

PARSONS

Higher Learning – University Condition Assessment

Infra 2017 – December 5, 2017





AGENDA

- Background
- Inspection Work and Condition Assessments
- Condition Assessment Ratings
- Deliverables

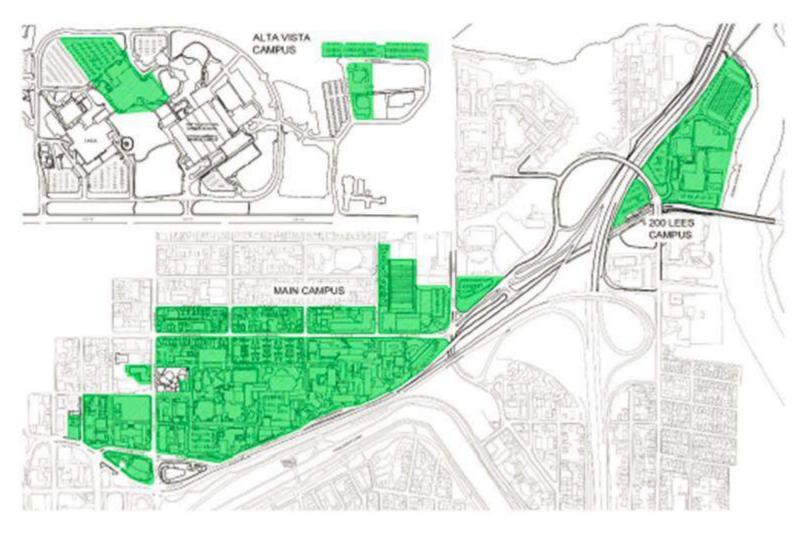
BACKGROUND

- University of Ottawa 1848
 - The Main Campus roughly 30 hectares in downtown Ottawa
 - The Lees Campus roughly 8 hectares located at the intersection of Highway 417 and the Rideau River
 - The Alta Vista Campus roughly 8 hectares located off of Smyth Road neighbouring the Children's Hospital of Eastern Ontario (CHEO)
- Condition assessment of water and sewer infrastructure, campus wide
- Included both private (University) and public (City of Ottawa) infrastructure
- Approximately 2.4 km of watermain, 5.5 km of storm infrastructure and 5.2 km of sanitary infrastructure were inspected

Team

- University of Ottawa (Owner)
- Parsons Inc. (Prime Consultants)
- GAME Trenchless Consultants (Sub-Consultant Watermains)
- Clean Water Works (Sub-Consultant Sewers)

Ottawa University



WATERMAIN INSPECTION

- JD7 Investigator+TM
 - Sonde, HD CCTV, acoustic leak detection on live watermains
 - 100 mm 300 mm diameter
 - Access through hydrants
 - Up to 50 m in each direction
- Limitations
 - Not feasible when no isolation valve or hydrant is seized



WATERMAIN CONDITION ASSESSMENT

- Preparation
 - Interviews with University Staff
 - Site Inspection/Hydrant Assessment
- Assessment
 - 53 Fire Hydrants Identified (38 Accessed)
 - Over 2,400 m Inspected Campus-Wide
 - Main Campus (1,250 m), 200 Lees (700 m), Alta Vista (400 m)
- Observations
 - Material Transitions
 - Tuberculation
 - Surface Damage
 - Debris

SEWER INSPECTION

- CCTV
- Limitations
 - Protruding service connections
 - Lack of access due to parking
 - Grease build-up outside restaurant
 - Broken pipes
 - Coordination with ongoing construction (on campus and LRT)



SEWER CONDITION ASSESSMENT

- Preparation
 - Interviews with University Staff
- Assessment
 - Over 10,700 m Inspected Campus-Wide for sanitary and storm including sewers, laterals and catchbasin leads
- Observations
 - Debris, broken pipes, grease build-up, displaced joints, etc.

