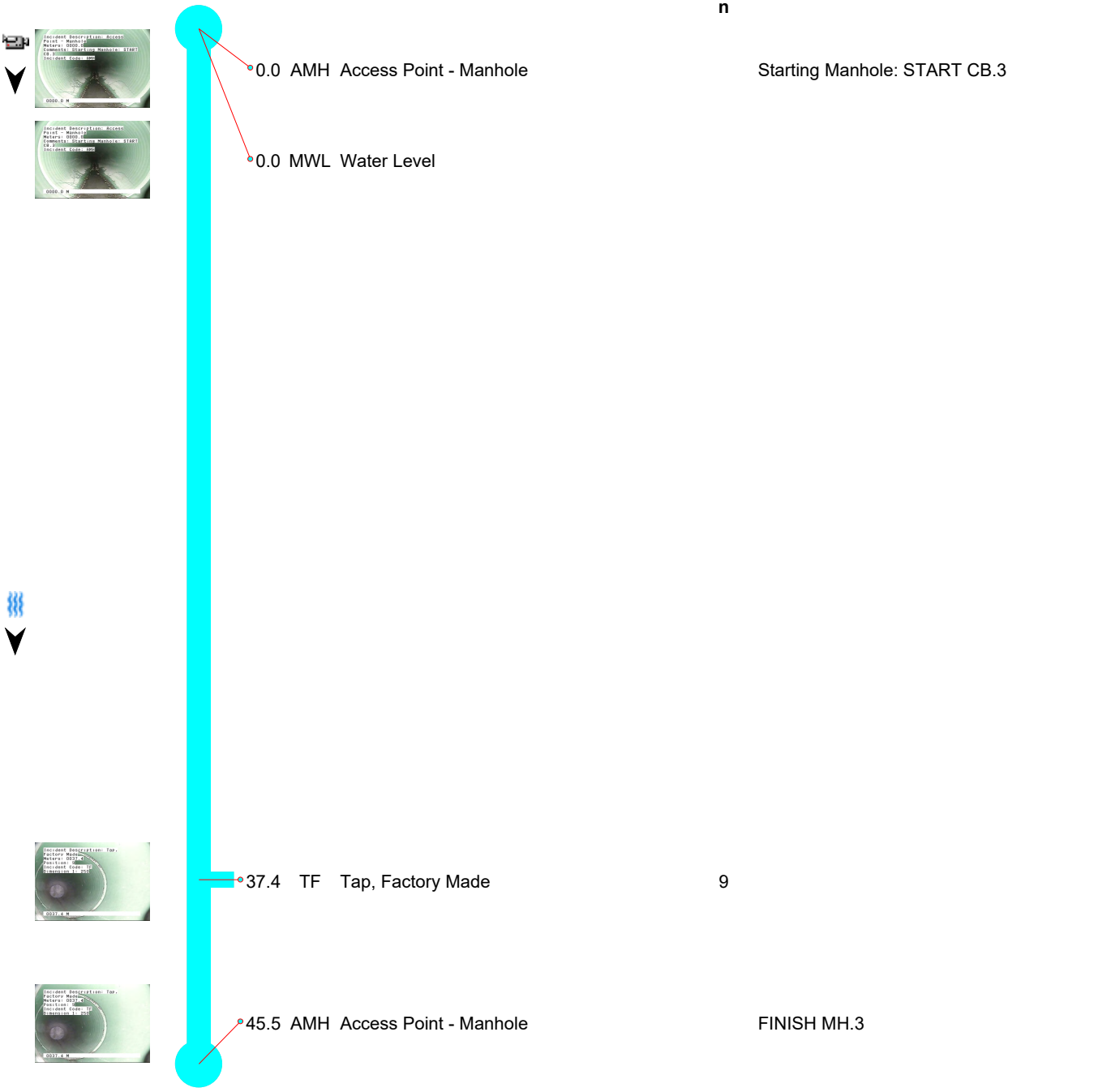
PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START CB.3	FINISH MH.3	450	Polyvinyl Chloride		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	12:00	45.5

Additional Information



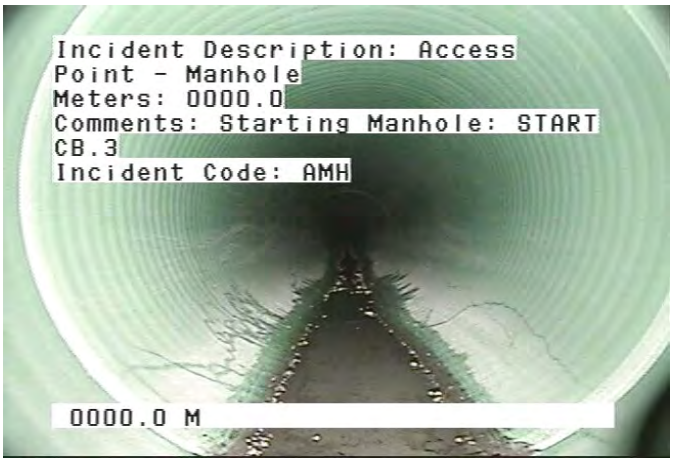
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START CB.3	FINISH MH.3	450	Polyvinyl Chloride		MISSISSAUGA

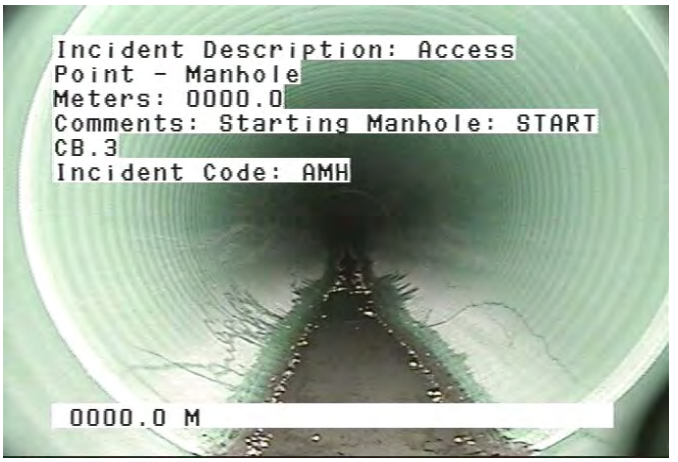
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	12:00	45.5

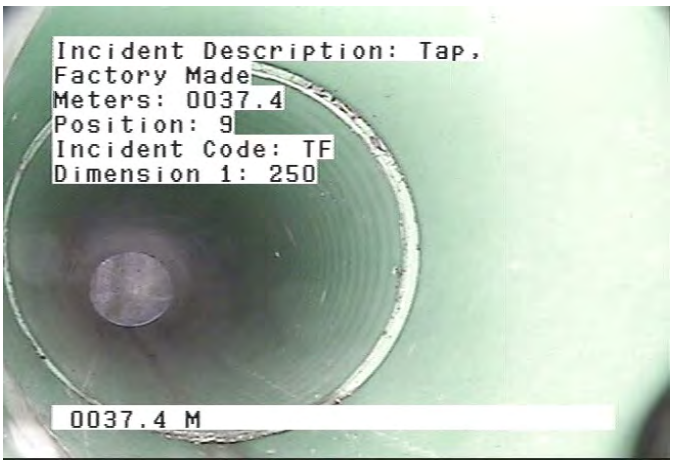
Additional Information



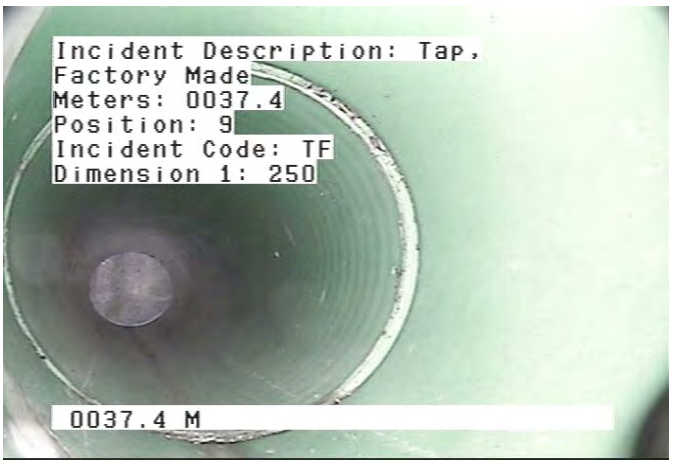
AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START CB.3



MWL - Water Level @ 0.0 m.



TF - Tap, Factory Made @ 37.4 m.



AMH - Access Point - Manhole @ 45.5 m.
FINISH MH.3

Surveyors name	Certificate Number	System Owner	Survey Customer	Drainage Area	Sheet
JOEL	U-516-07001825	EYE-VIEW	CITY OF MISSISSAUGA		19

P/O No.	Pipeline Segment Reference	Date	Time	Location (Street Name and number)	Locality
	MH.6-MH.8	20170613	12:08	SPEAKMAN DR	MISSISSAUGA

Further Location details	Upstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade
	START MH.6			

Downstream Manhole Number	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer	Direction	Flow Control	Height
FINISH MH.8				Stormwater	Downstream		450

Width	Shape	Material	Ln. Method	Pipe Joint Length	Total Length	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
	Circular	PVC		4		11.6			

Purpose	Sewer Category	Pre-Cleaning	Cleaned	Weather	Additional Information
F	Z	No Pre-Cleaning		Dry	

Distance (Meters)	Code		Continuous defect	Value				Joint	Circumferential Location		Image Ref.	Struct. Grade	O&M Grade	Remarks
	Group/ Descriptor	Modifier/ severity		S/M/L	Inches 1st	Inches 2nd	%		At / From	To				
0.0	AMH										AMH@0			Starting Manhole: START MH.6
0.0	MWL						5				MWL@0			
11.6	AMH										AMH@11.6			FINISH MH.8

	Structural								O & M								Overall							
Segment	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index
12 08-20170613-START MH.6-FINISH MH.8	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0000	

PACP Inspection Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.6	FINISH MH.8	450	Polyvinyl Chloride		MISSISSAUGA

Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	12:08	11.6

Additional Information

	Ftg.	Code	Description	Positio n	Comment
	0.0	AMH	Access Point - Manhole		Starting Manhole: START MH.6
	0.0	MWL	Water Level		
	11.6	AMH	Access Point - Manhole		FINISH MH.8

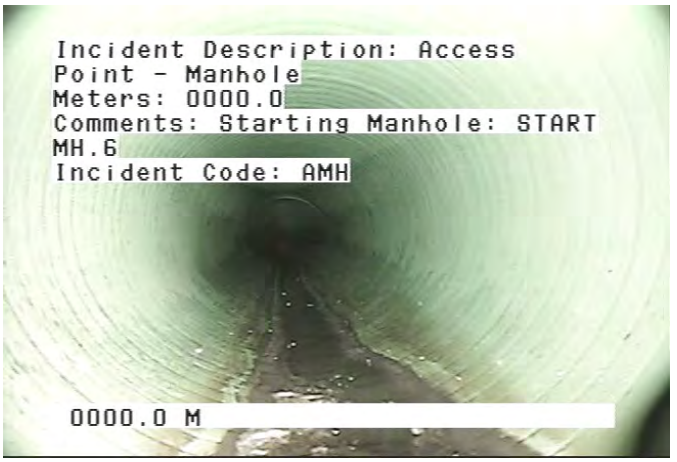
Incident Snapshot Report

Upstream MH	Downstream MH	Size	Material	Total Length	City
START MH.6	FINISH MH.8	450	Polyvinyl Chloride		MISSISSAUGA

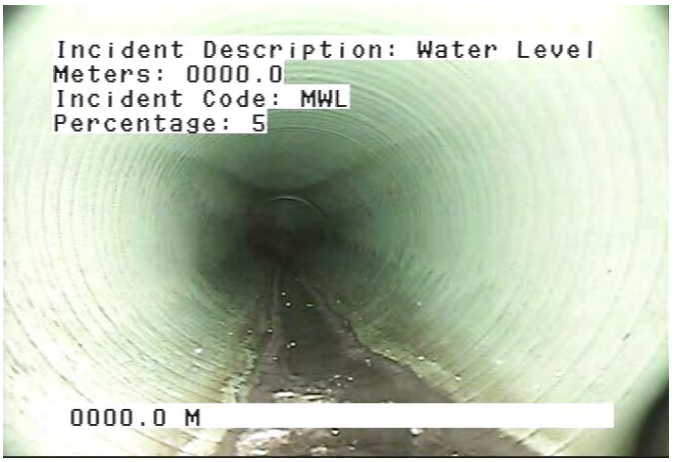
Surveyor's Name	Certificate Number	Street Address	Location Details
JOEL	U-516-07001825	SPEAKMAN DR	

Direction	Purpose	Weather	Date	Time	Length Surveyed
Downstream	Routine Assessment	Dry	20170613	12:08	11.6

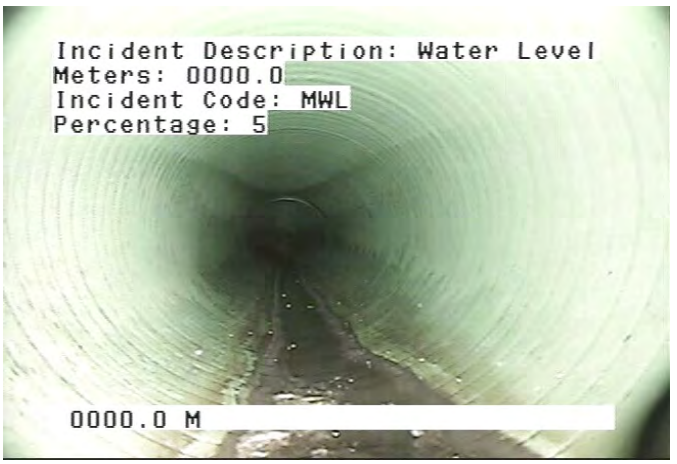
Additional Information



AMH - Access Point - Manhole @ 0.0 m.
Starting Manhole: START MH.6



MWL - Water Level @ 0.0 m.



