

# City of Winnipeg 2015: 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

Condition Assessment Report, Standard Analysis



PICA – Pipeline Inspection & Condition Analysis Corporation  
(A Subsidiary of Russell NDT Holdings Ltd.)

RFT ILI Tool

250mm (10in) Cast Iron & Steel

Assiniboine River Crossing

Between Misericordia Health Center & Wellington Crescent

Winnipeg, MB

PICA Project: Winnipeg 8007

Inspection Date: October 20, 2015  
Report Submission: June 6, 2016 (Rev 2.0); February 2, 2016 (Rev 1.0)  
Operators: P. Ryhanen, G. Bouchard, B. Senka, G. Hubbard, D. Barron, D. Burton  
Analysts: E. Zake, J. Kim  
Reviewers: J. Regala  
Report Revision: 2.0

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# City of Winnipeg: 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

*Condition Assessment Report, Standard Analysis*

## Executive Summary

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PICA, under contract with AECOM, inspected a number of Water River Crossings for the City of Winnipeg using Remote Field Testing (RFT) Technology between October 19 and 24, 2015. This report documents the results of the RFT inspection of the 250mm (10in) Maryland Bridge Watermain, which crosses the Assiniboine River. The inspected portion spanned between two newly installed access wyes at the Misericordia Health Centre and the south end of the Maryland Bridge, near Wellington Cr (refer to the line map on page 4). The inspection was conducted on October 20<sup>th</sup>, 2015. The results reported here document **PICA's** findings.

As noted in the supplied pipeline drawings, this watermain is comprised of approximately 46m of cast iron (CI) and 121m of steel piping.

In general, the RFT analysis found the inspected section to be in **“fair to poor”** condition, with 82% of all pipes measuring less than 74% remaining wall (RW). A total of 441 localized wall loss indications were detected. Among these defects, 173 were classified as *shallow* (**≥65% RW**), **221** were *medium* (40-64% RW) and 43 were *deep* (20-39% RW). There were four defects that measured <20%RW: 3%RW in P0150, 9%RW in P0160 and both 4%RW and 14%RW in P0300. The 4%RW defect in P0300 was verified as a through-hole during **AECOM's lining** of the watermain.

Note that all defect depth values in this report, and those in the original version (Rev 1.0) sent on February 2, 2016 were re-calibrated based on the aforementioned leak.

Table 1 provides an overview of the RFT findings on 10in Maryland Bridge Watermain River Crossing.

Table 1: Feature Indication Summary	
Inspected Length:	167.03m* Cast Iron (46.33m) Steel (120.70m)
Number of Pipe Sections:	38 <i>*Includes 2 elbows and couplings.</i>
Number of Analyzed Pipe Sections:	34
Average Wall Thickness:	98.2%
Thinnest circumferential pipe wall (Tcircmin):	78.4% (in Pipe 0020)
Number of pipes without localized wall loss indications:	5
Number of pipes with localized wall loss indications:	29
<ul style="list-style-type: none"> <li>• Number of <b>pipes in 'good' condition</b> (<math>\geq 75\%</math> RW):</li> </ul>	6
<ul style="list-style-type: none"> <li>• <b>Number of pipes in 'fair' condition</b> (50-74% RW):</li> </ul>	9
<ul style="list-style-type: none"> <li>• <b>Number of pipes in 'poor' condition</b> (&lt;50% RW):</li> </ul>	19
Total number of wall loss indications reported:	441
Number of joint connections (bell & spigot, girth welds):	31
Number of Elbows:	2
Number of Couplings:	2

Figures 1 and 2 illustrate the distribution of localized wall loss along the 250mm (10in) Maryland Bridge Watermain (Assiniboine River Crossing) with respect to remaining wall and circumferential location respectively. Note that there may be some (partially) overlapping data points due to defect proximity.

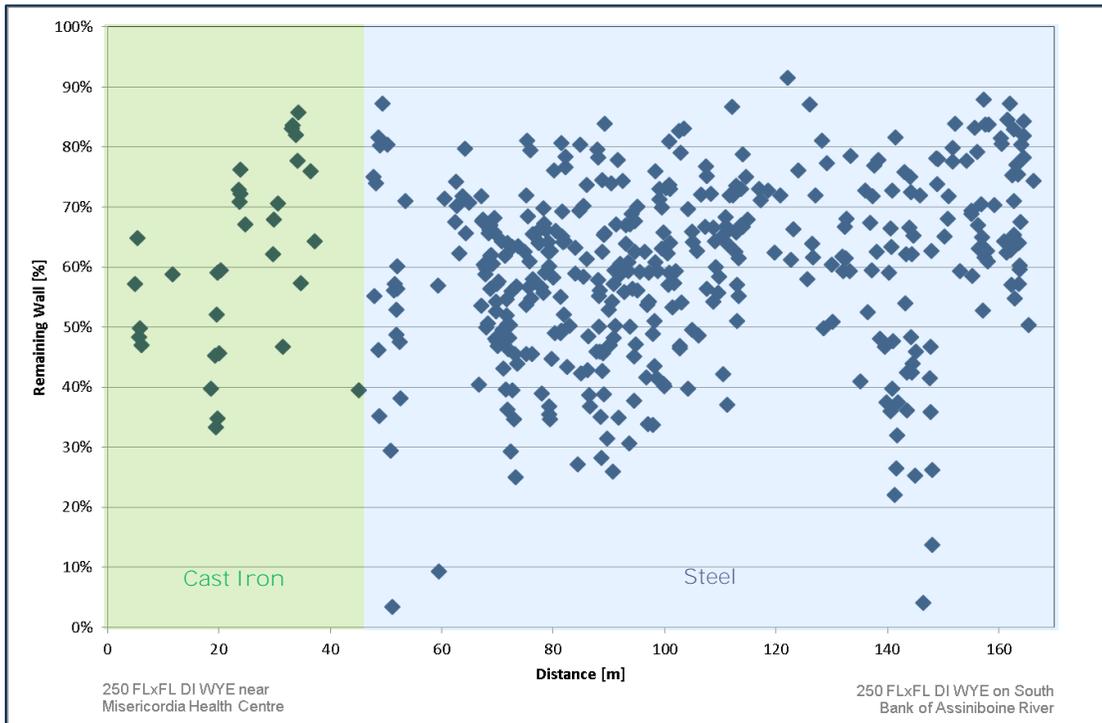


Figure 1: Distribution of wall loss with respect to remaining wall (%NWT) in pitting regions along the inspected section.

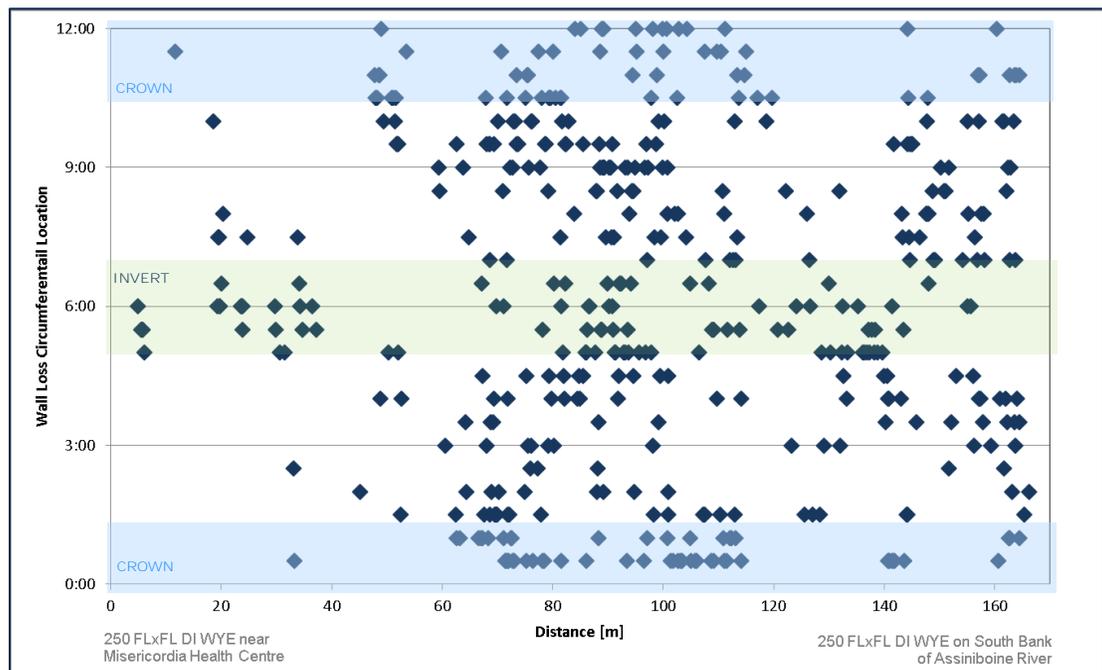


Figure 2: Circumferential distribution of pitting regions along the inspected section.

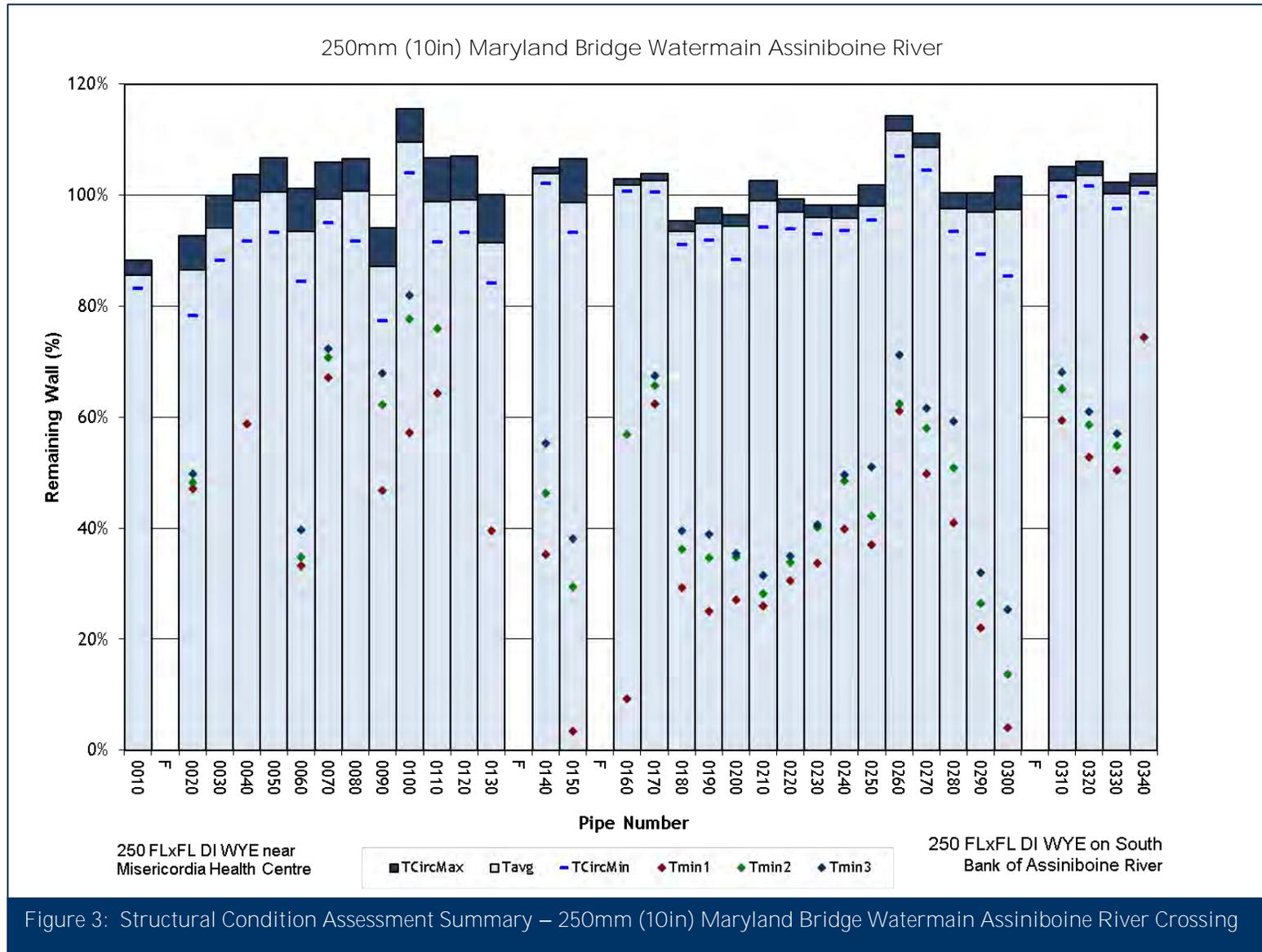


Figure 3: Structural Condition Assessment Summary – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

Table 2: Inspection Overview			
Client:	City of Winnipeg	Location:	Winnipeg, MB
Line Name:	Maryland Bridge Watermain River Crossing	Pipe Diameter:	250mm (10in)
Material:	Cast Iron (46.33m) Steel (120.70m)	Year Installed:	1970
Break History:	One recent failure post inspection.		
Inspection Date:	October 20, 2015		
Inspected Length:	167.03m		
Lead Technician:	P. Ryhanen	Technician(s):	G. Bouchard, B. Senka, G. Hubbard, D. Barron, D. Burton
Launch Access:	250mm FLxFL DI WYE near Misericordia Health Center		
Retrieve Access:	250mm FLxFL DI WYE near Wellington Cr (South river bank)		
Operational Comments:			
<u>October 20, 2015</u>			
7:45am: Arrived on site and commence dual winch set up.			
8:30am: Pull winch line to north side.			
9:00am: Tool on and placed in pipe.			
9:20am: Tool was launched from near Misericordia Health Centre.			
10:25am: Tool arrived at the retrieve end.			
10:45am: Retrieve run starts.			
11:45am: Tool arrived back at the launch wye near Misericordia Health Centre and tool removed from line.			
12:05pm: Data downloaded.			
1:15pm: Site broken down.			