CONDITION ASSESSMENT RATING

- Watermain Ratings
 - No widely accepted industry standard for watermain ratings
 - Developed operation and maintenance rating
- 5 Immediate Attention Defects with more than 50% reduction
- 4 Poor Defects with 36 50% reduction or inaccessible hydrant
- 3 Fair Defects with 21 35% reduction
- 2 Good Defects with 5 20% reduction
- 1 Excellent Minor Defects with <5% reduction



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Sewer Ratings

- Assessed and coded using the Manual of Sewer Condition
 Classification published by the Water Research Centre
- Rated separately for structural condition and for operation and maintenance defects

Structural Rating

- 5 Immediate Attention Collapsed or collapse imminent
- 4 Poor Collapse likely in foreseeable future
- 3 Fair Collapse unlikely in near future although future deterioration likely
- 2 Good Minimal collapse likelihood in short term but potential for further deterioration
- 1 Excellent Acceptable structural condition

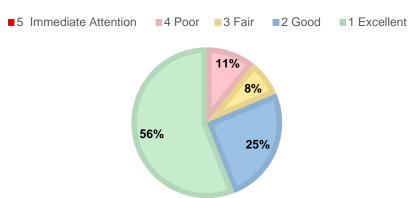
Operation and Maintenance Rating

- 5 Immediate Attention Defects requiring immediate attention
- 4 Poor Severe defects that become a 5 in the near future
- 3 Fair Moderate defects that continue to deteriorate
- 2 Good Defects that have begun to deteriorate
- 1 Excellent Minor defects

WATERMAIN RESULTS

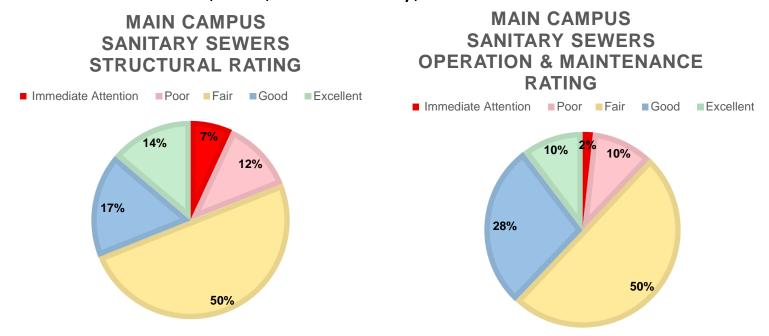
- Generally in good condition (No leaks!)
- Various levels of tuberculation
 - PVC Sections range <5-15% reduction
 - Iron Sections (Ductile or Cast) range 5-35% reduction
- Slight surface damage and debris noted (not critical)
- Flushing/Cleaning and Relining of Iron Sections
 - Campus Wide program recommended

MAIN CAMPUS WATERMAINS OPERATION & MAINTENANCE RATING



SEWER RESULTS

- Typical observations
 - Cracks, debris, displaced joints, surface damage, attached deposits, sags, visible rebar
- Materials
 - Concrete, PVC, Vitrified clay, asbestos cement

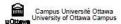


DELIVERABLES

- Recommendations for Repairs/Replacement and Class 'D' Estimates of Probable Cost
 - Watermains \$600,000 (not including flushing program)
 - Storm Infrastructure \$1.2 M (for infrastructure rated 4 or 5)
 - Sanitary Infrastructure \$1.7 M (for infrastructure rated 4 or 5)
- Color Coded Digital Mapping
- Excel Spreadsheets with results
- Update Base Plans (ACAD)









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University of Ottawa Assessment of Sewer and Watermain Conditio

