

## **APPENDIX C – 2006 OUTFALL INSPECTIONS CONDITION AND MAINTENANCE STUDY**



**WATER AND WASTE DEPARTMENT**

**2006 OUTFALL INSPECTIONS  
CONDITION AND MAINTENANCE STUDY**

**DRAFT**

**JUNE, 2006**

**KGS  
GROUP**

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CONSULTING ENGINEERS & PROJECT MANAGERS**

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## **1.0 INTRODUCTION**

In 1996, KGS Group was retained to perform a comprehensive assessment of the existing condition and the required maintenance for all the outfalls within the City of Winnipeg for which the City's Water and Waste Department had responsibility. The results of this study are contained in the Outfall Condition and Maintenance Study – Final Report, issued by KGS in August 1998. The report summarized the inspections and analyses of the outfalls and contained a number of recommendations regarding an immediate 5-year capital upgrade program and future operations and maintenance programs.

Since the 1998 Report, inspections, maintenance, and repairs to outfalls had diverged from the original recommendations. In 2005, 15 outfalls from the 1998 report were re-inspected and assessed for their condition. Based on these assessments, 7 outfalls were replaced or rehabilitated in early 2006.

This report examines 36 additional outfalls from the 1998 report having the worst conditions and recommends an updated 5-year capital upgrade program and continued maintenance program.

### **1.1 OUTFALL INSPECTION PROGRAM**

The 1998 report recommended continued inspection and assessment of outfalls to ensure the performance of the outfalls over the long term, and to provide information to the City for the effective maintenance of the outfalls. The purpose of outfall inspections is to identify severe failures in the outfall. Severe failures are those that leave the outfall capable of performing for a time before finally becoming a catastrophic failure.

The 1998 report recommended that an outfall be re-inspected after a certain number of years based on the rating of the outfall from the 1996/97 inspections. A five point rating system was employed to evaluate the condition of the outfalls. Outfalls with a rating of five were included in the 5-year Outfall Capital Upgrade Plan. Outfalls with a rating of four were to be re-inspected about 2 years after the previous inspection. Outfalls rated as threes were to be re-inspected approximately 5 to 6 years after of the previous inspection. Outfalls rated as one or two were to be re-inspected after a time of approximately 10 years. This criteria allowed for close

monitoring of those outfalls approaching a failure condition and maintained a reasonable monitoring level on outfalls in fair to good condition.

## **2.0   OUTFALL CONDITION ASSESSMENTS**

The assessments of the 36 outfalls in this report utilize the same condition criteria as the 1998 report. The 1998 assessments of outfalls were based on three conditions having the most impact on an outfall: the structural, hydraulic and geotechnical conditions. Each condition produced a rating on a scale of 1 (satisfactory) to 5 (failed). These individual ratings were then used to produce an overall condition rating for each outfall, also on a scale of 1 to 5.

Internally, the structural rating evaluated the physical condition of the outfall pipe, including: deformations, cracks, joint separations, mis-aligned pipe, deterioration of pipe material, etc. The internal deflection measurements on the larger diameter CMP outfalls were used to calculate the actual amount of deflection. Outfall pipes with a deflection of greater than 5% were deemed to have failed. Since the 1998 report, this value has been increased from 5% to 10% for practicality. Externally, the structural rating evaluated the physical condition of the outfall end-piece, including deformations, corrosion, and evidence of ice damage.

The hydraulic rating evaluated the hydraulic capacity of the outfall pipe, including: partial collapse of the pipe due to movement of the pipe or from impact from ice or debris, sediment and debris deposits within the pipe, and restrictions caused by roots intrusion in the pipe, or by vegetation growth downstream of the outlet.

The geotechnical rating evaluated the condition of the river bank at the outfall, including: erosion features such as toe scouring or undercutting of the bank, and any and all slope failure features such as active or inactive headscarps, tension cracking, and hummocky topography.

This report analyses the internal structural rating only. Geotechnical and hydraulic rating were not carried out as the inspections occurred during the winter months and neither the outfall end nor the surrounding topography was visible.

To assign each outfall with an appropriate condition rating we considered the overall rating from 1998 as well as the structural rating from 2006. The rationality behind this is that if an outfall was given an overall rating of 5 in 1998 and a structural rating lower than 5 in 2006, than this outfall must still receive a rating of 5. The outfall can not have improved over time and as such,

the 1998 rating must have been due to hydraulic or geotechnical failures. A list of the 36 outfalls inspected and their corresponding ratings can be found in Appendix B.