## Analysis Results

### Location Reporting, Pipe Lengths & Features

The total logged distance for the 10in Maryland Bridge Watermain Assiniboine River Crossing was 167.03m. The inspection started on the north side of the Assiniboine River and ended on the south side near Wellington Crescent. During the inspection, the tool was stopped just short of the access wye at the retrieve (south) side. As a result, approximately 3.1m of the line was not inspected (at the south end). Adding this missed 3.1m to the total logged distance of 167.03m results in a total distance of 170.13m, which represents full coverage of the line.

The zero datum point was set at the downstream joint of a 30° bend that is part of the lateral connecting to the launch WYE. PICA confirmed with Tricor that the launch access was modified differently from the specified configuration (refer to Figure 4 below) due to the depth and steep slope associated with the north bank.

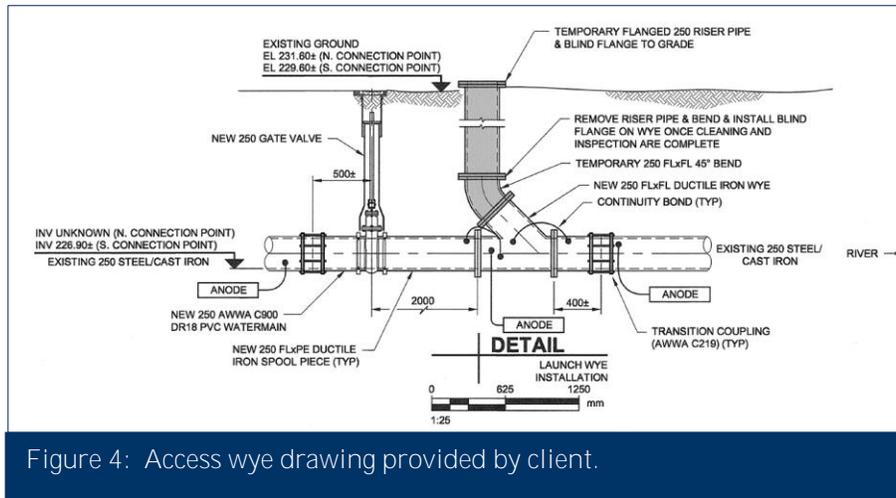


Figure 4: Access wye drawing provided by client.

The inspected line is comprised of two different pipe types: cast iron for the first 46m and steel for the remaining 121m. The average lengths for a standard pipe are 3.57m (11.7ft) and 6.31m (20.7ft) for cast and steel respectively. Shorter pieces were found adjacent to features (i.e. couplers, deflections). A total of four line features (two 45° bends and two couplers) were identified in the RFT data. In addition, nine shallow deflections were identified in the data using on board tool sensors.

## General Wall Thickness

Pipe sections longer than 1.0m were analyzed to obtain the average remaining wall thickness (PARW) calculated over the length of the pipe section. The measured average wall thickness for the inspected portion of the 10in Maryland Bridge Watermain River Crossing is 98.2%.

Due to manufacturing tolerances, fluctuations of  $\pm 15\%$  in the individual PARW values are common. Variations outside the normal  $\pm 15\%$  spread can be an indicator of a different nominal wall thickness (NWT) or point towards a problem like aggregate pitting or general wall loss. All the inspected pipes exhibited PARW values that are within the manufacturing tolerances.

As mentioned above, there were two pipe types (cast iron and steel) that were observed in the data. The respective PARW values were calculated using nominal wall thickness values from each pipe type. Table 3, on pages 12-14, lists the pipe type transition points along the inspected section.

## Local Wall Thickness

In general, the RFT analysis found the inspected section to be in *“fair to poor”* condition, with 82% of all pipes measuring less than 74% remaining wall (RW). A total of 441 localized wall loss indications were detected. Among these defects, 173 were classified as *shallow* ( $\geq 65\%$  RW), 221 were *medium* (40-64% RW) and 43 were *deep* (20-39% RW). There were four defects that measured  $< 20\%$  RW: 3%RW in P0150, 9%RW in P0160 and both 4%RW and 14%RW in P0300. The 4%RW defect in P0300 was verified as a through-hole during AECOM’s lining of this line.

Table 3, on pages 12-14, detail the three worst pitting indications per pipe ( $T_{min1}$ ,  $T_{min2}$  and  $T_{min3}$ ), as well as the average, minimum and maximum remaining wall values for the inspected section. The same results are shown graphically on page 4.

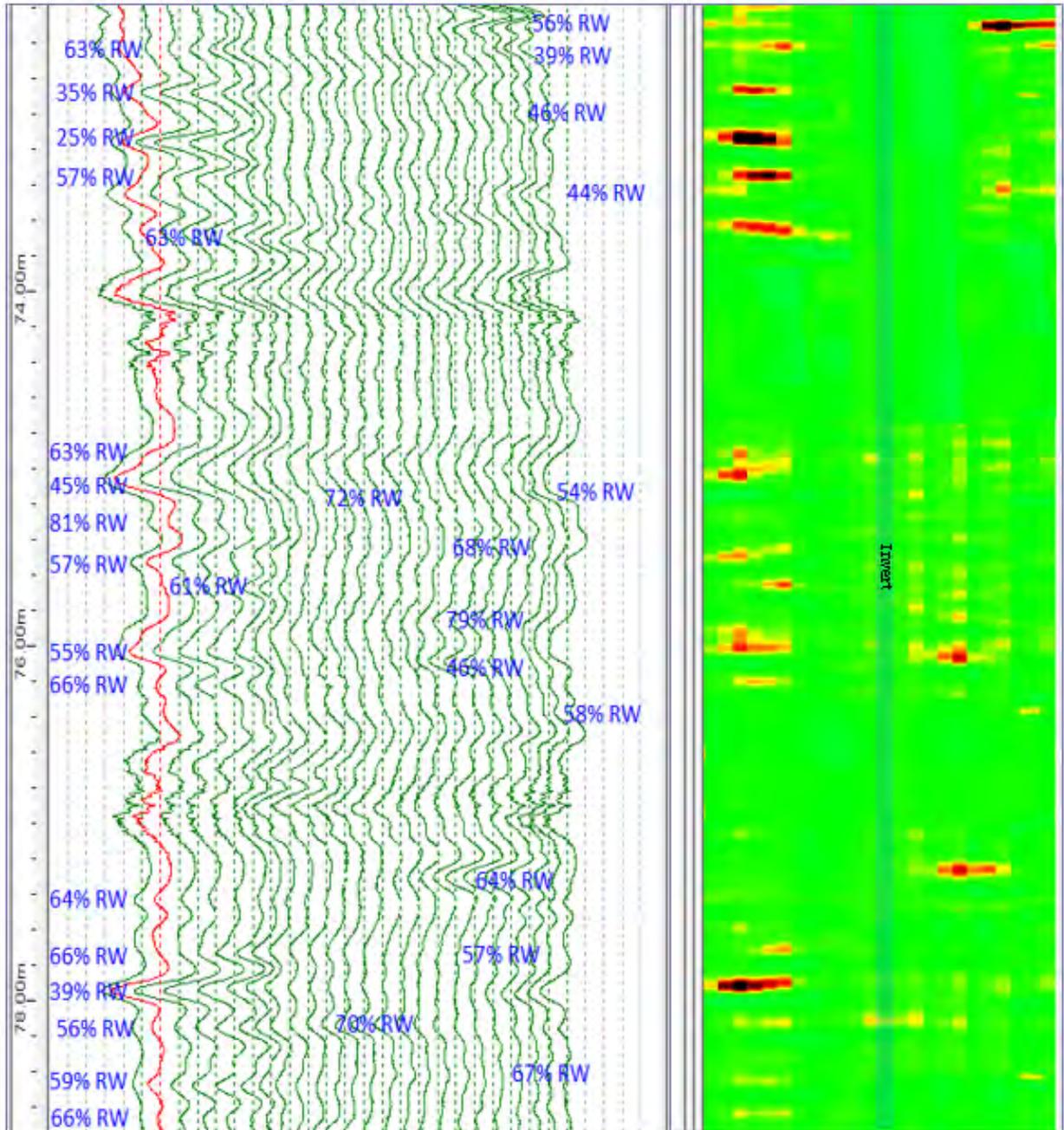
Table 4, on pages 15-55, provides additional detail for each defect with regards to its location relative to upstream and downstream features, axial length, signal quality index and analysis confidence level scoring.

Note that all defect depth values in this report, and those in the original version (Rev 1.0) sent on February 2, 2016 were re-calibrated based on the leak detected on the west bank during the lining operation.

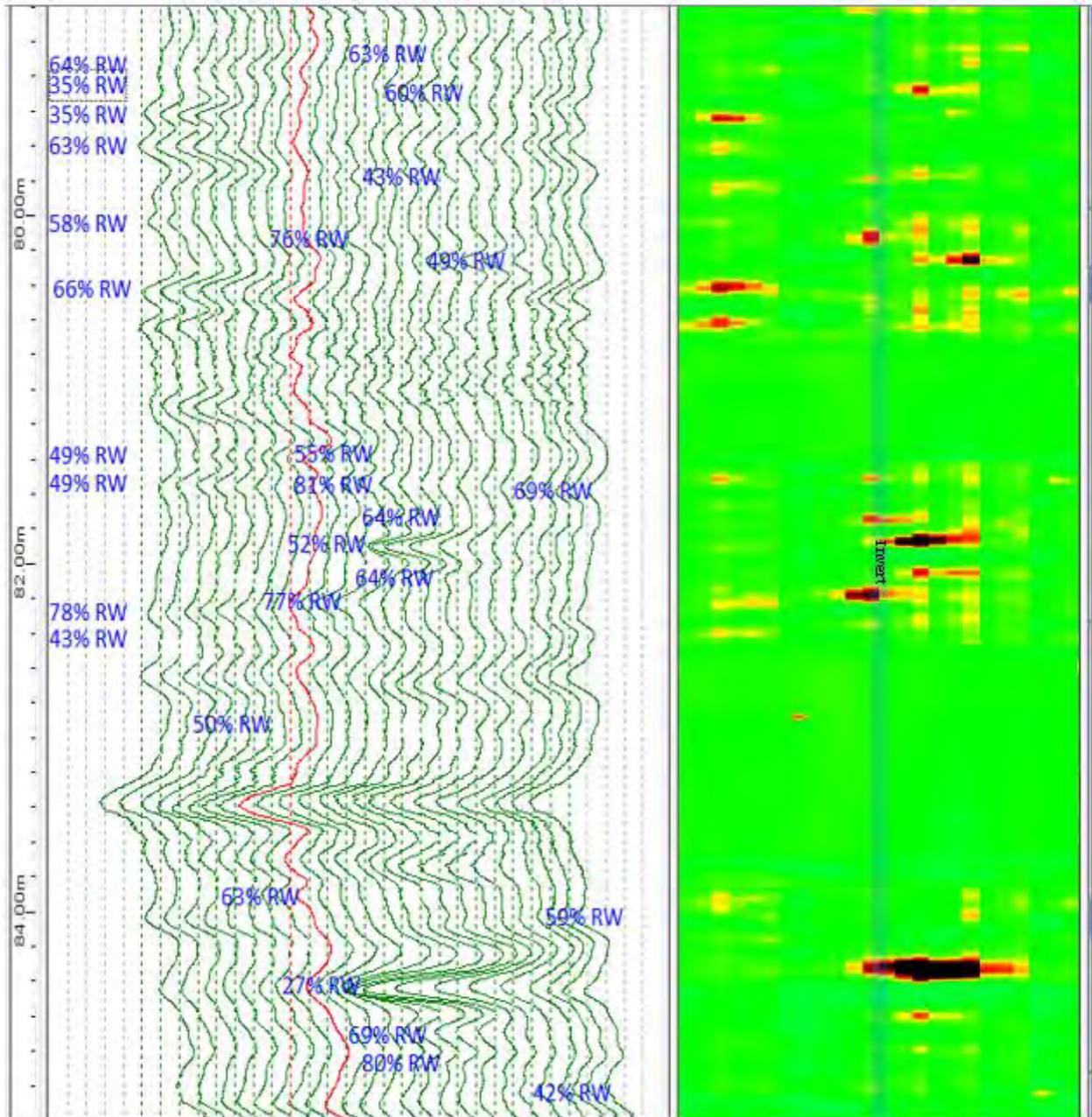
RFT Color Maps - Pipes 0190, 0200, 0210 and 0220

Color maps for four pipe sections with significant corrosion are presented in the next four pages. It is important to note that these color maps are for visual purposes only and should not be used to estimate the remaining wall.