AMH - Access Point - Manhole @ 11.6 m.
FINISH MH.8

#	Date	Street	Downstream MH	Upstream MH	Length Surveyed	Page
1	6/13/2017	SPEAKMAN DR	FINISH MH.2	START MH.1	37.5	2
2	6/13/2017	SPEAKMAN DR	FINISH MH.3	START MH.2	37.5	4
3	6/13/2017	SPEAKMAN DR	FINISH MH.4	START MH.3	77.1	7
4	6/13/2017	SPEAKMAN DR	FINISH MH.5	START MH.4	12.1	10
5	6/13/2017	SPEAKMAN DR	START MH.1	FINISH MH.7	33.9	13
6	6/13/2017	SPEAKMAN DR	FINISH MH.3	START CB.3	45.5	16
7	6/13/2017	SPEAKMAN DR	FINISH MH.8	START MH.6	11.6	19

Appendix C QUANTITY CONTROL

Manual Input
Automatic Output

Project: Living Arts Drive Road Extension
Project Number: 165011016
Project Location: Mississauga, ON
Date: 11/17/2017

Pre-Development 2-year Peak Flow

Storm	A	B	C
2-year	610	4.6	0.78
100-year	1450	4.9	0.78

	Area	C
Asphalt	0.68	0.90
Landscape	0.17	0.25
Total/Weighted Runoff Coefficient	0.85	0.75

Time of concentration	15.0	minutes
Rainfall Intensity	60	mm/hr

Rational Method

$$Q = 2.78 * C * i * a$$

C = Runoff Coefficient
i = Rainfall Intensity (mm/hr)
A = Contributing Area (ha)
Q = Flow (m^3/s)

Target Flow = **0.11**

External Flow Conveyed Through Site

Ext. 1	4.43	0.38
Ex- 3B[1]	1.58	0.30

[1] Runoff from EX-3B is controlled to pre-development level
therefore C=0.3 was used instead of the developed value of 0.75
the SWM report for area EX-3B is not available, details of the control system
will be required during the detiled design to confirm that the flow is not affected
by the proposed downstream storage in Living Arts Drive

Time of concentration	15.0	minutes	
Rainfall Intensity	141	mm/hr	(100-year peak flow)

Conveyed Flow = **0.84** m^3/s (External Area 100-year peak flow)

Allowable Release = **0.95** m^3/s

Allowable release equals the 0.11 target flow plus the 0.84 External Area 100-year peak flow

Project: Living Arts Drive Road Extension
Project No.: 165011016
Project Location: Mississauga, ON
Date: 11/17/2017

	Area	C
Total/Weighted Runoff Coefficient	0.85	0.75

Conveyed Flow = **0.84** m3/s

Modified Rational Method Storage Calculation

Storm	A	B	C
100-year	1450	4.9	0.78

Area =	0.85	ha
Runoff Coefficient =	0.75	
Time of Conc =	15.0	min
Time Increment =	5.0	min
Design Release Rate =	0.939	m^3/s
Maximum Storage =	**138**	m^3

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (m^3/s)	Runoff Volume (m^3)	Volume Released (m^3)	Storage Required (m^3)	
15.0	140.7	1.092	983.2	845.5	138	<<<<
20.0	118.1	1.052	1263.0	1127.3	136	
25.0	102.4	1.025	1536.9	1409.1	128	
30.0	90.8	1.004	1807.2	1691.0	116	
35.0	81.8	0.988	2074.9	1972.8	102	
40.0	74.6	0.975	2340.7	2254.6	86	
45.0	68.7	0.965	2605.1	2536.4	69	
50.0	63.8	0.956	2868.3	2818.3	50	
55.0	59.6	0.949	3130.7	3100.1	31	
60.0	56.0	0.942	3392.2	3381.9	10	
65.0	52.8	0.937	3653.2	3663.7	0	
70.0	50.0	0.932	3913.5	3945.6	0	
75.0	47.6	0.927	4173.5	4227.4	0	
80.0	45.4	0.924	4433.0	4509.2	0	
85.0	43.4	0.920	4692.1	4791.0	0	
90.0	41.6	0.917	4951.0	5072.9	0	
95.0	40.0	0.914	5209.5	5354.7	0	
115.0	34.7	0.905	6241.4	6482.0	0	

Project: Living Arts Drive Road Extension
Project No.: 165011016
Project Location: Mississauga, ON
Date: 11/17/2017

Post Development Conditions

Orifice Control:

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

C_d	0.82	(Orifice tube)
Location	EXMH118	
HWL	159.50	m
Orifice Size	525	mm
Orifice Invert	157.81	m
Centroid	158.07	m
Obvert	158.335	m
Head	1.43	m
Flow Area	0.216	m^2
Proposed Release Rate	**939**	l/s

Project: Living Arts Drive Road Extension
Project No.: 165011016
Project Location: Mississauga, ON
Date: 11/17/2017

Airport Equation To be used if "C" value is less than or equal to 0.4

$$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$$

Where: t_c = time of concentration, minutes
C = runoff coefficient
L = watershed length, m
S_w = watershed slope, %

Bransby-Williams Formula To be used if "C" value is greater than 0.4

$$t_c = 0.057 * L * S_w^{-0.2} * A^{-0.1}$$

where: t_c = time of concentration, minutes
L = watershed length, m
S_w = watershed slope, %
A = watershed area, ha

Ref: MTO, Drainage Management Manual, page 28, Chapter 8, 1997

Uplands Method

Table 10.7: $V/(S^{0.5})$ relationship for various land covers

Land Cover	$V/(S^{0.5})$
Forest with heavy ground litter, hay meadow	0.6
Trash fallow or minimum tillage cultivation	1.5
Short grass pasture	2.3
Cultivated, straight row	2.7
Nearly bare soil, untilled	3
Grassed waterway (ditch)	4.6
Paved areas; small upland gullies	6.1

$$\text{Travel Time} = \text{Travel Length} / [\text{Slope}^{0.5} * V/(S^{0.5})]$$

Where:
S = slope, m/m
t_c = sum of travel times for each land use

Longest overland Flow Path

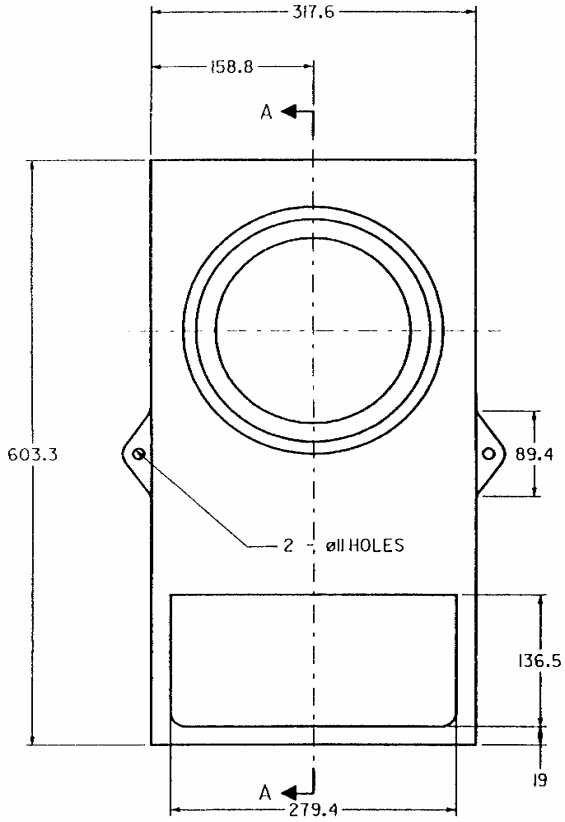
Length	213	m
Elevation Change	2.29	m
Slope	1.08	%
Slope	0.0108	m/m
Area	0.85	ha