## 2.1 2005 OUTFALL INSPECTIONS

In 2005, 15 outfalls from the 1998 report were re-inspected and assessed by KGS Group for their condition. Of the 15 outfalls, 10 were recommended for rehabilitation or replacement. The following 7 outfalls were rehabilitated or replaced over the winter of 2005-2006:

- Cloutier RR-7
- Dowker RR-28
- Kildonan Park RR-97
- Kennedy AS-91
- Hargrave AS-93
- Hawthorne RR-98
- Eastwood RR-108

The following 3 outfall remain on the list of outfalls to be reconstructed:

- Marion RR-52
- Despins RR-54
- Despins RR-55

These three outfalls will be given highest priority on the 5-year capital upgrade program

The remaining 5 outfalls are to be re-inspected in 2007 in accordance with the re-inspection program:

- St-Norbert x-Kalay RR-3
- Crane RR-26
- Dunkirk RR-31
- Marion RR-51
- Booth St-3

## 2.2 2006 OUTFALL INSPECTIONS

Uni-Jet Industrial Pipe Services Ltd conducted the 36 outfall inspections as part of the City of Winnipeg Bid Opportunity 74-2006 "2006 Outfall Inspections". The outfalls were located across

the City of Winnipeg, with diameters ranging from 300 mm to 2400 mm. Outfalls were televised from the upstream manhole to the downstream outfall and where required from an upstream manhole to a downstream manhole. KGS Group analyzed these outfalls and reassessed their internal structural condition rating.

Every outfall inspected possessed some structural defects to one degree or another.

Of concern were the outfalls that showed some form of failure. Specifically, the number of CMP outfalls which displayed evidence of corrosion to the point of failure.

Some general results from the inspections are as follows:

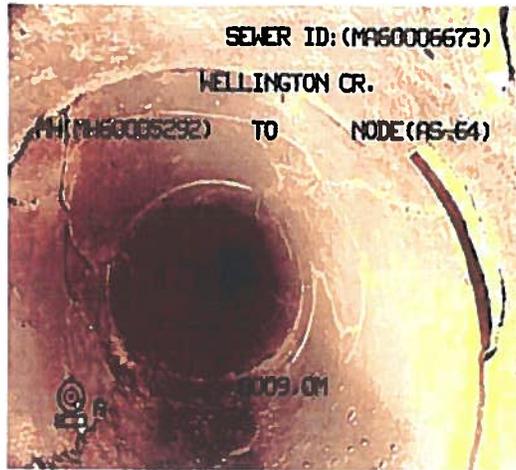
- No external inspections of the outfall structures were made. Due to water levels and the amount of snowfall this year, the outfalls were either submerged or buried.
- Inspection of outfalls within the influence of the City's major rivers (Red and Assiniboine) should be conducted in late fall, after the pre-winter drawdown. In late winter, ice can build up in outfalls and in inlets to the outfalls, obstructing the camera.
- Outfalls RR-8, RR-30, RR-45, RR-59, RR-104, AS-38, AS-63, AS-67A, AS-78, AS-86, BU-6, BU-13, SE-2, SE-27 and ST-17 experienced ice formation at the springline of the pipe. The end portion of the outfall could not be inspected.
- Parkside Drive Outfall AS-62 was televised from MH70007103 to MH70008110 only. Portion of Outfall from MH70008110 to river was completely submerged.
- Outfalls RR-23 RR-40, RR-41, RR-105, AS-27, AS-33, AS-64, ST-12 were filled with debris. In these cases the camera was only able to traverse sections of the outfalls that were free of debris. The end portion of the outfalls could not be inspected.
- Outfalls RR-22, RR-27#2, RR-34, AS-27, AS-60 & AS-70 could not be traversed as the CMP portion of the pipe was rotted to the degree that the invert was gone. Two other outfalls RR-8, RR-105 and OM-3 showed evidence of corroded or rotted portions of the CMP.

Utilizing the 1998 overall condition rating and the 2006 structural rating a 2006 overall condition rating was established for each outfall. 27 Outfalls, having a rating of 5, were included in a 5-year upgrade program. The other 9 outfalls, having a rating of 4, were set up for two-year inspections. The 27 outfalls having an overall condition rating of 5 were then ranked by priority from worst to best. A description of the current condition of each outfall inspected in 2006 is shown in Appendix A.