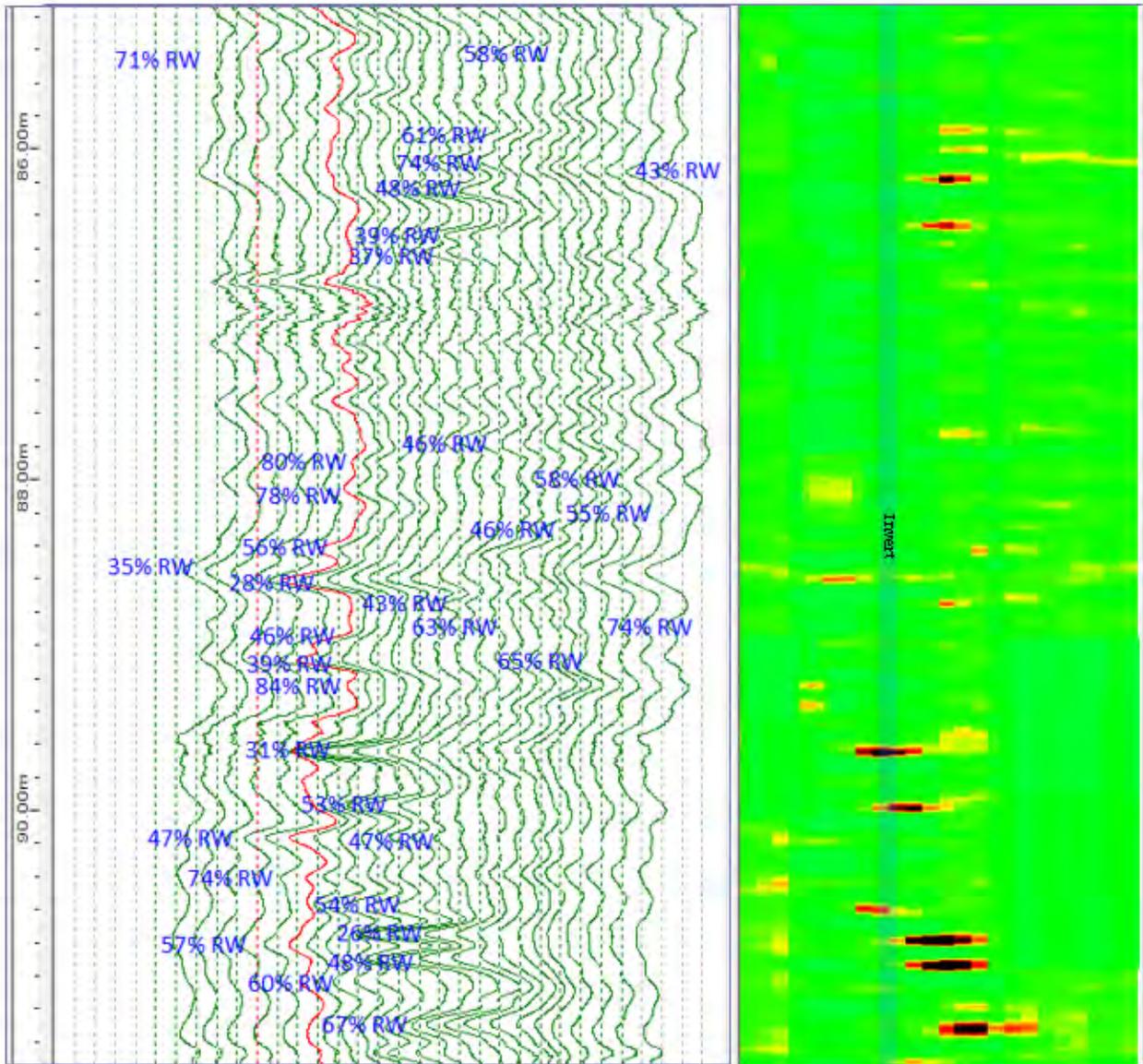
Pipe 0190: 72.44-78.81m (32 defects ranging between 25% and 81% RW)



Pipe 0200: 78.81-85.14m (31 defects ranging between 27% and 81% RW)



Pipe O210: 85.14-91.52m (38 defects ranging between 26% and 84% RW)



Pipe O220: 91.52-97.56m (30 defects ranging between 31% and 78% RW)

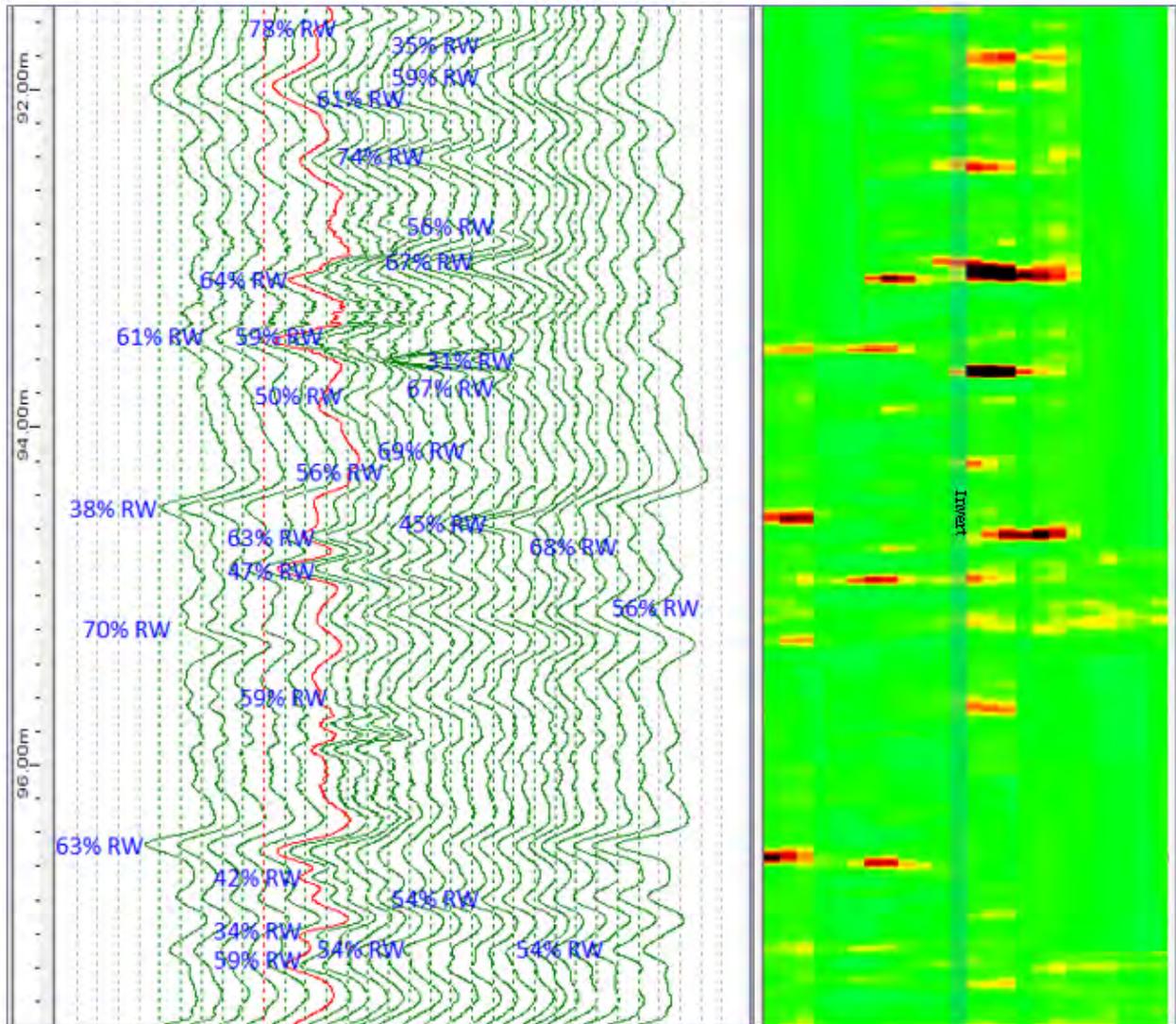


Table 3: Pipe List and Wall Thickness Readings – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

Pipe No.	Pipe Location			Tavg RW (%)	Circumferential Wall Thickness		Local Wall Thickness <i>Clock positions are with a Northeast to Southwest perspective (E.g. 3:00=NW, 9:00=SE). Defects entries in red were measured with &lt;20% RW.</i>									Comment Entries in black are cast iron. Entries in blue are steel pipes.	
	Start (m)	End (m)	Length (m)		Tcircmax RW (%)	Tcircmin RW (%)	Tmin1			Tmin2			Tmin3				
							RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position		
0010	0.00	3.62	3.62	86%	88%	83%											The zero datum point was set at the downstream joint of a 30° bend that is part of the lateral connecting to the launch WYE. Cast iron section.
F	3.62	4.25	0.63														45° vertical bend
0020	4.25	7.76	3.51	86%	93%	78%	47%	6.08	5:00	48%	5.65	5:30	50%	5.75	5:30		This pipe contains two additional defects with 57% and 65% RW.
0030	7.76	11.32	3.56	94%	100%	88%											
0040	11.32	14.84	3.52	99%	104%	92%	59%	11.66	11:30								
0050	14.84	18.40	3.56	101%	107%	93%											
0060	18.40	21.94	3.54	93%	101%	85%	33%	19.49	7:30	35%	19.76	6:00	40%	18.55	10:00		This pipe contains 5 additional defects between 45% and 59% RW.
0070	21.94	25.53	3.58	99%	106%	95%	67%	24.78	7:30	71%	23.69	6:00	72%	23.91	6:00		This pipe contains two additional defects with 73% and 76% RW.
0080	25.53	29.10	3.58	101%	107%	92%											
0090	29.10	32.70	3.60	87%	94%	77%	47%	31.47	5:00	62%	29.66	6:00	68%	29.86	5:30		3° vertical deflection at 29.10m; This pipe contains an additional defect with 71% RW.
0100	32.70	36.28	3.58	110%	116%	104%	57%	34.64	5:30	78%	34.16	6:30	82%	33.78	7:30		This pipe contains 3 additional defects between 83% and 86% RW.
0110	36.28	39.88	3.60	99%	107%	92%	64%	37.14	5:30	76%	36.48	6:00					3° vertical deflection at 36.28m.
0120	39.88	43.47	3.59	99%	107%	93%											3° vertical/5° horizontal deflection at 39.88m.
0130	43.47	46.33	2.85	91%	100%	84%	39%	45.14	2:00								End of cast iron section.
F	46.33	47.62	1.29	102%	104%	100%	72%	47.30	1:30	83%	47.09	8:30					Start of steel pipe section. 45° horizontal bend; 13° vertical deflection at 46.33m

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Pipe No.	Pipe Location			Tavg RW (%)	Circumferential Wall Thickness		Local Wall Thickness <i>Clock positions are with a Northeast to Southwest perspective (E.g. 3:00=NW, 9:00=SE). Defects entries in red were measured with &lt;20% RW.</i>									Comment Entries in black are cast iron. Entries in blue are steel pipes.
	Start (m)	End (m)	Length (m)		Tcircmax RW (%)	Tcircmin RW (%)	Tmin1			Tmin2			Tmin3			
							RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position	
O140	47.62	50.39	2.77	104%	105%	102%	35%	48.83	4:00	46%	48.56	11:00	55%	47.94	10:30	This pipe contains 6 additional defects between 74% and 87% RW.
O150	50.39	55.85	5.46	99%	107%	93%	3%	51.19	10:30	29%	50.84	10:30	38%	52.57	4:00	7° vertical deflection at 50.39m; This pipe contains 8 additional defects between 47% and 71% RW.
F	55.85	56.06	0.22													Coupler
O160	56.06	59.78	3.71	102%	103%	101%	9%	59.49	8:30	57%	59.35	9:00				5° vertical deflection at 56.06m.
O170	59.78	66.24	6.46	103%	104%	101%	62%	63.10	1:00	66%	64.38	2:00	67%	62.38	1:30	This pipe contains 6 additional defects between 70% and 80% RW.
O180	66.24	72.44	6.20	93%	95%	91%	29%	72.41	1:00	36%	71.77	1:30	40%	71.57	0:30	This pipe contains 38 additional defects between 40% and 72% RW.
O190	72.44	78.81	6.37	95%	98%	92%	25%	73.21	10:00	35%	72.93	10:00	39%	77.99	10:30	This pipe contains 29 additional defects between 39% and 81% RW.
O200	78.81	85.14	6.33	94%	96%	88%	27%	84.46	4:00	35%	79.42	10:30	35%	79.25	10:30	This pipe contains 28 additional defects between 37% and 81% RW.
O210	85.14	91.52	6.38	99%	103%	94%	26%	90.75	6:00	28%	88.61	9:00	31%	89.64	7:30	This pipe contains 35 additional defects between 35% and 84% RW.
O220	91.52	97.56	6.04	97%	99%	94%	31%	93.59	5:30	34%	97.00	9:30	35%	91.74	4:00	This pipe contains 27 additional defects between 38% and 78% RW.
O230	97.56	103.61	6.05	96%	98%	93%	34%	97.88	5:00	40%	99.98	11:30	41%	99.82	9:00	This pipe contains 29 additional defects between 41% and 83% RW.
O240	103.61	109.87	6.26	96%	98%	94%	40%	104.13	7:30	49%	106.09	0:30	50%	104.93	1:00	5° horizontal deflection at 103.61m; This pipe contains 16 additional defects between 54% and 77% RW.
O250	109.87	116.22	6.35	98%	102%	95%	37%	111.21	12:00	42%	110.47	11:30	51%	113.03	7:00	This pipe contains 22 additional defects between 55% and 87% RW.
O260	116.22	122.88	6.66	112%	114%	107%	61%	122.69	5:30	62%	119.72	10:30	71%	117.27	6:00	This pipe contains 4 additional defects between 72% and 92% RW.
O270	122.88	129.45	6.57	109%	111%	104%	50%	128.59	5:00	58%	125.60	1:30	62%	126.64	6:00	This pipe contains 7 additional defects between 64% and 87% RW.
O280	129.45	135.65	6.20	98%	100%	94%	41%	135.19	6:00	51%	130.22	5:00	59%	133.17	4:00	5° vertical deflection at 132.15m; This pipe contains 7 additional defects between 59% and 79% RW.