Table 5: Main Campus - Sanitary Sewers





LOCATION TYPE IMPERIORSTICS										CONDITION RECOMMENDATIONS												
\vdash	LOCATION	SECTION TYPE			-	-	-		ELOW SURFACE (m)	169	egitte (m)	CONDITION PIPE DEFECTS						CONDITI	ION RATING	RECOMM	ENDATIONS	
CAMPUS	STREET	U/S MH #	D/SMH#	SAN/STM	OWNERSHIP	DIAMETER (mm)	MATERIAL	SHAPE	UPSTREAM	DOWNSTREAM	ACTUAL	INSPECTED	DEFECT TYPE	DISTANCE FROM U/S MH (m)	TIME IN VIDEO (min)	Ton muesto	LOCATION (o'clock to n'clock)	NOTES	STRUCTURAL	OPERATION AND MAINTENANCE	TYPE*	EXPECTED COST (\$)
Math	Marie-Curie	SA1	SA 2	SAN	University	300	Vitrified Clay	Circular	n/a	5.41	90.0	33.7	Discolouration Displaced Joint	throughout	throughout throughout							
													Crisck	86.7	Dm03s		10	longitudinal	6			
													Orack American Property	85.1 76.8	Ombits	_	06	A Comment	E.			
													Attached Deposits Attached Deposits	74.7	1m46s 2m14s		02				300mm plat in poor	
													Change in Meterlal/ Displaced Joint	75.3	2m46s	1	.06	w/, creck	4	240	condition with several connections in poor	\$ 178,100
													Standing Water and Obstacle	75.3	2m50s			,	8	1-0.1	condition, replece	3.10,000
													Crack	67,3	3m53s	-	0009	longitudinal at joint			main	
													Creck Surface Demage	60.9	4m00s 4m32s	1	10	cap breaking apart			1//2	
													Surface Demage	60.4	-4m3th		03	icratches	8			
													Intruding Connections	57.3	Amel		01 & 11	w/ water sag				
5000		10000	10000		INCOME.	1000	145000000000000	030000	1000	147567	NAME OF		Intruding Connections	56.5	5mDla		- 11		2			
Mein Mein	Marie-Curie Marie-Curie	5A 2 5A 4	SA4 SA5	SAN	University	375 375	Polyvinyl Chloride Polyvinyl Chloride	Circular	3.41 3.47	3.45 3.50	2.5 18.0	18.0	Nothing to report for inspected sewer. Displaced Joint.	0.7	Ore20s	-			1	1		
Meso:	Sain-Care	300	~~		Grinerally	200	Polyringi Linorius	Cortain		330	1000		Surface Demage	11.2	1m39s	 	-07	scratches	2	- 3		
													Surface Demage	14.9	1m50k		DE	icratches	100			
Maln	Marle-Curie	SA5	SA 6	SAN	University	375	Polyvinyl Chloride	Circular	3.53	n/a	73.0	73.0	Surface Damage	5.6	Om32s		0804	cfroumferential scratch	2			
													Discolouration	16.5	1m00s		0711	atain	8		l	l 1
			1 1			1 1		ı	İ	1			Crack	20.0	1m09s 2m00s	-	0910		1	1	l	l 1
			1 1			1 1		ı		l			Crack Crack	43.3	2m10s	 	12				l	l 1
													Crack	70,3	3m22s		12	C				l l
Main	Marie-Curie	5A 6	SA 7	SAN	University	375	Polyvinyl Chloride	Circular	n/e	n/e	5.0	5.0	Nothing to report for inspected sewer	- (a) (b) (c)	57,1107		C 25.	recently lined	- 1	1		
Main	Louis Pasteur	5A 7	SA 101	SAN	University	600	Reinforced Concrete	Circular	n/e	4.52	19.5	19.5	Visible Rebar	19.5	0m11s		1112	National Control		2		
													Surface Damage	16.2 15.7	Om37s	_	0010	scratches	ā			l 1
1			1 1										Attached Deposits Surface Demage	12.5	Om/39s Om/49s	_	11	encrustation scretches				l 1
			1 1			1 1							Attached Deposits	12.1	Om50s		0804	encrustation		10000		l 1