The following images are taken from the 2006 outfall inspections. These images depict the structural concerns of the five highest priority outfalls from the 2006 inspections.

Wellington Cres. 1 (AS-64)

Multiple fractures with deformation greater than 10%.



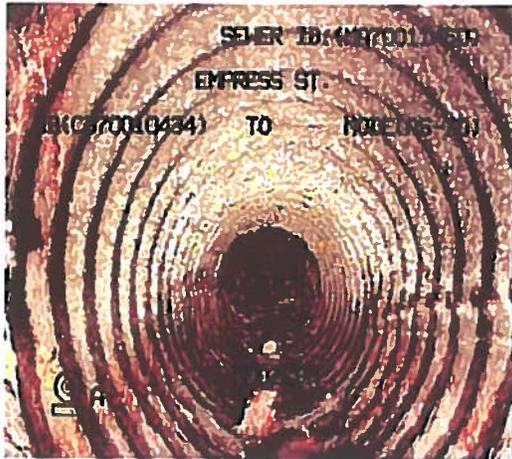
Crane Ave (RR-27#2)

CPS Section of Outfall is corroded to the point of failure. Outfall has no invert.



**Empress Street #1 (AS-70)**

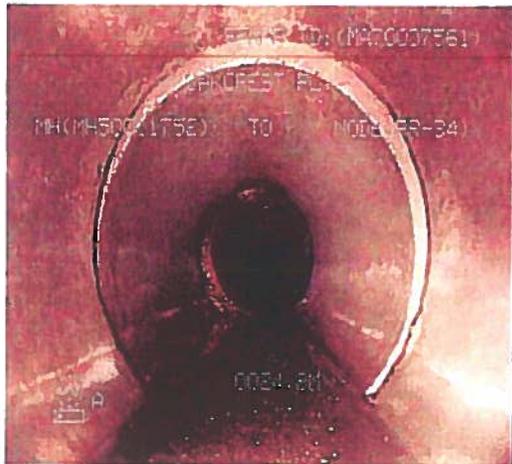
CPS Section of Outfall is corroded to the point of failure. Outfall has no invert.



**Oak Crest Pl. (RR-34)**

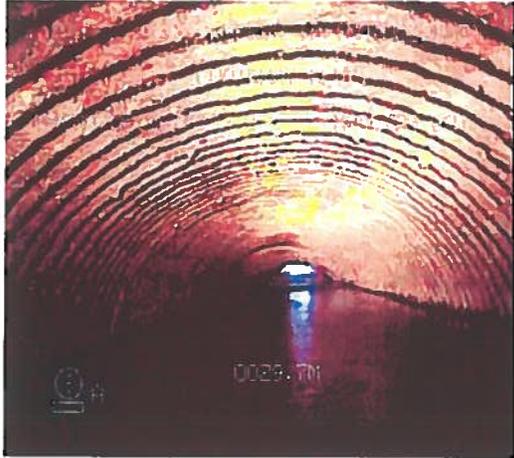
Pipe has large vertical displacements of joints in the concrete portion.

CSP portion is badly corroded and has a large section of pipe missing.



Chataway Blvd. (AS-60)

CSP portion is badly corroded.



### 3.0 RECOMMENDATIONS

All outfalls inspected in 2005 and 2006 have been classified as having an overall condition rating of 4 or 5. The outfalls having an overall condition ranking of 5 have been organized into a 5-year capital upgrade program. The outfalls having an overall condition ranking of 4 have been recommended for re-inspection according to the 1998 outfall inspection program guidelines.

#### 3.1 5-YEAR (2006-2011) CAPITAL UPGRADE PROGRAM

The 5-Year Capital Upgrade Program includes 31 outfalls having an overall condition ranking of 5. The list includes 3 outfalls from the 2005 outfall inspections, 27 outfalls from the 2006 outfall inspections and the Conway Outfall (AS-42). While KGS had excluded the Conway outfall from the 2006 inspections, The City of Winnipeg Water and Waste Department reports that it requires immediate attention. The worst of the condition 5 outfalls are given highest priority on the 5-year capital upgrade program. Outfalls inspected in 2005 have been placed at the top of the list. It is recommended that these outfalls be replaced or rehabilitated as cost permits.

