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BEND
OREGON
1905

CITY OF BEND

Collection System Master Plan

CITY PROJECT NO. SW12AA

VOLUME 5 OF 6

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VOLUME 1 OF 6

CITY OF BEND—COLLECTION SYSTEM MASTER PLAN
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June 20, 2013
July 11, 2013
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I/I Analysis Methods

Preliminary Flow Monitoring Data and I/I Analysis

Inflow/Infiltration Methods

I/I Definitions

Infiltration/inflow (I/I) consists of storm water and groundwater which enters the sewer system through pipe defects and improper storm drainage connections, defined as follows:

Inflow

Definition: Storm water inflow (SWI) is defined as water discharged into the sewer system, including private sewer laterals, from direction connections such as downspouts, yard and area drains, holes in manhole covers, cross connections from storm drains, or catch basins.

Impact: This component of I/I creates a **peak** flow problem in the sewer system and, together with RDI (explained below) dictates the required capacity of downstream pipes and transport facilities to carry these peak instantaneous flows. Because the response and magnitude of inflow is tied closely to the intensity of the storm event, the short-term peak instantaneous flows may result in surcharging and overflows within a collection system. Severe inflow may result in sewage dilution, resulting in upsetting the biological treatment (secondary treatment) at the treatment facility.

Cost of Source Identification and Removal: Compared to infiltration sources, SWI locations are usually less difficult to find and usually less expensive to correct. These sources include direct and indirect cross connections with storm drainage systems, roof downspouts, and various types of surface drains. Generally, the costs to identify and remove sources of SWI are low compared to potential benefits to public health and safety, or the costs of new facilities to transport the resulting peak flows.

Graphical Identification: Inflow is usually recognized graphically by large magnitude, short duration spikes immediately following a rain event.

Infiltration

Definition: Infiltration is defined as water entering the sanitary sewer system through defective pipes, pipe joints, and manhole walls, and may include cracks, offset joints, root intrusion points, and broken pipes.

Impact: Infiltration typically creates long-term annual **volumetric** problems, the major impact being the cost of pumping and treating the additional volume of water, of paying for treatment (for municipalities that are billed strictly on flow volume).

Cost of Source Detection and Removal: Infiltration sources are usually harder to find and more expensive to correct than inflow sources. Infiltration sources include defect in deteriorated sewer pipes and/or manholes, and may include cracks, offset joints, root intrusion points, and broken pipes. The sources may be wide-spread throughout a sanitary sewer system.

Graphical Identification: Infiltration is often recognized graphically by a gradual increase in flow after a wet weather event. The increased flow typically sustains for a period after rainfall has stopped and then gradually drops off as soils become less saturated, and as groundwater levels recede to normal levels. (Exception: RRI will graphically look more like SWI than infiltration.)

Infiltration can be further subdivided into components as follows:

- **Groundwater Infiltration** – Groundwater infiltration (GWI) depends on the depth of the groundwater table above the pipelines as well as the percentage of the system submerged. The variation on groundwater levels and subsequent GWI are seasonal in nature. On a day-to-day basis, GWI rates are steady and will not fluctuate greatly.
- **Rainfall Dependant Infiltration (RDI)** – This component occurs as a result of storm water and enters the sewer system through pipe defects similar to GWI, but due to rapid response, affects the system by contributing to **peak** flows as well as to the **total I/I volume**. This component may be further categorized as being rainfall-responsive or rainfall-related.
  - **Rainfall responsive infiltration (RRI)** is storm water which enters the collection system indirectly through pipe defects, but normally in sewers constructed close to the ground surface such as private laterals. RRI is independent of the groundwater table, and reaches defective sewers via the pipe trench in which the sewer is constructed, particularly if the pipe is placed in impermeable soil and bedded and backfilled with a granular material. In this case, the pipe trench serves as a conduit similar to a French drain, conveying storm drainage to defective joints and other openings in the system. Note: this type of infiltration can have a very quick response and graphically can look very similar to SWI.
  - **Rainfall related infiltration** is storm water that first percolates directly into the soil and then migrates to an infiltration point. Typically, the time of concentration for rainfall related infiltration may be 24 hours or longer, but depends on the soil permeability and saturation level.

Figure A-1 illustrates the possible locations and components of I/I.

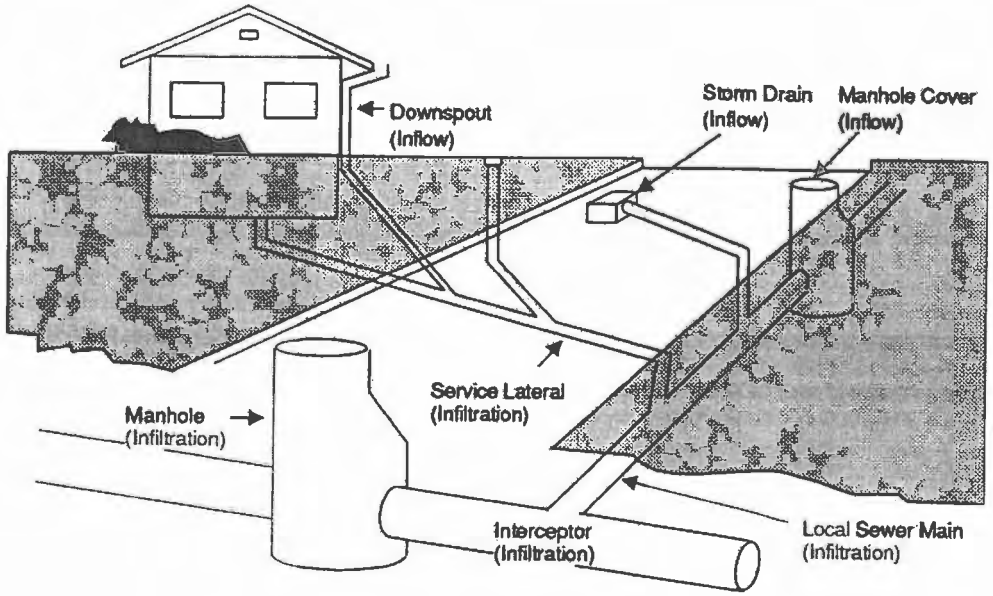

Figure A-1. Infiltration / Inflow Locations and Components

Graphical Identification of I/I Components

Figure A-2 shows sample graphs indicating the typical graphical response patterns for inflow and infiltration.

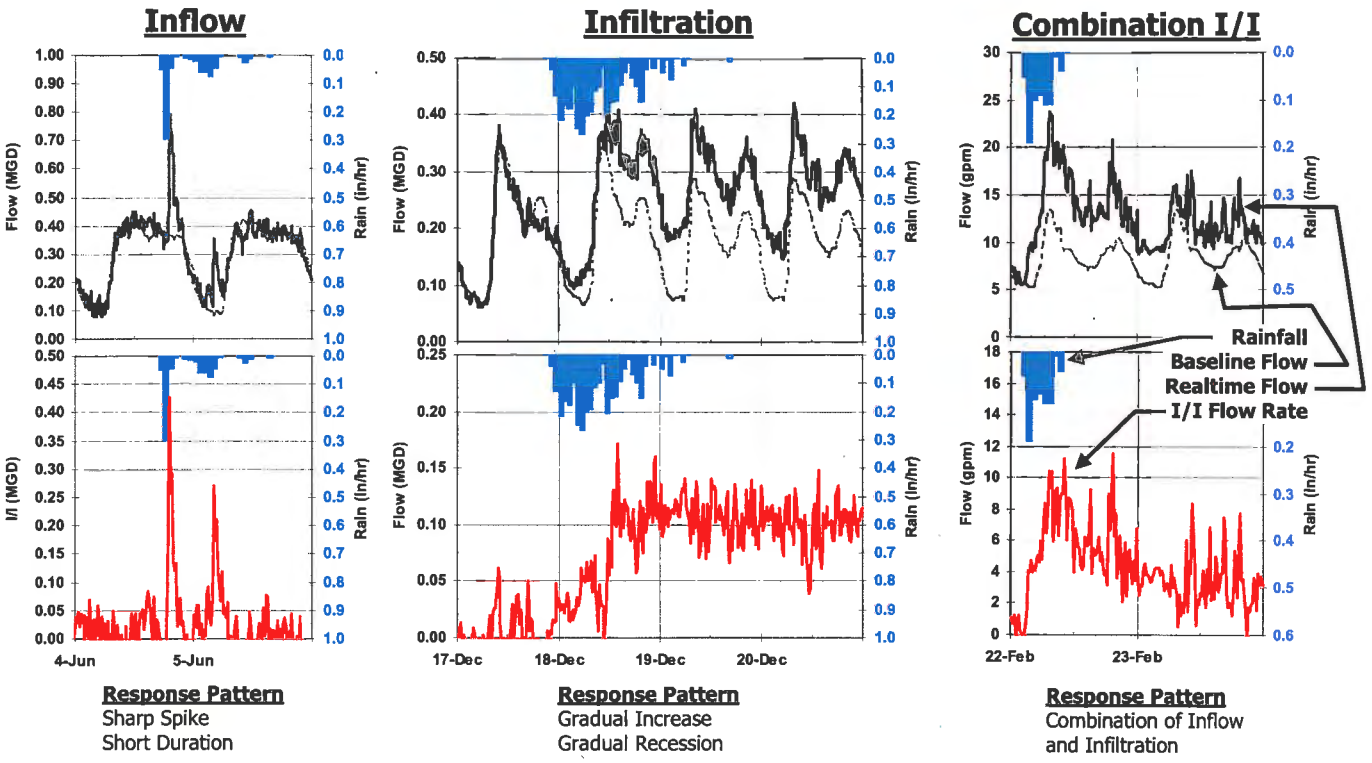

Figure A-2. Infiltration/Inflow Graphical Response Patterns

I/I Analysis Techniques

After differentiating I/I flows from baseline flows, various calculations can be made to determine which I/I component is more prevalent at a particular site, and to compare the relative magnitude of the I/I components between drainage basins and between storm events, summarized as follows:

Infiltration Indicators

R-Value: Knowing the acreages of each basin and total I/I attributable to a storm event, the percentage of rainfall that permeates into each basin can be calculated and is called the R-Value. The R-Value method provides a means to compare the relative magnitude and severity of total I/I volume between different basins and different storm events. Systems with R-Values less than 5%[1] are often considered to be performing well and this criterion will be used for this study. Because the infiltration component is usually more predominant than the inflow component on a **totalized I/I volume** flow basis, R-Value is listed as an indicator of infiltration.

Inflow Indicators

Peaking Factor: Peaking Factor is defined as the Peak Wet Weather Flow divided by the Average Dry Weather Flow. Peaking factors can be used to determine the magnitude of the inflow component of I/I within a particular basin. It is more of an instantaneous measurement, therefore it should be noted and considered when a peaking factor is calculated from an addition or subtraction of flows, and is not directly monitored at a flow monitoring site. A peaking factor threshold value of 3.0 is commonly used for sanitary sewer design.

Peak I/I Rate to ADWF Ratio: Since the Peaking Factor is based on the peak measured flow which *includes* the baseline flow levels, depending on the time of the day that the storm event hits, the true I/I levels may not be accurately reflected in the Peaking Factor calculation[2]. It can be useful to also look at the Peak I/I to ADWF ratio.

Figure A-3 shows a sample I/I graph that illustrates and summarizes the I/I response and I/I calculations made per site per storm event.

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[1] Keefe, P.N. "Test Basins for I/I Reduction and SSO Elimination", 1998, WEF Wet Weather Specialty Conference, Cleveland

[2] For example, identical storms which yield a peak I/I rate of 1.0 MGD and occur at 3:00 a.m. in Scenario A, and 9:00 a.m. in Scenario B, will yield the same result using the Peak I/I Rate to ADWF Ratio calculation, but will yield much different results using the Peaking Factor calculation.

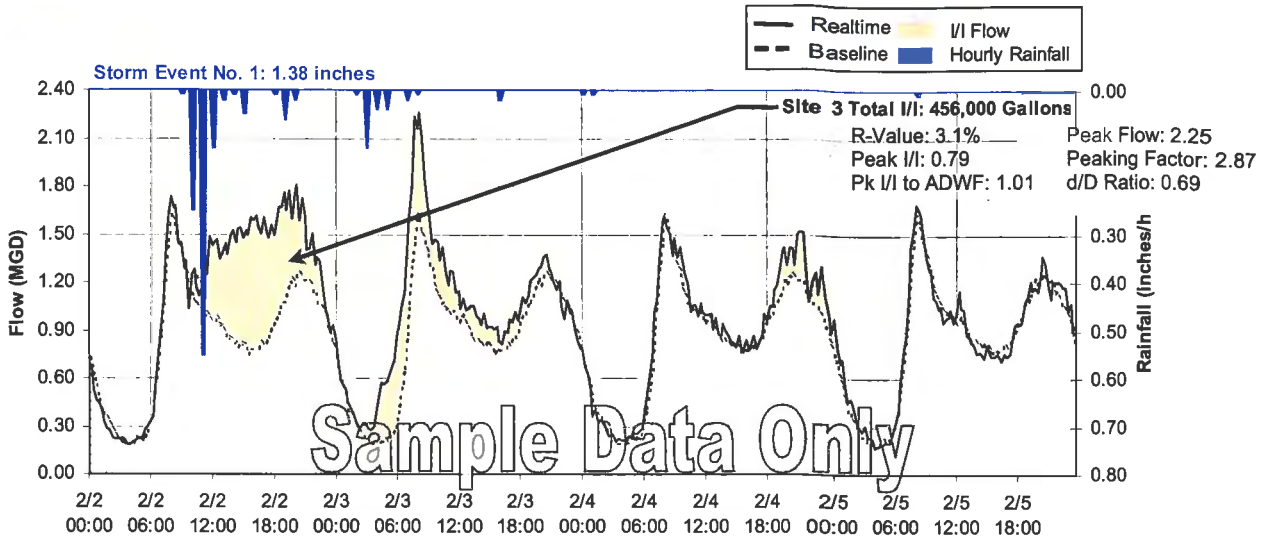


Figure A-3. Sample I/I Flow Graph

WET WEATHER FLOW AND I/I RESULTS

Table A-1 summarizes the I/I data collected from Storm Event No. 2, from June 4 to June 7, 2007. Figure A-4 summarizes the I/I results graphically. Please note: the values shown are for the entire basins upstream from the flow monitoring site. For example, the basin defined by Site 1 included the entire City of Bend flow, not the Basin 1 flows. Segregation of basins analysis has not been completed to date. All data is considered preliminary.

Table A-1. Basin I/I Summary

Complete Basin Upstream from Monitoring Site	ADWF (MGD)	Infiltration Indicators		Inflow Indicators		
		Total I/I (Gallons)	R-Value (%)	Peak Flow (MGD)	Peaking Factor	Peak I/I (MGD)
Site 1	5.65	332,000	0.07%	9.61	1.70	2.69
Site 2	0.94	98,000	0.15%	1.68	1.79	0.47
Site 3	3.68	244,000	0.08%	6.19	1.69	1.78
Site 4	0.61	53,000	0.12%	1.10	1.79	0.37
Site 5	0.37	102,000	0.49%	1.17	3.15	0.74
Site 6	1.43	106,000	0.07%	2.82	1.97	1.08
Site 7	0.11	8,000	0.10%	0.23	2.14	0.09
Site 8	0.62	41,000	0.05%	1.27	2.06	0.56
Site 9	0.45	61,000	0.08%	0.91	2.01	0.39
Site 10	0.29	46,000	0.40%	0.79	2.72	0.42
Site 11	0.65	124,000	0.14%	1.44	2.23	0.65
Site 12	0.47	50,000	0.07%	1.48	3.15	0.88
Site 13	0.17	60,000	0.22%	0.88	5.24	0.64
Site 14	0.54	62,000	0.15%	0.94	1.74	0.26
Site 15	0.73	165,000	0.19%	1.82	2.50	0.95

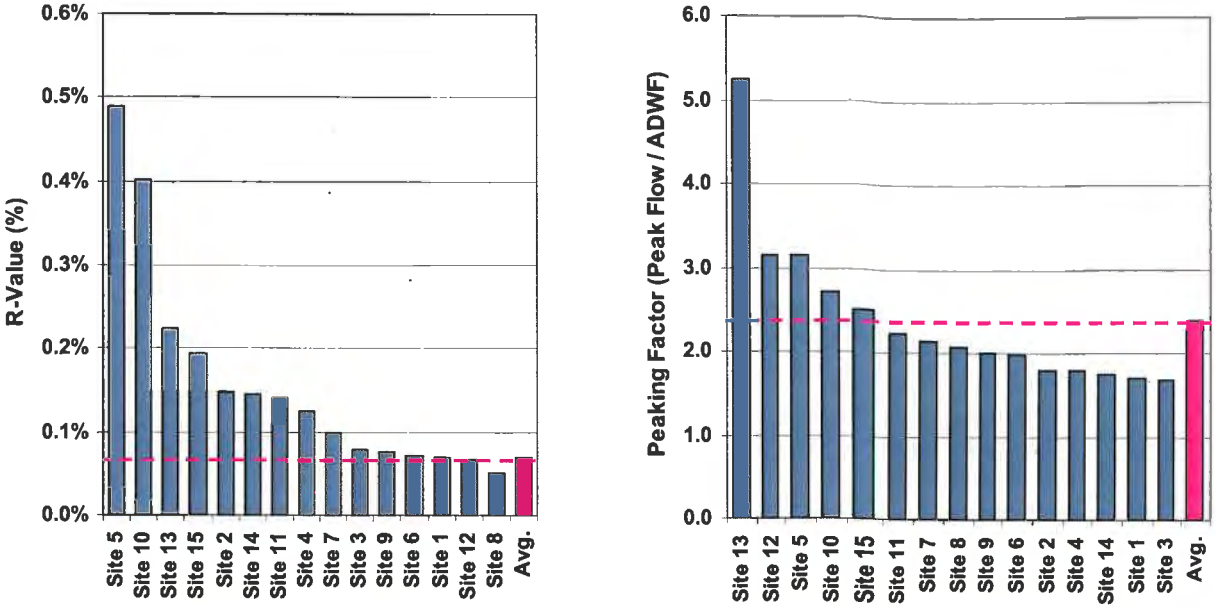


Figure A-11. Temperature Map of R-Value

Table A-2. Basin Ranking Summary (1 = Highest I/I, 15 = Lowest I/I)

Site	Infiltration Ranking	Inflow Ranking	Combined Ranking
Site 1	13	14	15
Site 2	5	11	6
Site 3	10	15	14
Site 4	8	12	10
Site 5	1	3	1
Site 6	12	10	12
Site 7	9	7	6
Site 8	15	8	13
Site 9	11	9	10
Site 10	2	4	3
Site 11	7	6	5
Site 12	14	2	6
Site 13	3	1	1
Site 14	6	13	9
Site 15	4	5	4

Site Information Report

Monitoring Site: Site 1

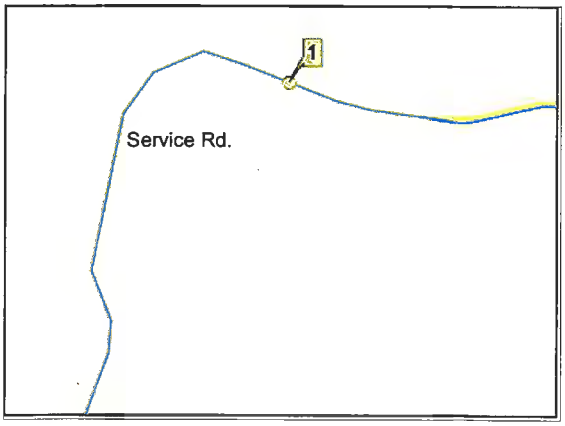
Location:

Diameter: 42 inches

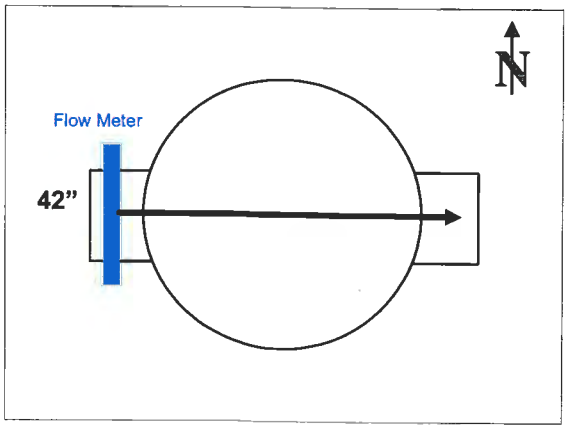
Average Dry Weather Flow: 5.647 *MGD*

Peak Measured Flow: 9.798 *MGD*

Sanitary sewer map:



Flow sketch:



Street-level photo:

Plan view photo:

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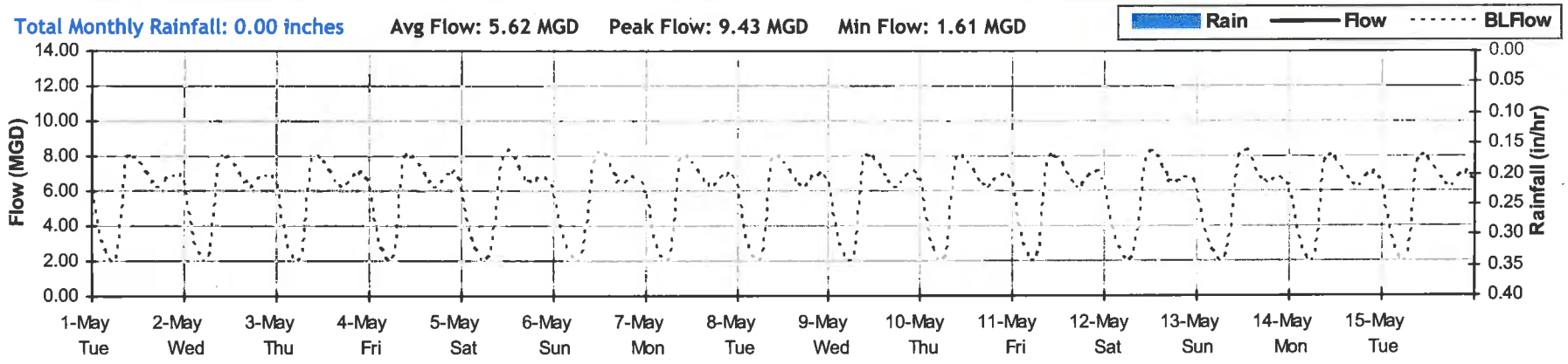
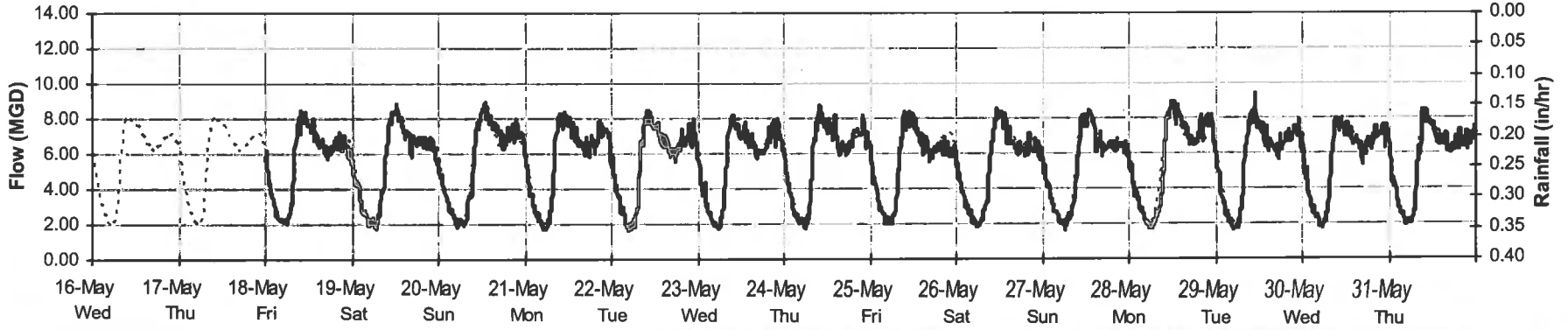
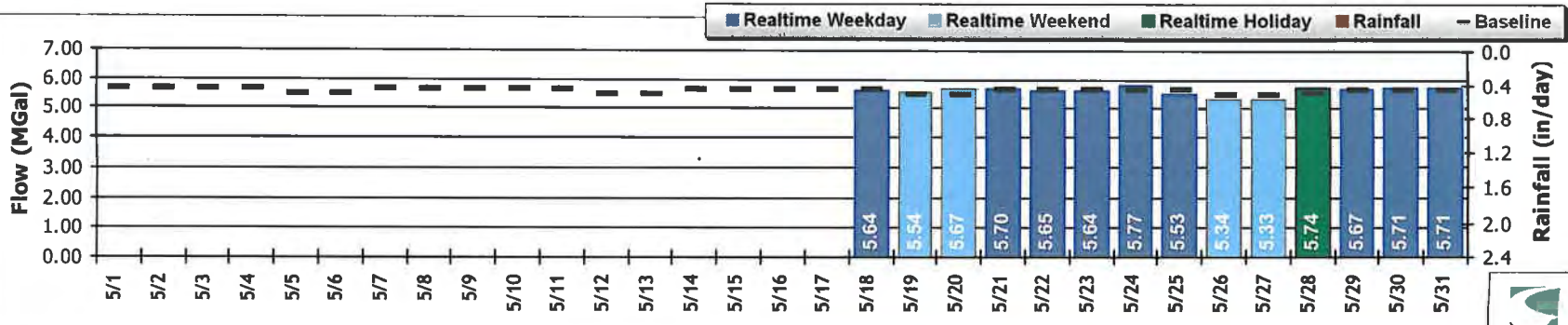
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 1

Total Monthly Rainfall: 0.00 inches Avg Flow: 5.62 MGD Peak Flow: 9.43 MGD Min Flow: 1.61 MGD







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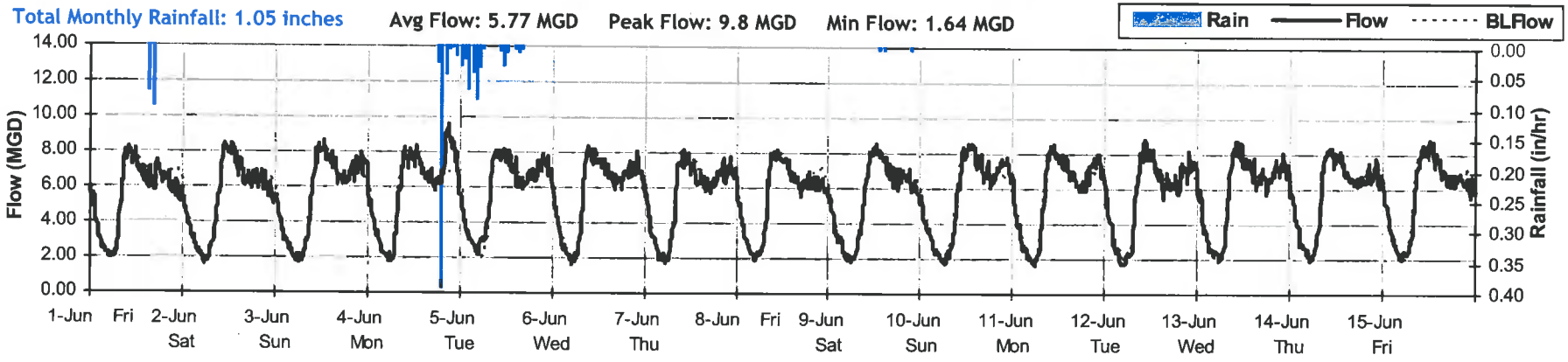
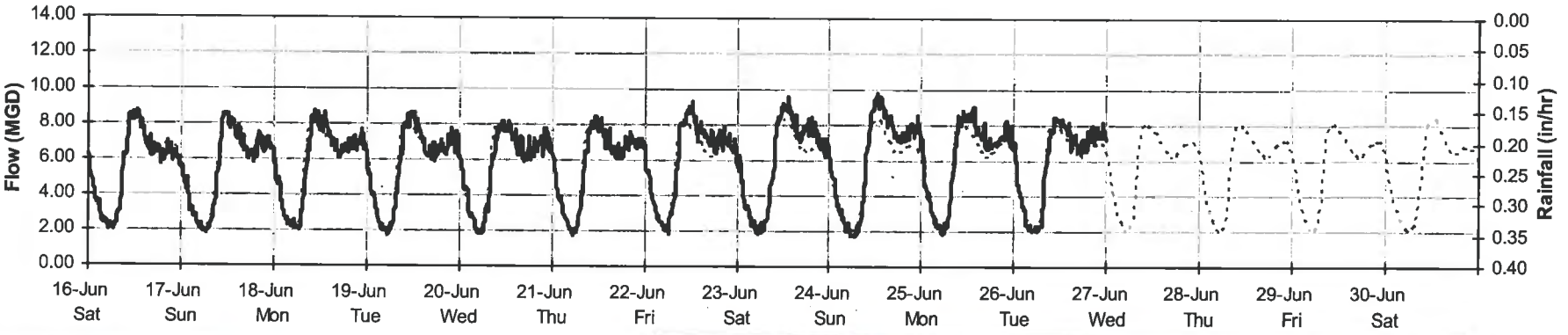
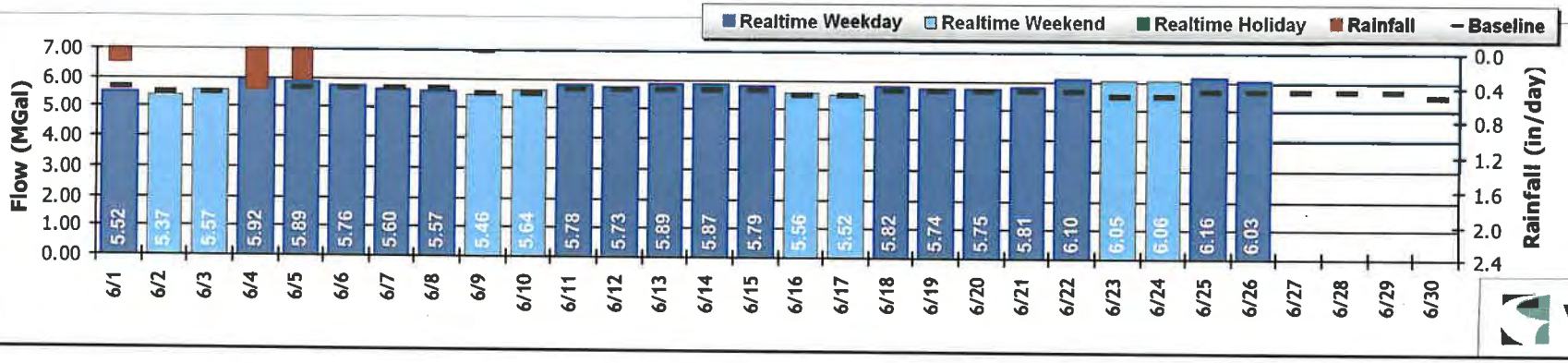
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 1

Total Monthly Rainfall: 1.05 inches Avg Flow: 5.77 MGD Peak Flow: 9.8 MGD Min Flow: 1.64 MGD







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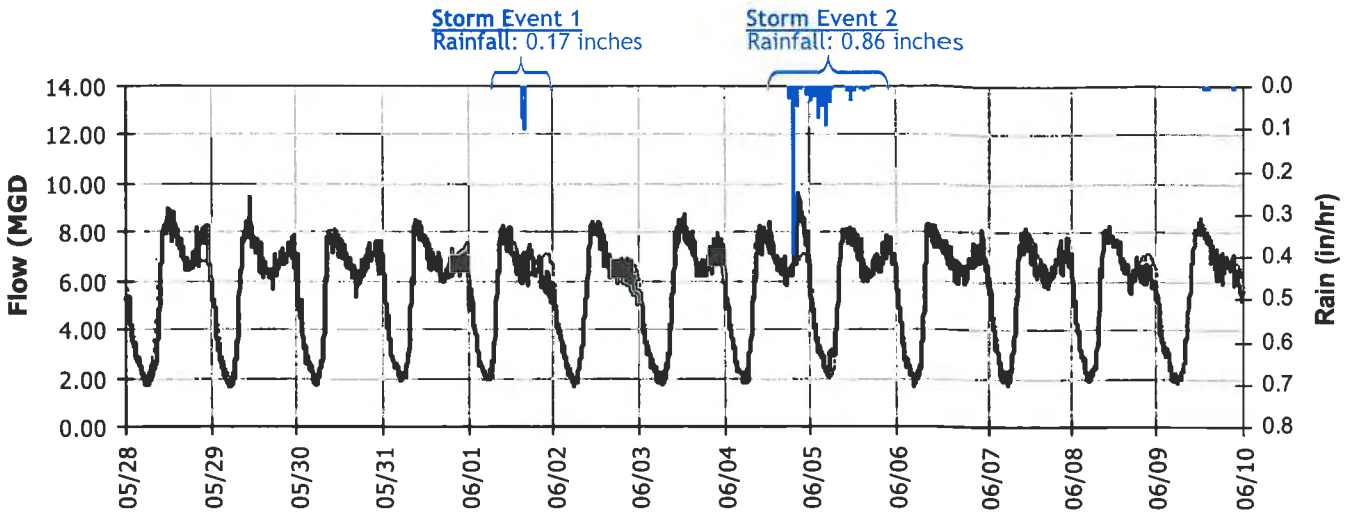
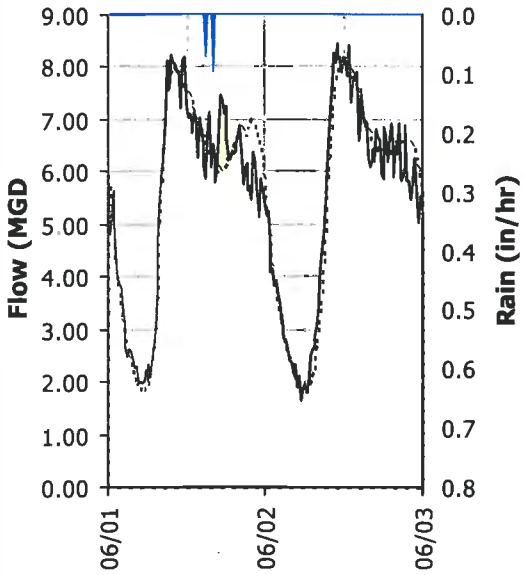
I/I Summary

Monitoring Site:
Site 1

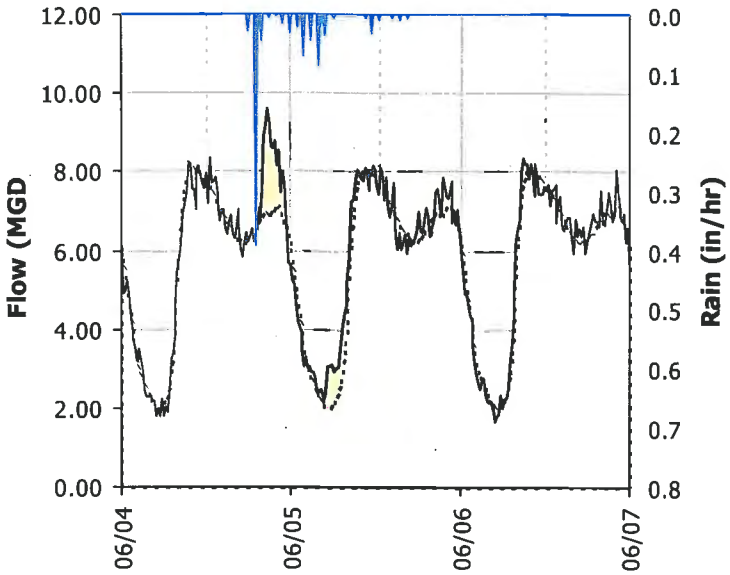
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.17	*inches*
Peak Flow:	7.48	*MGD*
Peak I/I Rate:	1.28	*MGD*
PF:	1.33	
Pk I/I:ADWF:	0.23	
Peak Level:	14.52	*inches*
d/D Ratio:	0.35	
Total I/I:	63,000	*gallons*
RE1 R-Value:	0.1%	

Storm Event #2 I/I Analysis

Rainfall:	0.86	*inches*
Peak Flow:	9.61	*MGD*
Peak I/I Rate:	2.69	*MGD*
PF:	1.70	
Pk I/I:ADWF:	0.48	
Peak Level:	17.29	*inches*
d/D Ratio:	0.41	
Total I/I:	332,000	*gallons*
RE2 R-Value:	0.1%	

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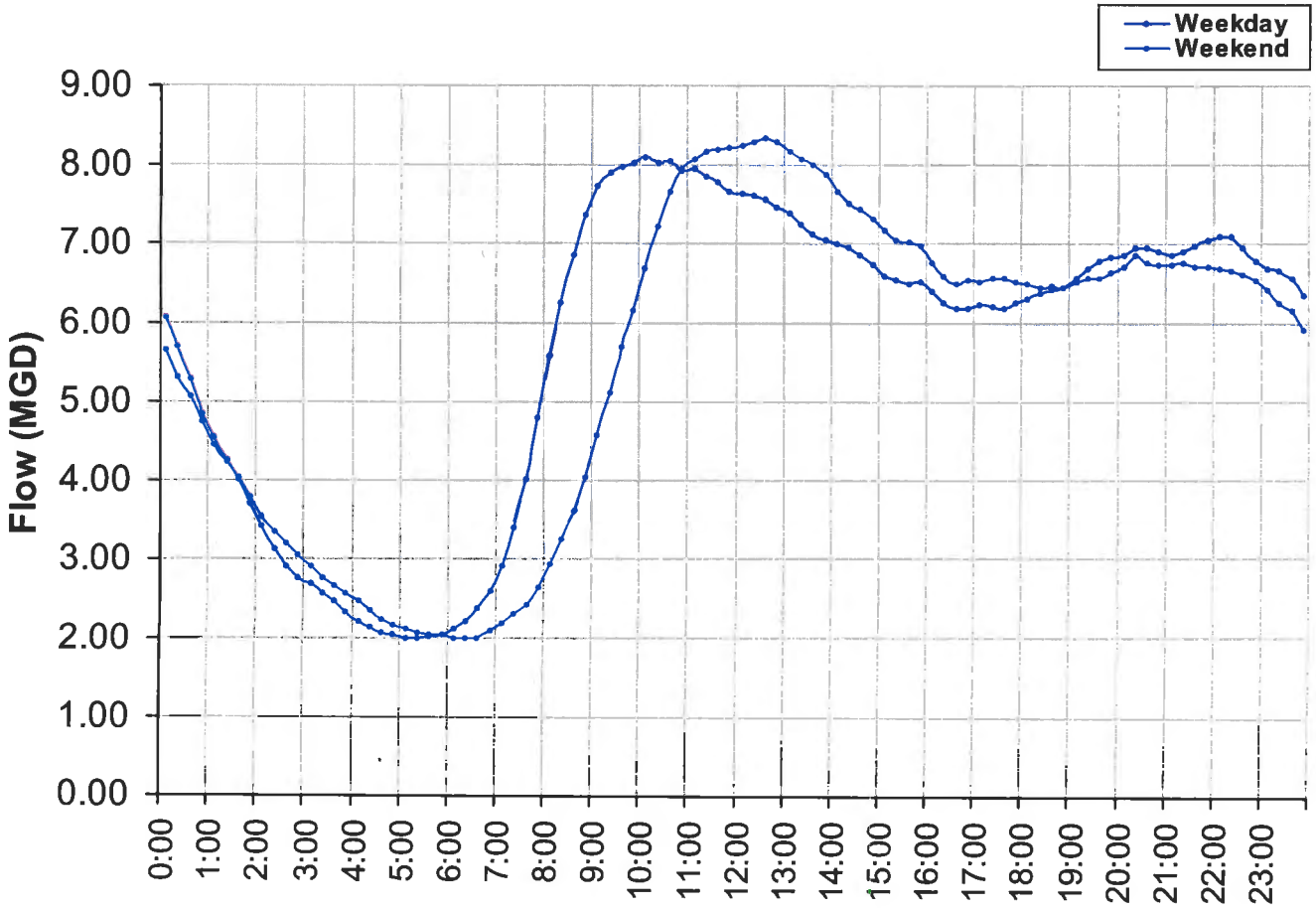
Average Dry Weather Flow