			1 1			1 1							Surface Demage	4.9	1m40s		0912	scratches				l 1
		discrete and a second		1000	and the second second			10000 Name		14574011			Surface Demage	1.7	1mAta		0904					
Main Main	Marie-Curie Cumberland Street	SAB	SA 2	SAN	University	250	Polyvinyl Chlorida Reinforced Concrete	Circular	3.14	3.41		4.0	Nothing to report for inspected sewer			-			- 1	4		
Mein	Compensed screen	5A12	SA 13	344	University	375	Reinforced Concrete	Circular	3.55	3.65	32.0	32.0	Water Sags Surface Demage	throughout	throughout throughout			Increased roughness, aggregate visible				
1			ll					1 1		l			Vhible Rebar	6.5	1m55s		03	w\ cracks				
													Outlet Damage	31.0	3m23s		S	chipped, not circular		4		
Main	University Private	5A 13	SA 14	SAN	University	375	Reinforced Concrete	Circular	3.68	4.76	80.5	80.5	Surface Demage	throughout	throughout			aggregate visible, increased roughness	6	3		
													Open Joint Visible Rebar	24.4 26.1	2m02s	-	0100		à			
													Displaced toint	34.6	2m02x	1	0302					
						21200				· Service			Attached Deposits	61.6	4m24s	1	0105	encruitation				
59339		- 10000	1000	- 000	I CONTRACTOR			CONTRACTOR OF THE PARTY.	990		THE WAS DELI		Surfece Demage	76.6	Sm25s		DA	D200000				
Main	Louis Pasteur	SA 14	SA 45	SAN	University	450	Reinforced Concrete	Circular	4.80	n/e	110.6	110.6	Surface Damage	throughout	throughout			Increased roughness				
										1000107			Water Seg Crack	throughout 110.6	throughout 0m15s	1	0810	circumferential				
1			1 1			1 /		ı		l			Collegaed Pipe/ Cracks	106.6	0m47a	 	0508	OCAMINE WILLIAM				
ll			1 1			1 1		ı		l			Debris	104.6	Omália		0506					l 1
1			1 1			1 1		ı		Hole (ISJD 2m03a 12	2				, I							
1			1 1			1 1		ı		l			Hole	66.0	2m40s	—	12	w/, encrustation		1	450 pipe appears to	l 1
1			1 1			1 1		ı		l			Attached Deposits	61.8 56.4	2m49s 3m16s	-	002	encrustation encrustation		- 4	be collepsed or backgraded 3 m	\$ 50,500.00
1			1 1			1 1		ı		l			Attached Deposits Attached Deposits	52.A	3m26s		11	encrustation, w\ visible rebar		1	outside d/s MH.	3
			1 1			ı		ı		l			Hole	47.5	3m39s		12			3	Repair pipe	
													Attached Deposits	403	30551		0708	encrustation, w\ debris			nucestree	
													Hole	40.1 88.5	3m58a 4m03	-	12					
													Hole Attached Deposits	27.5	4m03 4m39a	1	0709	encrustation				
													Hole	25.2	5m08s		12					
													Debris	4.2	5m54s		06		0			
Main	University Private	5A34	SA 35	SAN	University	200	Asbestos Cement	Cleaning	n/a	3:30	20.8	7.5	WaterSeg	20.0 - 16.3	Om10s - Dm40s	50				//	ATTACHED BETWEEN	
													Change is Material Attached Deposits	17.A 15.9	Om30v Om47s	1		cernent to PVC	4	4	iteplace entire pipe on corrected	\$ 45,250.00
													Displaced Joint	11.7	1mills			louing		100	on corrected elignment.	9 45,250,00
													Obstruction	13.A	1m03s			broken place of PVC pipe			\$200 PM	
														V1 911 1	***************************************		V 1		V 10			