1.	Despins ✓	(RR-54)	Replace outfall & remediate geotechnical failure
2.	Despins ✓	(RR-55)	Replace outfall & remediate geotechnical failure
X 3.	Marion	(RR-52)	Assess options to correct badly out-of-round pipe
4.	Conway ✓	(AS-42)	Partial Collapse of Pipe
X 5.	Wellington Cres	AS-64	Repair/Replace/Reline
6.	Crane Av ✓	(RR-27#2)	CMP portion corroded or missing
X 7.	Empress St	(AS-70)	CMP portion corroded or missing
✓ 8.	Oakcrest Pl	(RR-34)	CMP portion corroded or missing
X 9.	Chataway Blvd	AS-60	CMP portion corroded or missing
10.	Plaza Dr ✓	(RR-22)	CMP portion corroded or missing
11.	Empress St ✓	OM-3	CMP portion corroded or missing
X 12.	Henderson Hwy	RR-105	CMP portion corroded or missing
13.	Ridgedale Cres. ✓	AS-27	CMP portion corroded or missing
X 14.	Clifton St	AS-75	Repair/Replace/Reline
X 15.	Stormont Dr	(RR-8)	CMP portion corroded or missing
X 16.	Amarynth Cres. #2	ST-12	Repair/Replace/Reline
X 17.	Harvest Lane	ST-17	Repair/Replace/Reline
X 18.	Metcalfe Pl	RR-46	Repair/Replace/Reline
19.	Rue La Verendrye ✓	RR-59	Repair/Replace/Reline
X 20.	Velodrome #1	OM-4	Repair/Replace/Reline
X 21.	Rue Laverendrye	SE-2	Repair/Replace/Reline
X 22.	Churchil Dr	RR-41	Repair/Replace/Reline
X 23.	Lotus Lane	RR-30	Repair/Replace/Reline
X 24.	Vialoux Dr	AS-38	Repair/Replace/Reline

The following Seven outfalls have an overall 2006 condition rating of 5 but only received a 2006 structural rating of 4. Thus further investigation is required to determine what geotechnical or hydraulic repairs are required.

X	25.	Red River Blvd W	RR-104	Assess site conditions for geo/hydraulic failures
Y	26.	Cornish Av. FPS	AS-86	Assess site conditions for geo/hydraulic failures
X	27.	Elm St	AS-78	Assess site conditions for geo/hydraulic failures
X	28.	Cornish Av.	AS-88	Assess site conditions for geo/hydraulic failures
X	29.	Delbrook Cres. #1	BU-6	Assess site conditions for geo/hydraulic failures
X	30.	Evans Av	SE-27	Assess site conditions for geo/hydraulic failures
X	31.	Raleigh St. #1	BU-13	Assess site conditions for geo/hydraulic failures

### 3.2 RE-INSPECTION SCHEDULE

Outfalls with a condition ranking of 4 have been recommended for re-inspection every 2 years to assess their future state. Outfalls inspected in 2005 will require re-inspection in 2007 while outfalls inspected in 2006 will require re-inspection in 2008.

It is recommended that the following five condition 4 outfalls inspected in 2005 be re-inspected in 2007.

✓	1.	St-Norbert x-Kalay	RR-3
✓	2.	Crane	RR-26
X	3.	Dunkirk	RR-31
X	4.	Marion	RR-51
X	5.	Booth	St-3

It is recommended that the following nine Condition 4 outfalls inspected in 2006 be re-inspected in 2008.

1.	Rivera Cres	RR-23
2.	Kingston Row	RR-40
3.	Baltimore St. FPS	RR-45
4.	Olive St.	AS-33
5.	Parkside Dr	AS-62
6.	Riverbend Cres	AS-63
7.	Route 90 Bridge	AS-67A
8.	Mclvor Av	BU-12
9.	Raglan Rd	OM-1

**APPENDIX A**

**2006 OUTFALL INSPECTIONS – CONDITION ASSESMENTS**

**APPENDIX A**  
**2006 OUTFALL INSPECTIONS – CONDITION ASSESMENTS**

X  
**Outfall ID:** RR-8  
**Location:** Stormont Dr.  
**Pipe Length:** 37.50m-400mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 16.80m due to ice that plugged the pipe by more than 50% of its capacity. The deformation is less than 5% and the bottom of the pipe boasts wear surface damage.

**Outfall ID:** RR-22  
**Location:** Plaza Dr.  
**Pipe Length:** 49.8m-2400mm-PCP  
13.2m-2400mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** CMP section of pipe rotted to point of failure at 55.8m. Survey abandoned due to the bottom of the pipe is gone. Its deformation is about 5% on the CMP portion.