Table 3: Pipe List and Wall Thickness Readings – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

Pipe No.	Pipe Location			Tavg RW (%)	Circumferential Wall Thickness		Local Wall Thickness									Comment Entries in black are cast iron. Entries in blue are steel pipes.
	Start (m)	End (m)	Length (m)		Tcircmax RW (%)	Tcircmin RW (%)	Tmin1			Tmin2			Tmin3			
							RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position	RW (%)	Location (m)	Clock Position	
							Clock positions are with a Northeast to Southwest perspective (E.g. 3:00=NW, 9:00=SE). Defects entries in red were measured with <20% RW.									
O290	135.65	142.00	6.35	97%	100%	89%	22%	141.36	0:30	26%	141.59	0:30	32%	141.75	9:30	This pipe contains 20 additional defects between 36% and 82% RW.
O300	142.00	148.27	6.27	97%	103%	85%	4%	146.39	7:30	14%	147.98	8:00	25%	144.91	9:30	This pipe contains 20 additional defects between 26% and 76% RW.
F	148.27	148.40	0.12													Coupler; 5° vertical deflection at 148.27m.
O310	148.40	154.61	6.21	103%	105%	100%	59%	153.00	4:30	65%	150.27	9:00	68%	150.83	8:30	This pipe contains 8 additional defects between 72% and 84% RW.
O320	154.61	159.89	5.28	104%	106%	102%	53%	157.12	10:00	59%	155.20	8:00	61%	158.02	8:00	This pipe contains 15 additional defects between 62% and 88% RW.
O330	159.89	165.88	5.99	100%	102%	98%	50%	165.31	1:30	55%	162.91	9:00	57%	162.26	3:30	This pipe contains 24 additional defects between 57% and 87% RW.
O340	165.88	167.03	1.16	102%	104%	100%	74%	166.26	2:00							End of run is near the newly installed 250mm FLxFL DI WYE on the South side of Maryland Bridge.

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
O20	3100	4.95	57%	6:00	48	2	Medium	45° Vertical Bend	0.70	45° Horizontal Bend	42.67
O20	3282	5.42	65%	5:30	38	2.5	Med-High	45° Vertical Bend	1.17	45° Horizontal Bend	42.20
O20	3374	5.65	48%	5:30	30	3	High	45° Vertical Bend	1.40	45° Horizontal Bend	41.97
O20	3415	5.75	50%	5:30	32	3	High	45° Vertical Bend	1.50	45° Horizontal Bend	41.87
O20	3545	6.08	47%	5:00	89	3	High	45° Vertical Bend	1.83	45° Horizontal Bend	41.54
O40	5742	11.66	59%	11:30	78	3	High	45° Vertical Bend	7.41	45° Horizontal Bend	35.96
O60	8451	18.55	40%	10:00	18	1.5	Med-Low	45° Vertical Bend	14.30	45° Horizontal Bend	29.07
O60	8764	19.34	45%	6:00	18	1.5	Med-Low	45° Vertical Bend	15.09	45° Horizontal Bend	28.28
O60	8823	19.49	33%	7:30	56	3	High	45° Vertical Bend	15.24	45° Horizontal Bend	28.13
O60	8866	19.60	52%	7:30	42	3	High	45° Vertical Bend	15.35	45° Horizontal Bend	28.02
O60	8908	19.71	59%	6:00	10	1	Low	45° Vertical Bend	15.46	45° Horizontal Bend	27.91
O60	8931	19.76	35%	6:00	18	1.5	Med-Low	45° Vertical Bend	15.51	45° Horizontal Bend	27.86
O60	9036	20.03	46%	6:30	66	3	High	45° Vertical Bend	15.78	45° Horizontal Bend	27.59
O60	9139	20.29	59%	8:00	56	3	High	45° Vertical Bend	16.04	45° Horizontal Bend	27.33
O70	10416	23.54	73%	6:00	60	3	High	45° Vertical Bend	19.29	45° Horizontal Bend	24.08
O70	10475	23.69	71%	6:00	78	3	High	45° Vertical Bend	19.44	45° Horizontal Bend	23.93
O70	10531	23.83	76%	5:30	21	2.5	Med-High	45° Vertical Bend	19.58	45° Horizontal Bend	23.79
O70	10562	23.91	72%	6:00	16	2	Medium	45° Vertical Bend	19.66	45° Horizontal Bend	23.71

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
070	10906	24.78	67%	7:30	33	2	Medium	45° Vertical Bend	20.53	45° Horizontal Bend	22.84
090	12825	29.66	62%	6:00	46	1.5	Med-Low	45° Vertical Bend	25.41	45° Horizontal Bend	17.96
090	12905	29.86	68%	5:30	98	3	High	45° Vertical Bend	25.61	45° Horizontal Bend	17.76
090	13214	30.64	71%	5:00	76	3	High	45° Vertical Bend	26.39	45° Horizontal Bend	16.98
090	13540	31.47	47%	5:00	26	3	High	45° Vertical Bend	27.22	45° Horizontal Bend	16.15
100	14147	33.01	83%	2:30	161	3	High	45° Vertical Bend	28.76	45° Horizontal Bend	14.61
100	14225	33.21	84%	0:30	132	3	High	45° Vertical Bend	28.96	45° Horizontal Bend	14.41
100	14449	33.78	82%	7:30	132	3	High	45° Vertical Bend	29.53	45° Horizontal Bend	13.84
100	14598	34.16	78%	6:30	104	2	Medium	45° Vertical Bend	29.91	45° Horizontal Bend	13.46
100	14641	34.27	86%	6:00	112	2.5	Med-High	45° Vertical Bend	30.02	45° Horizontal Bend	13.35
100	14786	34.64	57%	5:30	50	3	High	45° Vertical Bend	30.39	45° Horizontal Bend	12.98
110	15513	36.48	76%	6:00	48	1	Low	45° Vertical Bend	32.23	45° Horizontal Bend	11.14
110	15770	37.14	64%	5:30	86	2.5	Med-High	45° Vertical Bend	32.89	45° Horizontal Bend	10.48
130	18921	45.14	39%	2:00	97	2.5	Med-High	45° Vertical Bend	40.89	45° Horizontal Bend	2.48
140	19930	47.70	75%	11:00	54	2	Medium	45° Horizontal Bend	0.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	119.33
140	20022	47.94	55%	10:30	88	2.5	Med-High	45° Horizontal Bend	0.32	End of Run is at end of installed DI WYE at South side of Maryland Bridge	119.09

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
140	20102	48.14	74%	10:30	100	2.5	Med-High	45° Horizontal Bend	0.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	118.89
140	20267	48.56	46%	11:00	72	3	High	45° Horizontal Bend	0.94	End of Run is at end of installed DI WYE at South side of Maryland Bridge	118.47
140	20305	48.65	82%	11:00	110	3	High	45° Horizontal Bend	1.03	End of Run is at end of installed DI WYE at South side of Maryland Bridge	118.38
140	20375	48.83	35%	4:00	21	2.5	Med-High	45° Horizontal Bend	1.21	End of Run is at end of installed DI WYE at South side of Maryland Bridge	118.20
140	20406	48.91	80%	12:00	88	1	Low	45° Horizontal Bend	1.29	End of Run is at end of installed DI WYE at South side of Maryland Bridge	118.12
140	20593	49.39	87%	10:00	104	1.5	Med-Low	45° Horizontal Bend	1.77	End of Run is at end of installed DI WYE at South side of Maryland Bridge	117.64
140	20926	50.23	80%	5:00	118	1.5	Med-Low	45° Horizontal Bend	2.61	End of Run is at end of installed DI WYE at South side of Maryland Bridge	116.80
150	21166	50.84	29%	10:30	58	3	High	45° Horizontal Bend	3.22	End of Run is at end of installed DI WYE at South side of Maryland Bridge	116.19
150	21302	51.19	3%	10:30	50	3	High	45° Horizontal Bend	3.57	End of Run is at end of installed DI WYE at South side of Maryland Bridge	115.84
150	21385	51.40	56%	10:00	22	1	Low	45° Horizontal Bend	3.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	115.63
150	21472	51.62	57%	10:30	70	3	High	45° Horizontal Bend	4.00	End of Run is at end of installed DI WYE	115.41

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
150	21542	51.80	53%	9:30	22	2.5	Med-High	45° Horizontal Bend	4.18	End of Run is at end of installed DI WYE at South side of Maryland Bridge	115.23
150	21589	51.92	49%	9:30	17	2.5	Med-High	45° Horizontal Bend	4.30	End of Run is at end of installed DI WYE at South side of Maryland Bridge	115.11
150	21642	52.05	56%	5:00	29	1	Low	45° Horizontal Bend	4.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	114.98
150	21642	52.05	60%	9:30	74	2.5	Med-High	45° Horizontal Bend	4.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	114.98
150	21788	52.42	47%	1:30	60	2.5	Med-High	45° Horizontal Bend	4.80	End of Run is at end of installed DI WYE at South side of Maryland Bridge	114.61
150	21847	52.57	38%	4:00	58	2.5	Med-High	45° Horizontal Bend	4.95	End of Run is at end of installed DI WYE at South side of Maryland Bridge	114.46
150	22208	53.49	71%	11:30	131	2	Medium	45° Horizontal Bend	5.87	End of Run is at end of installed DI WYE at South side of Maryland Bridge	113.54
160	24516	59.35	57%	9:00	22	2	Medium	45° Horizontal Bend	11.73	End of Run is at end of installed DI WYE at South side of Maryland Bridge	107.68
160	24569	59.49	9%	8:30	97	3	High	45° Horizontal Bend	11.87	End of Run is at end of installed DI WYE at South side of Maryland Bridge	107.54
170	24988	60.55	71%	3:00	131	1	Low	45° Horizontal Bend	12.93	End of Run is at end of installed DI WYE at South side of Maryland Bridge	106.48

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
170	25708	62.38	67%	1:30	109	2	Medium	45° Horizontal Bend	14.76	End of Run is at end of installed DI WYE at South side of Maryland Bridge	104.65
170	25778	62.56	74%	1:00	96	1.5	Med-Low	45° Horizontal Bend	14.94	End of Run is at end of installed DI WYE at South side of Maryland Bridge	104.47
170	25812	62.64	70%	9:30	104	2	Medium	45° Horizontal Bend	15.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	104.39
170	25994	63.10	62%	1:00	78	1	Low	45° Horizontal Bend	15.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	103.93
170	26247	63.75	72%	9:00	62	1.5	Med-Low	45° Horizontal Bend	16.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	103.28
170	26401	64.14	80%	3:30	84	1	Low	45° Horizontal Bend	16.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	102.89
170	26497	64.38	66%	2:00	109	1.5	Med-Low	45° Horizontal Bend	16.76	End of Run is at end of installed DI WYE at South side of Maryland Bridge	102.65
170	26685	64.86	71%	7:30	76	1.5	Med-Low	45° Horizontal Bend	17.24	End of Run is at end of installed DI WYE at South side of Maryland Bridge	102.17
180	27375	66.61	40%	1:00	68	2	Medium	45° Horizontal Bend	18.99	End of Run is at end of installed DI WYE at South side of Maryland Bridge	100.42
180	27542	67.04	54%	1:00	34	3	High	45° Horizontal Bend	19.42	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.99
180	27557	67.07	72%	6:30	37	1.5	Med-Low	45° Horizontal Bend	19.45	End of Run is at end of installed DI WYE	99.96