Monitoring Site:
Site 1



Average Dry Weather Flow:
5.65 *MGD*

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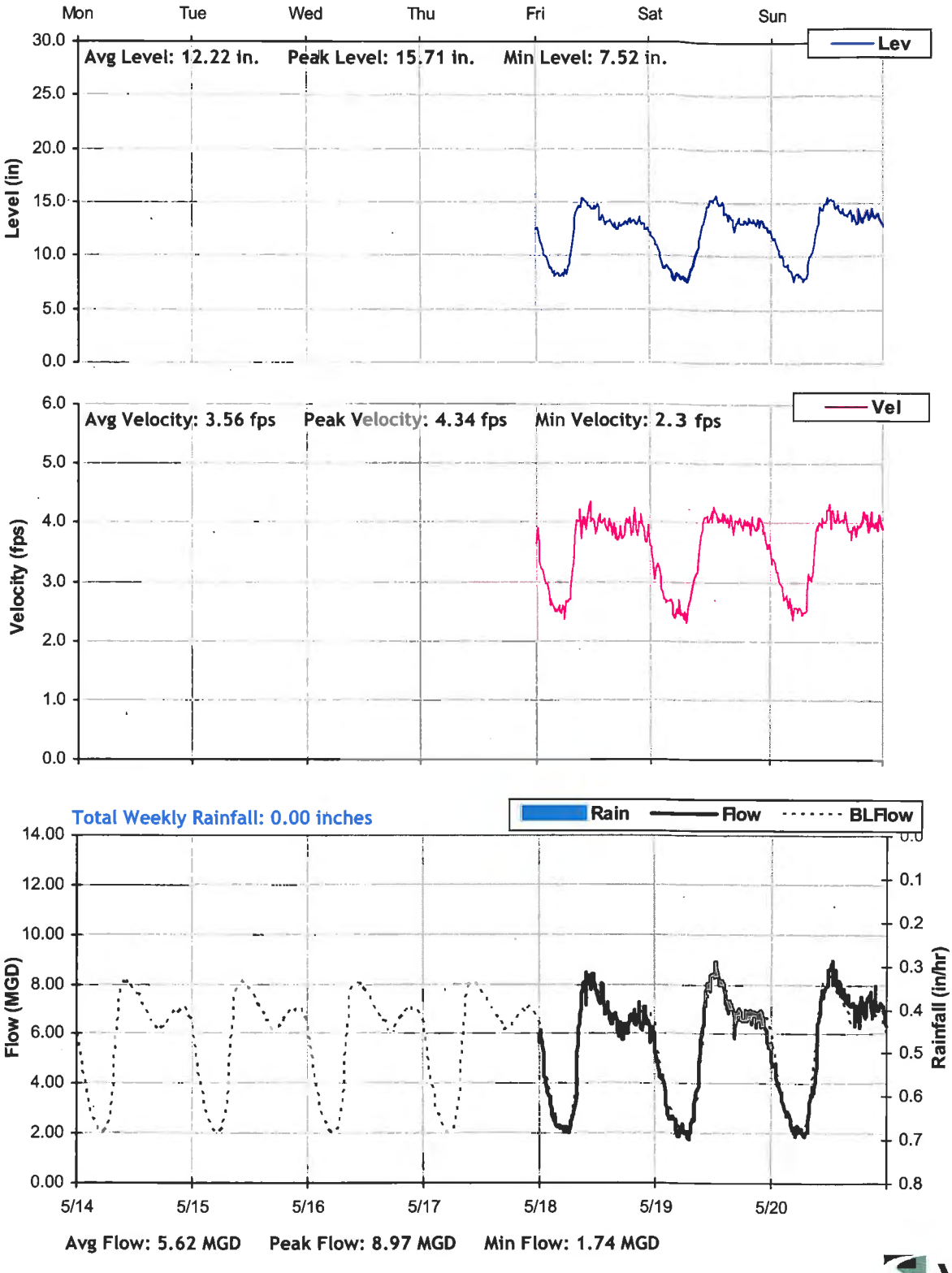
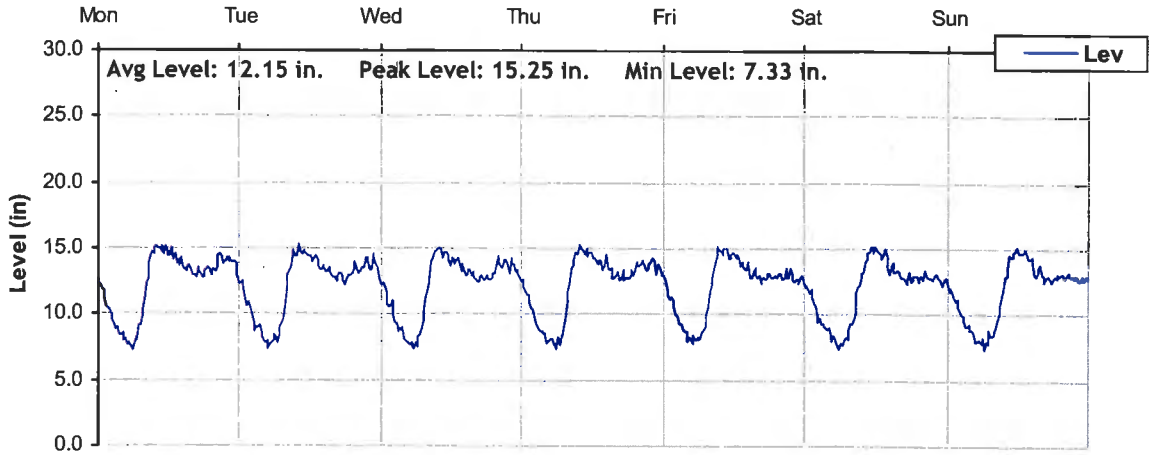
Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

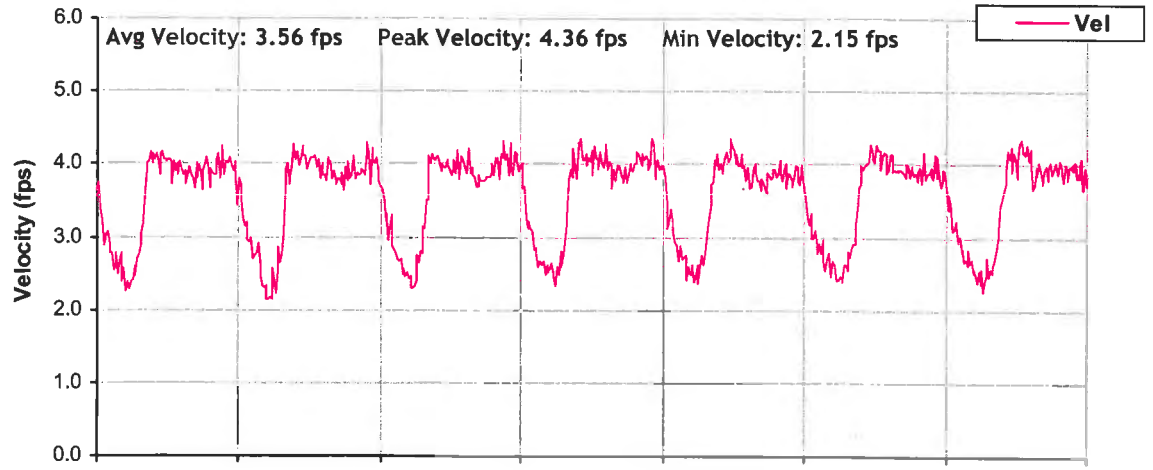
Monitoring Site:
Site 1

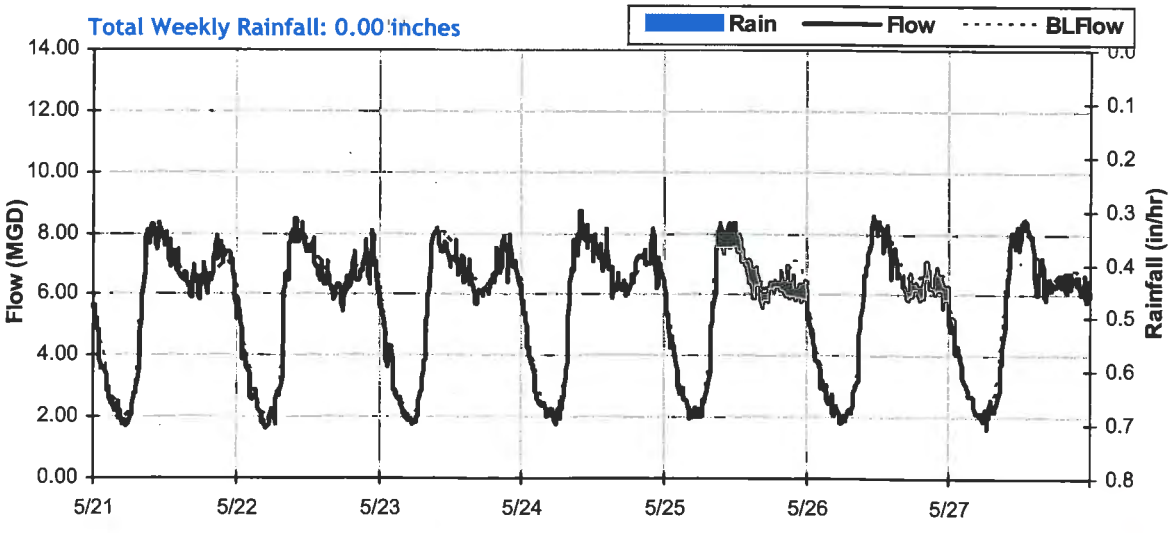


Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 1







Avg Flow: 5.57 MGD Peak Flow: 8.75 MGD Min Flow: 1.61 MGD

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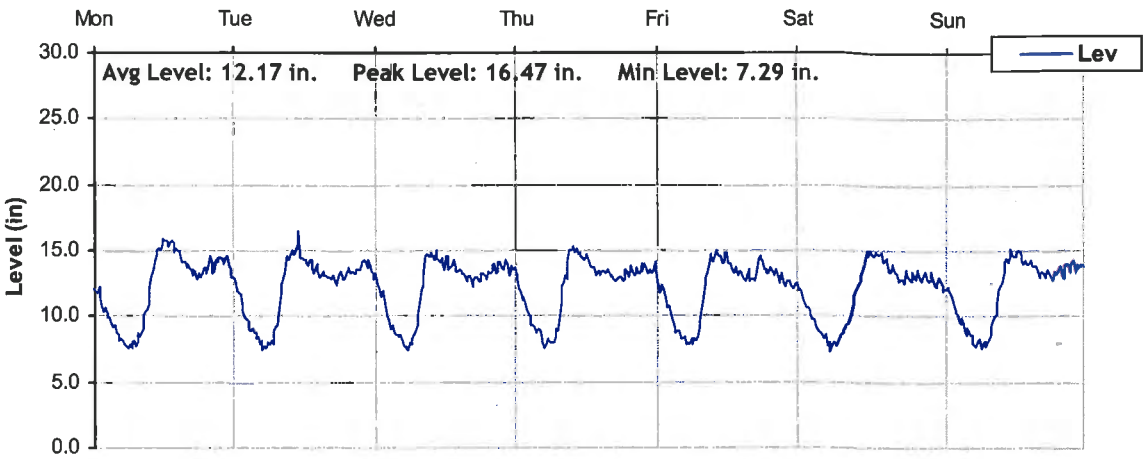
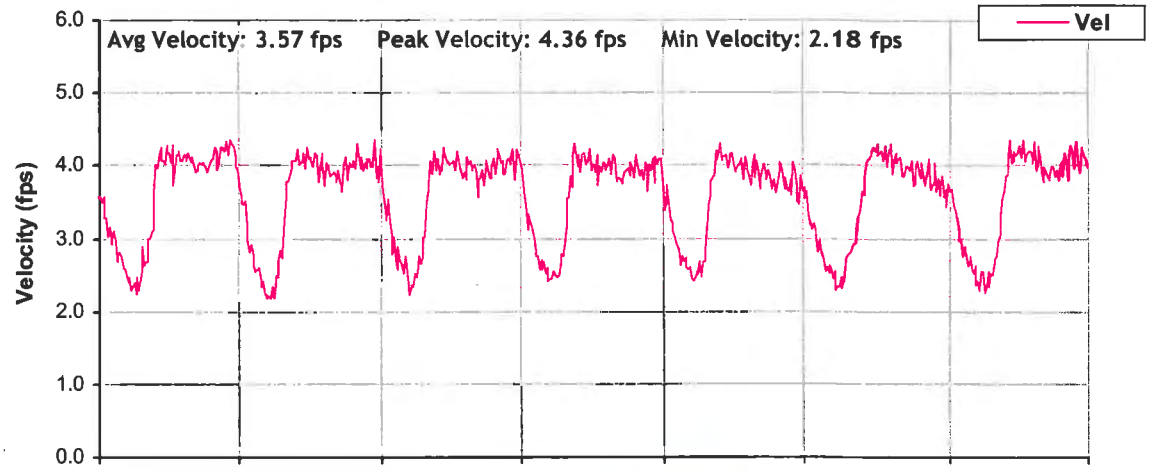
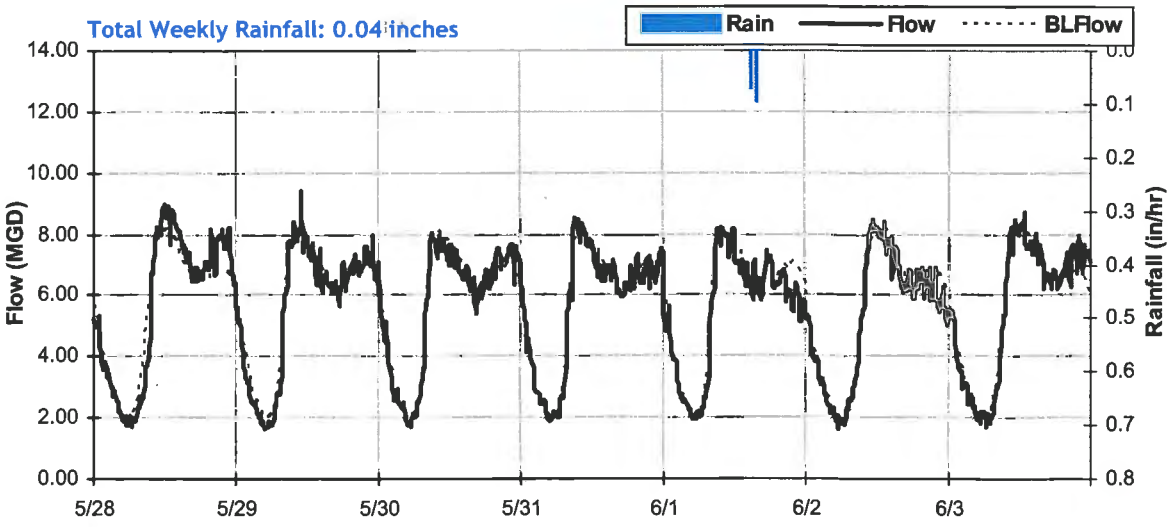
Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 1







Avg Flow: 5.61 MGD Peak Flow: 9.43 MGD Min Flow: 1.64 MGD

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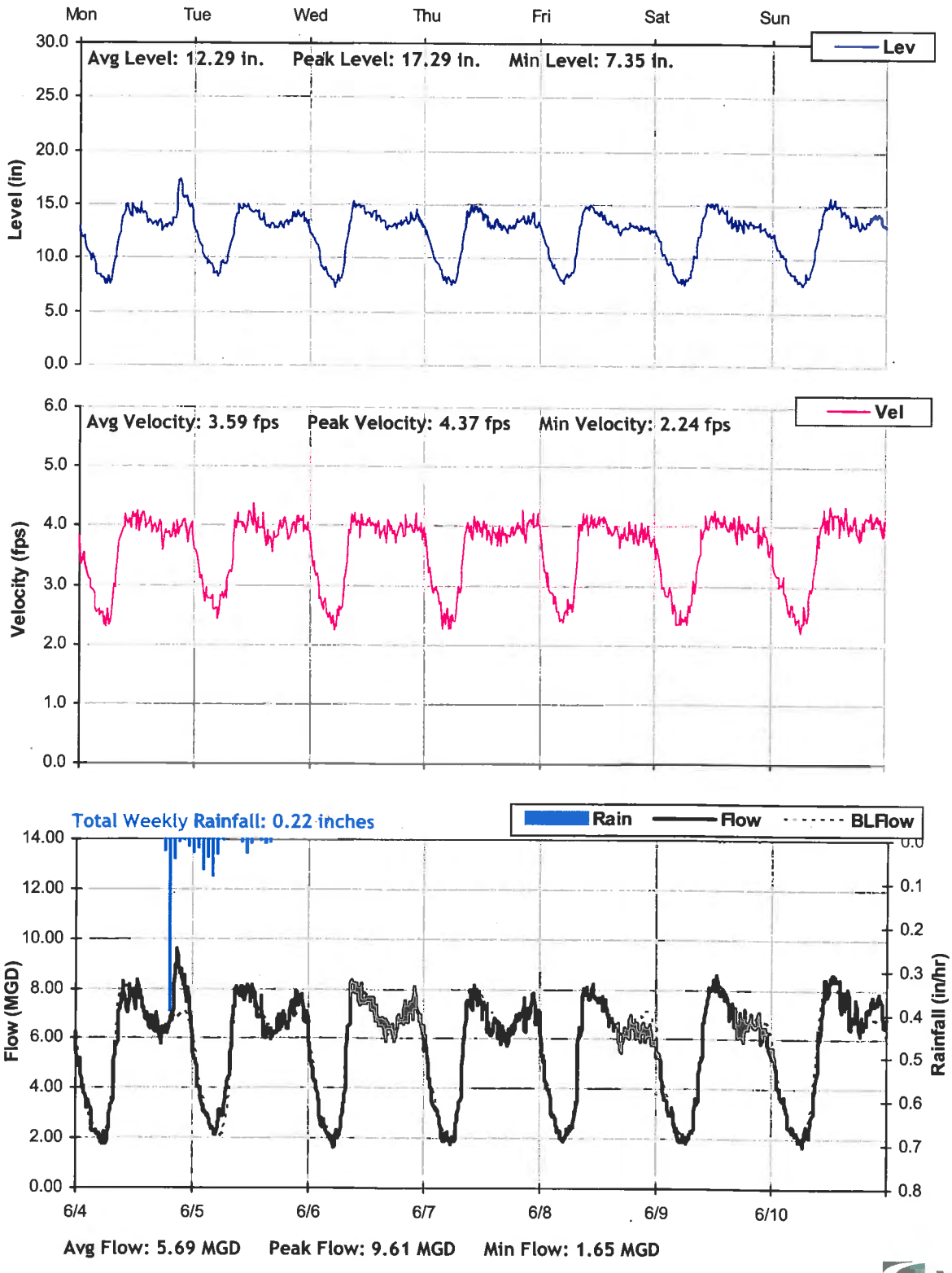
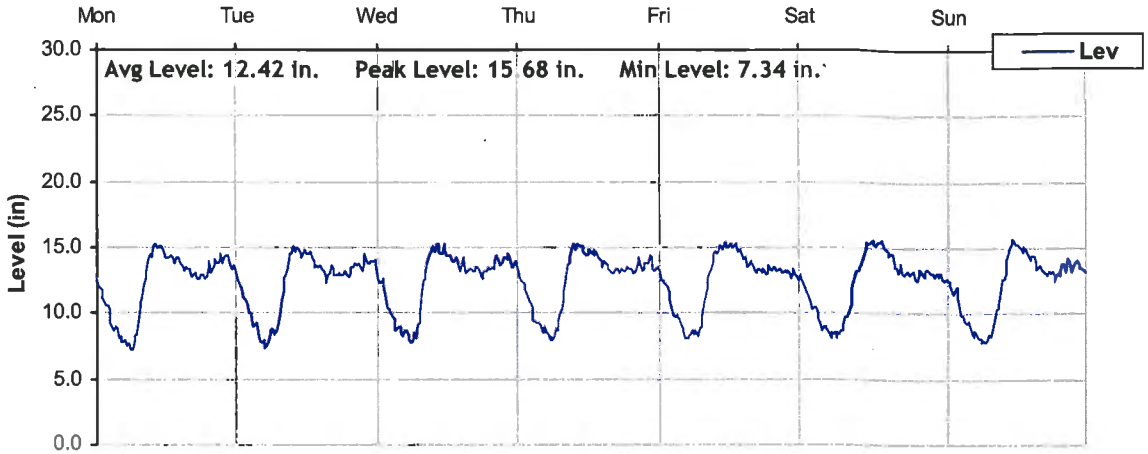
Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