X  
**Outfall ID:** RR-23  
**Location:** Rivera Cres.  
**Pipe Length:** 77.0m-1800mm-PCP  
4.0m-2000mm-CMP  
**1998 Ranking Conditions:** 4  
**2006 Report Conditions:** Survey abandoned in concrete section due to ice obstructing more than 25% of outfall

**Outfall ID:** RR-27#1  
**Location:** Crane Av.  
**Pipe Length:** 89.8m-900mm-PCP  
3.50m-900mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 3.5m into the CSP portion of the outfall due to debris. The invert is gone at the beginning of the CMP portion of the outfall. The deformation is in the order of 10%. Sink hole present above grade.

X  
**Outfall ID:** RR-30  
**Location:** Lotus Lane.  
**Pipe Length:** 92.9m-600mm-PCP  
108.1m-600mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 186.10m due to ice. It has a hole at top of the pipe at 91.8m. The deformation is in the order of 10% in the CMP portion.

X  
**Outfall ID:** RR-34  
**Location:** Oakcrest Pl.  
**Pipe Length:** 26.4m-375mm-PCP  
12.4+m-375mm-CMP  
**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey starts with PVC pipe and change to PCP at 3.10m. At 26.4m it changes to CMP pipe. This survey was abandoned at 38.60m due to hole at bottom of the CMP portion.

X  
**Outfall ID:** RR-40  
**Location:** Kingston Row Underpass.  
**Pipe Length:** 27.6m-600mm-PCP  
14.3+m-750mm-CMP

**1998 Ranking Conditions:** 4  
**2006 Report Conditions:** Survey abandoned at 41.9m due to debris that plugged the pipe by more than 50% of its capacity.

X  
**Outfall ID:** RR-41  
**Location:** Churchill Dr Underpass.  
**Pipe Length:** 39.4m-800mm-CMP

**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 20.30 due to debris that plugged the pipe by more than 50% of its capacity.

X  
**Outfall ID:** RR-45  
**Location:** Baltimore St. FPS.  
**Pipe Length:** 38.2m-1300mm-PCP  
12.5m-1800mm-CMP

**1998 Ranking Conditions:** 4  
**2006 Report Conditions:** Survey abandoned at 38.2m due to ice that plugged the pipe by more than 60% of its capacity.

X  
**Outfall ID:** RR-46  
**Location:** Metcalfe Pl.  
**Pipe Length:** 19.2m-2000mm-PCP  
16.1m-2000mm-CMP

**1998 Ranking Conditions:** 4  
**2006 Report Conditions:** This survey was traversed successfully. Some structural problems were noted such as wood supports broken and deformations (approx. 5%). In addition it is filled with debris in excess of 40% of its capacity

**Outfall ID:** RR-59  
**Location:** Rue La Verendrye.  
**Pipe Length:** 44.8m-1200mm-PCP  
xx.xm-1200mm-CMP

**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Inspection revealed a new gate chamber and outfall pipe. Survey abandoned at 44.80m due to ice that plugged the pipe by more than 30% of its capacity. It contains a large vertical displacement at 38.0m and a large horizontal displacement at 40.0m.

X  
**Outfall ID:** RR-104  
**Location:** Red River Blvd W.  
**Pipe Length:** 347.5m-750mm-PCP  
31.6+-750mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 347.0m due to ice. The CMP portion of the outfall was not Completed.

**Outfall ID:** RR-105

**Location:** Henderson Hwy.

**Pipe Length:** 50.3-600mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 25.2m due to debris that plugged the pipe more than 50% of its capacity. It has a large vertical displacement and its deformation is approximately 10%. In addition the bottom of the CMP portion pipe boasts wear surface damage.

**Outfall ID:** AS-27

**Location:** Ridgedale Cres.

**Pipe Length:** 67.6m-450-PCP;

6.2m-450-PCP

33.5m-450mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey starts with PCP and changes to CMP at 5.30m into outfall segment D/S of MH. A hole exists in the pipe. The Survey was abandoned at 25.1m D/S of MH due to a large horizontal displacement that has deposited debris above 30% of its capacity. CMP portion appears corroded.

**Outfall ID:** AS-33

**Location:** Olive St. #1.

**Pipe Length:** 53.0m-700mm-PCP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** Survey abandoned at 18.8m due to debris that plugged the pipe by more than 40% of its capacity.