Table 1:	Main Campus - Wat	termains																F	PARSONS	uOttawa
	LOCA	LOCATION SECTION			TYPE		· ·	PIPE CHARACTERISTICS			r:	CONDITION POP DEFECTS							RECOMMENDA	TIONS
CAMPUS	STREET	HYDRANT ID	DIRECTION	MAIN/ LEAD	OWNERSHIP	DIAMETER (mm)	MATERIAL	HYDRANT MAKE AND MODEL	FLOW DIRECTION	MEASURED WATER PRESSURE (PSI)	INSPECTED LENGTH (m)	DEFECT TYPE	DISTANCE (m)	TIME CODE (hr.minsex)	REDUCTION (%)	LOCATION (o'clock to o'clock)	NOTES	RATING	ТүрЕ	EXPECTED COST (S)
Main	Transitwey	H30	Left of Hydrant	Main	University	N/A	Coment Lined Iron	Mc Avity M67	Against flow	62	19.8	Tuberculation or debris at 45° bend down	2.10 5.6 to 16.9	11:25:38 11:26:20 to 11:26:34	5-10 45	06		3	Flush pipe	
Main	Transitwey	H30	Right of Hydrant	Main	University	N/A	Coment Lined Iron	Mc Avity M67	With Flow	62	2.1	Tuberculation at closed valve joint	2.10	11:36:04	5-10	-		- 2	Flush pipe	
Main	Transitway	HBL		Main	University	N/A	N/A	Mc Avity M67		N/A		No Inspection was conducted through this hydrant as the bolation valve box is full of mud.						- 3	Clean valve box and complete inspection	5 3,000.00
Main	Transitway	H32		Main	University	N/A	N/A	Canada valve Century		N/A		No inspection was conducted through this hydrant as the isolation valve box is full of mud.						9	Clean valve box and complete inspection	5 3,000.00
Main	Laurier Station	H33		tead	University	750	PVC	Mc Avity M67 Brigadier		58	10.1	Nothing to report for the inspected hydrant lead						1		
Main	Laurier Station	H33	Left of Hydrant	Main	University	750	PVC	Mc Avity M67 Brigadier		58	0.0	Could not turn camera at cross piece						-		
Main	200 Marie-Curie	H40		Lead	University	400	IVC	Derling 850-8-18		54	3.0	Nothing to report for the inspected hydrarit lead						4		
Main	300 Marie-Curie	H40	left	Mein	City of Ottawa	400	PVC	Derling 850-8-18		64	0.0	Could not turn tee in 400mm PVC main			_			10	1	$\overline{}$
Main	17 Stewart	H66		lead.	City of Ottawa	N/A	PVC	Mc Avity M67 Brigadier		64	4.0	Nothing to report for the inspected hydrant lead				*		- 1		
Main	17 Stewart	H66	Left of Hydrant	Main	City of Ottawa	N/A	PVC	Mic Avity M67 Brigadier	Against flow	64	43.2	Tuberculation along joint	43.20	09:15:05	<5			- 1	Flush pipe	
Main	17 Stewart	H66	Right of Hydrant	Main	City of Ottawa	N/A	PVC	Mc Avity M67 Brigadier	With flow	64	52.6	Nothing to report for inspected watermain						1		
Main	Water / Nicholes	H67		Lead	City of Ottawa	300	Cement Lined Iron/ PVC	Concord D67M		62	9.0	Turbid water reduced visuals Tuberculation at Hydrant Tee joint	8.48	12:39:50 12:41:00	90	-		3	Flush pipe	1 1
	THE STORE ST		and the second second		Ironionaumonio							Hydrant Tee, End of tuberculation	9.00	12:41:58	10					$\overline{}$
Main	Waller / Nicholas	H67	Left of Hydrant	Main	City of Ottawa	300	Cement Lined Iron/ PVC	Concord D67M	Against flow	62	22.2	Tuberculation around joint	2.00 2.6 to 6.6	12:53:49 12:53:55 to 12:54:32	- 6					
												Change of Material	6.50	12:54:32			Iron to PVC	4 Flu	Flush pipe	
												Change in material	14.30	12:58:20			PVC to iron		0.00000000	
Main	Walter / Nicholas	H67	Right of Hydrant	Main	City of Ottawa	300	Cement Lined Iron/ PVC	Concord D67M	With flow	62	18.4	Change in material Particle buildup on the bottom of the pipe	14.60	12:59:10 12:43:03	-5		Iron to PVC	1	Flush plos	
Main	135 Séraphin - Marion	H68	Supplied to the supplied to	Lead	City of Citsawa	300	Castiron	Mc Avity M67 Brigadier	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	52	2.9	Tuberculation	0.7 to 2.9	07:43:30 to 07:44:05	20-30				Watermain to be replaced	
- Manual	20 ampini manun	7120			City of Citawa		Catalian	me anny may or grant			447.)	Tuberculation in tea piece	2.90	07:34:05	20-30				as part of Seraphin-Marion Road reconstruction	
Main	135 Séraphín - Marion	H68	Left of Hydrant	Main	City of Ottawa	300	Cast Iron	Mc Avity M67 Brigadier	With flow	62	10.8	Turbid water reduced visibility	0.80	08:00:56					Watermain to be replaced as part of Seraphin-Marion	
												Tuberculation	2.2 to 10.8	08:01:31 to 08:07:26	10-15			112	Road reconstruction project Watermain to be replaced	Ш