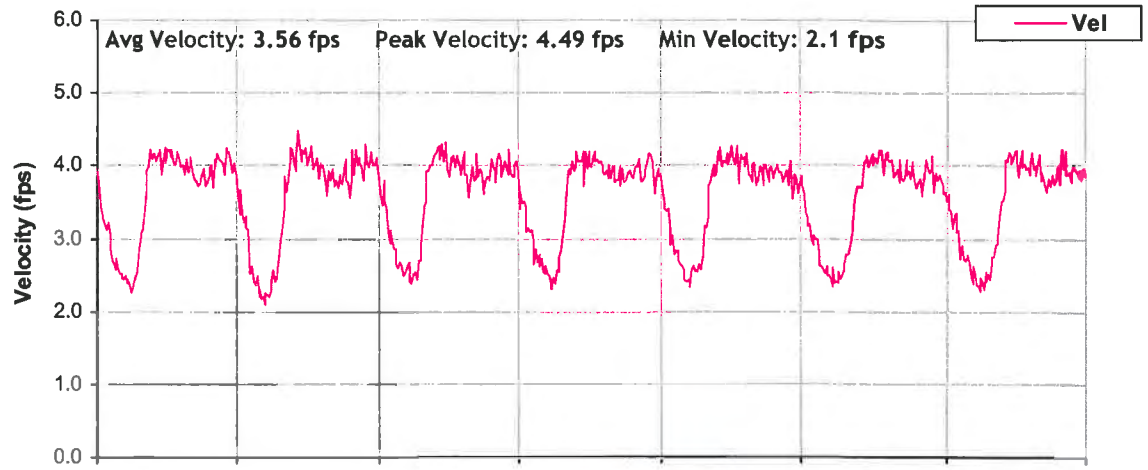
Monitoring Site:
Site 1

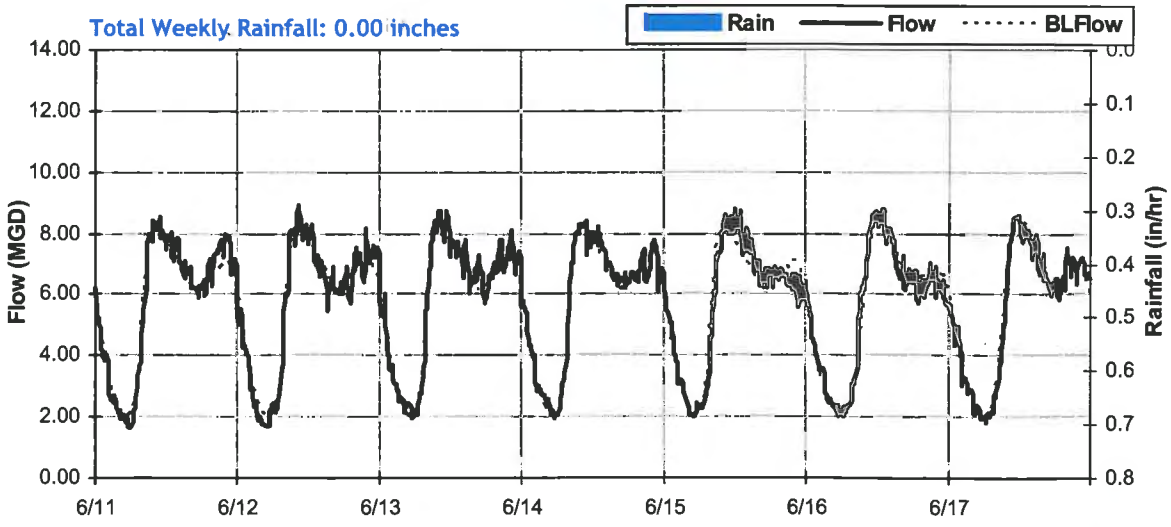


Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 1



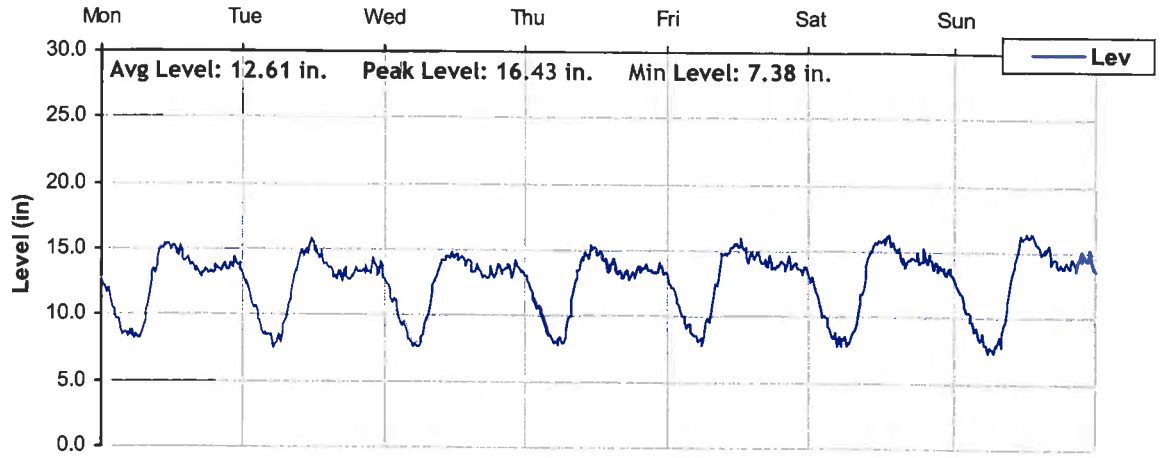


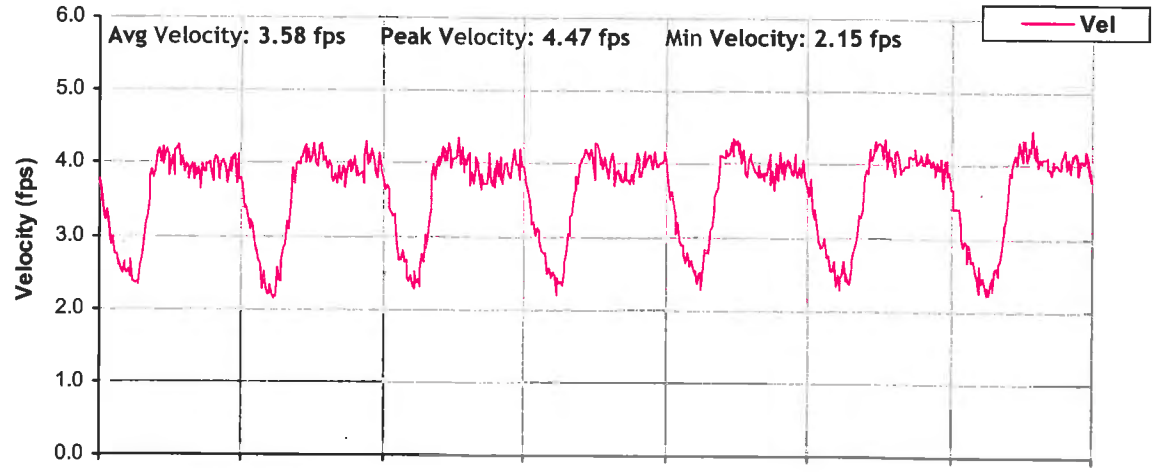


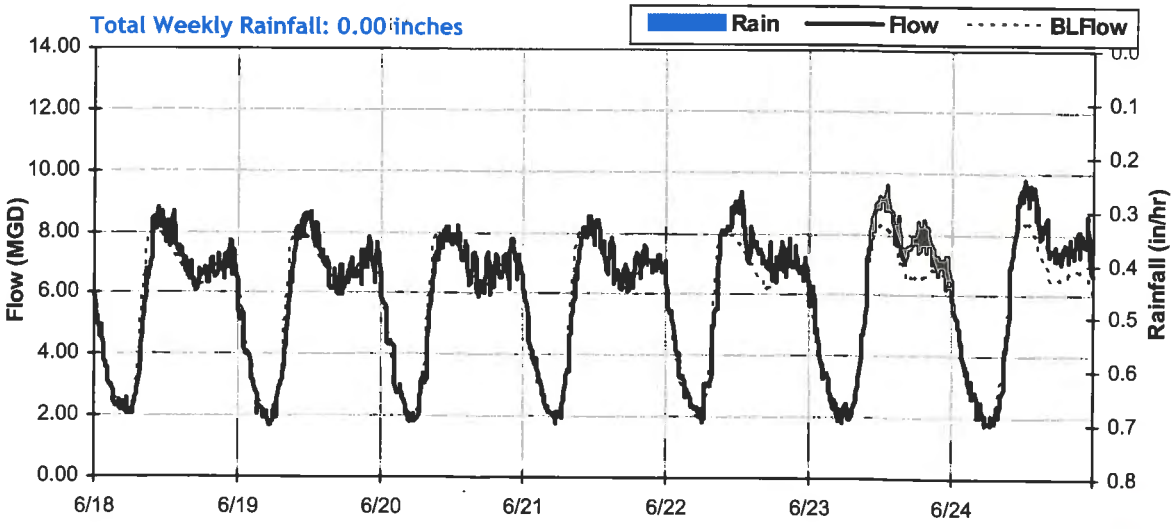
Avg Flow: 5.73 MGD Peak Flow: 8.9 MGD Min Flow: 1.64 MGD

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 1







Avg Flow: 5.9 MGD Peak Flow: 9.8 MGD Min Flow: 1.7 MGD

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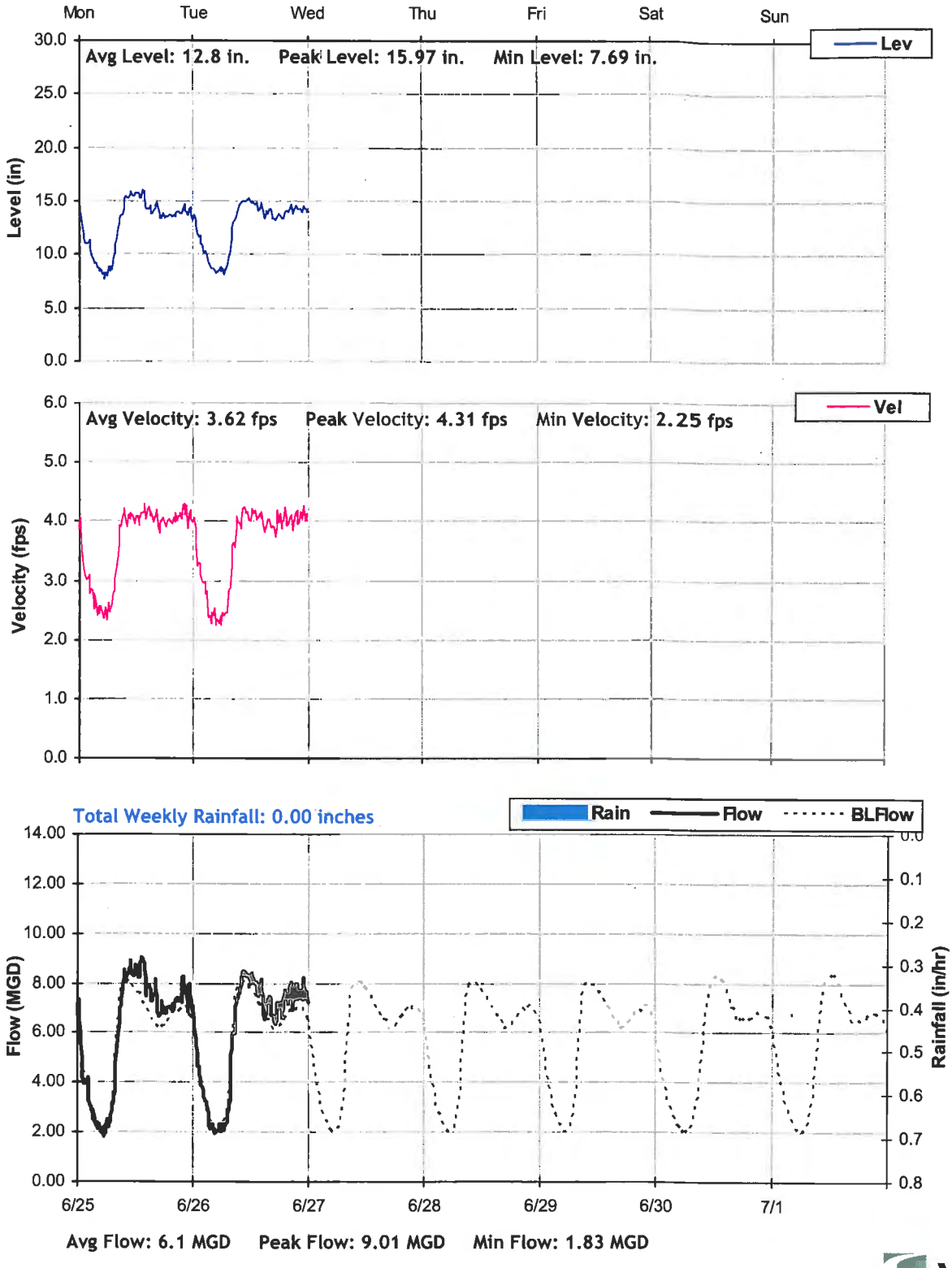
Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 1



	Site Information Report	**Monitoring Site:** Site 2

Location:

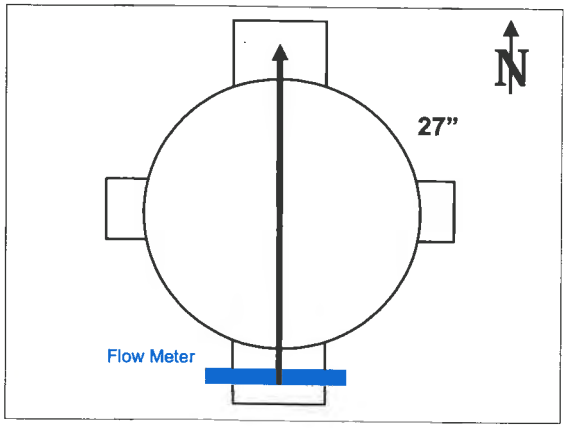
Diameter: 27 inches

Average Dry Weather Flow: 0.938 *MGD*

Peak Measured Flow: 1.722 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

Plan view photo:

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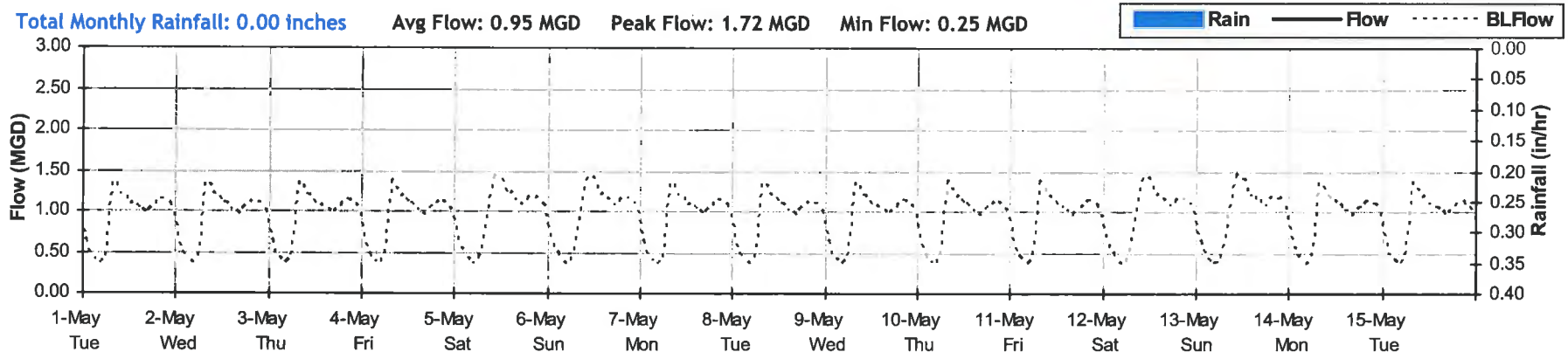
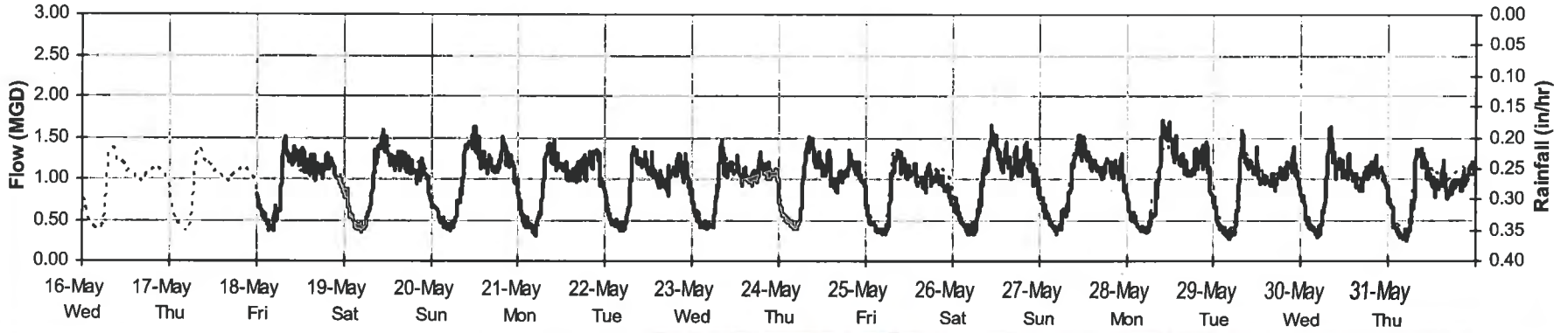
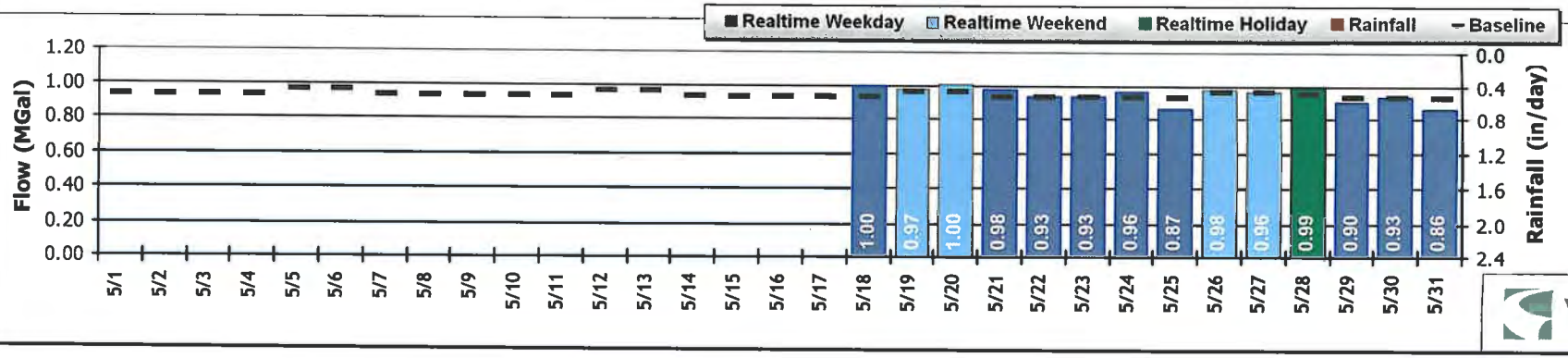
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 2

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.95 MGD Peak Flow: 1.72 MGD Min Flow: 0.25 MGD







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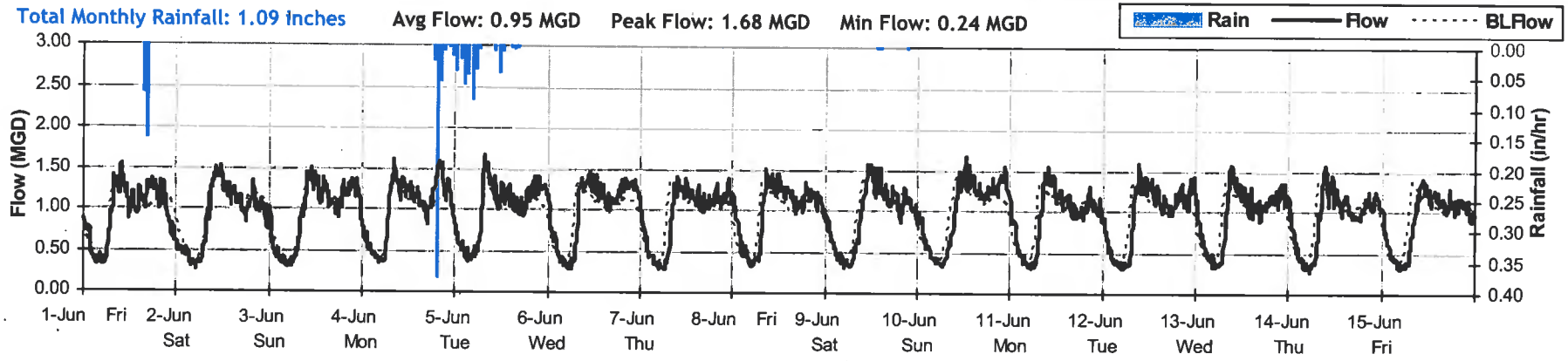
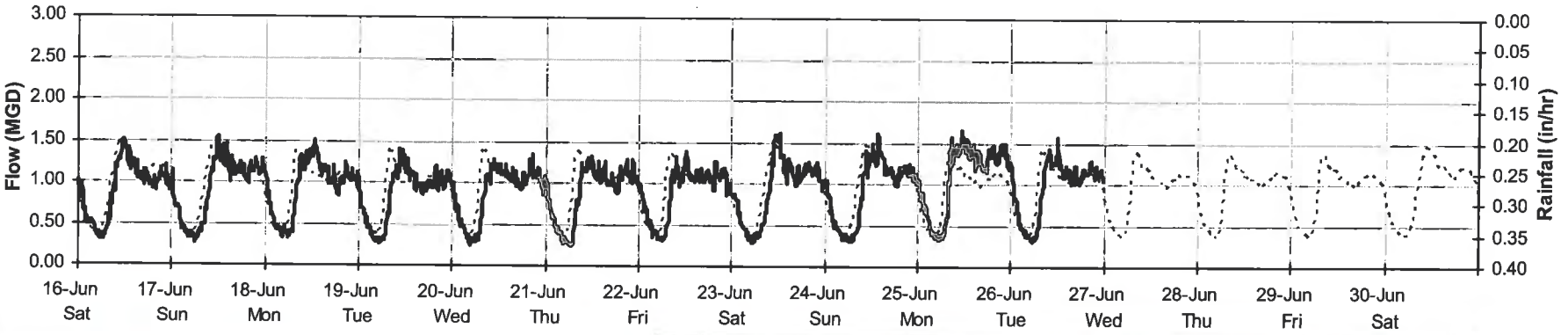
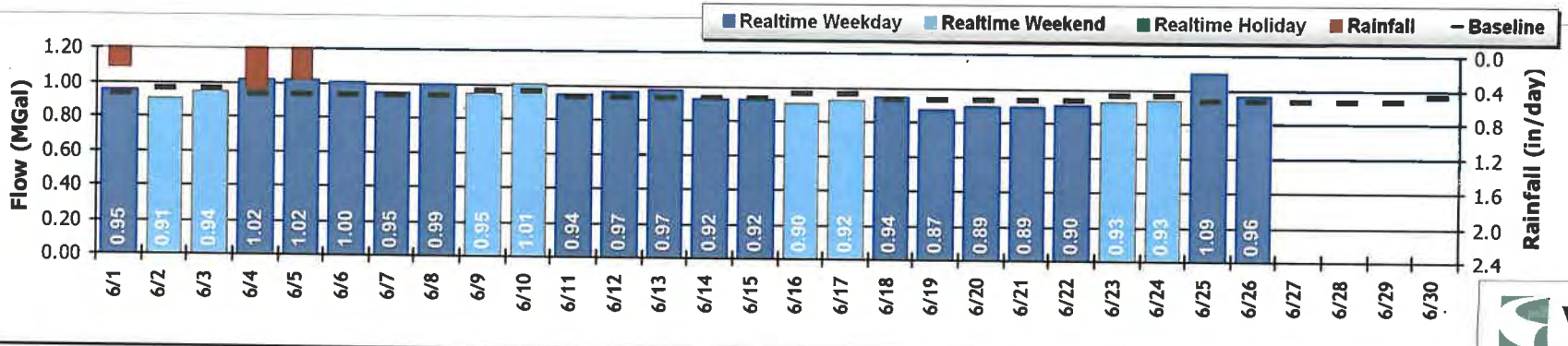
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 2