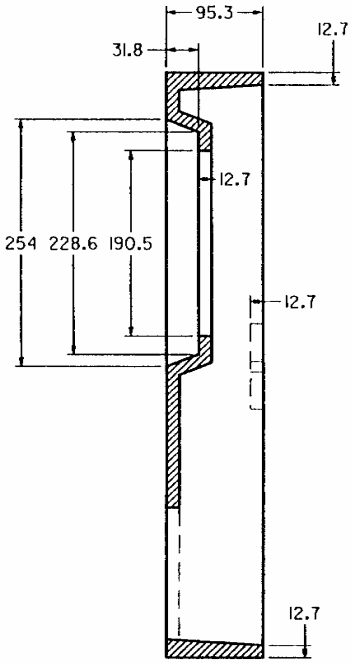
Time of Concentration

tc (Airport)	16.3	min
tc (BW)	12.2	min
tc(uplands)*	5.6	min

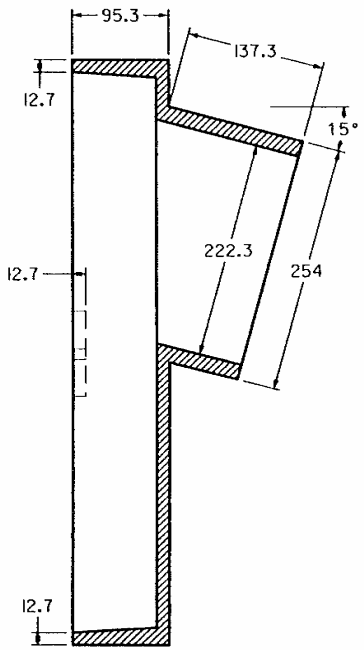
*Assumes paved areas

Appendix D QUALITY CONTROL

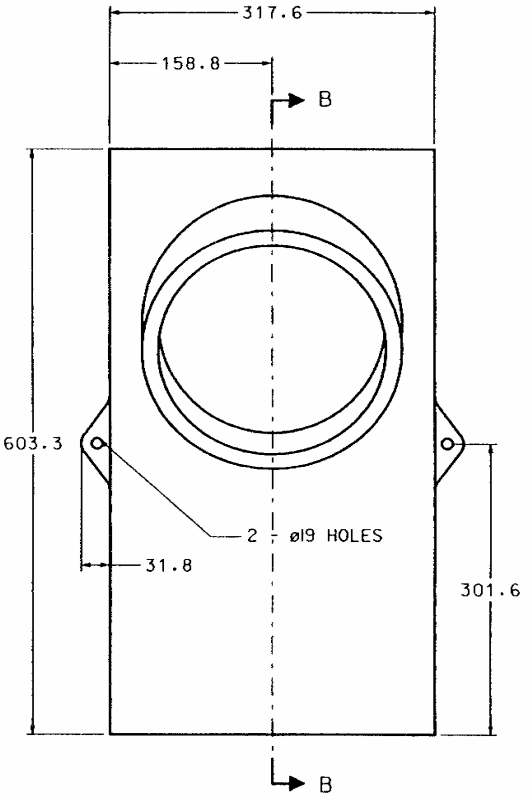


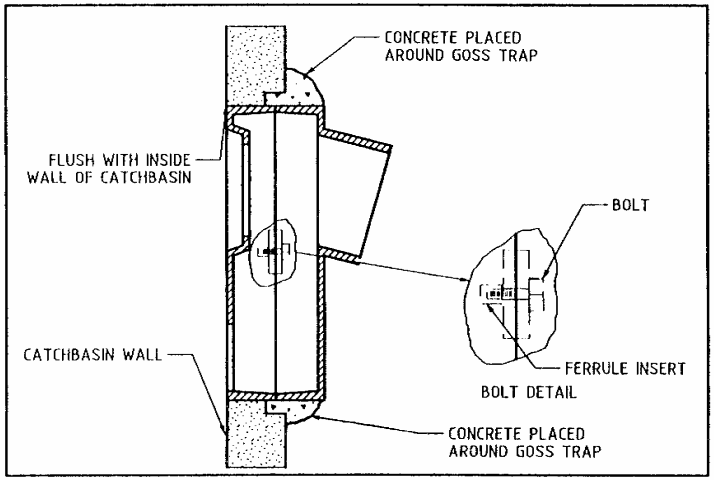


SECTION A-A



SECTION B-B





SECTION THROUGH INSTALLED GOSS TRAP

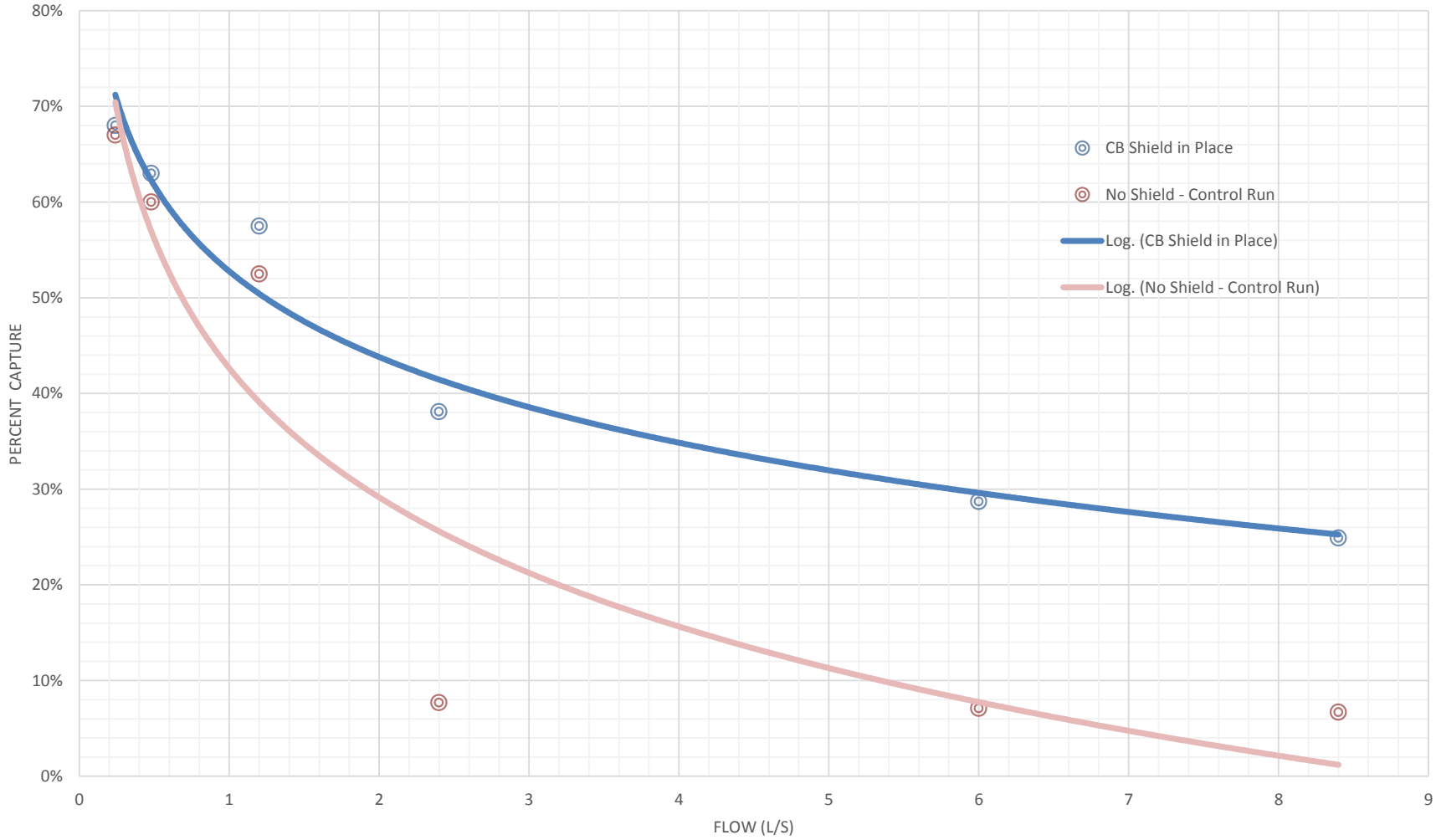
NOTES:
1. ABOVE DIAGRAM ILLUSTRATES A CAST IRON GOSS TRAP, POLYETHYLENE GOSS TRAPS ARE ALSO AVAILABLE
2. ALL DIMENSIONS ARE IN MILLIMETRES

CON CAST PIPE
ISO 9002 REGISTERED
R.R. #3, Guelph, Ontario N1H 6H9
Tel: 1-800-668-PIPE (7473)

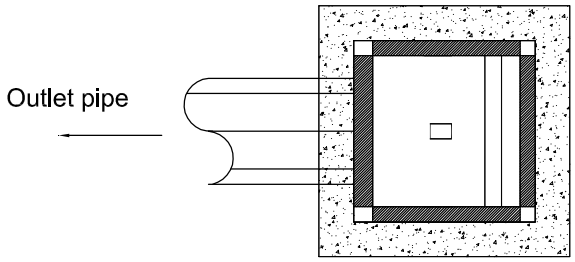
CON CAST PIPE

GOSS TRAP

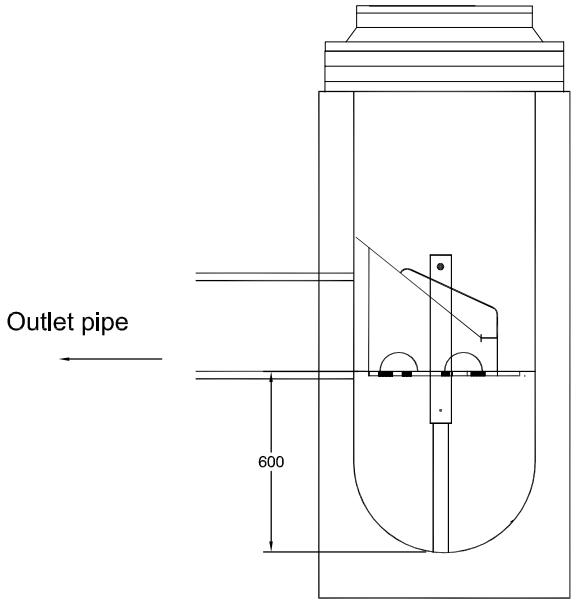
Lab Testing Results for CB Shield - % Capture vs. Flow Rate



Notes
1. CB Shield can be installed at any time. In a non frozen condition.
2. The frame and cover should be well aligned with the catchbasin for proper installation
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



Top view



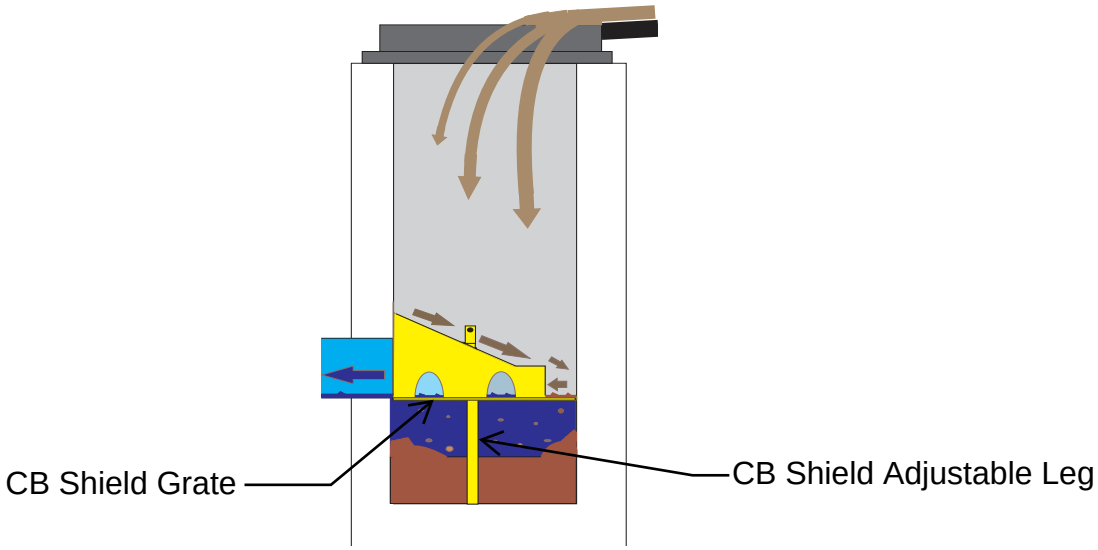
Profile view

CB Shield (600mm Sump)

CB Shield Operations Manual

Installing CB Shield

It is important the catch basin frame and cover is aligned properly with the catch basin below
If it is misaligned it may be difficult to install the CB Shield insert
Determine the depth of the sump (i.e. the distance from the invert of the outlet pipe to the bottom of the catch basin). If the catch basin is in service the sump depth will be the depth of the water. The grate section of the CB Shield insert should be the same elevation as the water depth in the sump.



Adjust the leg of the CB Shield to achieve the appropriate elevation
The CB Shield is lowered into place with the rope attached to the top of the leg. The high side of the sloped plate should face the wall with the outlet pipe. (The incoming water should be directed to the wall furthest from the outlet)
The flexible plastic skirt around the outer edges of the CB Shield insert may interfere with some misaligned frame and grates. If so a slice can be cut into the skirt with a utility knife at the point of interference.
Make sure the grate is at the desired level or remove CB Shield and re-adjust the leg length.

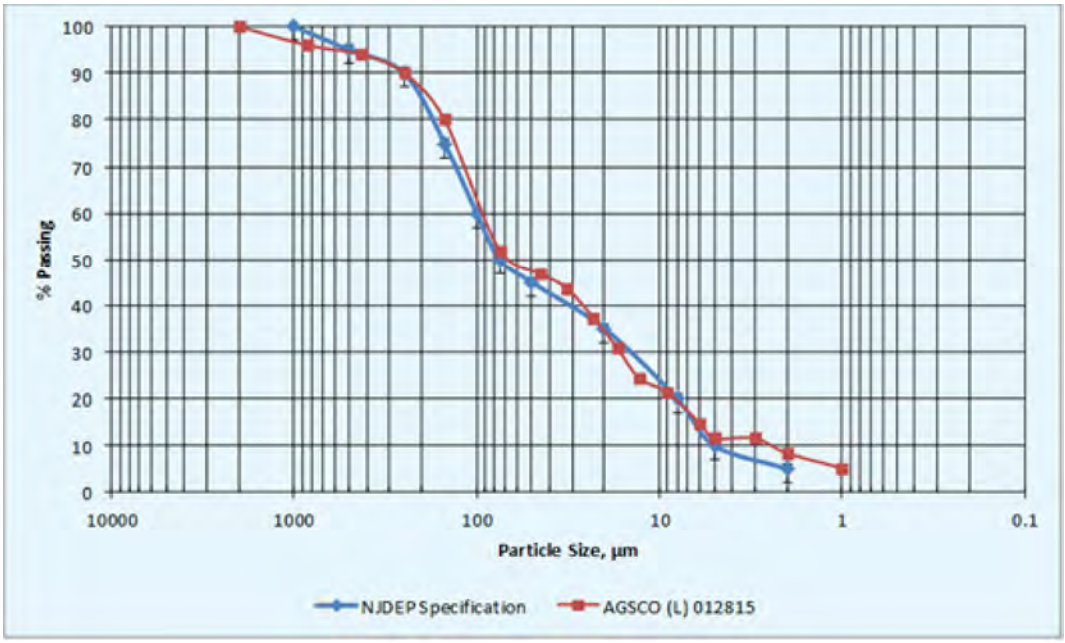
Inspecting a CB Shield Enhanced Catch Basin

Open grate
A lifting rope is attached to the top of the centered leg of the CB Shield insert. Lift and remove the insert.
Inspect CB Shield for any possible damage. Quite often leaves will accumulate on the grate. This can actually improve the Shield's ability to capture sediment and assist in preventing leave litter from being washed down stream.
Use a Sludge Judge to measure the sediment depth in 4 - 6 locations of the sump.
If the sediment depth is 300mm – 600mm deep it is recommended that the unit be cleaned.

Cleaning a CB Shield Enhanced Catch Basin

Open grate and remove CB Shield with lift rope.
Clean catch basin as usual with a Vacuum truck.
Clean CB Shield (if needed) and re-install into catch basin.
If there is any significant damage to a CB Shield please send a picture and its location to CB Shield Inc. (info@cbshield.com).

Graph of ETV Test Sediment PSD as prepared by Joe Costa of GHL, and forwarded in an email received from Joe Costa 24March2015.



Joe Costa indicates in his email that “this batch has a d50 of just under 75 µm and falls within the allowed variance at every specified particle size (though it is a close call at 1000 µm).”

Average Annual Sediment Removal Rates (%) using a CB Shield (based on ETV Sediment - 1 to 1000 micron Particle Size Distribution)

Area to CB (ha)	Imperviousness[1] (%)					
	20%	35%	50%	65%	80%	100%
0.02	57%	57%	57%	57%	56%	56%
0.05	56%	56%	56%	55%	55%	54%
0.10	56%	55%	54%	53%	52%	51%
0.20	54%	53%	51%	49%	48%	46%
0.30	53%	50%	48%	46%	45%	43%
0.40	51%	48%	46%	44%	42%	40%
0.50	50%	47%	44%	42%	40%	38%
0.60	49%	45%	43%	40%	39%	36%

Notes:

1. Runoff Coefficient 'C' is approximately equal to 0.05 + 0.9*Impervious Fraction.
2. Above chart is based on long term continuous hydrologic analysis of Toronto, Ontario (Bloor St) rainfall data.
3. Assumes 0.6 m sump in CB and that maintenance is performed (i.e. CB cleaning) when required by sediment/pollutant build-up or otherwise.
4. See accompanying chart for suggested maintenance scheduling - AND - get CB Shield Inc. to monitor it for you in field.
5. Sediment/Pollutant removal rates based on third party certified laboratory testing using ETV sediment (PSD analysis available on request).
6. See additional discussion regarding scour protection from CB Shield during more infrequent runoff events.