**Outfall ID:** AS-38

**Location:** Vialoux Dr. Cul-de-Sac

**Pipe Length:** 64.2m-750mm-PCP

27.1m-750mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned as a 15.7m section of the CMP was submerged. Its water level is more than 70%

**Outfall ID:** AS-60

**Location:** Chataway Blvd.

**Pipe Length:** 51.7m-900mm-CMP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** Survey abandoned at 30.20m due to ice that filled the pipe by more than 50% of its capacity. The deformation is more than 10% and the bottom of the pipe is badly rotted (hole).

**Outfall ID:** AS-62

**Location:** Parkside Dr

**Pipe Length:** 63.2m-750mm-PCP

78.5m-750mm-CMP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** PCP portion of this survey was traversed successfully. The CMP portion was not televised. Some structural problems and surfaces damage exists.

**Outfall ID:** AS-63  
**Location:** Riverbend Cres.  
**Pipe Length:** 26.3m-2340mm-PCP  
10.0-2210mm-CMP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** Survey abandoned at 33.7m due to ice that plugged the pipe by over 60% of its capacity. The deformation on the CMP portion is less than 10%.

**Outfall ID:** AS-64  
**Location:** Wellington Cres. #1  
**Pipe Length:** 57.5m-300mm-PCP  
**1998 Ranking Conditions:** 4

**2006 Report Conditions:** Survey abandoned at 52.0m due to debris that plugged the pipe more than 50% of its capacity. Its has more than 10% of deformation from 8.20m to 27.8m which is caused by multiple fractures.

**Outfall ID:** AS-67A  
**Location:** Route 90 Bridge  
**Pipe Length:** 16.0m-450mm-CMP  
**1998 Ranking Conditions:** 4

**2006 Report Conditions:** Survey abandoned at 10.8m due to ice that plugged the pipe by over 75% of its capacity. Its deformation is above 5%.

**Outfall ID:** AS-70  
**Location:** Empress Street #1.  
**Pipe Length:** 16.0m-450mm-CMP  
**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 3.40m because the bottom of the pipe is badly rotted (invert gone).

**Outfall ID:** AS-75  
**Location:** Clifton St.  
**Pipe Length:** 26.5m-2300mm-CMP  
**1998 Ranking Conditions:** 5

**2006 Report Conditions:** This survey was traversed successfully. Some structural problems were noted. Its deformations are more than 10%. In addition, it is filled with debris above 30% of its capacity.

**Outfall ID:** AS-78  
**Location:** Elm St.  
**Pipe Length:** 118.9m-750mm-PCP  
5.1m-762mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 124.0m due to ice that plugged the pipe by more than 30% of its capacity.

**Outfall ID:** AS-86  
**Location:** Cornish Av. FPS

**Pipe Length:** 65.7m-1600mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 65.70 due to ice and debris that plugged the pipe in excess of 70% of its capacity.

**Outfall ID:** AS-88

**Location:** Cornish Av.

**Pipe Length:** 18.6m-1500mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** This survey was traversed successfully. Some structural problems were noted. Its deformations are less than 5%.

**Outfall ID:** BU-6

**Location:** Delbrook Cres. #1

**Pipe Length:** 17.0m-400mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 10.40m due to ice and debris that plugged the pipe by over 60% of its capacity. Its deformations are approx. 10%.

**Outfall ID:** BU-12

**Location:** McIvor Av.

**Pipe Length:** 23.7m-400mm-CMP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** This survey was traversed successfully. Some structural problems were noted. Its deformations are in approx of 5%. In addition it is filled with ice higher than 40% of its capacity.

**Outfall ID:** BU-13

**Location:** Raleigh St. #1

**Pipe Length:** 18.9m-400mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** Survey abandoned at 18.9m due to ice and debris that plugged the pipe above 90% of its capacity.

**Outfall ID:** OM-1

**Location:** Raglan Rd.

**Pipe Length:** 34.5m-400mm-CMP

**1998 Ranking Conditions:** 4

**2006 Report Conditions:** This survey was traversed successfully. The bottom of the pipe has wear surface damage medium with deformation no more than 5%.

**Outfall ID:** OM-3

**Location:** Empress Street #1.

**Pipe Length:** 70.1m-750mm-PCP

6.6m-750mm-CMP

**1998 Ranking Conditions:** 5

**2006 Report Conditions:** This survey was traversed successfully. Some structural problems and a hole were noted at joint with the CMP part. The bottom of the pipe is badly rotted (invert gone).