Total Monthly Rainfall: 1.09 inches Avg Flow: 0.95 MGD Peak Flow: 1.68 MGD Min Flow: 0.24 MGD







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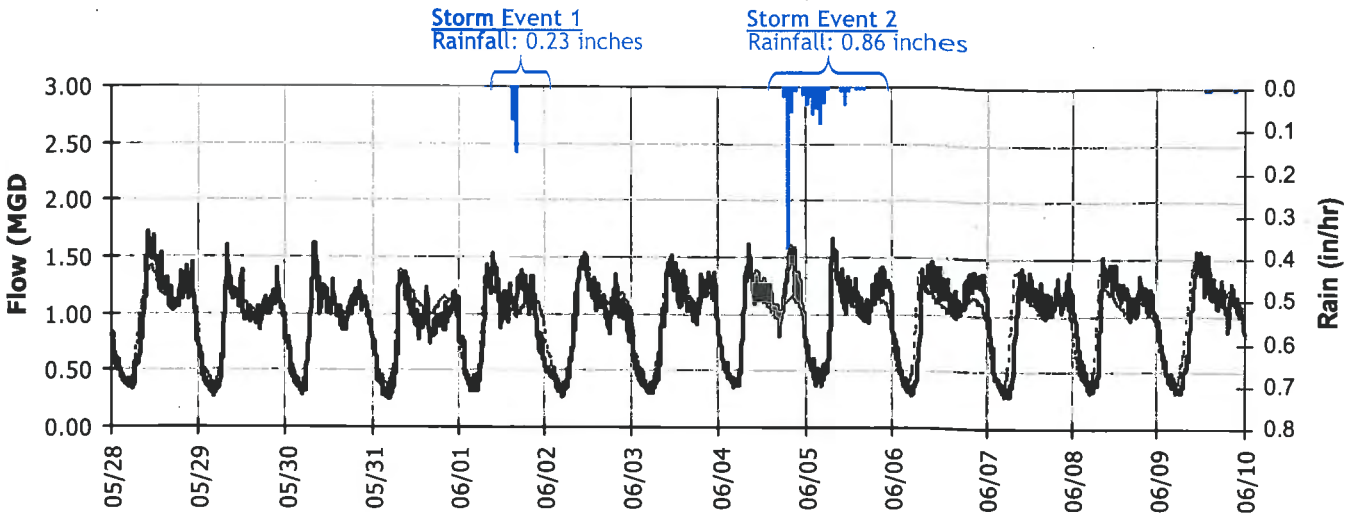
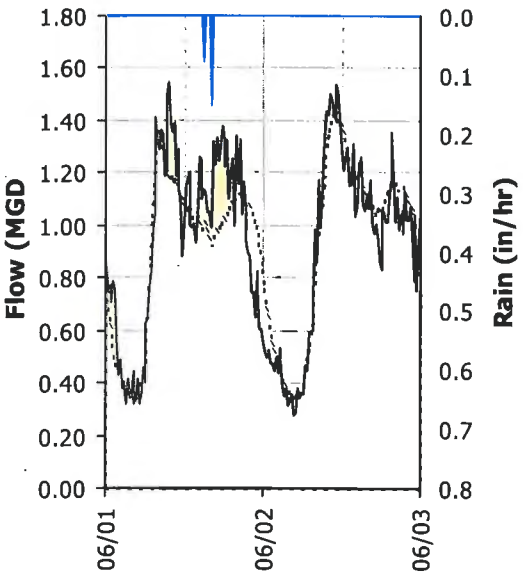
I/I Summary

Monitoring Site:
Site 2

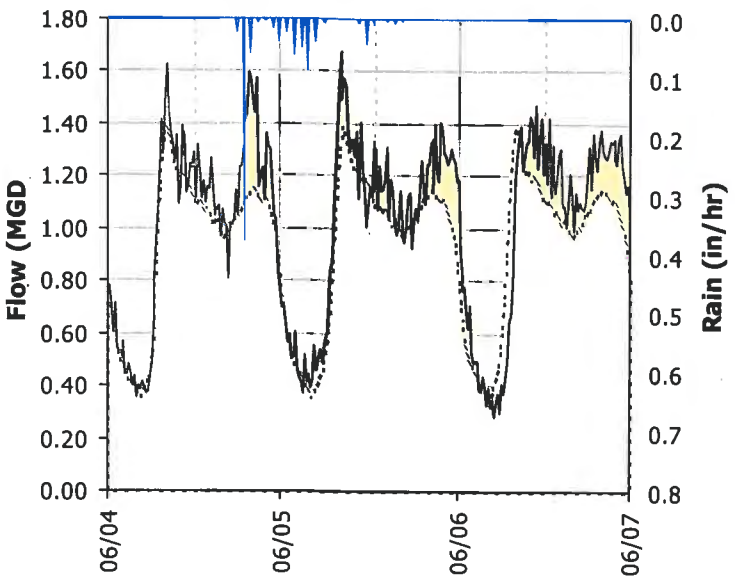
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.23	*inches*
Peak Flow:	1.38	*MGD*
Peak I/I Rate:	0.33	*MGD*
PF:	1.47	
Pk I/I:ADWF:	0.35	
Peak Level:	7.48	*inches*
d/D Ratio:	0.28	
Total I/I:	36,000	*gallons*
RE1 R-Value:	0.2%	

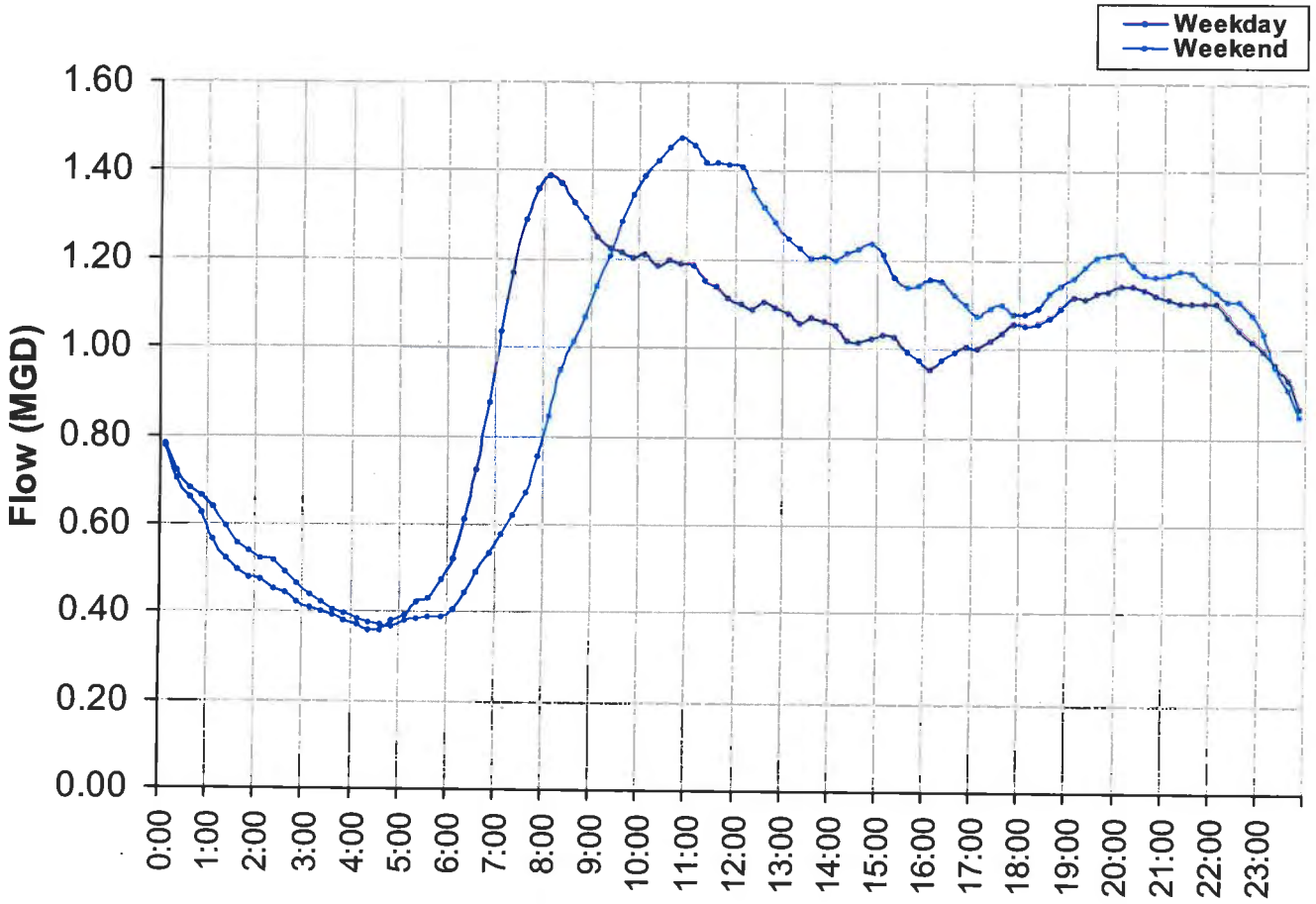
Storm Event #2 I/I Analysis

Rainfall:	0.86	*inches*
Peak Flow:	1.68	*MGD*
Peak I/I Rate:	0.47	*MGD*
PF:	1.79	
Pk I/I:ADWF:	0.50	
Peak Level:	7.94	*inches*
d/D Ratio:	0.29	
Total I/I:	98,000	*gallons*
RE2 R-Value:	0.1%	

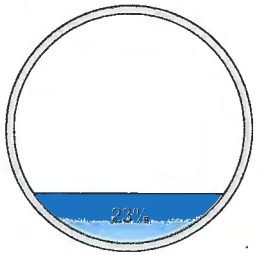
V&A

Average Dry Weather Flow

Monitoring Site:
Site 2



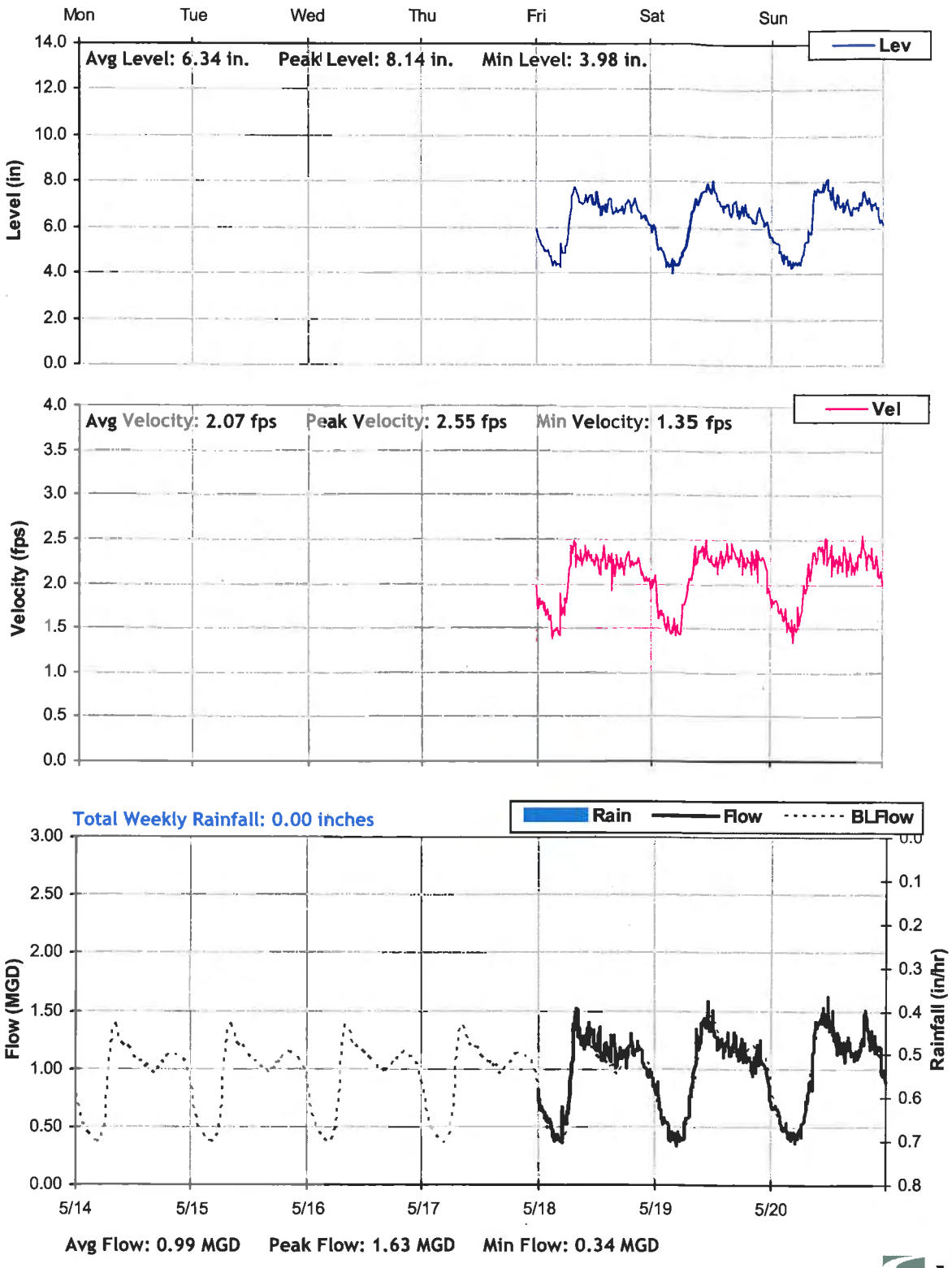
Average Dry Weather Flow:
0.94 *MGD*



V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

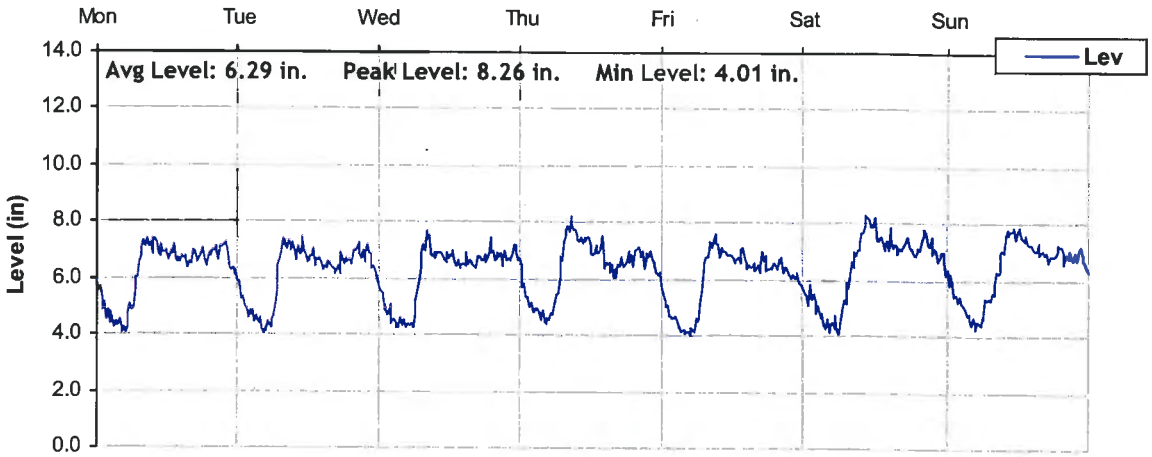
Monitoring Site:
Site 2

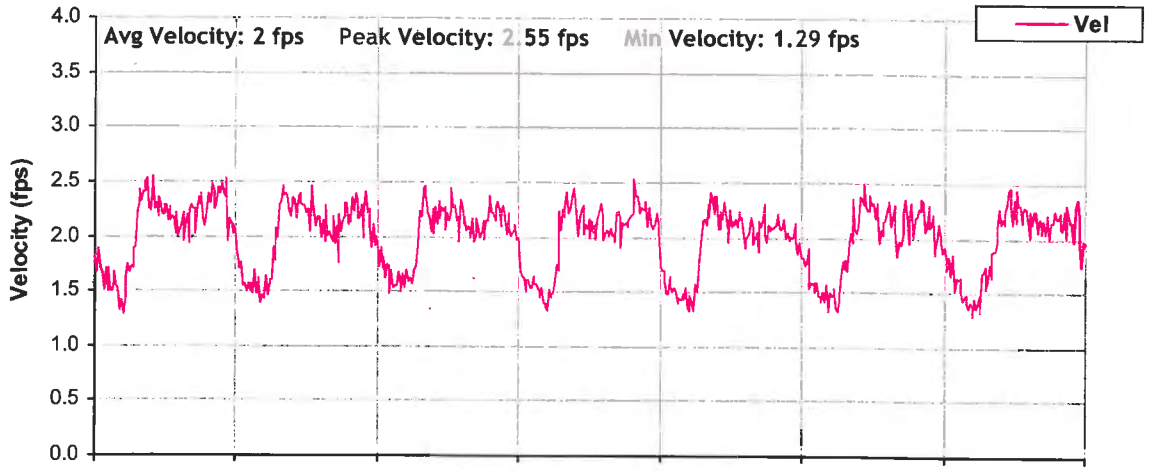


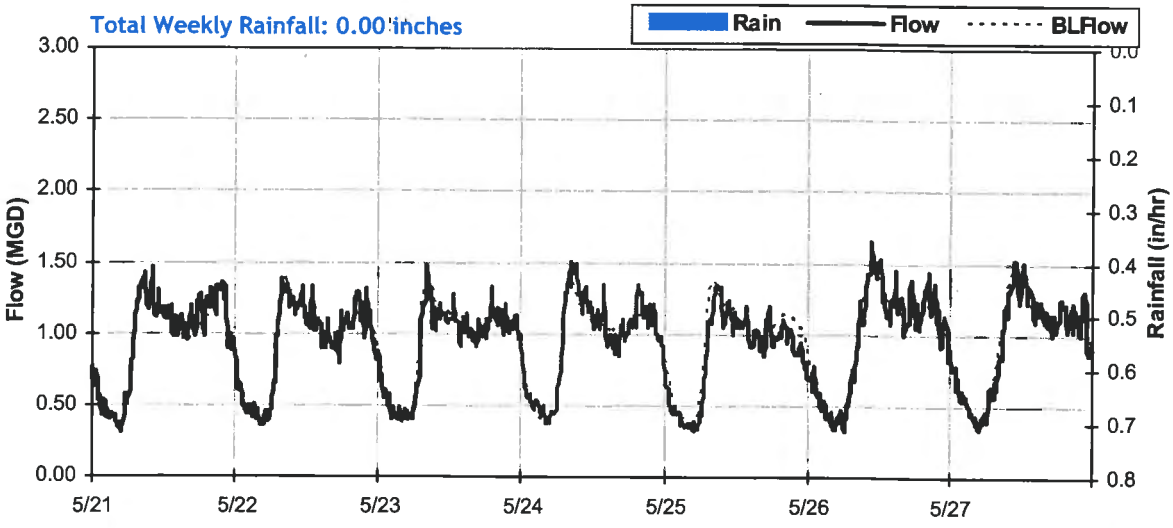
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 2





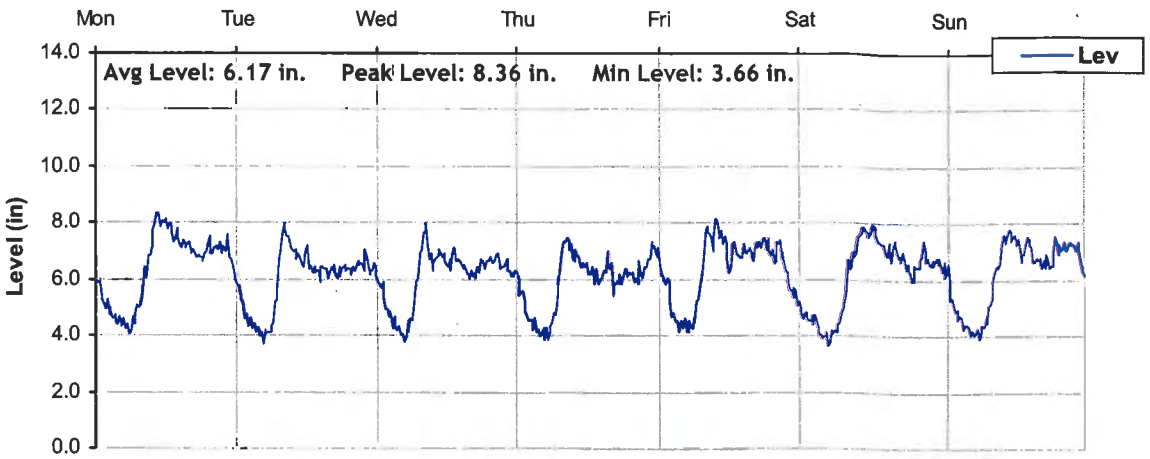


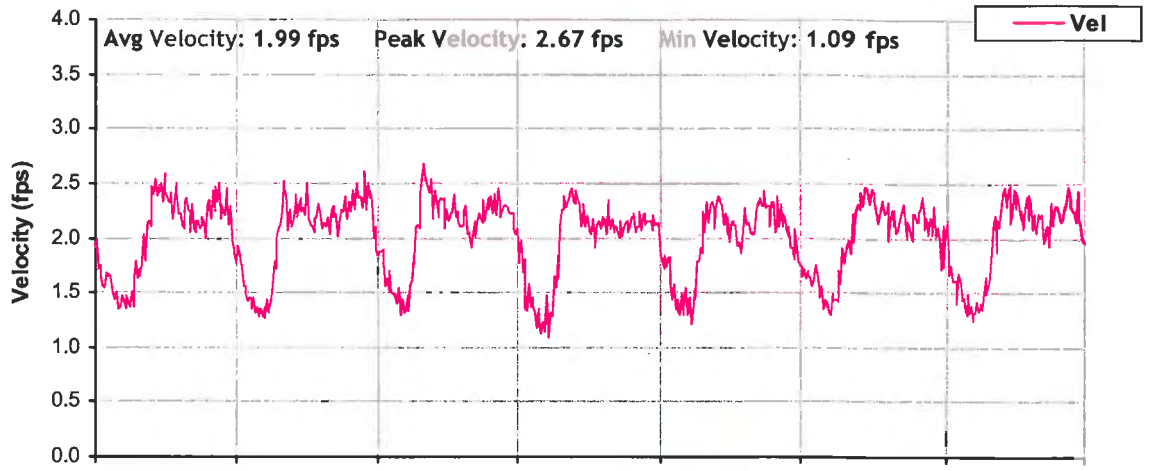
Avg Flow: 0.94 MGD Peak Flow: 1.66 MGD Min Flow: 0.31 MGD