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
180	27634	67.27	68%	1:00	92	2	Medium	45° Horizontal Bend	19.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.76
180	27660	67.34	68%	4:30	62	1.5	Med-Low	45° Horizontal Bend	19.72	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.69
180	27729	67.51	60%	1:30	68	2	Medium	45° Horizontal Bend	19.89	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.52
180	27867	67.86	59%	10:30	70	2	Medium	45° Horizontal Bend	20.24	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.17
180	27920	68.00	60%	9:30	27	2.5	Med-High	45° Horizontal Bend	20.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.03
180	27928	68.02	50%	3:00	115	2.5	Med-High	45° Horizontal Bend	20.40	End of Run is at end of installed DI WYE at South side of Maryland Bridge	99.01
180	28018	68.25	51%	1:00	19	2.5	Med-High	45° Horizontal Bend	20.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.78
180	28080	68.40	66%	9:30	94	2	Medium	45° Horizontal Bend	20.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.63
180	28166	68.62	66%	7:00	92	2.5	Med-High	45° Horizontal Bend	21.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.41
180	28174	68.64	62%	1:30	82	2.5	Med-High	45° Horizontal Bend	21.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.39

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
180	28185	68.67	56%	9:30	30	1	Low	45° Horizontal Bend	21.05	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.36
180	28221	68.76	67%	3:30	23	1.5	Med-Low	45° Horizontal Bend	21.14	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.27
180	28273	68.89	62%	2:00	52	2.5	Med-High	45° Horizontal Bend	21.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	98.14
180	28372	69.14	60%	3:30	98	3	High	45° Horizontal Bend	21.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.89
180	28469	69.39	68%	4:00	105	3	High	45° Horizontal Bend	21.77	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.64
180	28474	69.40	66%	9:30	94	3	High	45° Horizontal Bend	21.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.63
180	28530	69.55	48%	1:30	21	2.5	Med-High	45° Horizontal Bend	21.93	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.48
180	28592	69.70	53%	1:30	22	2	Medium	45° Horizontal Bend	22.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.33
180	28594	69.71	54%	6:00	42	2	Medium	45° Horizontal Bend	22.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.32
180	28639	69.82	48%	1:30	26	3	High	45° Horizontal Bend	22.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.21
180	28691	69.96	57%	1:30	74	3	High	45° Horizontal Bend	22.34	End of Run is at end of installed DI WYE	97.07

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
180	28710	70.00	47%	10:00	105	3	High	45° Horizontal Bend	22.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	97.03
180	28786	70.20	58%	2:00	109	2.5	Med-High	45° Horizontal Bend	22.58	End of Run is at end of installed DI WYE at South side of Maryland Bridge	96.83
180	28991	70.72	64%	11:30	60	2.5	Med-High	45° Horizontal Bend	23.10	End of Run is at end of installed DI WYE at South side of Maryland Bridge	96.31
180	29061	70.89	50%	8:30	38	2	Medium	45° Horizontal Bend	23.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	96.14
180	29121	71.05	43%	6:00	32	3	High	45° Horizontal Bend	23.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.98
180	29141	71.10	47%	1:00	64	2.5	Med-High	45° Horizontal Bend	23.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.93
180	29255	71.39	62%	0:30	80	2.5	Med-High	45° Horizontal Bend	23.77	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.64
180	29326	71.57	40%	0:30	68	3	High	45° Horizontal Bend	23.95	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.46
180	29355	71.64	52%	7:00	30	1	Low	45° Horizontal Bend	24.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.39
180	29355	71.64	55%	10:30	76	3	High	45° Horizontal Bend	24.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.39

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
180	29405	71.77	36%	1:30	32	1.5	Med-Low	45° Horizontal Bend	24.15	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.26
180	29432	71.84	64%	4:00	70	2	Medium	45° Horizontal Bend	24.22	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.19
180	29440	71.86	50%	0:30	26	2.5	Med-High	45° Horizontal Bend	24.24	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.17
180	29501	72.01	46%	0:30	42	2.5	Med-High	45° Horizontal Bend	24.39	End of Run is at end of installed DI WYE at South side of Maryland Bridge	95.02
180	29549	72.13	48%	1:30	54	2.5	Med-High	45° Horizontal Bend	24.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.90
180	29603	72.27	50%	9:00	21	1.5	Med-Low	45° Horizontal Bend	24.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.76
180	29658	72.41	29%	1:00	72	3	High	45° Horizontal Bend	24.79	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.62
190	29717	72.56	56%	1:00	21	3	High	45° Horizontal Bend	24.94	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.47
190	29760	72.67	39%	0:30	44	3	High	45° Horizontal Bend	25.05	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.36
190	29765	72.68	63%	9:00	64	3	High	45° Horizontal Bend	25.06	End of Run is at end of installed DI WYE at South side of Maryland Bridge	94.35
190	29864	72.93	35%	10:00	56	3	High	45° Horizontal Bend	25.31	End of Run is at end of installed DI WYE	94.10

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
190	29909	73.05	46%	0:30	24	2	Medium	45° Horizontal Bend	25.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	93.98
190	29973	73.21	25%	10:00	105	4	Very High	45° Horizontal Bend	25.59	End of Run is at end of installed DI WYE at South side of Maryland Bridge	93.82
190	30054	73.42	57%	9:30	50	3	High	45° Horizontal Bend	25.80	End of Run is at end of installed DI WYE at South side of Maryland Bridge	93.61
190	30082	73.49	44%	11:00	42	2	Medium	45° Horizontal Bend	25.87	End of Run is at end of installed DI WYE at South side of Maryland Bridge	93.54
190	30178	73.73	63%	9:30	84	2.5	Med-High	45° Horizontal Bend	26.11	End of Run is at end of installed DI WYE at South side of Maryland Bridge	93.30
190	30651	74.93	63%	2:00	23	1	Low	45° Horizontal Bend	27.31	End of Run is at end of installed DI WYE at South side of Maryland Bridge	92.10
190	30720	75.11	45%	10:30	105	3	High	45° Horizontal Bend	27.49	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.92
190	30745	75.17	54%	0:30	30	1.5	Med-Low	45° Horizontal Bend	27.55	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.86
190	30762	75.22	72%	4:30	21	1	Low	45° Horizontal Bend	27.60	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.81
190	30818	75.36	81%	11:00	161	1	Low	45° Horizontal Bend	27.74	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.67

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
190	30861	75.47	68%	3:00	29	1	Low	45° Horizontal Bend	27.85	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.56
190	30905	75.58	57%	11:00	66	2.5	Med-High	45° Horizontal Bend	27.96	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.45
190	30962	75.72	61%	9:00	68	3	High	45° Horizontal Bend	28.10	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.31
190	31039	75.92	79%	2:30	66	2	Medium	45° Horizontal Bend	28.30	End of Run is at end of installed DI WYE at South side of Maryland Bridge	91.11
190	31103	76.08	55%	10:00	64	2.5	Med-High	45° Horizontal Bend	28.46	End of Run is at end of installed DI WYE at South side of Maryland Bridge	90.95
190	31120	76.12	46%	3:00	32	2.5	Med-High	45° Horizontal Bend	28.50	End of Run is at end of installed DI WYE at South side of Maryland Bridge	90.91
190	31183	76.28	66%	10:00	92	2.5	Med-High	45° Horizontal Bend	28.66	End of Run is at end of installed DI WYE at South side of Maryland Bridge	90.75
190	31233	76.41	58%	0:30	48	1	Low	45° Horizontal Bend	28.79	End of Run is at end of installed DI WYE at South side of Maryland Bridge	90.62
190	31597	77.34	64%	2:30	113	2.5	Med-High	45° Horizontal Bend	29.72	End of Run is at end of installed DI WYE at South side of Maryland Bridge	89.69
190	31653	77.48	64%	11:30	44	1.5	Med-Low	45° Horizontal Bend	29.86	End of Run is at end of installed DI WYE at South side of Maryland Bridge	89.55
190	31770	77.78	66%	9:00	54	2.5	Med-High	45° Horizontal Bend	30.16	End of Run is at end of installed DI WYE	89.25

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
190	31783	77.81	57%	1:30	23	1	Low	45° Horizontal Bend	30.19	End of Run is at end of installed DI WYE at South side of Maryland Bridge	89.22
190	31856	77.99	39%	10:30	101	4	Very High	45° Horizontal Bend	30.37	End of Run is at end of installed DI WYE at South side of Maryland Bridge	89.04
190	31928	78.18	70%	5:30	76	2	Medium	45° Horizontal Bend	30.56	End of Run is at end of installed DI WYE at South side of Maryland Bridge	88.85
190	31938	78.20	56%	0:30	74	2.5	Med-High	45° Horizontal Bend	30.58	End of Run is at end of installed DI WYE at South side of Maryland Bridge	88.83
190	32028	78.43	67%	0:30	29	1	Low	45° Horizontal Bend	30.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	88.60
190	32062	78.52	59%	9:30	66	2.5	Med-High	45° Horizontal Bend	30.90	End of Run is at end of installed DI WYE at South side of Maryland Bridge	88.51
190	32144	78.73	66%	9:30	52	1.5	Med-Low	45° Horizontal Bend	31.11	End of Run is at end of installed DI WYE at South side of Maryland Bridge	88.30
200	32293	79.10	63%	3:00	46	1.5	Med-Low	45° Horizontal Bend	31.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.93
200	32311	79.15	64%	8:30	58	1.5	Med-Low	45° Horizontal Bend	31.53	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.88
200	32352	79.25	35%	10:30	21	2	Medium	45° Horizontal Bend	31.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.78

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
200	32353	79.26	37%	10:30	26	1.5	Med-Low	45° Horizontal Bend	31.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.77
200	32365	79.29	60%	4:30	76	1.5	Med-Low	45° Horizontal Bend	31.67	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.74
200	32418	79.42	35%	10:30	46	3	High	45° Horizontal Bend	31.80	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.61
200	32493	79.61	63%	10:30	117	2.5	Med-High	45° Horizontal Bend	31.99	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.42
200	32547	79.75	45%	4:00	26	2	Medium	45° Horizontal Bend	32.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.28
200	32659	80.03	58%	11:30	52	1.5	Med-Low	45° Horizontal Bend	32.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	87.00
200	32699	80.14	76%	6:30	102	1	Low	45° Horizontal Bend	32.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	86.89
200	32747	80.26	49%	3:00	60	2.5	Med-High	45° Horizontal Bend	32.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	86.77
200	32813	80.43	66%	10:30	115	2	Medium	45° Horizontal Bend	32.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	86.60
200	33187	81.37	49%	10:30	23	2	Medium	45° Horizontal Bend	33.75	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.66
200	33196	81.40	55%	7:30	76	1	Low	45° Horizontal Bend	33.78	End of Run is at end of installed DI WYE	85.63

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
200	33250	81.54	81%	6:00	100	2	Medium	45° Horizontal Bend	33.92	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.50
200	33254	81.55	49%	10:30	66	1.5	Med-Low	45° Horizontal Bend	33.93	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.48
200	33273	81.59	69%	0:30	52	1	Low	45° Horizontal Bend	33.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.44
200	33306	81.68	65%	10:00	14	1	Low	45° Horizontal Bend	34.06	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.35
200	33334	81.75	64%	5:00	18	2	Medium	45° Horizontal Bend	34.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.28
200	33391	81.89	52%	4:30	66	3	High	45° Horizontal Bend	34.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	85.14
200	33464	82.08	64%	4:00	33	2	Medium	45° Horizontal Bend	34.46	End of Run is at end of installed DI WYE at South side of Maryland Bridge	84.95
200	33521	82.22	77%	6:30	94	2.5	Med-High	45° Horizontal Bend	34.60	End of Run is at end of installed DI WYE at South side of Maryland Bridge	84.81
200	33536	82.26	78%	9:30	70	2	Medium	45° Horizontal Bend	34.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	84.77
200	33603	82.43	43%	9:30	25	1	Low	45° Horizontal Bend	34.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	84.60

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
200	33790	82.91	50%	10:00	22	1	Low	45° Horizontal Bend	35.29	End of Run is at end of installed DI WYE at South side of Maryland Bridge	84.12
200	34183	83.90	63%	8:00	62	1.5	Med-Low	45° Horizontal Bend	36.28	End of Run is at end of installed DI WYE at South side of Maryland Bridge	83.13
200	34231	84.03	59%	12:00	60	1	Low	45° Horizontal Bend	36.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	83.00
200	34401	84.46	27%	4:00	170	4	Very High	45° Horizontal Bend	36.84	End of Run is at end of installed DI WYE at South side of Maryland Bridge	82.57
200	34499	84.71	69%	4:30	127	2	Medium	45° Horizontal Bend	37.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	82.32
200	34569	84.89	80%	4:00	50	1.5	Med-Low	45° Horizontal Bend	37.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	82.14
200	34614	85.00	42%	12:00	19	1	Low	45° Horizontal Bend	37.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	82.03
210	34784	85.43	58%	4:30	52	1.5	Med-Low	45° Horizontal Bend	37.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	81.60
210	34792	85.45	70%	9:30	86	1.5	Med-Low	45° Horizontal Bend	37.83	End of Run is at end of installed DI WYE at South side of Maryland Bridge	81.58
210	34994	85.96	61%	5:00	38	2.5	Med-High	45° Horizontal Bend	38.34	End of Run is at end of installed DI WYE at South side of Maryland Bridge	81.07
210	35027	86.05	74%	5:00	54	3	High	45° Horizontal Bend	38.43	End of Run is at end of installed DI WYE	80.98