Catch Basin Shield: Localized Sediment Control in Urban Environments

UNIVERSITY OF TORONTO

Pavneet Brar, Jennifer Drake, Ph.D., Stephen Braun

CB Shield

Ontario Centres of Excellence
Where Next Happens

Context

Degradation of stormwater runoff quality has lead to implementation of **Treatment Train Approach** by many municipalities.

Source → **Conveyance** → **End-of-Pipe**

Many localized controls exist, but not all are implemented, due to:

- Perceived additional costs
- Unknown maintenance and long-term functionality
- Lack of credible verification protocols

An exploratory field study was conducted by the University of Toronto to evaluate the performance and feasibility of a catch basin insert, called **Catch Basin (CB)Shield**, under urban environments.

Objective: Ease the transition of CB Shields from testing stage to field-implementation stage.

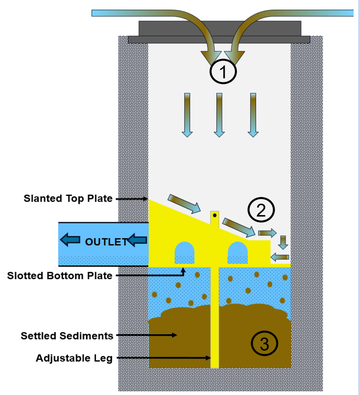
Discussion

Retaining more sediments in the sump is beneficial for *municipal infrastructure*, *local waterbodies*, and *aquatic habitats*. The use of localized controls, such as CB Shield, can be encouraged by:

- Establishing better communication between hierarchical operational entities
- Having clear dissemination of maintenance requirements and practices
- Promoting best management practices and novel technologies through pilot field testing

CB Shield

CB Shield can simply be placed in catch basins to improve their sediment retention capability.



1) Water enters through the catch basin frame on the top.
2) Water runs down the slanted plate and over the slotted grate.
3) The sump is not turbulent, so sediments and other material are able to settle out.

Methodology

Two locations at the University of Toronto are tested: at each location, there is a control and a retrofitted catch basin.

Conventional

Catch basin with CB Shield

June to December 2015:
Sumps sampled bi-weekly and tested for chemical, physical, and microbiological parameters.

December 2015:
Complete catch basin clean out.

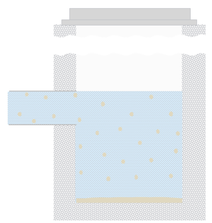
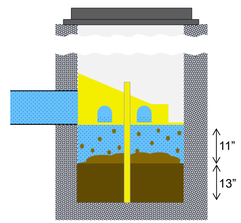
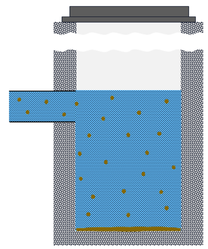
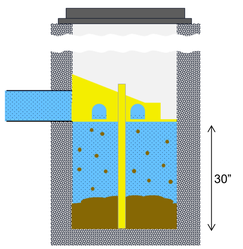
a) Cleanout using trashpump; b) Pail-and-shovel method for sediment; c) Rooftop drying; d) Filtering water; e) Indoor drying

Once only sediment remained, they were analyzed.

Chemical	Physical
• Total Nitrogen (TKN) • Total Phosphorus (TP) • Metals scan (Arsenic, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, Selenium, Silver, and Zinc)	• Dry weight • Particle Size Distribution (Fine: <53μm , Medium: 53μm -2mm, Coarse: 2-4mm) • Organic Content

a) Weigh dry sediment; b) Particle size distribution using sieves; c) Samples for chemical analysis; d) Organic content using ignition; e) Dried sediment for SF shielded, GSU control, and GSU shielded, respectively

Annual Sediment Retention

Location 1: Sandford Fleming (SF) Building		Location 2: Graduate Student Union (GSU) Building	
Control	**Shielded**	**Control**	**Shielded**
			
Catch basin disturbed during study; accidently cleaned out early by UofT Facilities Services	**Catch basin not properly cleaned prior to study; older sediment deposited below 11" depth**		

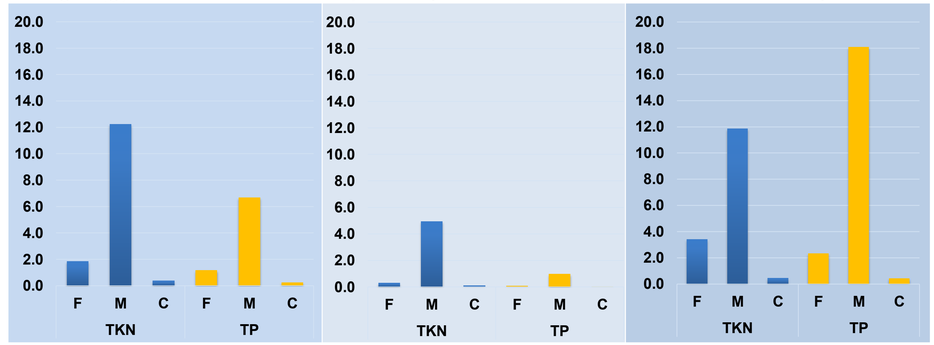
Dried sediment weight (kg) captured in the sumps

10.4	**0.8**	**38.3**

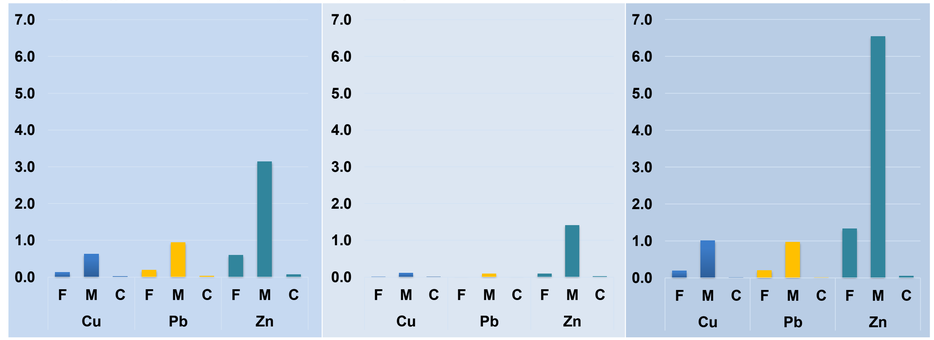
Volume (%) of the sump filled by sediment

9	**1**	**25**

Weight (g) of total Nutrients captured **(F = fine, M = medium, and C = coarse)**



Weight (g) of total Heavy Metals captured



Appendix E WATER BALANCE

Erosion Control: Living Arts Drive

Project Name :Living Arts Drive Road Extension Missussaga

Project No. : 165011016 **November 17, 2017**

Runoff from the roadway will be captured via catchbasins which drain into the Silva Cells soil or infiltration trench.

Total Site Area	0.85	ha
Target Volume (based on retention of 5 mm over site area)	43	m^3

Available Retention Volume:

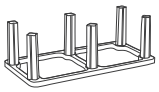
Total no. of trees within the boulevard	10	trees
Volume of planting soil per tree	15	m^3
Total volume of planting soil	150	m^3
Void ratio	0.4	
Total void volume	60	m^3

Captured Rainwater Volume

Road Width	16.05	m
Total length of boulevard + sidewalk	225	m
Total Area	3,611	m^2
Capture event	12.0	mm
Total rain volume captured by the trees	43	m^3
Target volume	43	m^3
% of target	100%	Ok

SILVA CELL SYSTEM LAYOUT INSTRUCTIONS

DeepRoot®



Silva Cell system layout is not complicated, but it does require general product orientation. Accordingly, this document is divided into three sections – General Principles, Sizing a Silva Cell System, and Layout Guidelines. An understanding of each of these sections is critical for the successful integration of the Silva Cell into your site plans. Use these guidelines with the Standard Silva Cell details.

GENERAL PRINCIPLES

- The Silva Cell system is designed to be installed beneath paved areas such as sidewalks, plazas, and parking bays. Different pavement types (concrete, asphalt, or pavers) require different pavement profiles in order to meet H-20 loading requirements. The Silva Cell system is not designed to support high speed traffic loads. Consult our standard details for more information.

- Understand how utilities, soils, water table and structures might affect your Silva Cell layout. Silva Cells can often accommodate existing and proposed utilities and structures, but planning for this integration is critical for a successful layout and installation. Share your Silva Cell layout with the project Civil Engineer in order to work around site and utility conflicts early in the process.

- Silva Cells allow growth of large trees that, with adequate soil volumes, proper installation and care, will reach its true mature size. This tree will grow to have a large canopy and a significant trunk flare that your design should accommodate.

- Wherever possible, link Silva Cell soil volumes to each other or to existing nearby soil volumes such as parks or lawns.

SIZING A SILVA CELL SYSTEM

1. Determine if the Silva Cell system will be used to grow big trees or grow big trees and treat stormwater.

   - Silva Cells are used to provide soil to grow large trees, but can also be used to treat stormwater. Determine your project goals for using Silva Cells and begin to think about how to size and design your system accordingly.

   - For large trees, consider how the Silva Cell system can use a passive irrigation system. If passive irrigation is not a possibility, make sure to include irrigation in your plans.

   - For large trees and stormwater, consider how to distribute the stormwater throughout the Silva Cell system and tie into overall site drainage.

   - See "Stormwater Schematics" for concepts for managing stormwater in the Silva Cells.

2. Determine the optimal tree size that you would like to achieve on your site.

   - See "How Much Soil to Grow a Big Tree" to find a target soil volume for your ideal tree size.

   - A simple rule of thumb for target soil volume is to provide 1,000 ft3 (28m3) of soil for a canopy tree and 600 ft3 (17m3) of soil for an understory tree. You can also use a general 2:1 ratio of Soil Volume: Canopy Size. Trees can also share soil volumes, an efficient way to provide rooting volume is to connect planters together. Shared soil volume targets are typically around 600 ft3 (17m3) per overstory tree.

3. Determine the volume of suitable soil available outside of the Silva Cell system.

   - Make your tree openings as large as possible. Due to lack of infrastructure, this is the cheapest soil available. Large tree openings will also accommodate the size of a mature tree.

   - Wherever possible, link Silva Cell soil volumes to each other or to existing nearby soil volumes, such as parks or lawns.

   - Calculate the Available Soil Volume in the area of work, including available soil in the treeopenings themselves, as well as adjacent open space that the Silva Cells can link to like parks, lawns, etc.

4. Determine how many Silva Cells are needed to meet the target soil volume.

   - Each Silva Cell holds approximately 10 ft3 (0.28 m3) of soil.

   - Target Soil Volume = (Available Soil Volume + Soil in Silva Cells)

   For example: The target soil volume is 1,000 ft3 (28m3). Each tree has a 4'x4' tree opening, and the Silva Cell system will be 3-frames deep. The depth of planting media in the Cells (and adjacent tree opening) would be approximately 3.75'.

   3.75'x4'x4' = 60 ft3 (1.7m3) in the tree opening

   1,000 ft3 – 60 ft3 = 940 ft3 needed in Silva Cells

   940 ft3/10ft3 per frame = 94 Cell frames

   Since we're using 3-frames deep, 94/3 = 31.3 decks.

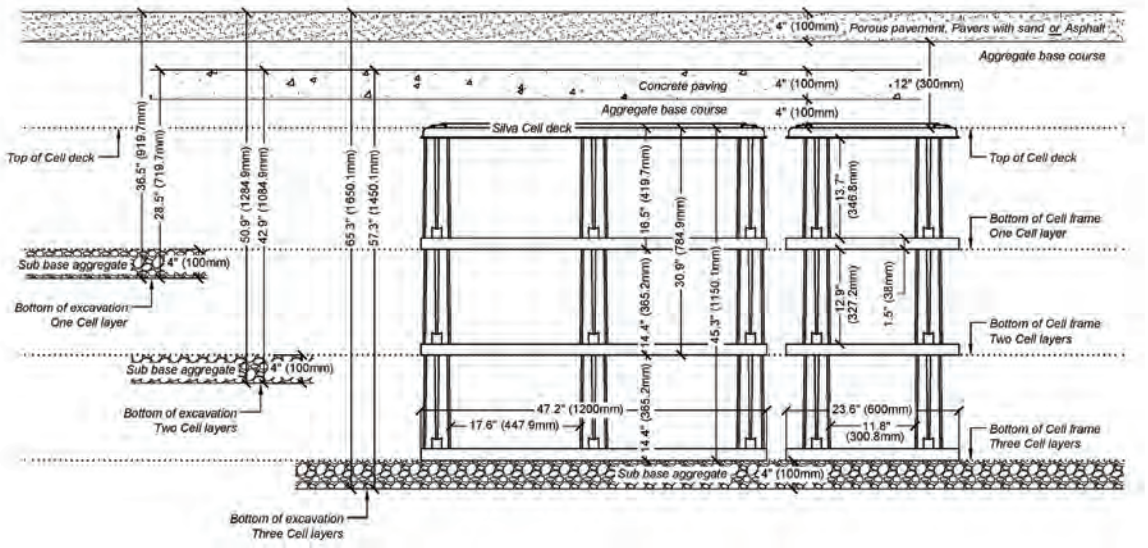
   Obviously, we can't have 0.3 Cell decks. So bump this up to:

   32 decks x 3 frames deep = 96 Cell frames = 960 ft3 + 60 ft3 = 1,020 ft3 soil provided

   32 decsk x 3 frames deep = 96 Cell frames = 26.9 m3 + 1.7 m3 = 28.6 m3 soil provided

5. If designing the system for on-site stormwater management, determine how many Silva Cells are needed to provide stormwater treatment for your site.