**APPENDIX B**

**2006 OUTFALL INSPECITONS  
STUCTURAL AND OVERALL RATING**

**Outfall ID:** OM-4  
**Location:** Velodrome #1  
**Pipe Length:** 55.4m-380mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** This survey was traversed successfully. It has change material from PCP to PVC at 15.3m. It has some horizontal and vertical displacements at joints with gap less than 5mm.

**Outfall ID:** SE-2  
**Location:** Rue Laverendrye  
**Pipe Length:** 39.0m-525mm-PCP  
9.9m-600mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 28.1m due to ice and debris that plugged the pipe by over 30% of its capacity. It has some vertical displacement with gap less than 10mm

**Outfall ID:** SE-27  
**Location:** Evans Av.  
**Pipe Length:** 6.9m-1050mm-PCP  
18.1m-1067mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 22.7m due that it is filled with ice and debris that plugged the pipe more than 25% of its capacity.

**Outfall ID:** ST-12  
**Location:** Amarynth Cres. #2  
**Pipe Length:** 55m-450mm-PCP  
24+m-400mm-CMP  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 79.0m due to debris that plugged the pipe over 35% of its capacity. Some structural problems and vertical displacement were noted at 70.5m. Its deformation is over 10%.

**Outfall ID:** ST-17  
**Location:** Harvest Line.  
**Pipe Length:** 47.3m-525mm-PCP  
6.50-400mm-pcp  
**1998 Ranking Conditions:** 5  
**2006 Report Conditions:** Survey abandoned at 50.0m due to ice that plugged the pipe by more than 60% of its capacity. Some structural problems and horizontal displacement were noted at 43.6m & 45.6m.