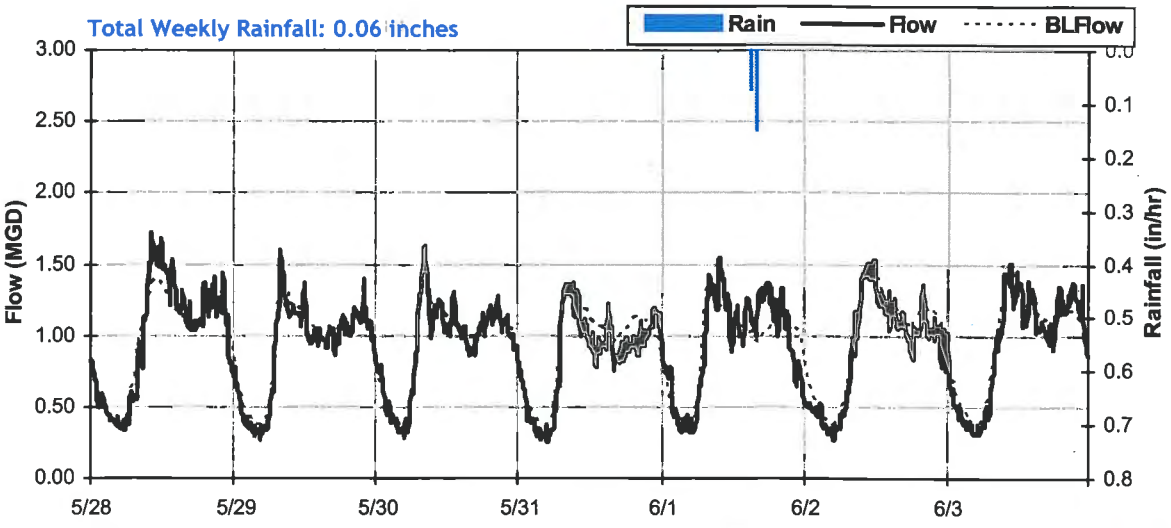
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 2





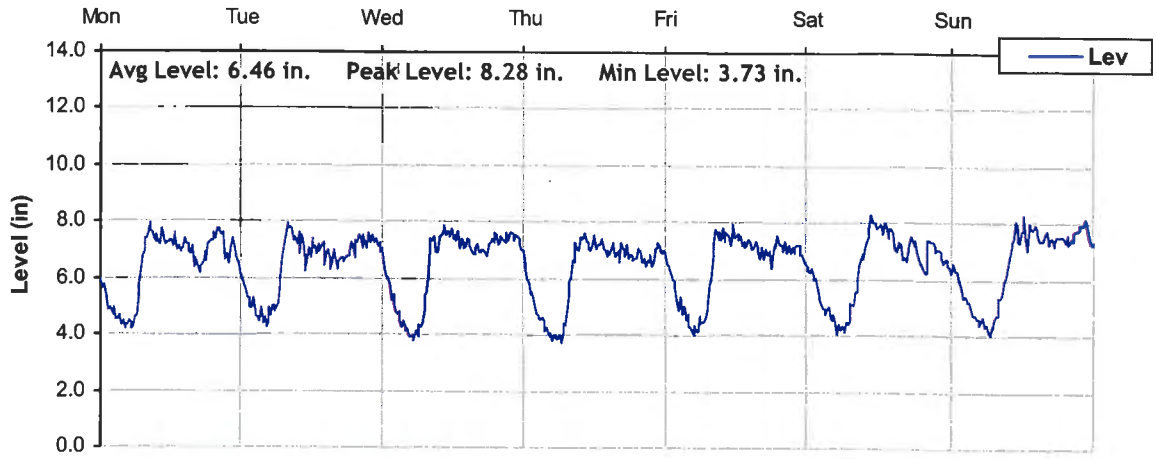


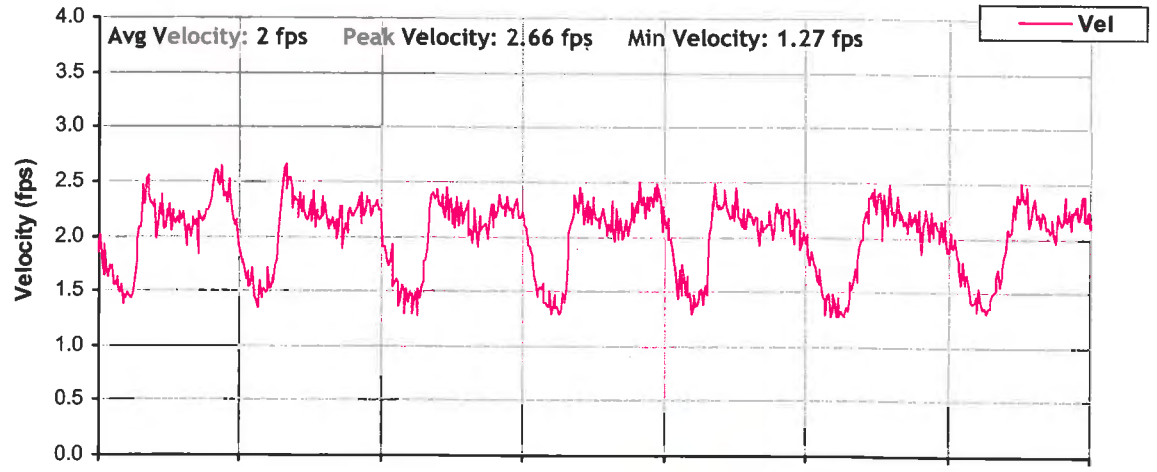
Avg Flow: 0.93 MGD Peak Flow: 1.72 MGD Min Flow: 0.25 MGD

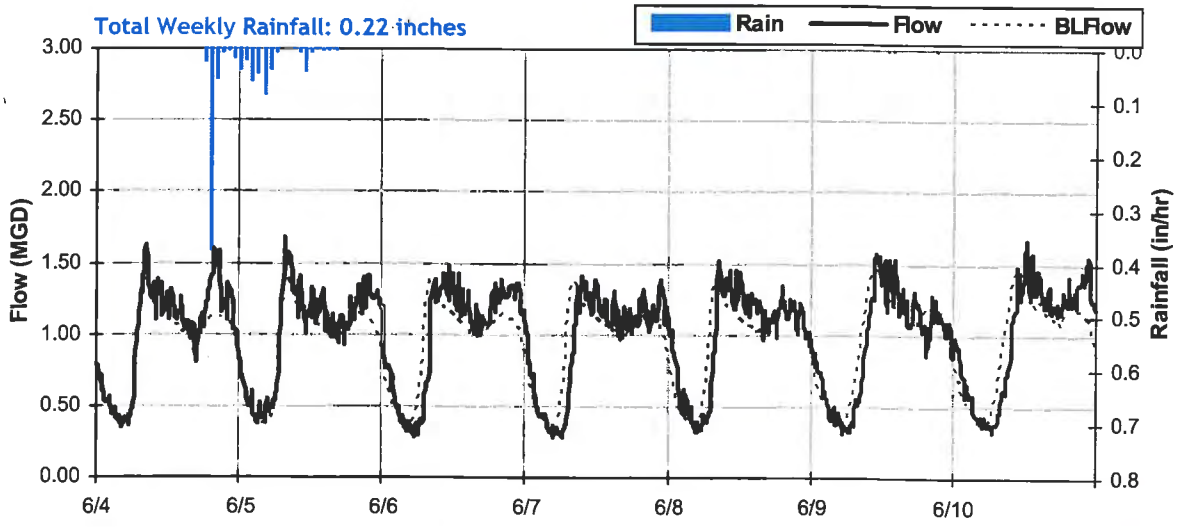
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 2





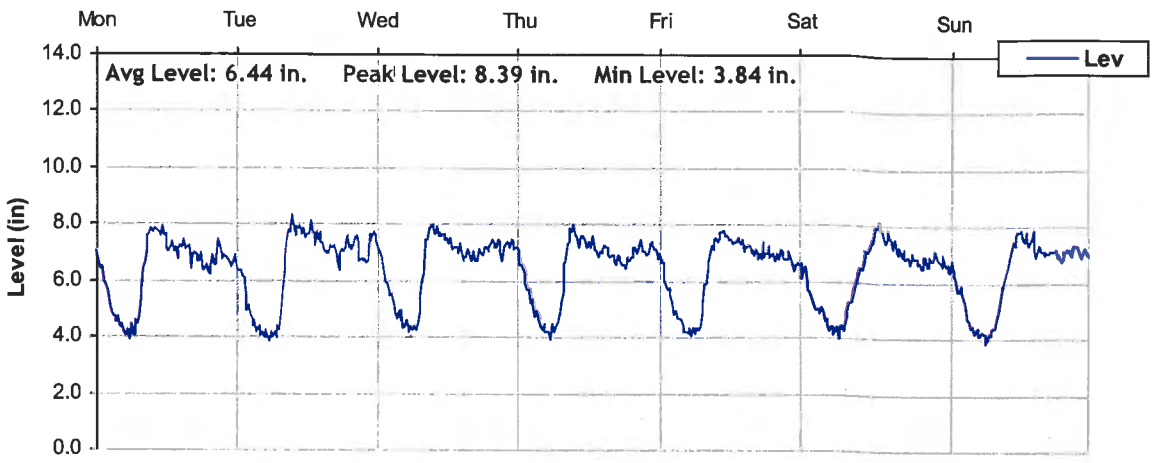


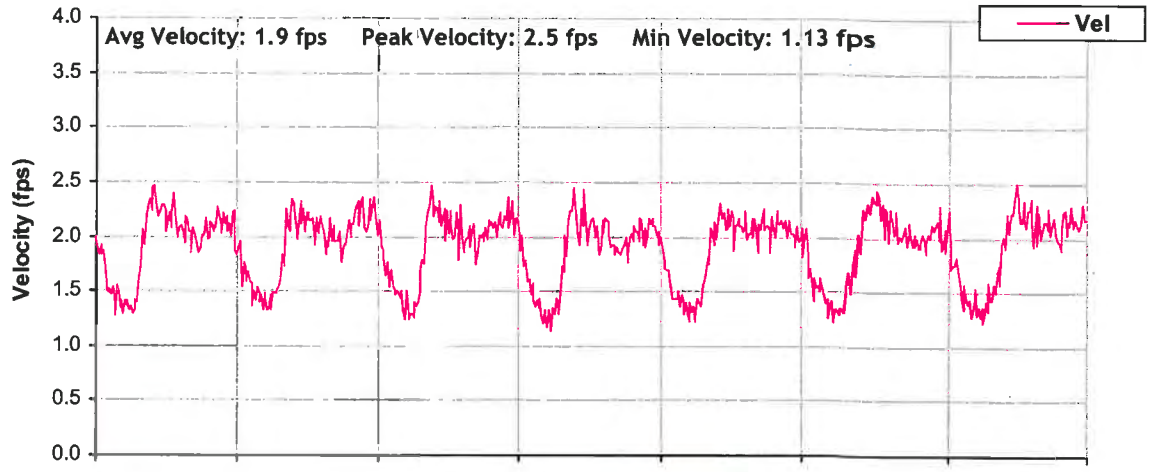
Avg Flow: 0.99 MGD Peak Flow: 1.68 MGD Min Flow: 0.28 MGD

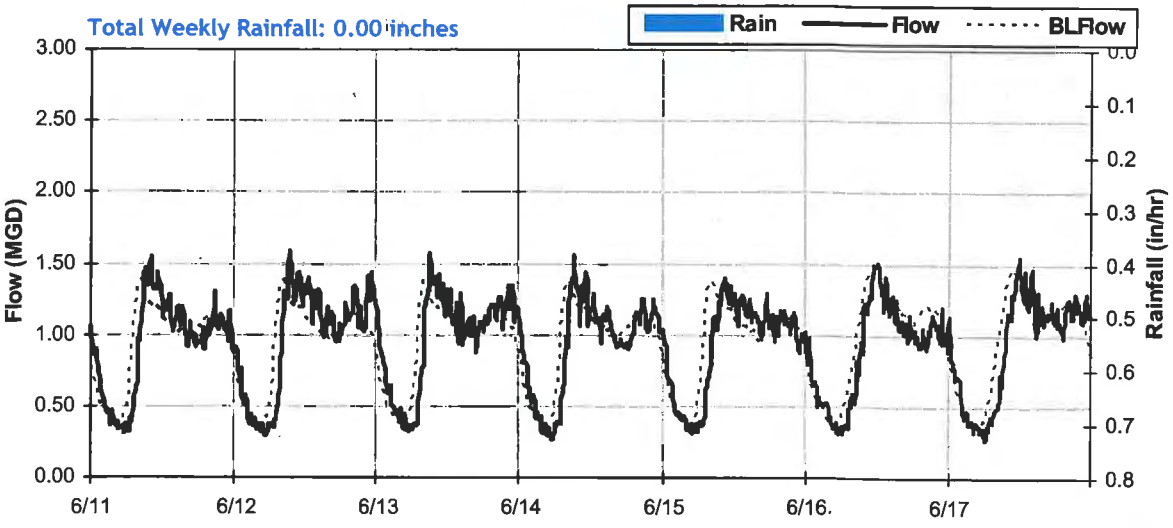
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 2





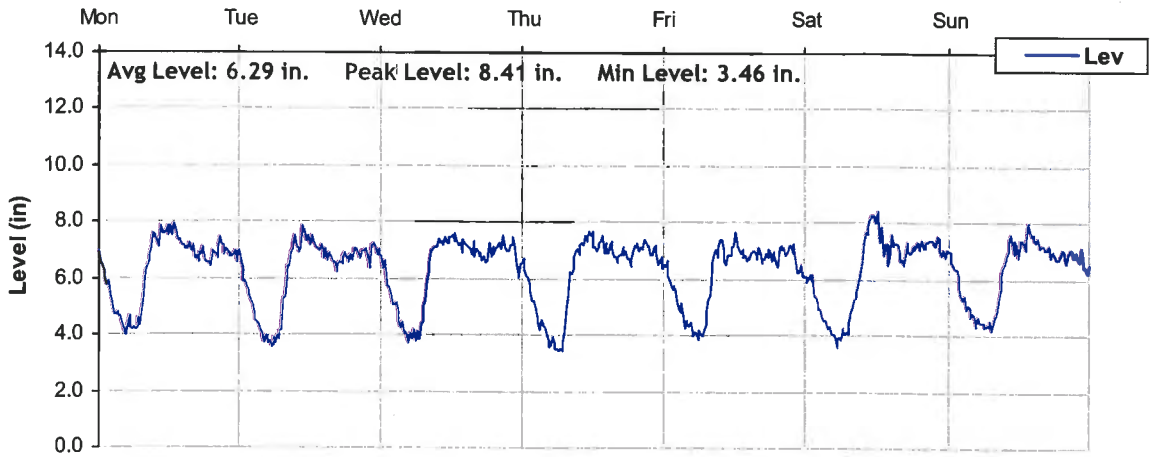


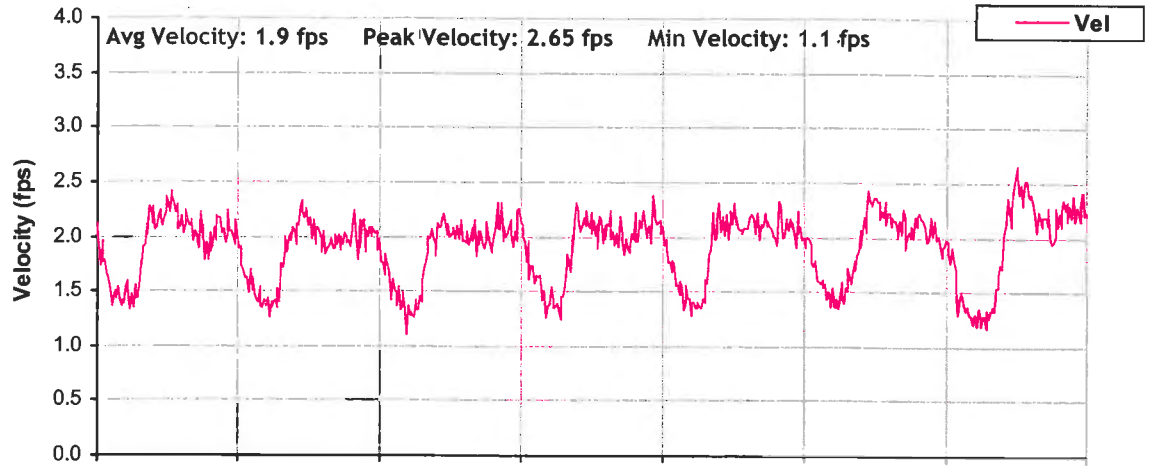
Avg Flow: 0.94 MGD Peak Flow: 1.59 MGD Min Flow: 0.26 MGD

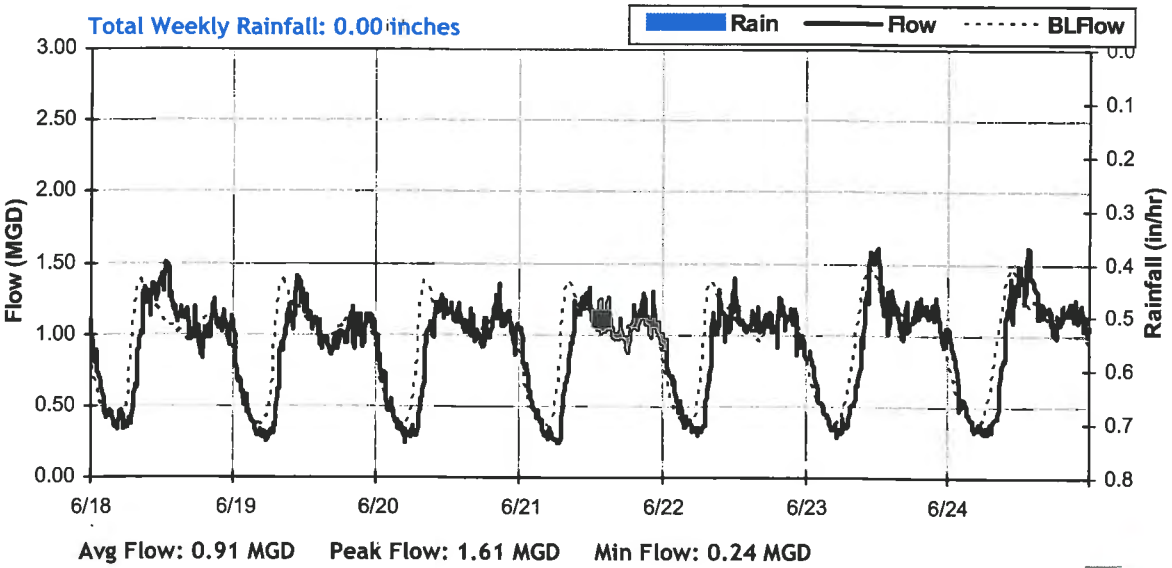
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 2