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
210	35060	86.13	43%	0:30	28	3	High	45° Horizontal Bend	38.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	80.90
210	35105	86.25	48%	5:30	48	3	High	45° Horizontal Bend	38.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	80.78
210	35214	86.52	39%	6:00	24	3	High	45° Horizontal Bend	38.90	End of Run is at end of installed DI WYE at South side of Maryland Bridge	80.51
210	35250	86.62	37%	6:00	18	3	High	45° Horizontal Bend	39.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	80.42
210	35702	87.76	46%	5:00	91	2	Medium	45° Horizontal Bend	40.14	End of Run is at end of installed DI WYE at South side of Maryland Bridge	79.27
210	35747	87.88	80%	8:30	54	1.5	Med-Low	45° Horizontal Bend	40.26	End of Run is at end of installed DI WYE at South side of Maryland Bridge	79.15
210	35799	88.01	58%	2:00	38	1	Low	45° Horizontal Bend	40.39	End of Run is at end of installed DI WYE at South side of Maryland Bridge	79.02
210	35817	88.06	78%	8:30	113	1.5	Med-Low	45° Horizontal Bend	40.44	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.97
210	35867	88.18	55%	2:30	23	1	Low	45° Horizontal Bend	40.56	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.85
210	35894	88.25	50%	1:00	26	1.5	Med-Low	45° Horizontal Bend	40.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.78

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
210	35914	88.30	46%	3:30	22	2	Medium	45° Horizontal Bend	40.68	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.73
210	35964	88.43	56%	9:30	50	3	High	45° Horizontal Bend	40.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.60
210	36009	88.54	35%	11:30	117	1	Low	45° Horizontal Bend	40.92	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.49
210	36036	88.61	28%	9:00	81	3	High	45° Horizontal Bend	40.99	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.42
210	36092	88.75	43%	5:30	22	3	High	45° Horizontal Bend	41.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.28
210	36135	88.86	63%	5:30	52	1	Low	45° Horizontal Bend	41.24	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.17
210	36140	88.88	74%	12:00	74	1.5	Med-Low	45° Horizontal Bend	41.26	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.15
210	36184	88.99	46%	9:00	24	3	High	45° Horizontal Bend	41.37	End of Run is at end of installed DI WYE at South side of Maryland Bridge	78.04
210	36225	89.09	39%	9:00	40	3	High	45° Horizontal Bend	41.47	End of Run is at end of installed DI WYE at South side of Maryland Bridge	77.94
210	36241	89.13	65%	2:00	64	1.5	Med-Low	45° Horizontal Bend	41.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	77.90
210	36263	89.19	66%	12:00	36	1.5	Med-Low	45° Horizontal Bend	41.57	End of Run is at end of installed DI WYE	77.84

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
210	36288	89.25	84%	9:00	120	1.5	Med-Low	45° Horizontal Bend	41.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	77.78
210	36440	89.64	31%	7:30	52	3	High	45° Horizontal Bend	42.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	77.39
210	36567	89.96	53%	6:30	88	3	High	45° Horizontal Bend	42.34	End of Run is at end of installed DI WYE at South side of Maryland Bridge	77.07
210	36644	90.16	47%	6:00	26	3	High	45° Horizontal Bend	42.54	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.87
210	36646	90.16	47%	9:00	50	3	High	45° Horizontal Bend	42.54	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.87
210	36745	90.41	74%	9:00	52	2	Medium	45° Horizontal Bend	42.79	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.62
210	36812	90.58	54%	7:30	76	3	High	45° Horizontal Bend	42.96	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.45
210	36877	90.75	26%	6:00	48	3	High	45° Horizontal Bend	43.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.28
210	36904	90.82	57%	9:30	82	1.5	Med-Low	45° Horizontal Bend	43.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.21
210	36935	90.89	48%	5:30	70	3	High	45° Horizontal Bend	43.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.14

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
210	36985	91.02	60%	7:30	92	2	Medium	45° Horizontal Bend	43.40	End of Run is at end of installed DI WYE at South side of Maryland Bridge	76.01
210	37034	91.15	50%	5:00	21	2.5	Med-High	45° Horizontal Bend	43.53	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.88
210	37099	91.31	67%	5:00	90	3	High	45° Horizontal Bend	43.69	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.72
220	37236	91.66	78%	8:30	41	2	Medium	45° Horizontal Bend	44.04	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.37
220	37268	91.74	35%	4:00	26	1	Low	45° Horizontal Bend	44.12	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.29
220	37338	91.92	59%	4:30	60	2.5	Med-High	45° Horizontal Bend	44.30	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.11
220	37382	92.03	61%	6:30	44	2	Medium	45° Horizontal Bend	44.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	75.00
220	37527	92.40	74%	6:30	119	3	High	45° Horizontal Bend	44.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	74.63
220	37690	92.81	56%	5:00	28	2	Medium	45° Horizontal Bend	45.19	End of Run is at end of installed DI WYE at South side of Maryland Bridge	74.22
220	37786	93.06	67%	5:00	123	3	High	45° Horizontal Bend	45.44	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.97
220	37810	93.12	64%	9:00	46	2	Medium	45° Horizontal Bend	45.50	End of Run is at end of installed DI WYE	73.91

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
220	37953	93.48	61%	0:30	94	2	Medium	45° Horizontal Bend	45.86	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.55
220	37959	93.50	59%	9:00	62	2.5	Med-High	45° Horizontal Bend	45.88	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.53
220	37998	93.59	31%	5:30	25	3	High	45° Horizontal Bend	45.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.44
220	38071	93.78	67%	5:00	33	1	Low	45° Horizontal Bend	46.16	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.25
220	38089	93.83	50%	8:00	64	1.5	Med-Low	45° Horizontal Bend	46.21	End of Run is at end of installed DI WYE at South side of Maryland Bridge	73.20
220	38207	94.13	69%	6:30	86	1	Low	45° Horizontal Bend	46.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.90
220	38269	94.28	56%	8:30	52	2	Medium	45° Horizontal Bend	46.66	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.75
220	38346	94.48	38%	11:00	127	3	High	45° Horizontal Bend	46.86	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.55
220	38379	94.56	45%	4:30	62	3	High	45° Horizontal Bend	46.94	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.47
220	38411	94.64	63%	8:30	66	3	High	45° Horizontal Bend	47.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.39

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
220	38429	94.69	68%	2:00	48	1.5	Med-Low	45° Horizontal Bend	47.07	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.34
220	38480	94.82	47%	9:00	88	3	High	45° Horizontal Bend	47.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	72.21
220	38571	95.05	56%	12:00	28	1	Low	45° Horizontal Bend	47.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	71.98
220	38622	95.18	70%	11:30	86	2	Medium	45° Horizontal Bend	47.56	End of Run is at end of installed DI WYE at South side of Maryland Bridge	71.85
220	38782	95.59	59%	5:00	44	1	Low	45° Horizontal Bend	47.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	71.44
220	39128	96.47	63%	0:30	121	3	High	45° Horizontal Bend	48.85	End of Run is at end of installed DI WYE at South side of Maryland Bridge	70.56
220	39205	96.66	42%	9:00	23	3	High	45° Horizontal Bend	49.04	End of Run is at end of installed DI WYE at South side of Maryland Bridge	70.37
220	39258	96.80	54%	5:00	64	1	Low	45° Horizontal Bend	49.18	End of Run is at end of installed DI WYE at South side of Maryland Bridge	70.23
220	39340	97.00	34%	9:30	28	2.5	Med-High	45° Horizontal Bend	49.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	70.03
220	39375	97.09	54%	1:00	54	2	Medium	45° Horizontal Bend	49.47	End of Run is at end of installed DI WYE at South side of Maryland Bridge	69.94
220	39375	97.09	54%	7:00	42	2.5	Med-High	45° Horizontal Bend	49.47	End of Run is at end of installed DI WYE	69.94

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
220	39409	97.18	59%	9:00	78	2.5	Med-High	45° Horizontal Bend	49.56	End of Run is at end of installed DI WYE at South side of Maryland Bridge	69.85
230	39681	97.87	49%	10:30	60	2.5	Med-High	45° Horizontal Bend	50.25	End of Run is at end of installed DI WYE at South side of Maryland Bridge	69.16
230	39685	97.88	34%	5:00	64	3	High	45° Horizontal Bend	50.26	End of Run is at end of installed DI WYE at South side of Maryland Bridge	69.15
230	39799	98.17	51%	12:00	97	3	High	45° Horizontal Bend	50.55	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.86
230	39802	98.18	44%	3:00	97	3	High	45° Horizontal Bend	50.56	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.85
230	39858	98.32	76%	1:30	35	1	Low	45° Horizontal Bend	50.70	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.71
230	39877	98.37	61%	7:30	20	1	Low	45° Horizontal Bend	50.75	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.66
230	39987	98.65	41%	9:30	58	2.5	Med-High	45° Horizontal Bend	51.03	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.38
230	40045	98.79	59%	11:00	27	1.5	Med-Low	45° Horizontal Bend	51.17	End of Run is at end of installed DI WYE at South side of Maryland Bridge	68.24
230	40176	99.13	71%	3:30	17	1.5	Med-Low	45° Horizontal Bend	51.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.90

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
230	40181	99.14	73%	10:00	46	1	Low	45° Horizontal Bend	51.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.89
230	40324	99.50	70%	4:30	98	2.5	Med-High	45° Horizontal Bend	51.88	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.53
230	40350	99.57	63%	7:30	60	3	High	45° Horizontal Bend	51.95	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.46
230	40447	99.82	41%	9:00	32	2.5	Med-High	45° Horizontal Bend	52.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.21
230	40465	99.86	66%	12:00	36	1	Low	45° Horizontal Bend	52.24	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.17
230	40512	99.98	40%	11:30	32	2	Medium	45° Horizontal Bend	52.36	End of Run is at end of installed DI WYE at South side of Maryland Bridge	67.05
230	40594	100.19	73%	10:00	70	1	Low	45° Horizontal Bend	52.57	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.84
230	40752	100.59	62%	12:00	101	2	Medium	45° Horizontal Bend	52.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.44
230	40795	100.70	57%	8:00	22	1.5	Med-Low	45° Horizontal Bend	53.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.33
230	40828	100.78	59%	9:00	48	1	Low	45° Horizontal Bend	53.16	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.25
230	40838	100.81	81%	1:00	120	2	Medium	45° Horizontal Bend	53.19	End of Run is at end of installed DI WYE	66.22

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
230	40872	100.89	74%	2:00	37	1.5	Med-Low	45° Horizontal Bend	53.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.14
230	40876	100.91	64%	1:30	60	1	Low	45° Horizontal Bend	53.29	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.12
230	40895	100.95	73%	4:30	76	2	Medium	45° Horizontal Bend	53.33	End of Run is at end of installed DI WYE at South side of Maryland Bridge	66.08
230	41067	101.39	53%	0:30	82	2.5	Med-High	45° Horizontal Bend	53.77	End of Run is at end of installed DI WYE at South side of Maryland Bridge	65.64
230	41193	101.71	57%	0:30	84	3	High	45° Horizontal Bend	54.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	65.32
230	41314	102.02	59%	8:00	56	2	Medium	45° Horizontal Bend	54.40	End of Run is at end of installed DI WYE at South side of Maryland Bridge	65.01
230	41512	102.52	83%	10:30	118	1	Low	45° Horizontal Bend	54.90	End of Run is at end of installed DI WYE at South side of Maryland Bridge	64.51
230	41584	102.70	46%	8:00	58	3	High	45° Horizontal Bend	55.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	64.33
230	41586	102.71	47%	0:30	26	1.5	Med-Low	45° Horizontal Bend	55.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	64.32
230	41628	102.82	79%	12:00	29	1	Low	45° Horizontal Bend	55.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	64.21