   - Bioretention soil is used within the Silva Cells for standard stormwater projects. Volume of filtration or "storage" is based on the water storage within the soil, and the location of any distribution or overflow pipes.



- The static storage of water within the Silva Cells will be roughly equivalent to 20% of the total bioretention soil volume (2 ft³/.05 m³ per frame).

- There are many ways for stormwater to be brought into and out of the Silva Cell system. This is highly project-specific, but we would be happy to discuss your project to help you find the best fit. Please consult with DeepRoot if you have stormwater specific questions.

6. Balance the required soil volume for soil rooting with required soil volume for stormwater treatment.

   - Provide approximately 1,000 ft3 (28 m3) of soil for a canopy tree and 600 ft3 (17 m3) of soil for an understory tree. Stormwater treatment volumes will vary based on project location and goals.

CREATING YOUR SILVA CELL PLAN

Standard Silva Cell dimensions are approximately 2' (0.6 m) wide x 4' (1.2 m) long.

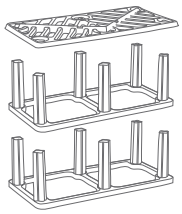
1-frame stack = 16.5" (419.7 mm) deep
2-frame stack = 30.9" (784.9 mm) deep
3-frame stack = 45.3" (1,150.6 mm) deep

The standard spacing required between Silva Cells is 1-3" (25 mm x 75 mm). These dimensions should be used for all standard Silva Cell Layouts. As long as you main¬tain a 1-3" (25 mm x 75 mm) gap between each stack they can be oriented in a layout that best accommodates your site needs.

1. Determine the available area for Silva Cell placement based on existing and proposed site conditions.

- Use current site base data, including (but not limited to) structures, utilities, roads and landscape plans to evaluate all potential conflicts with the Silva Cell system.
- Determine the depth of your Silva Cell system. This will depend on available space, target soil volume, and budget.
  - Silva Cells can be stacked 1-, 2-, or 3-frames deep. Once you determine the maximum depth that can be accommodated, refer to "Construction Depths for Silva Cells" to calculate how the Silva Cell system will fit into your site cross-section. Note the pavement profile required to meet H-20 loading and required sub base depth. Account for these materials when calculating the total Silva Cell system depth.
- Project sites do not have to be of uniform depth to use the Silva Cell.
  - Stacks of Silva Cells 1-, 2- and 3-frames deep can be positioned adjacent to one another in one-frame increments. Altering the depth of the system is a useful way to transition between site depths to accommodate utilities or other features that pass through your area of work.
- For use on sites with slopes greater than 5%, please contact DeepRoot directly (415 781 9700 or info@deeproot.com).

2. Determine the available area for Silva Cell placement based on setbacks from proposed or existing curbs.
   - Draw in the curb setback.
     - The standard setback from face of curb is 18" (45.72 cm). This setback can be used as a general guideline, but project-specific setbacks may vary.
   - In many cases, the Silva Cell system can be installed immediately adjacent to walls, footings, or other site structures that extend below the Silva Cell System. The maximum distance should be 3" (75 mm) from these structures in order to eliminate additional support measures. This circumstance should always be evaluated by a DeepRoot consultant prior to construction. Please see the "Gap Bridging" details in our Modified Details package for more information.



3. Evaluate the design of the tree openings.
   - Consider the dimensions of the tree openings and how easily they will work with the 2' x 4' (0.6 m x 1.2 m) basic Silva Cell size. If tree grates are part of the tree opening design, take into consideration how the Silva Cells can be arranged to provide support to the grate. Tree grate support shall be placed directly above the Silva Cell posts. Remember to plan for the trunk flare of a mature tree when designing the tree opening and choosing an appropriate tree grate.
4. Create a Silva Cell in your landscape plan or use the supplied CAD file.
   - Insert the appropriate DeepRoot Silva Cell block into your project Landscape Plan. This

block has been created to-scale and includes required Silva Cell spacing for ease of layout. Verify the size of the Silva Cell after insertion into your drawing for compliance with standard Silva Cell dimensions.

- Silva Cell frames must be placed between 1" and 3" (2.5 cm and 7.6 cm) apart. Spacing between frames does not need to be uniform across the entire site as long as it stays within the 1" to 3" parameters. If Cells need to be placed more than 3" apart for any reason, please refer to our Modified details for information about gap bridging.

5. Place Silva Cells on your site starting with the most restrictive areas.

- Copy the Silva Cell block to fill the approximate Silva Cell area, starting along the curb setback and around tree openings and/or other site obstacles and utilities.

- Copy the Silva Cell block to fill the approximate Silva Cell area, starting along the curb setback and around tree openings and/or other site obstacles and utilities.

- All structures such as tree grates, curbs, and footings designed to be supported by Silva Cell structures must be placed directly above the Silva Cell posts. Silva Cell posts are located around the perimeter of the Silva Cell frames.

- Link soil volumes wherever possible between trees so that they can share soil.

6. Silva Cells should always be placed parallel or perpendicular to each other.

- Gaps larger than 3" (75 mm) should be avoided if possible. See “Gap Bridging” details for further information.

7. After the Silva Cells are laid out, finalize all volume calculations and Silva Cell counts.

- Verify that the designed system meets the target soil volume for the intended tree(s), and if used in a stormwater application, meets the target stormwater treatment volumes.

- Determine the number of Silva Cell frames and Silva Cell decks required for your design (i.e., a 3-layer system requires 3 Silva Cell frames and 1 Silva Cell deck).

All Silva Cell layouts and details must be reviewed by a DeepRoot consultant prior to construction to ensure proper application of the Silva Cell technology. Please contact DeepRoot if you run into any difficulties; we will help find solutions for your site.

USA: (800) 458 7558
Canada: (800) 561 3883
United Kingdom: +44 (0) 207 969 2739
info@deeproot.com

DeepRoot®

DeepRoot Green Infrastructure, LLC
530 Washington Street
San Francisco, CA 94111

Tel: 415 781 9700
Toll Free: 800 458 7668
Fax: 415 781 0191

www.deeproot.com
info@deeproot.com

DeepRoot Canada Corp.
#201, 2425 Quebec St.
Vancouver, BC V5T 4L6

Tel: 604 687 0899
Toll Free: 800 561 3883
(Canada Only)
Fax: 604 684 6744

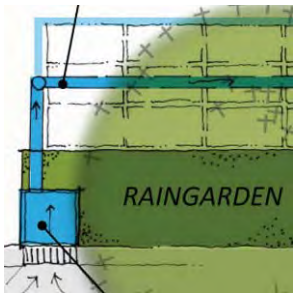
mjames@deeproot.com

DeepRoot UK
43-45 Portman Square
London
W1H 6HN
United Kingdom

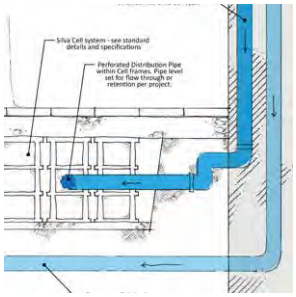
Tel: +44 (0) 207 969 2739
Fax: +44 (0) 207 969 2800

steve@deeproot.com

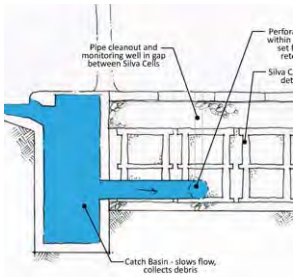
Stormwater and the Silva Cell System
SCHEMATICS



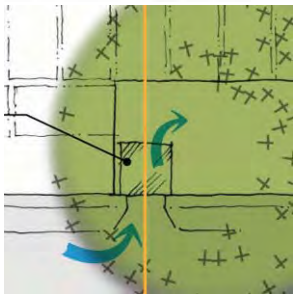
Raingarden Schematic -
Section View
Plan View