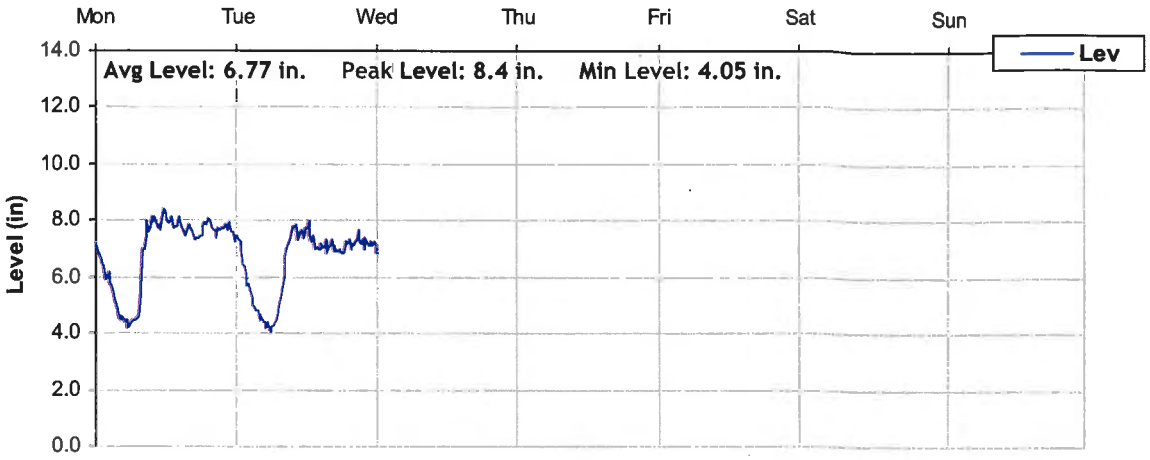


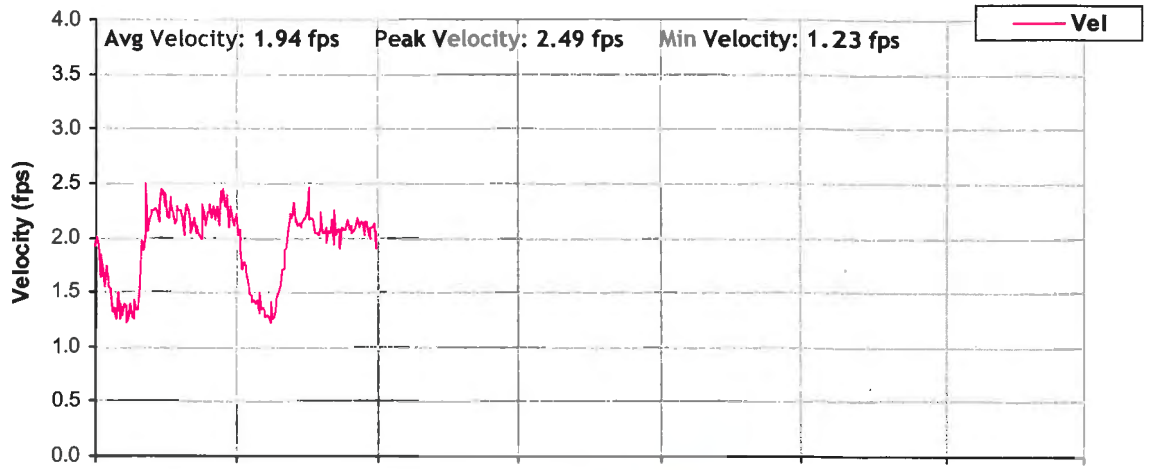
Avg Flow: 0.91 MGD Peak Flow: 1.61 MGD Min Flow: 0.24 MGD

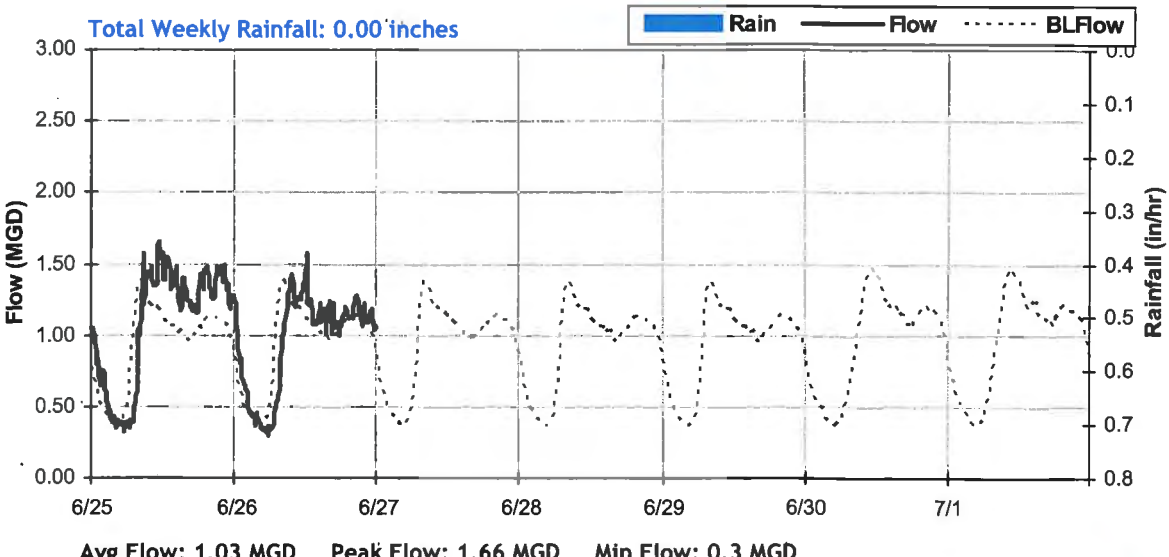
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 2







Avg Flow: 1.03 MGD **Peak Flow: 1.66 MGD** **Min Flow: 0.3 MGD**

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Site Information Report

Monitoring Site: Site 3

Location:

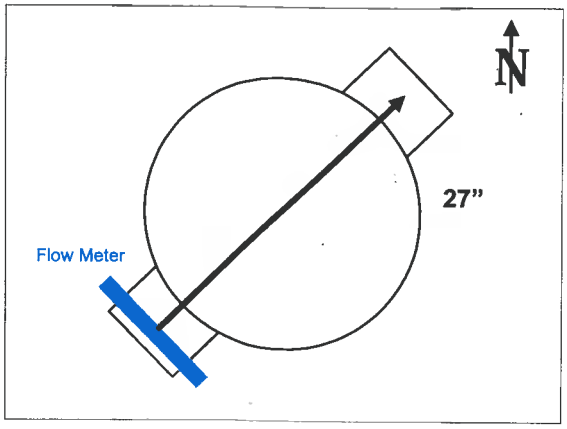
Diameter: 27 inches

Average Dry Weather Flow: 3.675 *MGD*

Peak Measured Flow: 6.362 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

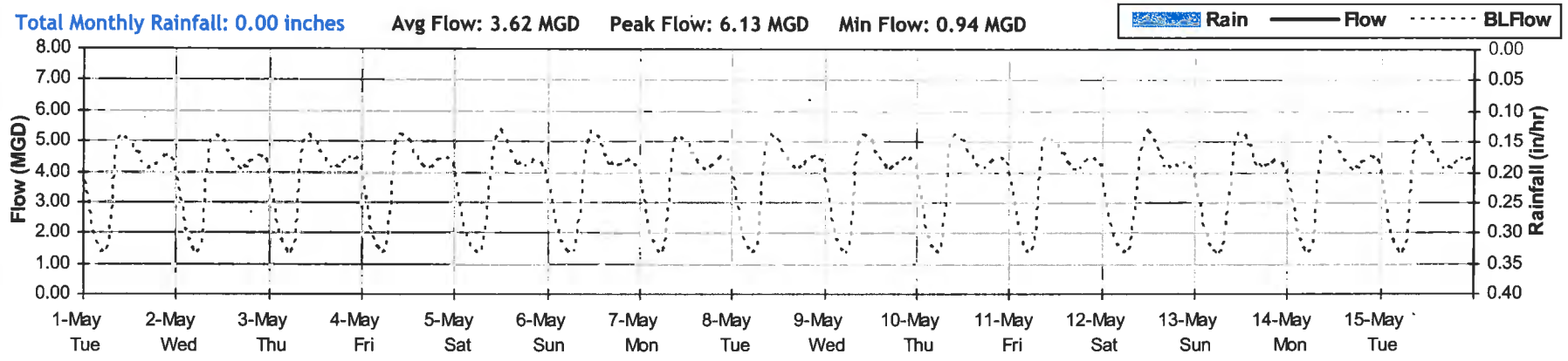
Plan view photo:

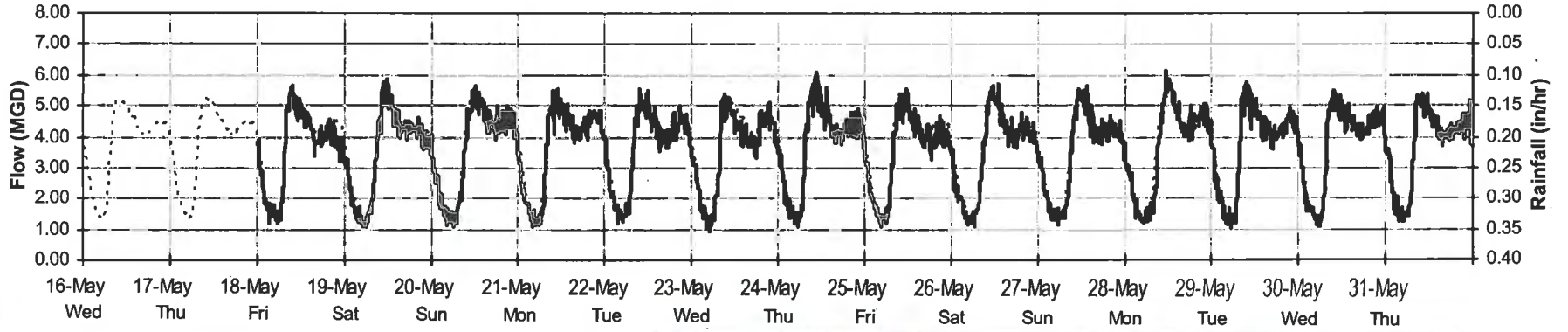
V&A

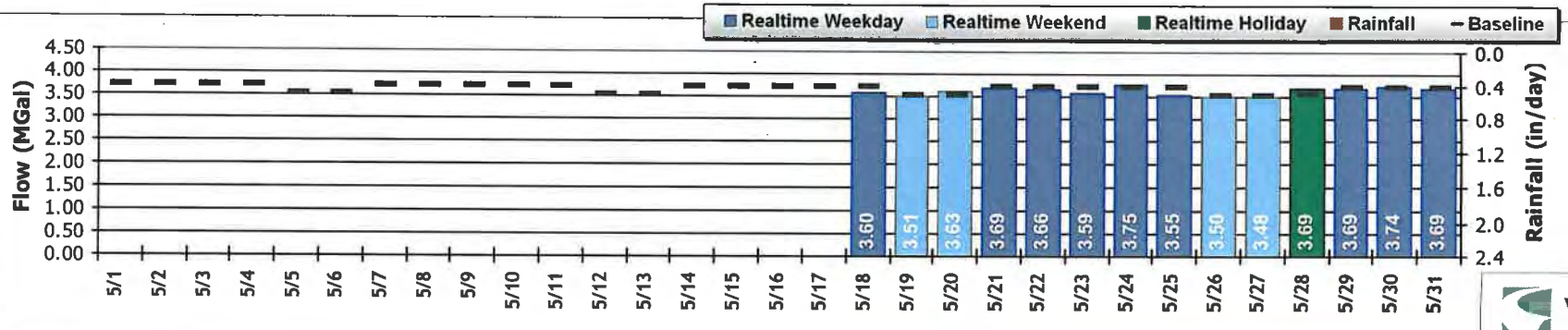
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 3

Total Monthly Rainfall: 0.00 inches Avg Flow: 3.62 MGD Peak Flow: 6.13 MGD Min Flow: 0.94 MGD





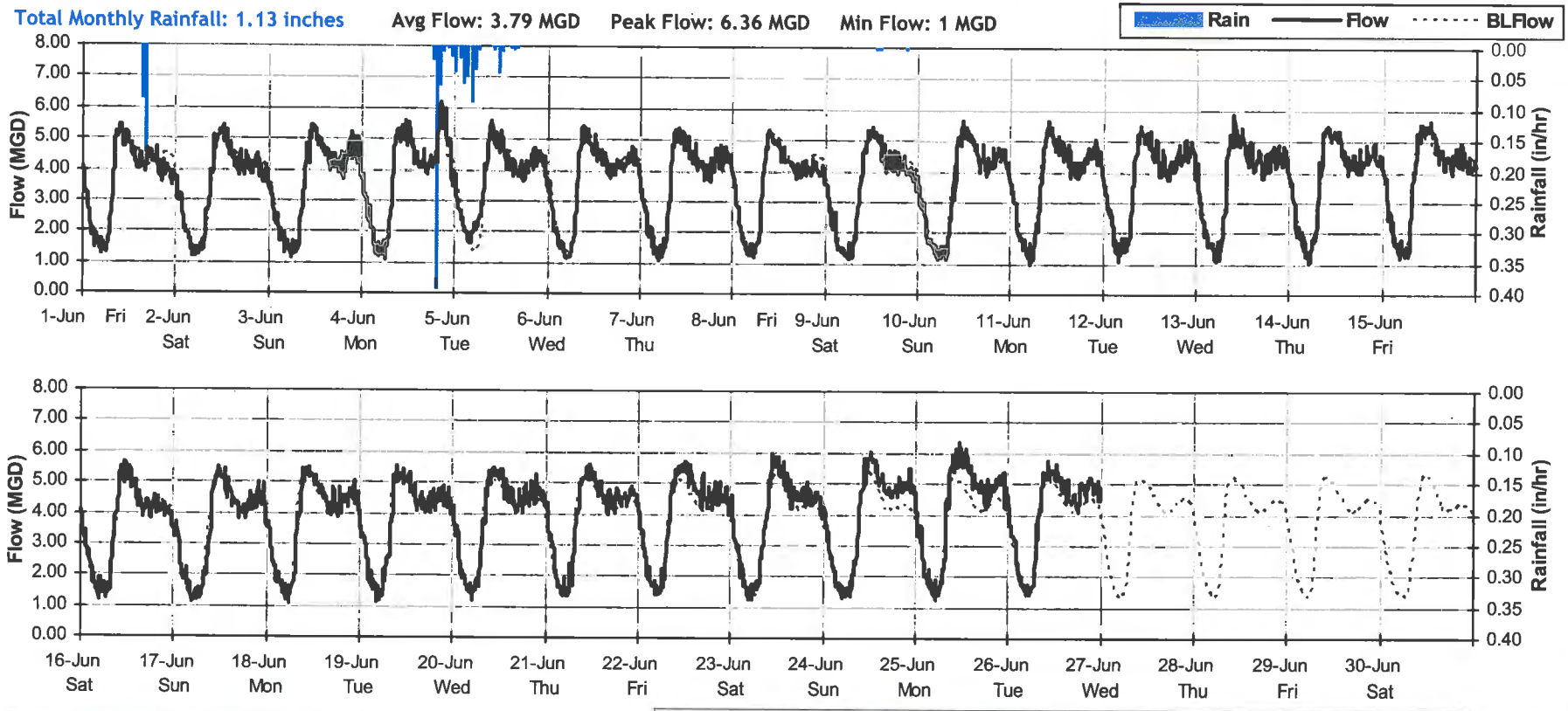


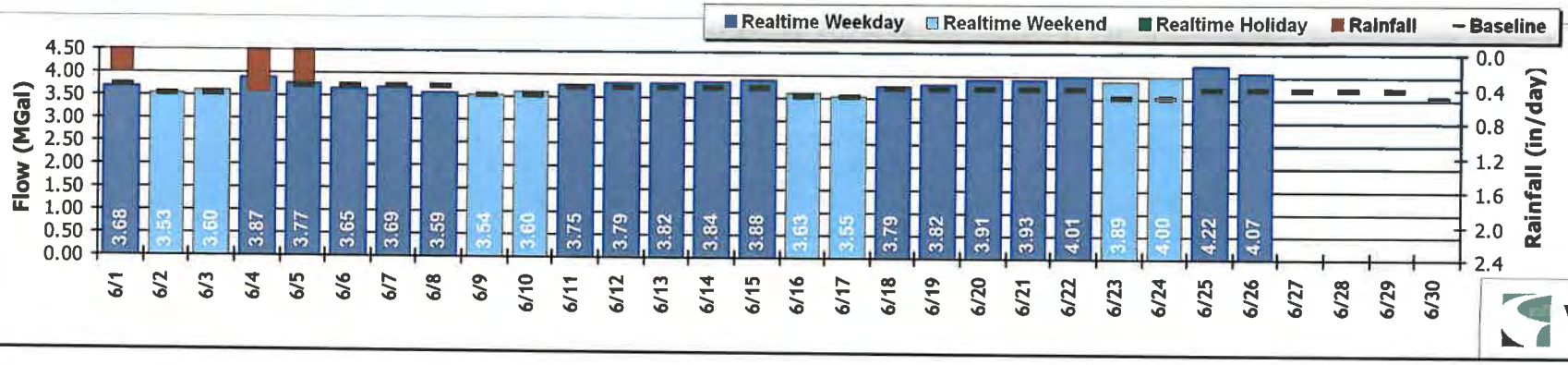
V&A

Monthly Flow Summary
June, 2007

Monitoring Site:
Site 3

Total Monthly Rainfall: 1.13 inches Avg Flow: 3.79 MGD Peak Flow: 6.36 MGD Min Flow: 1 MGD



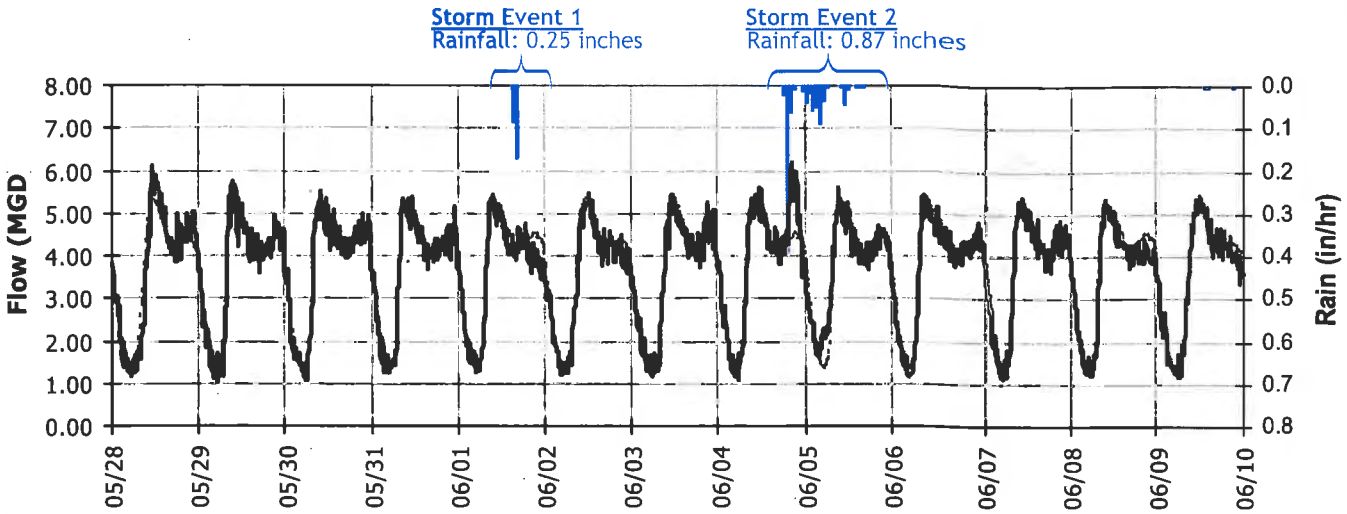


V&A

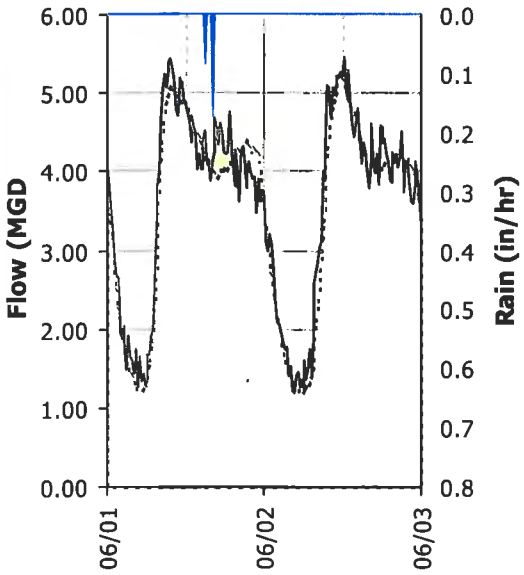
I/I Summary

Monitoring Site:
Site 3

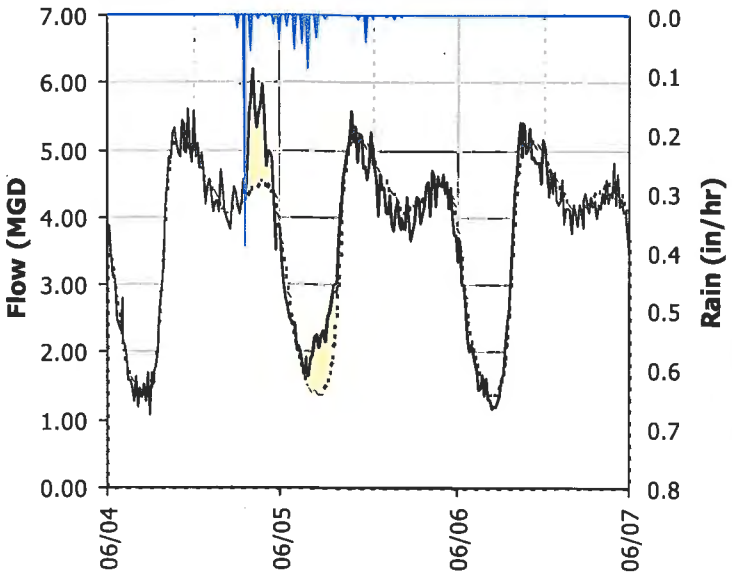
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.25	*inches*
Peak Flow:	4.75	*MGD*
Peak I/I Rate:	0.62	*MGD*
PF:	1.29	
Pk I/I:ADWF:	0.17	
Peak Level:	8.00	*inches*
d/D Ratio:	0.30	
Total I/I:	52,000	*gallons*
RE1 R-Value:	0.1%	