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
230	41732	103.08	54%	0:30	84	2	Medium	45° Horizontal Bend	55.46	End of Run is at end of installed DI WYE at South side of Maryland Bridge	63.95
230	41860	103.40	83%	0:30	118	1	Low	45° Horizontal Bend	55.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	63.63
240	42146	104.13	40%	7:30	109	2.5	Med-High	45° Horizontal Bend	56.51	End of Run is at end of installed DI WYE at South side of Maryland Bridge	62.90
240	42191	104.25	70%	12:00	104	3	High	45° Horizontal Bend	56.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	62.78
240	42446	104.89	66%	6:30	92	2.5	Med-High	45° Horizontal Bend	57.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	62.14
240	42459	104.93	50%	1:00	22	2	Medium	45° Horizontal Bend	57.31	End of Run is at end of installed DI WYE at South side of Maryland Bridge	62.10
240	42514	105.07	64%	0:30	109	2	Medium	45° Horizontal Bend	57.45	End of Run is at end of installed DI WYE at South side of Maryland Bridge	61.96
240	42791	105.77	63%	0:30	125	2.5	Med-High	45° Horizontal Bend	58.15	End of Run is at end of installed DI WYE at South side of Maryland Bridge	61.26
240	42919	106.09	49%	0:30	68	3	High	45° Horizontal Bend	58.47	End of Run is at end of installed DI WYE at South side of Maryland Bridge	60.94
240	43082	106.51	72%	5:00	92	1.5	Med-Low	45° Horizontal Bend	58.89	End of Run is at end of installed DI WYE at South side of Maryland Bridge	60.52
240	43370	107.24	67%	1:30	147	2.5	Med-High	45° Horizontal Bend	59.62	End of Run is at end of installed DI WYE	59.79

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
240	43455	107.46	77%	1:30	41	1	Low	45° Horizontal Bend	59.84	End of Run is at end of installed DI WYE at South side of Maryland Bridge	59.57
240	43489	107.54	56%	11:30	46	2	Medium	45° Horizontal Bend	59.92	End of Run is at end of installed DI WYE at South side of Maryland Bridge	59.49
240	43519	107.62	75%	7:00	50	1	Low	45° Horizontal Bend	60.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	59.41
240	43777	108.27	72%	6:30	127	3	High	45° Horizontal Bend	60.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	58.76
240	43955	108.73	54%	0:30	113	1.5	Med-Low	45° Horizontal Bend	61.11	End of Run is at end of installed DI WYE at South side of Maryland Bridge	58.30
240	43981	108.79	67%	5:30	60	3	High	45° Horizontal Bend	61.17	End of Run is at end of installed DI WYE at South side of Maryland Bridge	58.24
240	44082	109.05	64%	5:30	21	2	Medium	45° Horizontal Bend	61.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	57.98
240	44126	109.16	60%	0:30	52	1	Low	45° Horizontal Bend	61.54	End of Run is at end of installed DI WYE at South side of Maryland Bridge	57.87
240	44328	109.67	56%	11:30	84	1	Low	45° Horizontal Bend	62.05	End of Run is at end of installed DI WYE at South side of Maryland Bridge	57.36
240	44359	109.75	58%	4:00	44	1	Low	45° Horizontal Bend	62.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	57.28

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
250	44553	110.24	65%	1:30	84	2	Medium	45° Horizontal Bend	62.62	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.79
250	44643	110.47	42%	11:30	115	1.5	Med-Low	45° Horizontal Bend	62.85	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.56
250	44736	110.71	65%	8:30	101	3	High	45° Horizontal Bend	63.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.32
250	44801	110.87	68%	1:00	60	2	Medium	45° Horizontal Bend	63.25	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.16
250	44852	111.00	67%	8:00	46	2	Medium	45° Horizontal Bend	63.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.03
250	44863	111.03	67%	0:30	101	2	Medium	45° Horizontal Bend	63.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	56.00
250	44935	111.21	37%	12:00	72	3	High	45° Horizontal Bend	63.59	End of Run is at end of installed DI WYE at South side of Maryland Bridge	55.82
250	45018	111.43	64%	0:30	135	3	High	45° Horizontal Bend	63.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	55.60
250	45096	111.62	72%	5:30	19	1.5	Med-Low	45° Horizontal Bend	64.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	55.41
250	45271	112.07	72%	7:00	121	2.5	Med-High	45° Horizontal Bend	64.45	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.96
250	45280	112.09	87%	1:00	152	2.5	Med-High	45° Horizontal Bend	64.47	End of Run is at end of installed DI WYE	54.94

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
250	45361	112.30	72%	1:00	78	2	Medium	45° Horizontal Bend	64.68	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.73
250	45518	112.70	63%	7:00	121	3	High	45° Horizontal Bend	65.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.33
250	45585	112.87	66%	1:30	37	1.5	Med-Low	45° Horizontal Bend	65.25	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.16
250	45585	112.87	74%	10:00	27	1.5	Med-Low	45° Horizontal Bend	65.25	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.16
250	45648	113.03	51%	7:00	68	3	High	45° Horizontal Bend	65.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	54.00
250	45666	113.07	57%	1:00	105	3	High	45° Horizontal Bend	65.45	End of Run is at end of installed DI WYE at South side of Maryland Bridge	53.96
250	45758	113.31	62%	7:30	54	1	Low	45° Horizontal Bend	65.69	End of Run is at end of installed DI WYE at South side of Maryland Bridge	53.72
250	45779	113.36	55%	11:00	74	2.5	Med-High	45° Horizontal Bend	65.74	End of Run is at end of installed DI WYE at South side of Maryland Bridge	53.67
250	45926	113.73	67%	10:30	96	2.5	Med-High	45° Horizontal Bend	66.11	End of Run is at end of installed DI WYE at South side of Maryland Bridge	53.30
250	45945	113.78	73%	5:30	62	2.5	Med-High	45° Horizontal Bend	66.16	End of Run is at end of installed DI WYE at South side of Maryland Bridge	53.25

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
250	46052	114.05	79%	0:30	90	2.5	Med-High	45° Horizontal Bend	66.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	52.98
250	46069	114.10	67%	4:00	36	1.5	Med-Low	45° Horizontal Bend	66.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	52.93
250	46300	114.68	75%	11:00	78	2	Medium	45° Horizontal Bend	67.06	End of Run is at end of installed DI WYE at South side of Maryland Bridge	52.35
250	46414	114.97	68%	11:30	92	2.5	Med-High	45° Horizontal Bend	67.35	End of Run is at end of installed DI WYE at South side of Maryland Bridge	52.06
260	47222	117.02	73%	10:30	102	2.5	Med-High	45° Horizontal Bend	69.40	End of Run is at end of installed DI WYE at South side of Maryland Bridge	50.01
260	47319	117.27	71%	6:00	100	3	High	45° Horizontal Bend	69.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	49.76
260	47851	118.62	73%	10:00	80	3	High	45° Horizontal Bend	71.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	48.41
260	48285	119.72	62%	10:30	107	2	Medium	45° Horizontal Bend	72.10	End of Run is at end of installed DI WYE at South side of Maryland Bridge	47.31
260	48690	120.75	72%	5:30	107	2.5	Med-High	45° Horizontal Bend	73.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	46.28
260	49237	122.14	92%	8:30	128	1	Low	45° Horizontal Bend	74.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	44.89
260	49451	122.69	61%	5:30	84	3	High	45° Horizontal Bend	75.07	End of Run is at end of installed DI WYE	44.34

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
270	49643	123.17	66%	3:00	27	1	Low	45° Horizontal Bend	75.55	End of Run is at end of installed DI WYE at South side of Maryland Bridge	43.86
270	49988	124.05	76%	6:00	151	2.5	Med-High	45° Horizontal Bend	76.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	42.98
270	50600	125.60	58%	1:30	123	2.5	Med-High	45° Horizontal Bend	77.98	End of Run is at end of installed DI WYE at South side of Maryland Bridge	41.43
270	50767	126.03	87%	8:00	136	2	Medium	45° Horizontal Bend	78.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	41.00
270	50923	126.42	64%	7:00	36	1	Low	45° Horizontal Bend	78.80	End of Run is at end of installed DI WYE at South side of Maryland Bridge	40.61
270	51008	126.64	62%	6:00	44	2	Medium	45° Horizontal Bend	79.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	40.39
270	51168	127.05	72%	1:30	54	1	Low	45° Horizontal Bend	79.43	End of Run is at end of installed DI WYE at South side of Maryland Bridge	39.98
270	51658	128.29	81%	1:30	179	2.5	Med-High	45° Horizontal Bend	80.67	End of Run is at end of installed DI WYE at South side of Maryland Bridge	38.74
270	51774	128.59	50%	5:00	72	2.5	Med-High	45° Horizontal Bend	80.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	38.44
270	51993	129.14	77%	3:00	62	2	Medium	45° Horizontal Bend	81.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	37.89

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
280	52324	129.98	60%	6:30	31	2.5	Med-High	45° Horizontal Bend	82.36	End of Run is at end of installed DI WYE at South side of Maryland Bridge	37.05
280	52419	130.22	51%	5:00	58	2.5	Med-High	45° Horizontal Bend	82.60	End of Run is at end of installed DI WYE at South side of Maryland Bridge	36.81
280	53088	131.92	62%	8:30	50	2.5	Med-High	45° Horizontal Bend	84.30	End of Run is at end of installed DI WYE at South side of Maryland Bridge	35.11
280	53149	132.08	59%	3:00	52	2	Medium	45° Horizontal Bend	84.46	End of Run is at end of installed DI WYE at South side of Maryland Bridge	34.95
280	53253	132.34	67%	5:00	27	1.5	Med-Low	45° Horizontal Bend	84.72	End of Run is at end of installed DI WYE at South side of Maryland Bridge	34.69
280	53316	132.50	61%	6:00	18	1.5	Med-Low	45° Horizontal Bend	84.88	End of Run is at end of installed DI WYE at South side of Maryland Bridge	34.53
280	53376	132.66	68%	4:30	101	3	High	45° Horizontal Bend	85.04	End of Run is at end of installed DI WYE at South side of Maryland Bridge	34.37
280	53578	133.17	59%	4:00	123	3	High	45° Horizontal Bend	85.55	End of Run is at end of installed DI WYE at South side of Maryland Bridge	33.86
280	53671	133.40	79%	5:00	37	2	Medium	45° Horizontal Bend	85.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	33.63
280	54373	135.19	41%	6:00	72	2	Medium	45° Horizontal Bend	87.57	End of Run is at end of installed DI WYE at South side of Maryland Bridge	31.84
290	54724	136.08	73%	5:00	119	3	High	45° Horizontal Bend	88.46	End of Run is at end of installed DI WYE	30.95

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
290	54861	136.43	52%	5:00	82	3	High	45° Horizontal Bend	88.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	30.60
290	55044	136.89	67%	5:00	52	1.5	Med-Low	45° Horizontal Bend	89.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	30.14
290	55143	137.14	59%	5:30	139	3	High	45° Horizontal Bend	89.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	29.89
290	55221	137.34	72%	5:00	165	3	High	45° Horizontal Bend	89.72	End of Run is at end of installed DI WYE at South side of Maryland Bridge	29.69
290	55353	137.68	77%	5:30	68	3	High	45° Horizontal Bend	90.06	End of Run is at end of installed DI WYE at South side of Maryland Bridge	29.35
290	55526	138.12	63%	5:00	62	2.5	Med-High	45° Horizontal Bend	90.50	End of Run is at end of installed DI WYE at South side of Maryland Bridge	28.91
290	55639	138.40	78%	5:30	96	2.5	Med-High	45° Horizontal Bend	90.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	28.63
290	55758	138.71	48%	5:00	70	2	Medium	45° Horizontal Bend	91.09	End of Run is at end of installed DI WYE at South side of Maryland Bridge	28.32
290	56112	139.60	47%	5:00	115	2.5	Med-High	45° Horizontal Bend	91.98	End of Run is at end of installed DI WYE at South side of Maryland Bridge	27.43
290	56220	139.88	37%	4:30	25	2.5	Med-High	45° Horizontal Bend	92.26	End of Run is at end of installed DI WYE at South side of Maryland Bridge	27.15

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
290	56386	140.30	59%	3:30	135	2.5	Med-High	45° Horizontal Bend	92.68	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.73
290	56466	140.50	66%	4:30	56	2	Medium	45° Horizontal Bend	92.88	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.53
290	56517	140.63	36%	0:30	25	2.5	Med-High	45° Horizontal Bend	93.01	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.40
290	56533	140.67	63%	4:00	76	2.5	Med-High	45° Horizontal Bend	93.05	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.36
290	56590	140.82	40%	0:30	72	3	High	45° Horizontal Bend	93.20	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.21
290	56617	140.89	73%	4:00	94	3	High	45° Horizontal Bend	93.27	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.14
290	56641	140.95	48%	0:30	156	3	High	45° Horizontal Bend	93.33	End of Run is at end of installed DI WYE at South side of Maryland Bridge	26.08
290	56805	141.36	22%	0:30	160	4	Very High	45° Horizontal Bend	93.74	End of Run is at end of installed DI WYE at South side of Maryland Bridge	25.67
290	56825	141.42	82%	6:00	207	2	Medium	45° Horizontal Bend	93.80	End of Run is at end of installed DI WYE at South side of Maryland Bridge	25.61
290	56895	141.59	26%	0:30	89	3	High	45° Horizontal Bend	93.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	25.44
290	56955	141.75	32%	9:30	28	1.5	Med-Low	45° Horizontal Bend	94.13	End of Run is at end of installed DI WYE	25.28