Rainleader Schematic -
Section View
Plan View



Catch Basin Schematic -
Section View
Plan View



Curb Cut Schematic -
Section View
Plan View

DeepRoot Urban Solutions

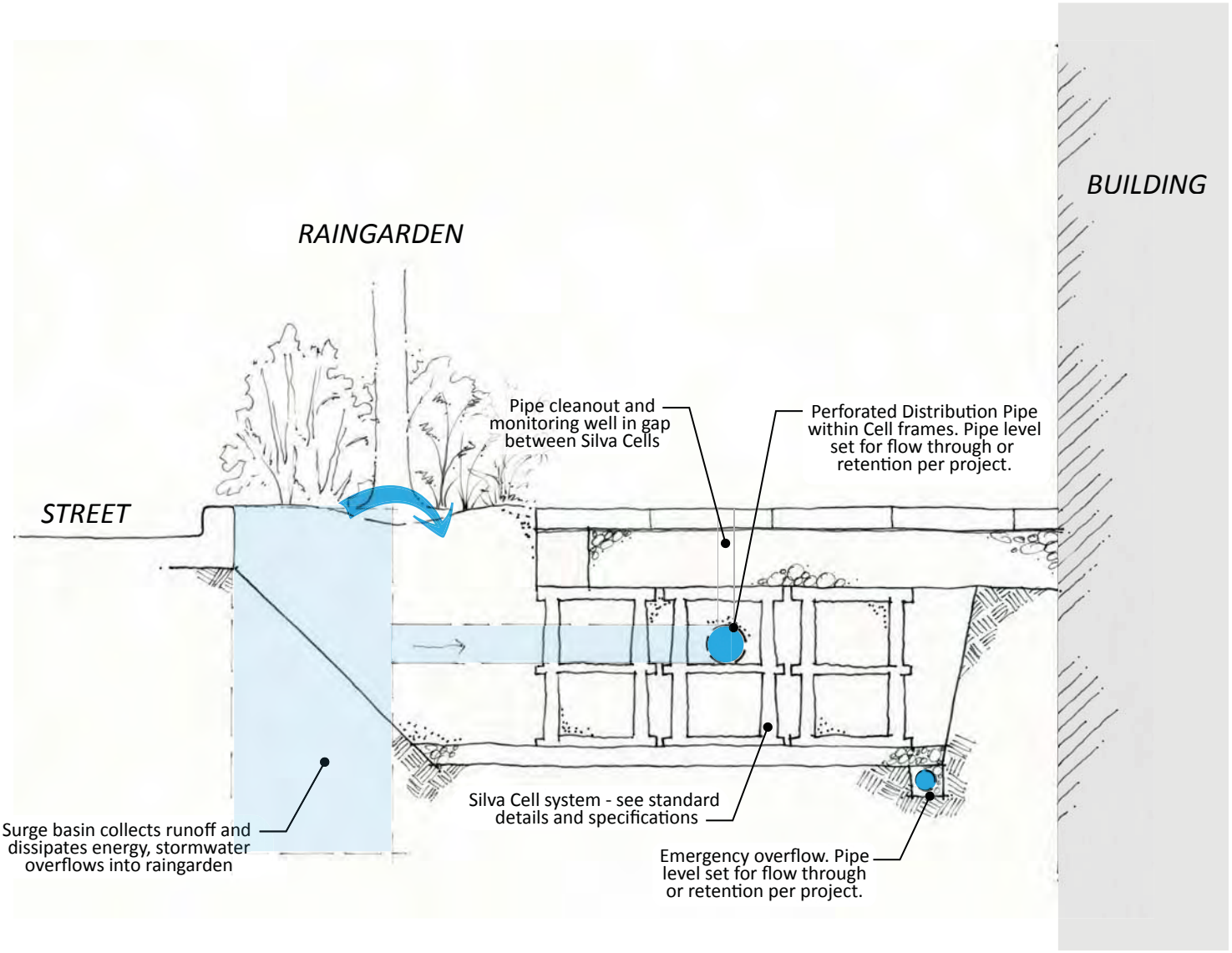
Updated 2/15/2011

Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

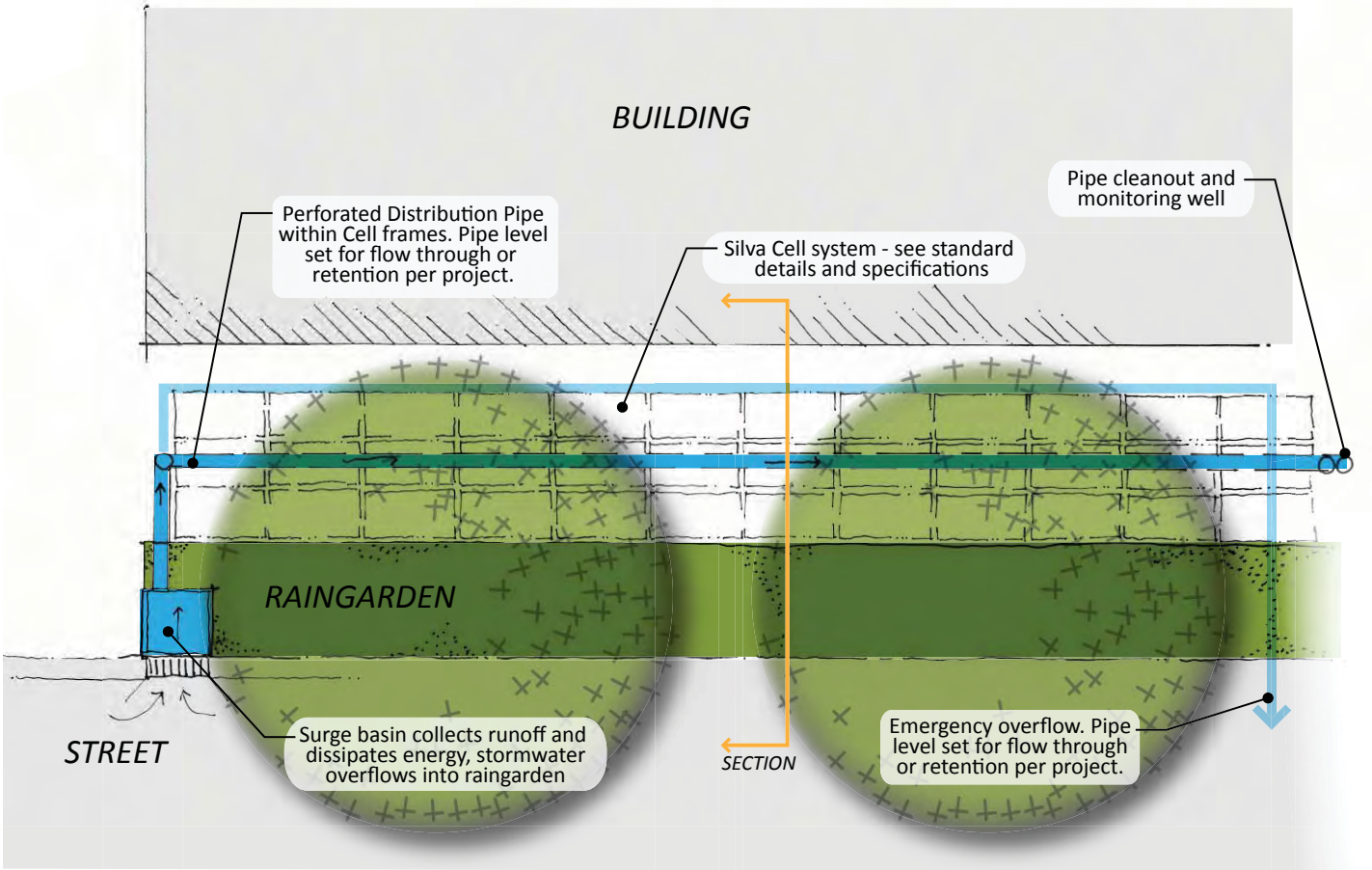


Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