Main	135 Séraphin - Marion	H68	Right of Hydrant	Main	City of Ottawa	300	Cast Iron	McAvity M67 Brigadier	Against flow	62	12.6	Tuberculation Tuberculation	3.1 to 12.6	07:45:04 to 07:45:46 07:45:46 to 07:55:15	45-5 5-10	,	<u> </u>	12	es part of Seraphin-Marion Road reconstruction	
Main	505 Cumberland	H84		Lead	University	300	Cast Iron	Concord D67M		62	4.5	Tuberculation in the Bend	2.60	11:04:35					project	
- men	505 Cumperanu	num		Linear	Linversity	300	Cast for	CDINORIA DOFM		- 02	4.3	Tuberculation in the Bend	3.70	11:05:40	10					
ll		1									l	Tuberculation	3.90	11:07:18	10-15			2 Clean	Clean and Ene watermain	\$ 1,625,00
CONTRACTOR OF	Workship Control of the	2000	and the second second			20000		United the second	215000000000	2000	WW.11	Tuberculation in hydrant tee	4.50	11:08:14	0000	_			Section 1997	CO STRUCTURE
Main	505 Cumberland	H84	Left of Hydrant	Main	Oty of Ottown	300	Cestiron	Concord D67M	Against flow	62	5.8	Tuberculation	1.2 to 5.8	11:20:01 to 11:27:01	5-10			- 2	Clean and line watermain	\$ 19,500.00
Main	505 Cumberland	H84	Right of Hydrant	Main	City of Ottawa	300	Cast Iron	Concord D67M	With flow	62	4.3	Tuberculation Tuberculation	1.2 to 4.3 4.30	11:36:55 to 11:43:00 11:43:00	15-25 25-35			3	Clean and line watermain	\$ 13,000.00
Main	SS0 Cumberland	HBS	1	Lead	City of Ottown	300	Castiron	Durling 850-8-18		65	6.4	Tuberculation at the valve	0.30	08.55.50	45				AND ASSESSMENT OF THE PARTY OF	
S-1000	27/20/04/2007	2000				111000		THE PROPERTY OF THE		200	2000	Tuberculation		08:55:52 to 08:56:45	5-10				Clean and line watermain	5 1,950.00
Main	550 Cumberland	HES	Left of Hydrant	Main	City of Ottawa	300	Cast from	Derling 850-8-18	Against flow	65	1.3	Tuberrulation	0.3 to 1.3	08:56:45 to 08:58:55 08:59:52 to 09:04:12	15-20 5-10					
	DV SATERINHES	0.500	CERTAIN THE CHIE		West and the second	900000	10757670	77.000 (March 2007)	100011130201754	110041	1000	Tuberculation	1.30	09:04:12	10-15			.3	Clean and line watermein	\$ 14,625.00
Main	550 Cumberland	HIS	Right of Hydrant	Main	City of Ottawa	300	Cast Iron	Derling 850-8-18	Withflow	65	5.6	Tuberculation Tuberculation	0.6 to 2.8 2.8 to 5.6	09:07:33 to 09:10:14 09:10:14 to 09:15:10	45-10 10-15				Clean and line watermain	\$ 17,875.00
Main	577 King Edward	H96		Main	Oty of Ottawa	N/A	N/A	Canada Valve Century		N/A		No Inspection was conducted through this hydrant as there was no isolation valve.						82	Install isolation valve and complete inspection	\$ 10,000.00
Main	641 King Edward	H97		Main	City of Ottawa	N/A	N/A	Canada Valve Century		N/A		No Inspection was conducted through this hydrant as there was no isolation valve.							Install isolation valve and complete inspection	\$ 10,000.00
Main	721 King Edward	Н99		Main	City of Ottawa	N/A	N/A	Concord-Daigle		N/A		No Inspection was conducted through this hydrant as there was no isolation valve.						14	Install isolation valve and complete inspection	\$ 10,000.00
Main	770 King Edward	H100		lead	City of Ottawa	450	Cement Lined Iron	Canada Valve Century		80	3.6	Tuberculation at the bend's joint Tuberculation around the valve	1.10 2.60	11:37:51 11:38:21	-65 -65			1	Flush pipe	
Main	770 King Edward	H100	Left of Hydrant	Main	City of Ottawa	450	Cement Lined Iron	Canada Valve Century	With flow	80	36.2	Tuberculation around the joint Loose Debris at joint	3.60 1.60	11:38:34 11:54:34	-65		ľ			$\overline{}$
		1000				0.000		The second secon	oceation.	1,790	11-2000	Angled joint downwards	4.80	11:55:16				1	Flush pipe	
1000	220 Kg at 7 4 and	Here	Obstant of the Avenue	64-1-	Co. of Co.	400	Company 11 - China	View Andrews	Assistant Account	-	957	Cement Liner buildup, spot tuberculation	8.48	11:55:54	-6				Charle whee	
Main	770 King Edward	H100	Right of Hydrant	Main	City of Ottawa	450	Coment Lined Iron	Canada Valve Century	Against flow	80	33.6	Locse Debris at joint	0.80	11:42:55	ં				Flash pipe	
Main	25 Templeton	H117		Main	City of Ottawa	N/A	N/A	Concord D67M		N/A	cr-	No inspection was conducted through this hydrant as there was no isolation valve.			L			lit	Install isolation valve and complete inspection	5 10,000.00

Do you have any questions or comments?