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
290	56998	141.85	38%	0:30	144	4	Very High	45° Horizontal Bend	94.23	End of Run is at end of installed DI WYE at South side of Maryland Bridge	25.18
300	57488	143.10	76%	4:00	86	2	Medium	45° Horizontal Bend	95.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.93
300	57535	143.22	54%	8:00	60	1.5	Med-Low	45° Horizontal Bend	95.60	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.81
300	57596	143.37	62%	7:30	44	1.5	Med-Low	45° Horizontal Bend	95.75	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.66
300	57624	143.44	36%	5:30	42	1.5	Med-Low	45° Horizontal Bend	95.82	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.59
300	57673	143.57	42%	0:30	121	3	High	45° Horizontal Bend	95.95	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.46
300	57841	144.00	67%	1:30	98	3	High	45° Horizontal Bend	96.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	23.03
300	57899	144.14	75%	1:30	27	1.5	Med-Low	45° Horizontal Bend	96.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.89
300	57919	144.19	72%	9:30	66	3	High	45° Horizontal Bend	96.57	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.84
300	57947	144.27	48%	12:00	58	3	High	45° Horizontal Bend	96.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.76

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
300	57999	144.40	62%	10:30	133	2.5	Med-High	45° Horizontal Bend	96.78	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.63
300	58010	144.43	42%	7:30	20	2	Medium	45° Horizontal Bend	96.81	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.60
300	58075	144.59	44%	9:30	72	3	High	45° Horizontal Bend	96.97	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.44
300	58099	144.65	65%	7:00	60	2.5	Med-High	45° Horizontal Bend	97.03	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.38
300	58202	144.91	25%	9:30	81	3	High	45° Horizontal Bend	97.29	End of Run is at end of installed DI WYE at South side of Maryland Bridge	22.12
300	58276	145.10	46%	9:30	42	2.5	Med-High	45° Horizontal Bend	97.48	End of Run is at end of installed DI WYE at South side of Maryland Bridge	21.93
300	58566	145.84	72%	3:30	86	1.5	Med-Low	45° Horizontal Bend	98.22	End of Run is at end of installed DI WYE at South side of Maryland Bridge	21.19
300	58784	146.39	4%	7:30	56	3	High	45° Horizontal Bend	98.77	End of Run is at end of installed DI WYE at South side of Maryland Bridge	20.64
300	59276	147.64	42%	8:00	40	3	High	45° Horizontal Bend	100.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	19.39
300	59296	147.69	47%	10:00	64	3	High	45° Horizontal Bend	100.07	End of Run is at end of installed DI WYE at South side of Maryland Bridge	19.34
300	59330	147.78	36%	8:00	64	3	High	45° Horizontal Bend	100.16	End of Run is at end of installed DI WYE	19.25

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
300	59353	147.84	63%	10:30	72	3	High	45° Horizontal Bend	100.22	End of Run is at end of installed DI WYE at South side of Maryland Bridge	19.19
300	59409	147.98	14%	8:00	40	3	High	45° Horizontal Bend	100.36	End of Run is at end of installed DI WYE at South side of Maryland Bridge	19.05
300	59442	148.06	26%	6:30	56	3	High	45° Horizontal Bend	100.44	End of Run is at end of installed DI WYE at South side of Maryland Bridge	18.97
310	59706	148.73	78%	8:30	143	1	Low	45° Horizontal Bend	101.11	End of Run is at end of installed DI WYE at South side of Maryland Bridge	18.30
310	59799	148.97	74%	7:00	174	1	Low	45° Horizontal Bend	101.35	End of Run is at end of installed DI WYE at South side of Maryland Bridge	18.06
310	59866	149.14	78%	7:00	125	2	Medium	45° Horizontal Bend	101.52	End of Run is at end of installed DI WYE at South side of Maryland Bridge	17.89
310	60310	150.27	65%	9:00	76	2	Medium	45° Horizontal Bend	102.65	End of Run is at end of installed DI WYE at South side of Maryland Bridge	16.76
310	60531	150.83	68%	8:30	48	1	Low	45° Horizontal Bend	103.21	End of Run is at end of installed DI WYE at South side of Maryland Bridge	16.20
310	60613	151.04	72%	8:30	119	2.5	Med-High	45° Horizontal Bend	103.42	End of Run is at end of installed DI WYE at South side of Maryland Bridge	15.99
310	60850	151.64	80%	2:30	129	2	Medium	45° Horizontal Bend	104.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	15.39

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
310	60872	151.69	78%	9:00	159	2	Medium	45° Horizontal Bend	104.07	End of Run is at end of installed DI WYE at South side of Maryland Bridge	15.34
310	61051	152.15	84%	3:30	185	1.5	Med-Low	45° Horizontal Bend	104.53	End of Run is at end of installed DI WYE at South side of Maryland Bridge	14.88
310	61386	153.00	59%	4:30	153	2	Medium	45° Horizontal Bend	105.38	End of Run is at end of installed DI WYE at South side of Maryland Bridge	14.03
310	61844	154.16	78%	7:00	62	1	Low	45° Horizontal Bend	106.54	End of Run is at end of installed DI WYE at South side of Maryland Bridge	12.87
320	62190	155.04	69%	10:00	117	2	Medium	45° Horizontal Bend	107.42	End of Run is at end of installed DI WYE at South side of Maryland Bridge	11.99
320	62206	155.08	69%	6:00	54	1	Low	45° Horizontal Bend	107.46	End of Run is at end of installed DI WYE at South side of Maryland Bridge	11.95
320	62252	155.20	59%	8:00	68	1	Low	45° Horizontal Bend	107.58	End of Run is at end of installed DI WYE at South side of Maryland Bridge	11.83
320	62425	155.64	83%	6:00	152	2	Medium	45° Horizontal Bend	108.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	11.39
320	62592	156.06	79%	4:30	70	2	Medium	45° Horizontal Bend	108.44	End of Run is at end of installed DI WYE at South side of Maryland Bridge	10.97
320	62664	156.25	67%	3:00	36	1	Low	45° Horizontal Bend	108.63	End of Run is at end of installed DI WYE at South side of Maryland Bridge	10.78
320	62748	156.46	63%	7:30	101	3	High	45° Horizontal Bend	108.84	End of Run is at end of installed DI WYE	10.57

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
320	62877	156.79	70%	7:00	94	1.5	Med-Low	45° Horizontal Bend	109.17	End of Run is at end of installed DI WYE at South side of Maryland Bridge	10.24
320	62957	156.99	65%	11:00	92	2	Medium	45° Horizontal Bend	109.37	End of Run is at end of installed DI WYE at South side of Maryland Bridge	10.04
320	63009	157.12	53%	10:00	42	1	Low	45° Horizontal Bend	109.50	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.91
320	63023	157.16	63%	4:00	109	3	High	45° Horizontal Bend	109.54	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.87
320	63072	157.28	88%	11:00	193	2.5	Med-High	45° Horizontal Bend	109.66	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.75
320	63108	157.37	62%	4:00	68	1	Low	45° Horizontal Bend	109.75	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.66
320	63206	157.62	84%	8:00	120	1	Low	45° Horizontal Bend	110.00	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.41
320	63277	157.80	63%	3:30	92	2	Medium	45° Horizontal Bend	110.18	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.23
320	63364	158.02	61%	8:00	78	2.5	Med-High	45° Horizontal Bend	110.40	End of Run is at end of installed DI WYE at South side of Maryland Bridge	9.01
320	63435	158.20	84%	7:00	124	2	Medium	45° Horizontal Bend	110.58	End of Run is at end of installed DI WYE at South side of Maryland Bridge	8.83

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
320	63850	159.26	70%	3:00	147	1.5	Med-Low	45° Horizontal Bend	111.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	7.77
330	64276	160.34	82%	12:00	187	2	Medium	45° Horizontal Bend	112.72	End of Run is at end of installed DI WYE at South side of Maryland Bridge	6.69
330	64368	160.57	81%	0:30	173	2.5	Med-High	45° Horizontal Bend	112.95	End of Run is at end of installed DI WYE at South side of Maryland Bridge	6.46
330	64513	160.94	64%	4:00	92	2	Medium	45° Horizontal Bend	113.32	End of Run is at end of installed DI WYE at South side of Maryland Bridge	6.09
330	64662	161.32	62%	10:00	107	3	High	45° Horizontal Bend	113.70	End of Run is at end of installed DI WYE at South side of Maryland Bridge	5.71
330	64774	161.61	85%	10:00	203	2	Medium	45° Horizontal Bend	113.99	End of Run is at end of installed DI WYE at South side of Maryland Bridge	5.42
330	64804	161.68	64%	2:30	117	3	High	45° Horizontal Bend	114.06	End of Run is at end of installed DI WYE at South side of Maryland Bridge	5.35
330	64914	161.96	87%	4:00	177	2.5	Med-High	45° Horizontal Bend	114.34	End of Run is at end of installed DI WYE at South side of Maryland Bridge	5.07
330	64956	162.07	63%	8:30	60	2	Medium	45° Horizontal Bend	114.45	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.96
330	65032	162.26	57%	3:30	42	2	Medium	45° Horizontal Bend	114.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.77
330	65082	162.39	75%	9:00	94	2.5	Med-High	45° Horizontal Bend	114.77	End of Run is at end of installed DI WYE	4.64

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
										at South side of Maryland Bridge	
330	65118	162.48	63%	1:00	27	2	Medium	45° Horizontal Bend	114.86	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.55
330	65179	162.63	71%	1:00	102	1.5	Med-Low	45° Horizontal Bend	115.01	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.40
330	65199	162.69	83%	7:00	185	2	Medium	45° Horizontal Bend	115.07	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.34
330	65205	162.70	65%	11:00	92	1	Low	45° Horizontal Bend	115.08	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.33
330	65288	162.91	55%	9:00	74	2	Medium	45° Horizontal Bend	115.29	End of Run is at end of installed DI WYE at South side of Maryland Bridge	4.12
330	65406	163.21	77%	2:00	70	1.5	Med-Low	45° Horizontal Bend	115.59	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.82
330	65498	163.44	75%	10:00	135	2.5	Med-High	45° Horizontal Bend	115.82	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.59
330	65532	163.53	57%	3:30	107	3	High	45° Horizontal Bend	115.91	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.50
330	65576	163.64	64%	11:00	68	1	Low	45° Horizontal Bend	116.02	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.39
330	65620	163.75	60%	7:00	68	2	Medium	45° Horizontal Bend	116.13	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.28

Table 4: Anomaly Reference Distances – 250mm (10in) Maryland Bridge Watermain Assiniboine River Crossing

\* Signal Quality Index are based on signal strength and correlation with calibration defect signatures.  
 \*\* Distances to Nearest Upstream and Downstream Features are measured from the downstream joint of the feature.

In Pipe #	Data Index	Defect Location [m] (measured from launch)	Defect Remaining Wall	Clock Position*	Axial Length (mm)	Signal Quality Index**	Confidence Level	Nearest Upstream Feature	Distance to Nearest U/S Feature (m)	Nearest Downstream Feature	Distance to Nearest D/S Feature (m)
330	65627	163.77	60%	3:00	36	2	Medium	45° Horizontal Bend	116.15	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.26
330	65668	163.88	68%	11:00	76	1	Low	45° Horizontal Bend	116.26	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.15
330	65728	164.03	80%	4:00	172	2.5	Med-High	45° Horizontal Bend	116.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.00
330	65728	164.03	80%	4:00	172	2.5	Med-High	45° Horizontal Bend	116.41	End of Run is at end of installed DI WYE at South side of Maryland Bridge	3.00
330	65876	164.41	78%	3:30	31	1	Low	45° Horizontal Bend	116.79	End of Run is at end of installed DI WYE at South side of Maryland Bridge	2.62
330	65893	164.45	82%	11:00	112	3	High	45° Horizontal Bend	116.83	End of Run is at end of installed DI WYE at South side of Maryland Bridge	2.58
330	65909	164.49	84%	1:00	110	2	Medium	45° Horizontal Bend	116.87	End of Run is at end of installed DI WYE at South side of Maryland Bridge	2.54
330	66231	165.31	50%	1:30	42	1	Low	45° Horizontal Bend	117.69	End of Run is at end of installed DI WYE at South side of Maryland Bridge	1.72
340	66605	166.26	74%	2:00	78	1	Low	45° Horizontal Bend	118.64	End of Run is at end of installed DI WYE at South side of Maryland Bridge	0.77

## Disclaimer - PICA Corporation

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### Scope of Services

The agreement of PICA Corp to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of PICA Corp based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. PICA Corp is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by PICA Corp. Nothing contained in this Agreement shall create a contractual relationship with or cause of action in favor of a third party against either the Line Owner or PICA Corp. In no event shall PICA Corp's liability in respect of the services referred to herein exceed the amount paid for such services.

### Standard of Care

In performing the services provided, PICA Corp uses the degree, care, and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by PICA Corp.