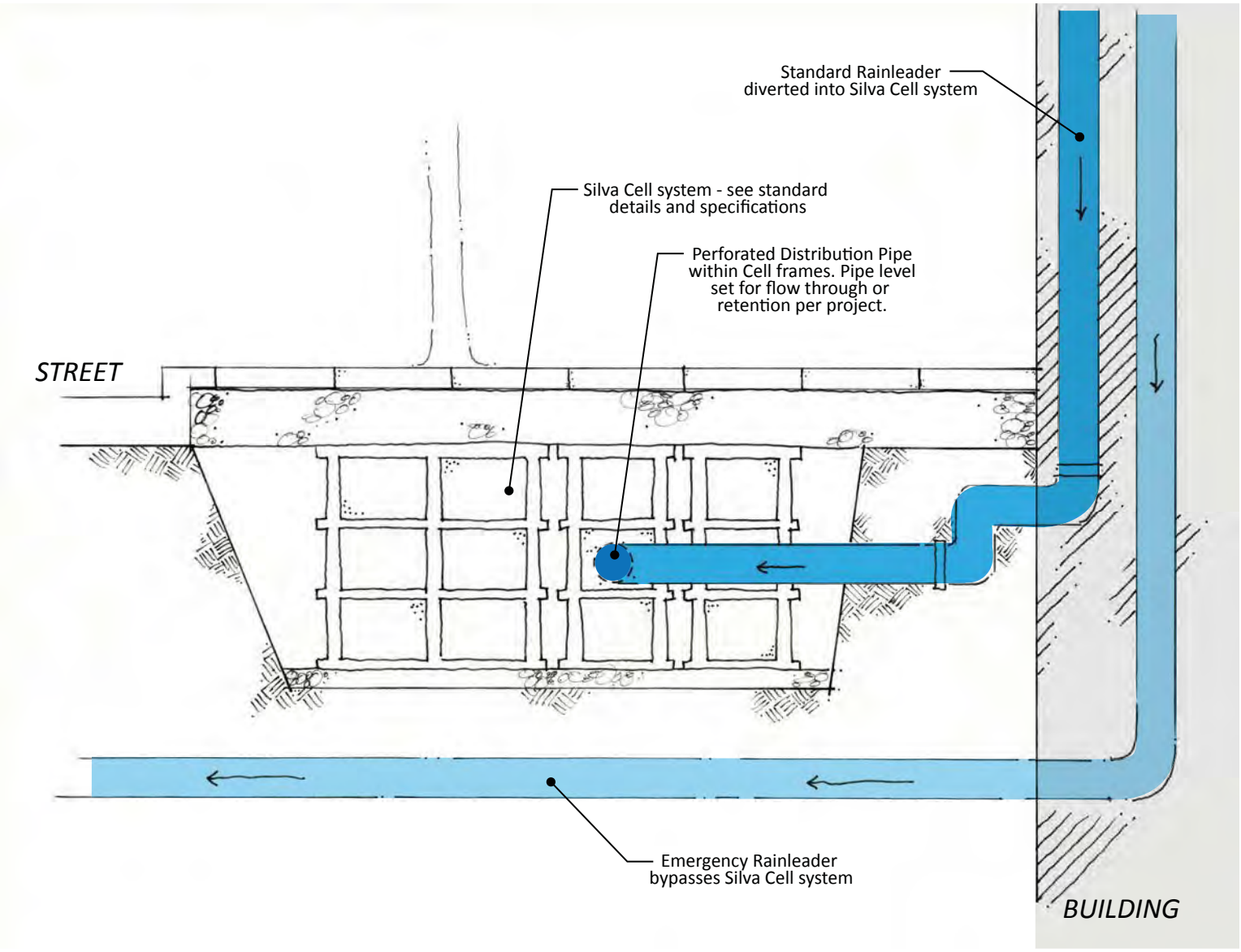


Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

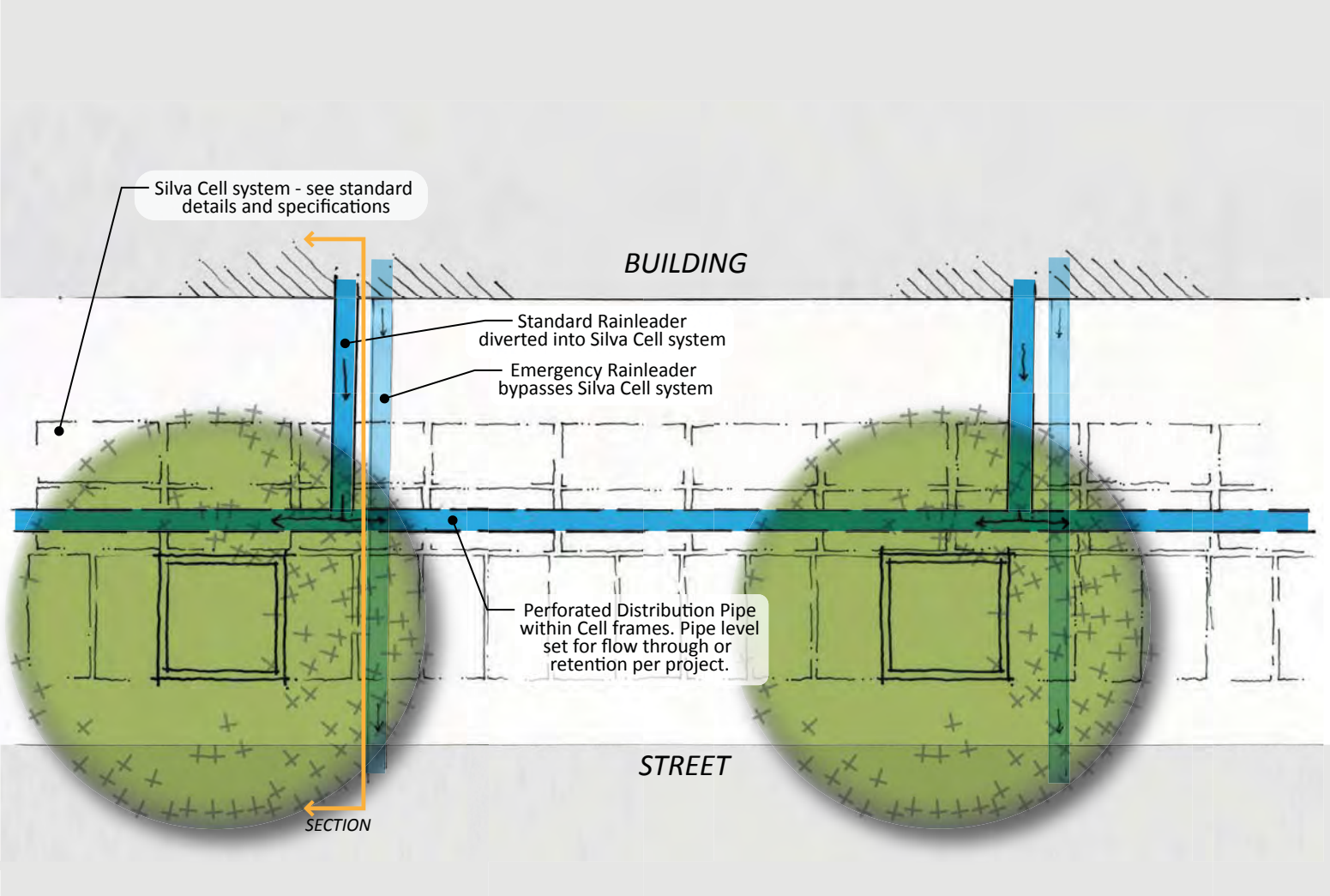


Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

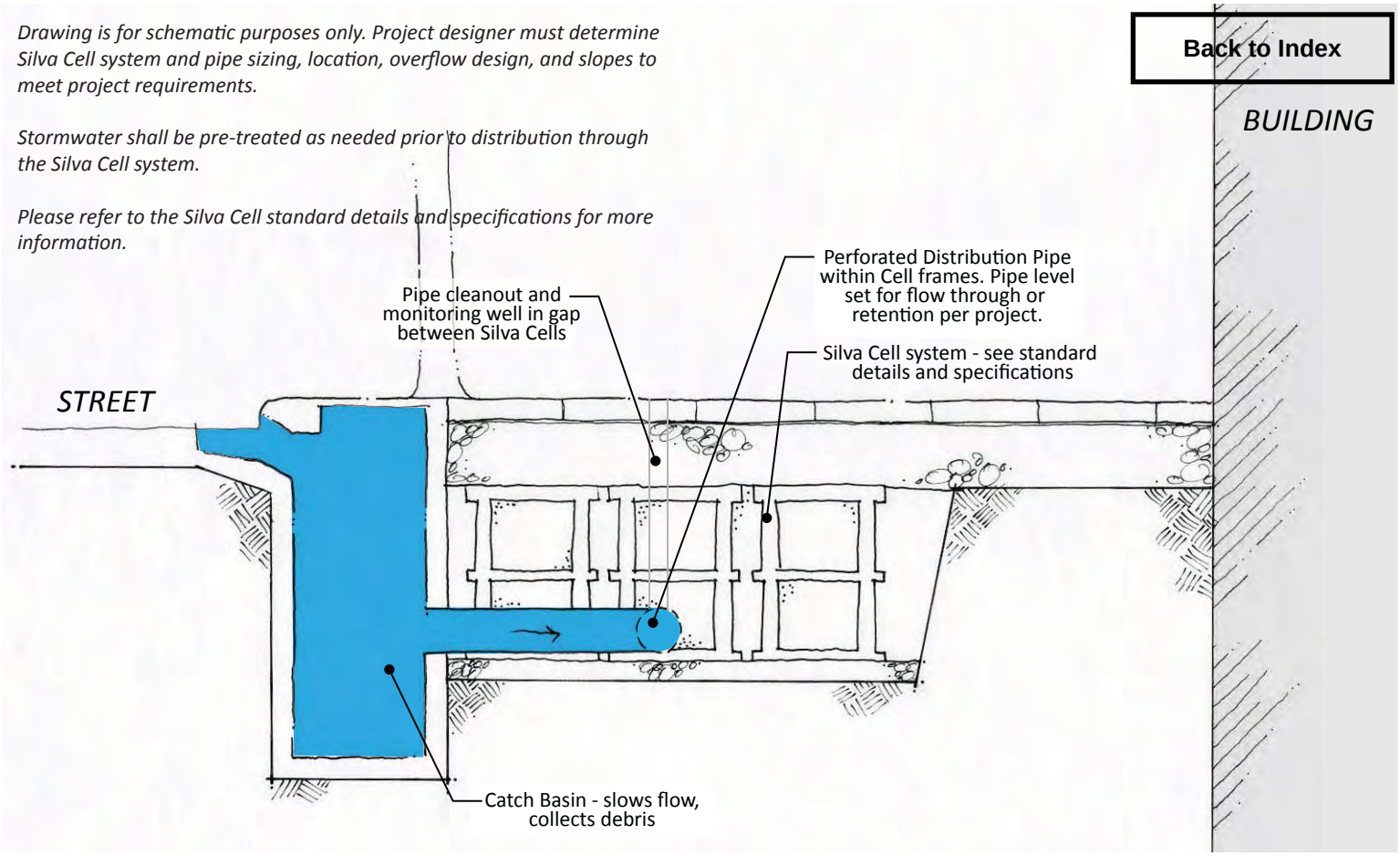


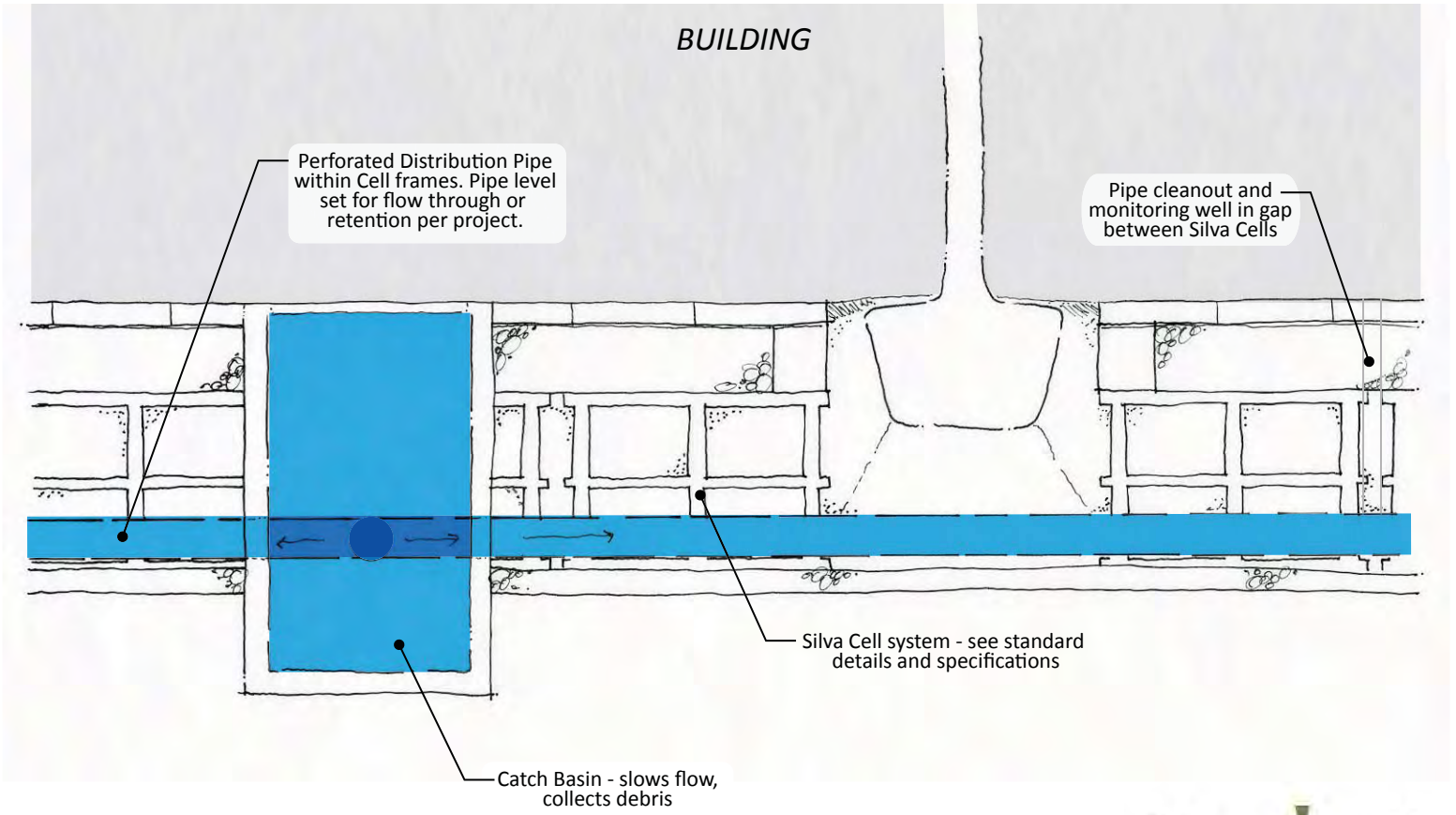
Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index