**APPENDIX B  
2006 OUTFALLS INSPECTIONS  
Structural and Overall Rating**

ID No	Location	Pipe Length	Televised Length	Overall Rating 1998	Structural Rating 2008	Overall Rating 2006	Comments	Priority
RR-3	Stormont Dr.	37.5m-400mm-CMP	16.8	5	5	5	SA; H; D < 5%; ICE > 50%	11
RR-22	Plaza Dr.	49.8m-2400mm-PCP 13.2m-2400mm-CMP	49.8 6.8	5	5+	5	SA@55.8m; Invert gone; DE > 10%; C < 5%	6
RR-23	Rivera Cres.	77.0m-1800mm-PCP 4.0m-2000mm-CMP	58.0	4	4-	4	SA; ICE > 25%	
RR-27#2	Crane Av.	89.8m-900mm-PCP; XXXm-900mm-CMP	89.8; 3.5	---	NA 5+	5	RFJ; CL@12 SSL: D > 10%; DE > 25%	2
RR-30	Lotus Lane	92.9m-800mm-PCP; 108.1m-600mm-CMP	92.9; 90.8/93.2	5	2 5	5	SA; FULL ICE; D>10% 91.8/183/(189.1)	10
RR-34	Oakcrest Pl.	28.4m-375mm-PCP 12.4m-800mm-CMP	3.1/28.4 12.4	5	5+	5	CE > 40%; D @ 5%; timber supports Broken	4
RR-40	Kingston Row Underpass	27.0m-600mm-PCP 14.3m-750mm-CMP	27.0 14.3	4	4	4	SA; DE > 50%	
RR-41	Churchill Dr. Underpass	39.4m-800mm-CMP	20.3	5	5	5	SA; DE > 50%	18
RR-45	Baltimore St. FPS	38.2m-1300mm-PCP 12.5m-1800mm-CMP	38.2 8.7	4	4	4	SA; ICE > 60%	
RR-46	Melcalfe Pl.	19.2m-2000mm-PCP 16.1m-2000mm-CMP	19.2 15.6	4	5	5	CE > 40%; D ≥ 5% SupBroken	14
RR-59	Rue La Verendrye	44.8m-1200mm-PCP X.XXm-1200mm-CMP	44.8	5	5	5	SA@44.8m; JDL@38m; OJL@40m; ICE > 30%	15
RR-104	Red River Blvd W	104.2m-750mm-PCP; 100.2m-750mm-PCP; 96.0m-750mm-PCP; 47.1m-750mm-PCP 31.6m-750mm-CMP	104.2; 100.2; 96.0; 47.1 28.3/29.8/31.6	5	4	5	SA@347m; WL>25%; ICE > 50%; 102.2/202.4/298.5/(347.7 )	21
RR-105	Henderson Hwy.	50.3-600mm- CMP	25.2	5	5+	5	SA; D≥10%; DE > 40%; JDL	8
AS-27	Ridgedale Cres	67.6m-450mm-PCP; 6.2m-450mm-PCP 33.5m-450mm-CMP	67.6; 6.2 18.9	5	5+	5	SA@25.1m; HJ@5.3m; JDL @24.8m; DE > 30%; MC to CMP at 6.2m	9
AS-33	Olive St. #1	53.0m-750mm-PCP	18.8	4	4	4	SA; DE > 30%	
AS-38	Vialoux Dr Cul-de-Sac	64.2m-750mm-PCP; 27.1m-750mm-CMP	13.0/64.2; 15.7	5	4	5	SA; WL>70%; DE>30%	20
AS-60	Chataway Blvd	51.7m-900mm-CMP	30.2	4	5+	5	SA; WL>50% (ICE); H; D>10%	5
AS-62	Parkside Dr.	63.2m-750mm-PCP; 78.5m-750mm-PCP	63.2; N/A	4	4	4	PCP portion full video. CMP portion was not televised	
AS-63	Riverbend Cres.	25.9m-2340mm-PCP 8.0m-2210mm-CMP	25.9 8.0	4	4	4	SA@33.7m; ICE > 60%; D<10%	
AS-64	Wellington Cres. #1	57.5m-300mm-PCP	52.0	4	5+	5	CE>50%	1
AS-67A	Route 90 Bridge	16.0m-450mm-CMP	10.8	4	4	4	SA; ICE > 75%; D>5.0%	
AS-70	Empress Street #1	16.0m-450mm-CMP	3.4	5	5+	5	SA; SSL (Invert Gone)	3
AS-75	Clifton St.	26.5m-2300mm-CMP	25.0	5	5	5	C > 10%; DE > 30%	10
AS-78	Elm St.	118.9-750mm-PCP 5.1m-762mm-CMP	118.9 5.1	5	4	5	SA; ICE > 30%	23
AS-86	Cornish Av FPS	65.7m-1600mm-CMP	65.7	5	4	5	SA; D > 5%; DE > 70% WL>30%; ICE>60%	22
AS-88	Cornish Av	18.6m-1500mm-CMP	18.6	5	4	5	Full video; D < 5%; ICE< 30%	24
BU-8	Delbrook Cres. #1	17.0-400mm-CMP	10.4	5	4	5	SA@10.4m; D<5%; WL.50%	25
BU-12	McIvor Av	23.7m-400mm-CMP	23.7	4	4	4	C=5%; WL>30%; ICE>40%	
BU-13	Raleigh St. #1	18.9m-400mm-CMP	18.9	5	4	5	SA; OB>90% (ICE)	27
OM-1	Raglan Rd	34.5m-400mm-CMP	34.5	4	4	4	ICE on bottom; D<5%; SSM	
OM-3	Empress St.#1	70.1m-750mm-PCP 6.6m-750mm-CMP	70.1 6.6	5	5+	5	Invert Gone; HJ; ICE<30%	7
OM-4	Velodrome #1	55.4m-400mm-PCP	15.3-55.4(PVC Liner)	5	5	5	OJM; JDM	16
SE-2	Rue Laverendrye	39.0m-525mm-PCP 9.9m-800mm-CMP	0-2.2(PVC Liner)/28.1 N/A	5	5	5	SA; OB>25% (Lumber); ICE>30%; JDM	17
SE-27	Evans Av.	6.9m-1050mm-PCP 18.1m-1067mm-CMP	6.9 15.8	5	4	5	SA; OB>25%	26
ST-12	Amarynth Cres. #2	55.0m-450mm-PCP 24m-400mm-CMP	55.0 24.0	5	5	5	SA@76.0m; JDL; D>10%@70.5m; CE>35%; RMJ(PCP); SSS	12
ST-17	Harvest Lane	47.3m-525mm-PCP 6.5m-400mm-PCP	47.3 2.7	5	5	5	SA@50.0m; JDL@47.3m; OJM @ 43.6 and 45.6; OB>10%; ICE>60%	13

**Notes:**

A semi-colon (;) separating Pipe Lengths or Televised Lengths indicates a MH

Empress #1 (OM-3)



Photos taken from March 12, 2010 (except inner photos of Cornish Outfall)

Cornish Outfall



Crane (RR27)



Empress #1 (AS-70)



Marion Street (RR-52)



Renfrew & Wellington (AS-72)



West Perimeter Outfall