DeepRoot® Urban Solutions

Stormwater and the Silva Cell System

Catch Basin *Schematic*

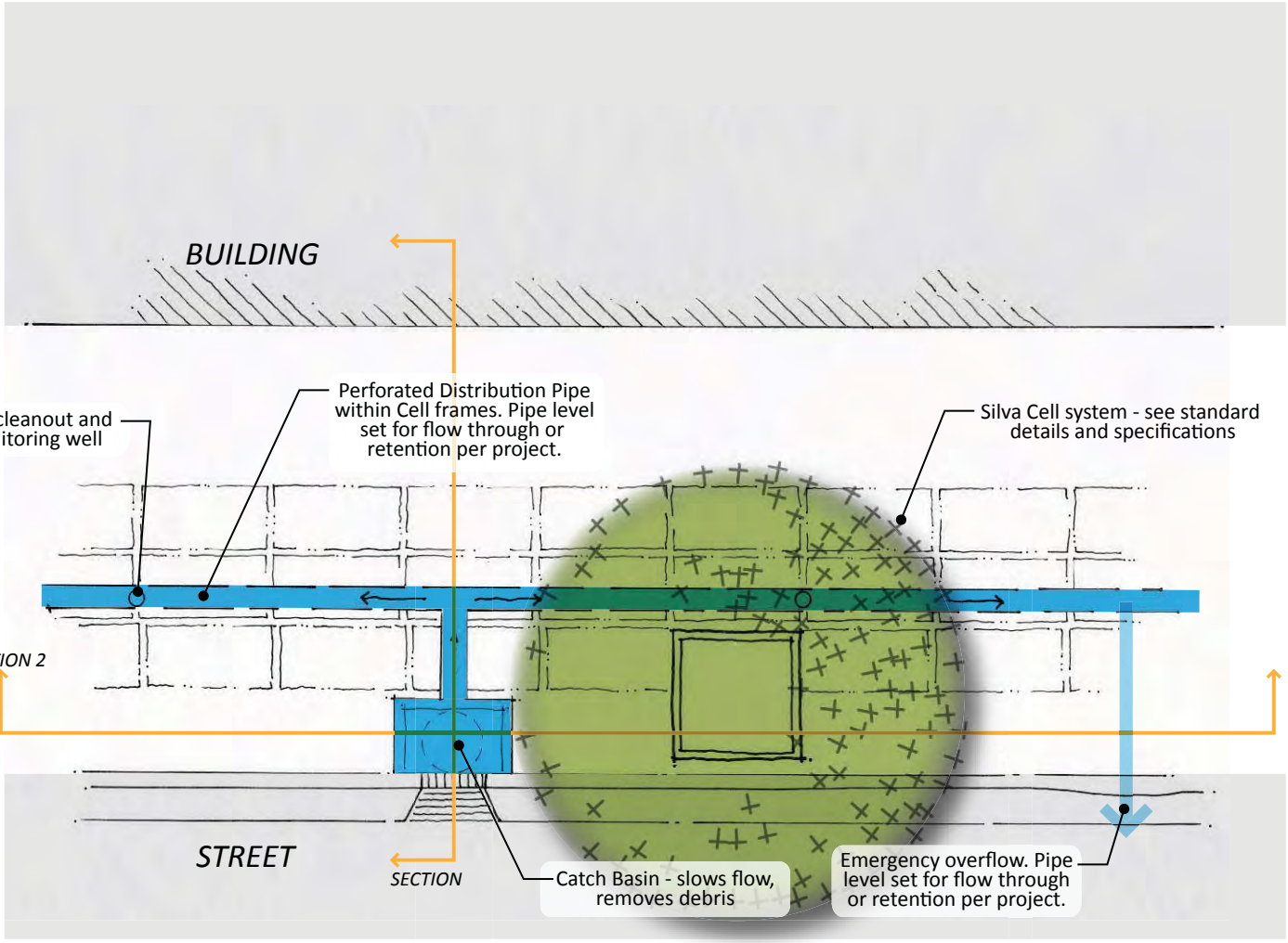
Updated 2/15/2011

Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

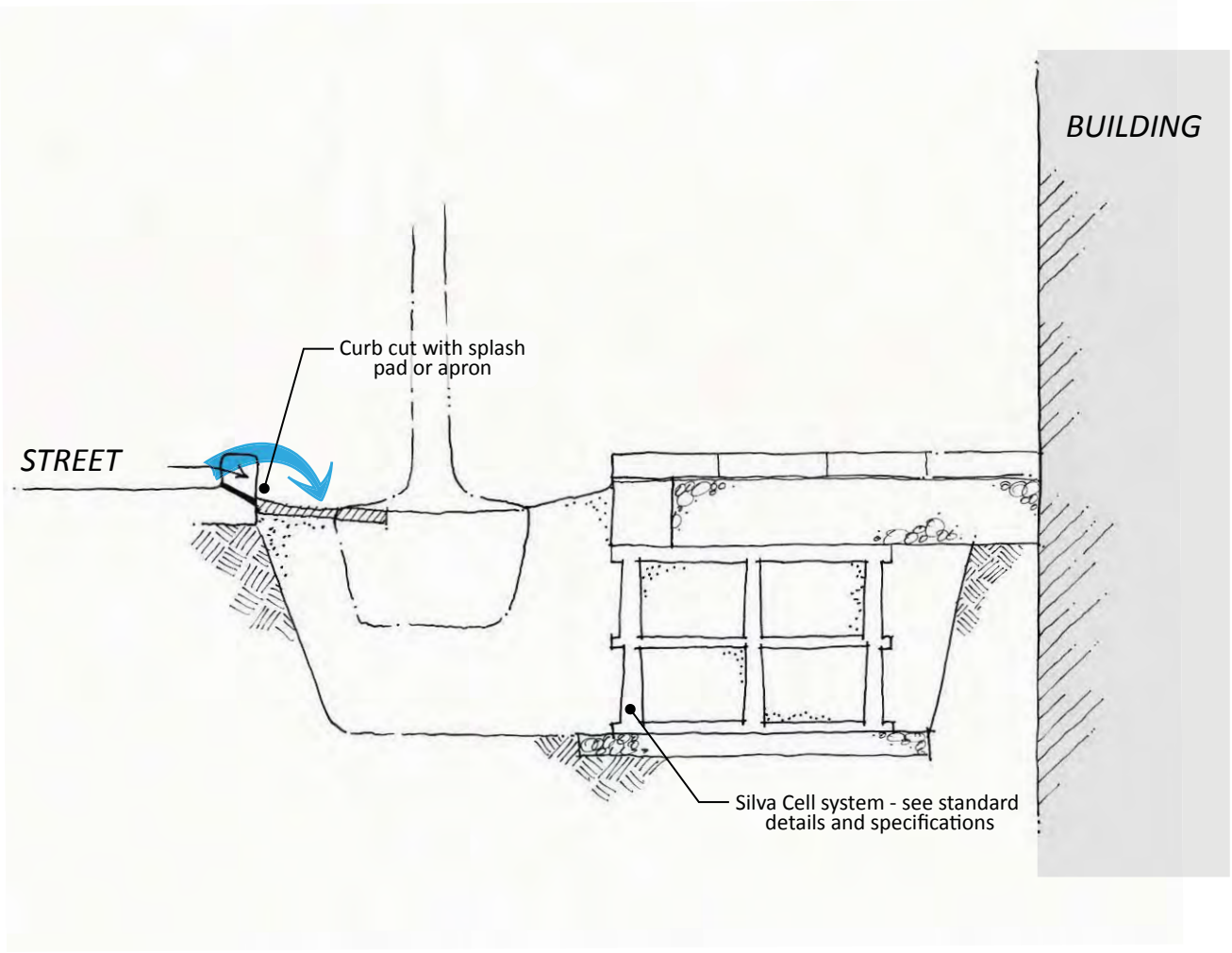


Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index

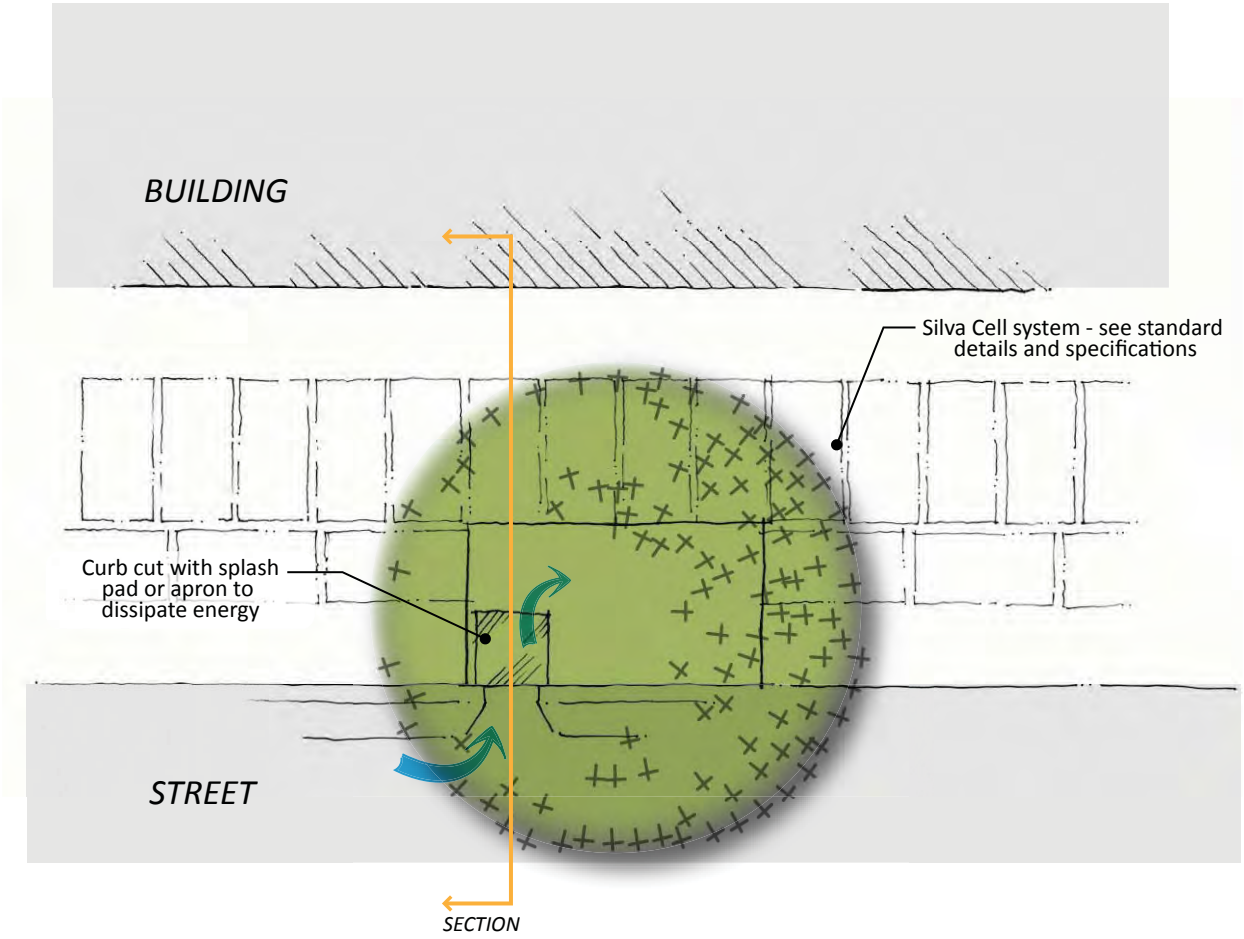


Drawing is for schematic purposes only. Project designer must determine Silva Cell system and pipe sizing, location, overflow design, and slopes to meet project requirements.

Stormwater shall be pre-treated as needed prior to distribution through the Silva Cell system.

Please refer to the Silva Cell standard details and specifications for more information.

Back to Index



Appendix F EXISTING AND PROPOSED STORMSEWER DESIGN SHEETS

Storm Sewer Design Sheet

Living Arts Drive

Existing Conditions

Rainfall Intensity = $\frac{A}{(Tc+B)^{c}}$

	10-YEAR	100-YEAR
A=	1010	3078
B=	4.6	0
c=	0.78	0.686
Starting Tc =	15 min	

CB FLOW = 35 l/s

Project: Living Arts Drive
Project No: 165011016
Date: 13-Nov-17
Designed by: MM

STREET	FROM MH	TO MH	10-YR AREA (ha)	10-YR RUNOFF COEFFICIENT "R"	10-YR "AR"	10-YR ACCUM. "AR"	10-YR RAINFALL INTENSITY (mm/hr)	10-YR ACCUM. FLOW (m^3/s)	Total Flow (m^3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONC. (min)	%Full
EX-1	DIMH6	MH5	4.43	0.38	1.68	1.68	99	0.46	0.464	34.7	0.70	600	0.51	1.82	0.3	15.3	90%
Living Arts	MH5	MH4	0.28	0.75	0.21	1.89	98	0.52	0.515	38.7	0.40	675	0.53	1.49	0.4	15.8	97%
Living Arts	MH4	MH3	0.1	0.75	0.08	1.97	96	0.53	0.527	37.2	0.40	675	0.53	1.49	0.4	16.2	99%
EX-3B	CBMH9	MH3	1.48	0.30	0.44	0.44	99	0.12	0.122	47.0	0.50	450	0.20	1.27	0.6	15.6	61%
Living Arts	MH3	MH2	0.335	0.75	0.25	2.66	95	0.70	0.701	76.2	0.60	825	1.11	2.08	0.6	16.8	63%
EX-3B	DCBMH3	MH2	0.1	0.68	0.07	0.07	99	0.02	0.019	8.2	1.00	300	0.10	1.37	0.1	15.1	19%
Living Arts	MH2	MH1	0.032	0.75	0.02	2.76	93	0.71	0.709	14.1	1.50	825	1.76	3.29	0.1	16.9	40%
EX-5A	MH1	MH18	0.62	0.75	0.47	3.22	94	0.84	0.844	7.4	1.25	825	1.60	3.00	0.0	16.3	53%
EX-3A	EXMH1	EXMH2	0.12	0.75	0.09	0.09	91	0.02	0.023	31.5	0.25	525	0.21	0.99	0.5	17.8	11%
EX-2	EXMH2	MHEX6	0.21	0.75	0.16	0.25	80	0.05	0.055	55.5	0.25	600	0.31	1.09	0.9	22.3	18%
EX-3C	DICB1	EXMH5	0.44	0.25	0.11	0.11	91	0.03	0.028	28.8	2.00	300	0.14	1.93	0.2	17.5	20%
EX-3C	EXMH5	EXMH6	0	0.75	0.00	0.11	77	0.02	0.023	23.5	0.33	825	0.82	1.54	0.3	22.9	3%
EX-4	EXMH6	EXMH18	0.54	0.75	0.41	0.51	93	0.13	0.133	129.5	0.26	975	1.14	1.53	1.4	18.1	12%
EX-6	EXMH18	MH180	0.44	0.75	0.33	0.84	76	0.18	0.178	104.5	0.50	1050	1.93	2.23	0.8	23.8	9%

Storm Sewer Design Sheet
Living Arts Drive

Proposed Conditions

Rainfall Intensity = $\frac{A}{(Tc+B)^{c}}$

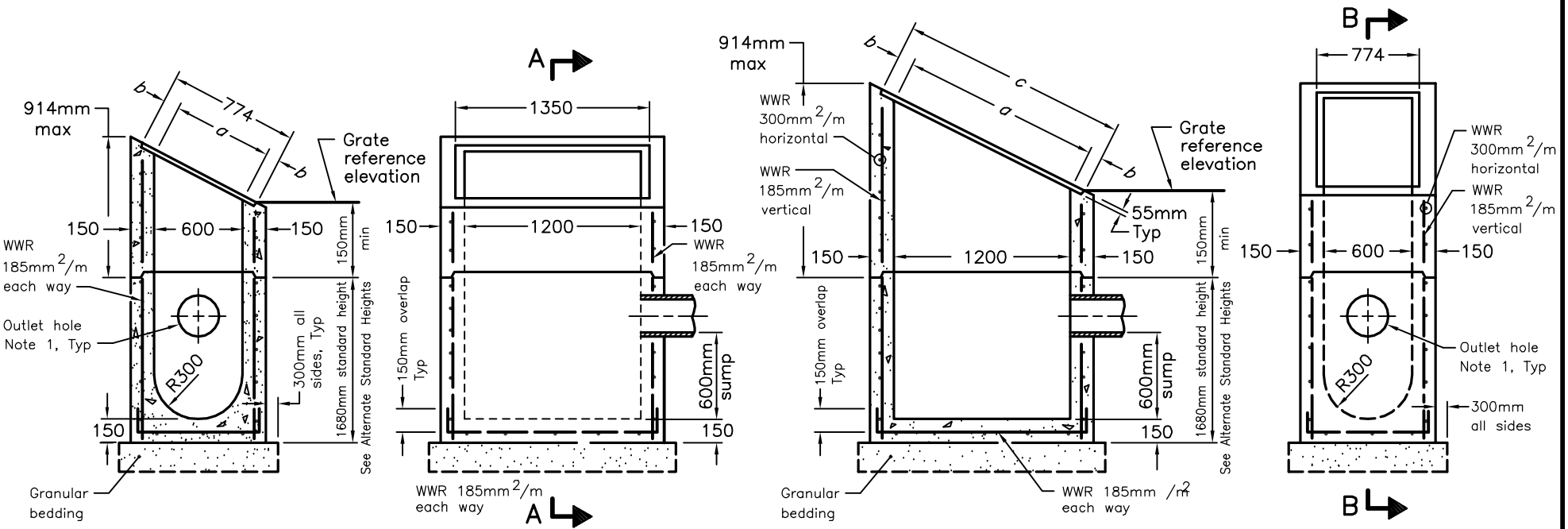
	10-YEAR	100-YEAR
A=	1010	3078
B=	4.6	0
c=	0.78	0.686
Starting Tc =	15 min	

CB FLOW = 35 l/s

Project: Living Arts Drive
Project No: 165011016
Date: 13-Nov-17
Designed by: MM

STREET	FROM MH	TO MH	10-YR AREA (ha)	10-YR RUNOFF COEFFICIENT "R"	10-YR "AR"	10-YR ACCUM. "AR"	10-YR RAINFALL INTENSITY (mm/hr)	10-YR ACCUM. FLOW (m^3/s)	Total Flow (m^3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONC. (min)	%Full
EX-1	DIMH6	MH5	4.43	0.38	1.68	1.68	99	0.46	0.464	34.7	0.70	675	0.70	1.97	0.3	15.3	66%
Living Arts	MH5	MH4	0.28	0.75	0.21	1.89	98	0.52	0.516	38.7	0.40	750	0.70	1.59	0.4	15.7	73%
Living Arts	MH4	MH3	0.1	0.75	0.08	1.97	96	0.53	0.528	37.2	0.40	750	0.70	1.59	0.4	16.1	75%
EX-3B	CBMH9	MH3	1.48	0.30	0.44	0.44	99	0.12	0.122	47.0	0.50	450	0.20	1.27	0.6	15.6	61%
Living Arts	MH3	MH2	0.335	0.75	0.25	2.66	95	0.70	0.703	76.2	0.60	825	1.11	2.08	0.6	16.7	63%
EX-3B	DCBMH3	MH2	0.1	0.68	0.07	0.07	99	0.02	0.019	8.2	1.00	300	0.10	1.37	0.1	15.1	19%
Living Arts	MH2	MH1	0.032	0.75	0.02	2.76	93	0.71	0.711	14.1	1.50	825	1.76	3.29	0.1	16.8	40%
EX-5A	MH1	MH18	0.62	0.75	0.47	3.22	93	0.83	0.829	7.4	1.25	600	0.69	2.43	0.1	16.8	121%
EX-3A	EXMH1	EXMH2	0.12	0.75	0.09	0.09	91	0.02	0.023	31.5	0.25	525	0.21	0.99	0.5	17.8	11%
EX-2	EXMH2	MHEX6	0.21	0.75	0.16	0.25	80	0.05	0.055	55.5	0.25	600	0.31	1.09	0.9	22.3	18%
EX-3C	DICB1	EXMH5	0.44	0.25	0.11	0.11	91	0.03	0.028	28.8	2.00	300	0.14	1.93	0.2	17.5	20%
EX-3C	EXMH5	EXMH6	0	0.75	0.00	0.11	77	0.02	0.023	23.5	0.33	825	0.82	1.54	0.3	22.9	3%
EX-4	EXMH6	EXMH18	0.54	0.75	0.41	0.51	93	0.13	0.133	129.5	0.26	975	1.14	1.53	1.4	18.1	12%
EX-6	EXMH18	MH180	0.44	0.75	0.33	0.84	76	0.18	0.178	104.5	0.50	1050	1.93	2.23	0.8	23.8	9%

quantity control orifice see Appendix C



TYPE A

Opening Dimensions			
Grate		*a*	*b*
Type	Slope		
B	2H:1V	670	52
	3H:1V	632	71
	4H:1V	618	78
	HOR	600	87

Alternate Standard Heights	
Alternate	Dimension
A	1980
B	1520
C	1380

TYPE B

Opening Dimensions				
Grate		*a*	*b*	*c*
Type	Slope			
C	2H:1V	1341	66	1473
	3H:1V	1265	104	1473
	4H:1V	1237	118	1473
B	6H:1V	1216	65	1346
	HOR	1200	73	1346

NOTES:

1 Outlet hole size 525mm max diameter.

A Where inlet is placed across ditch and is accessible to vehicular traffic, grating slope shall be 6H:1V or flatter.

B Center reinforcing in wall and base slab ±25mm.

C Lap riser horizontal wires 300mm. Laps shall be placed at corners.

D Granular backfill shall be placed to a minimum thickness of 300mm all around the ditch inlet.

E Grating shall be according to OPSD 403.010.

F Pipe support shall be according to OPSD 708.020.

G All dimensions are nominal.

H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

PRECAST CONCRETE DITCH INLETS

600 x 1200mm

Nov 2014 | Rev 3

OPSD 705.040