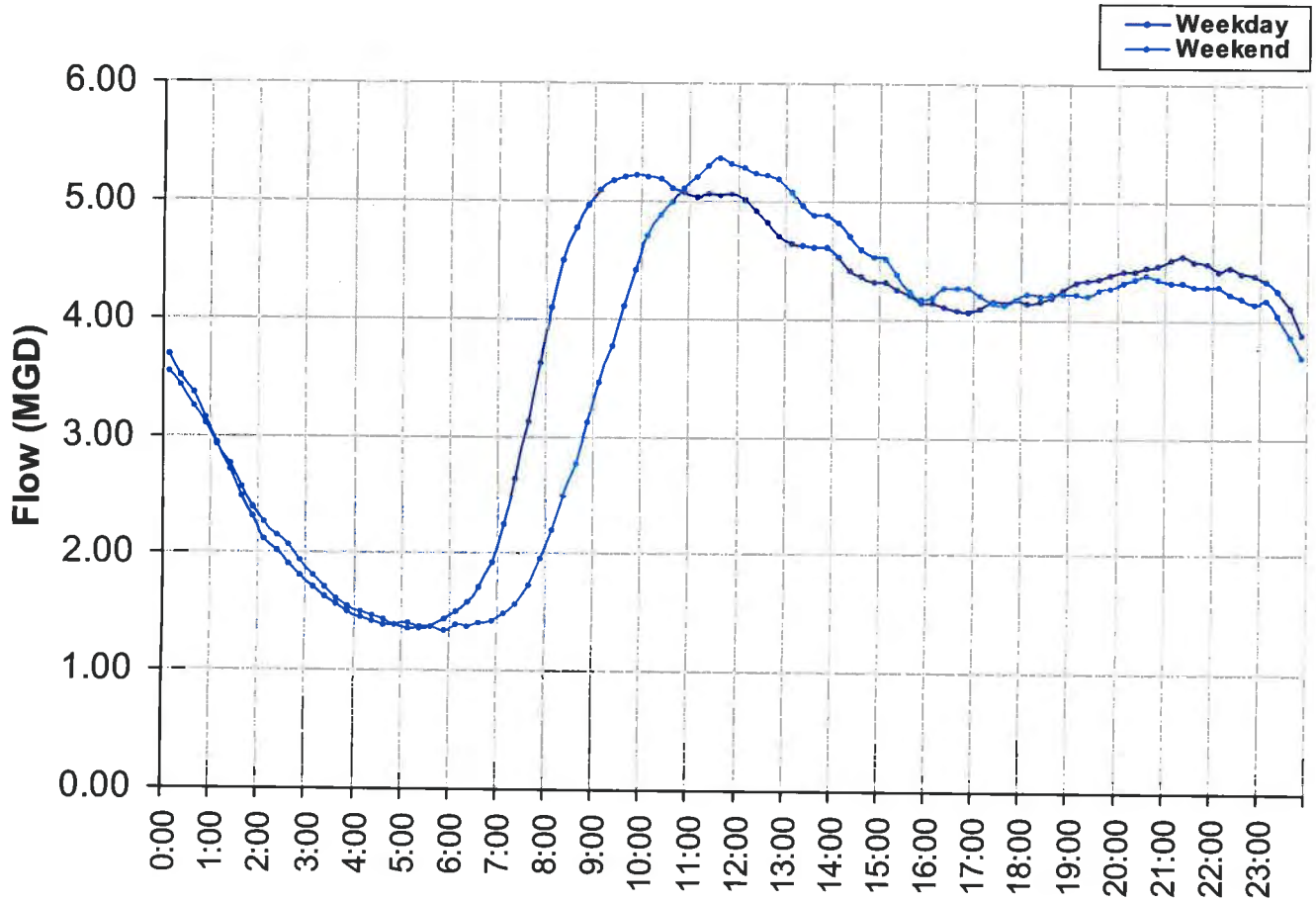
Storm Event #2 I/I Analysis

Rainfall:	0.87	*inches*
Peak Flow:	6.19	*MGD*
Peak I/I Rate:	1.78	*MGD*
PF:	1.69	
Pk I/I:ADWF:	0.49	
Peak Level:	9.25	*inches*
d/D Ratio:	0.34	
Total I/I:	244,000	*gallons*
RE2 R-Value:	0.1%	

V&A

Average Dry Weather Flow

Monitoring Site:
Site 3

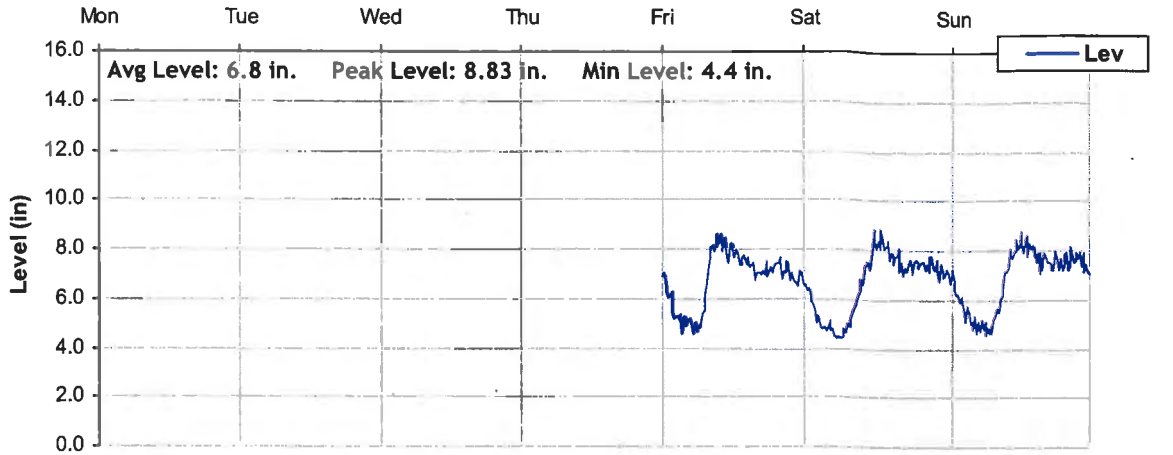


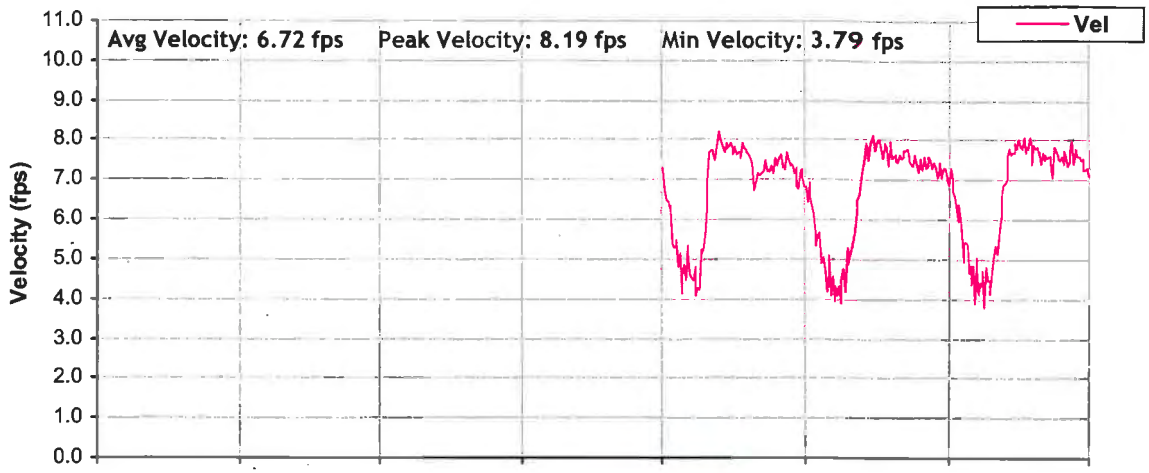
Average Dry Weather Flow:
3.68 *MGD*

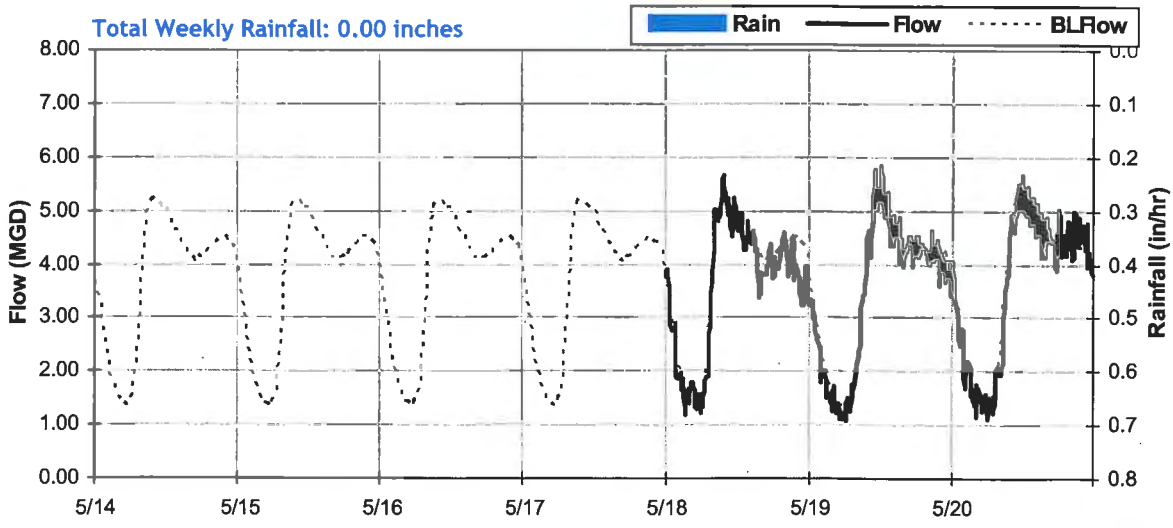
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 3





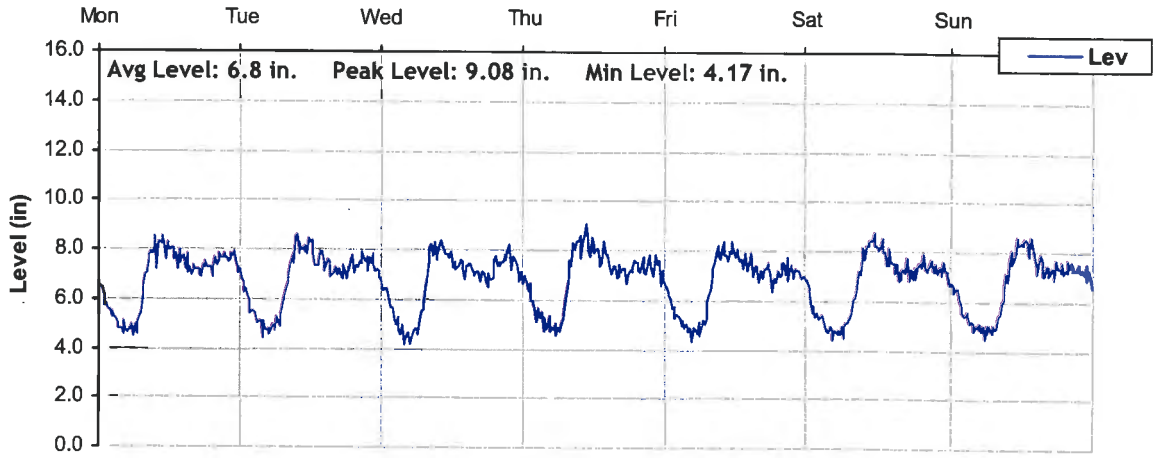


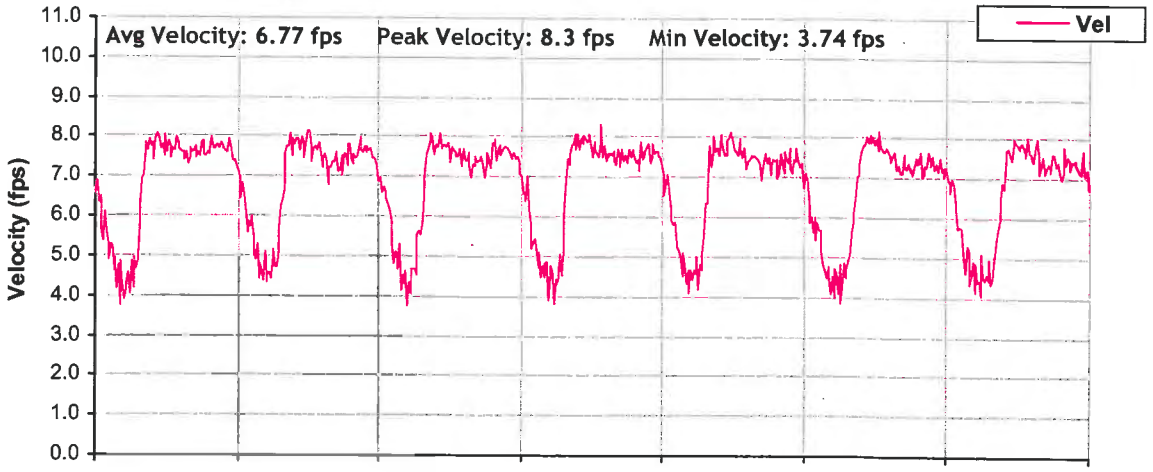
Avg Flow: 3.58 MGD Peak Flow: 5.86 MGD Min Flow: 1.06 MGD

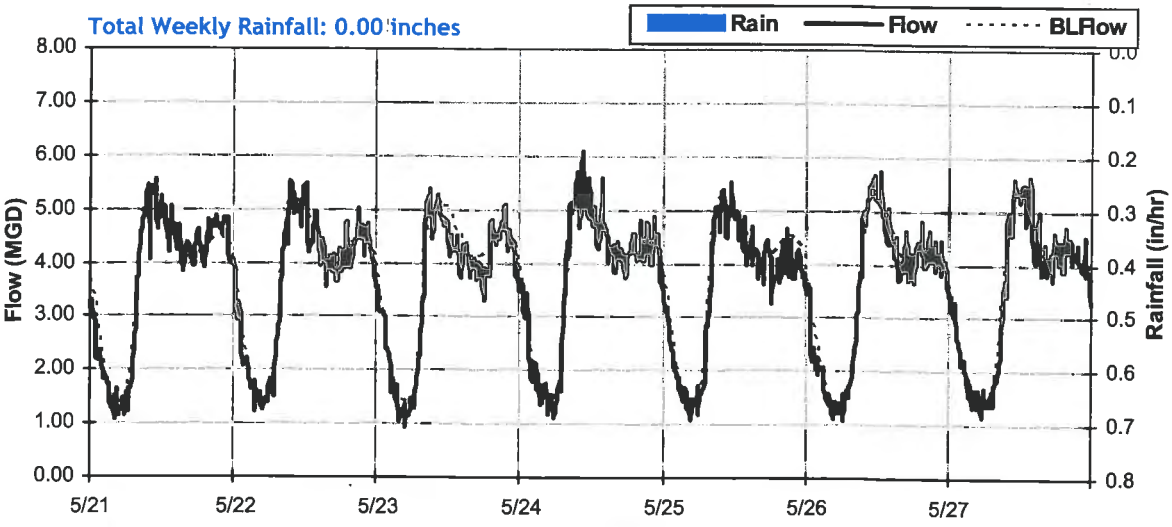
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 3





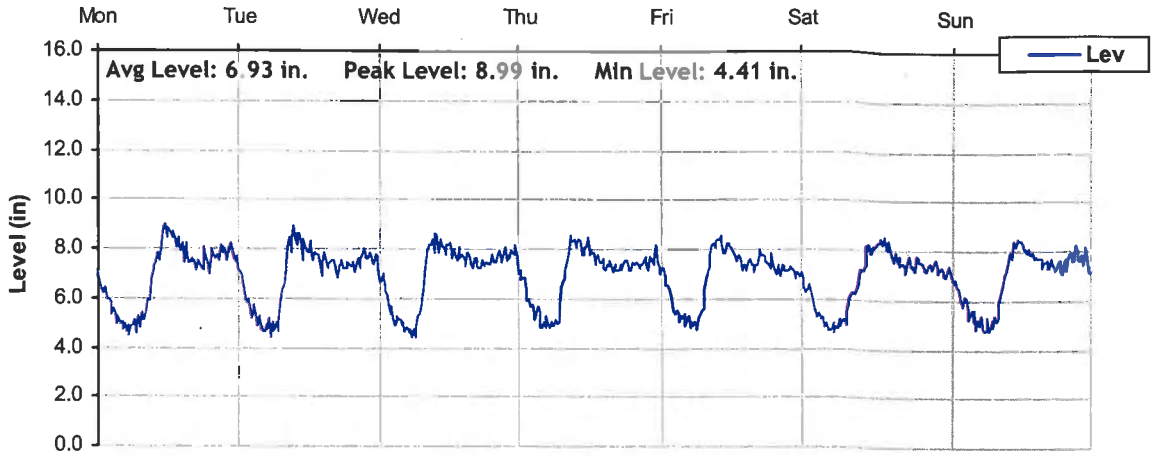


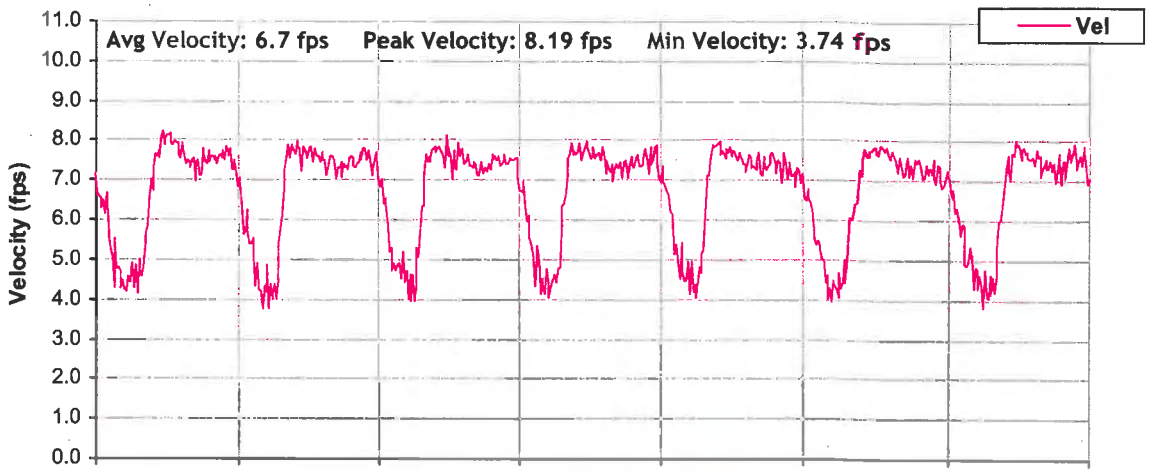
Avg Flow: 3.6 MGD Peak Flow: 6.1 MGD Min Flow: 0.94 MGD

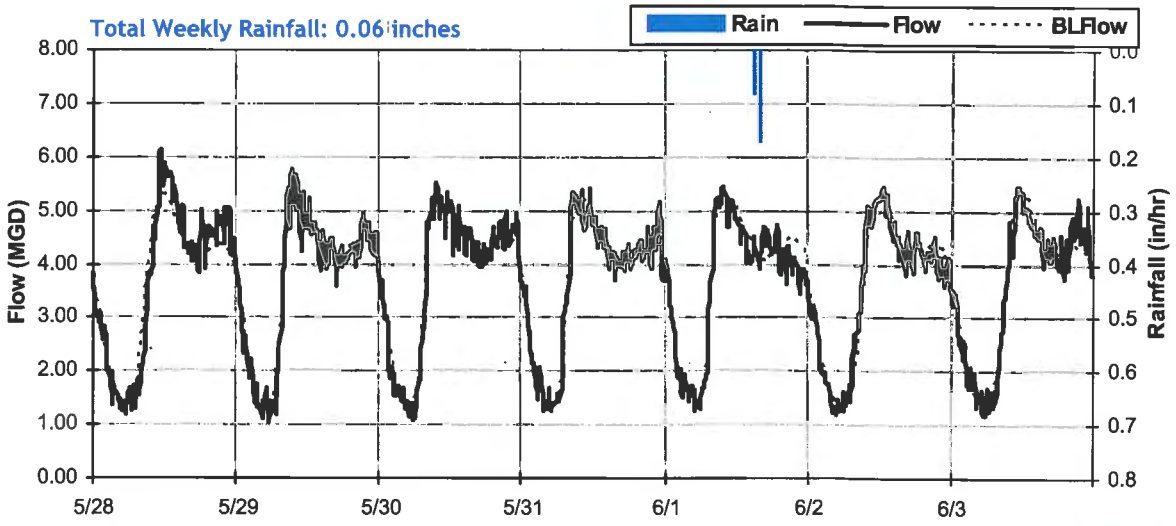
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 3





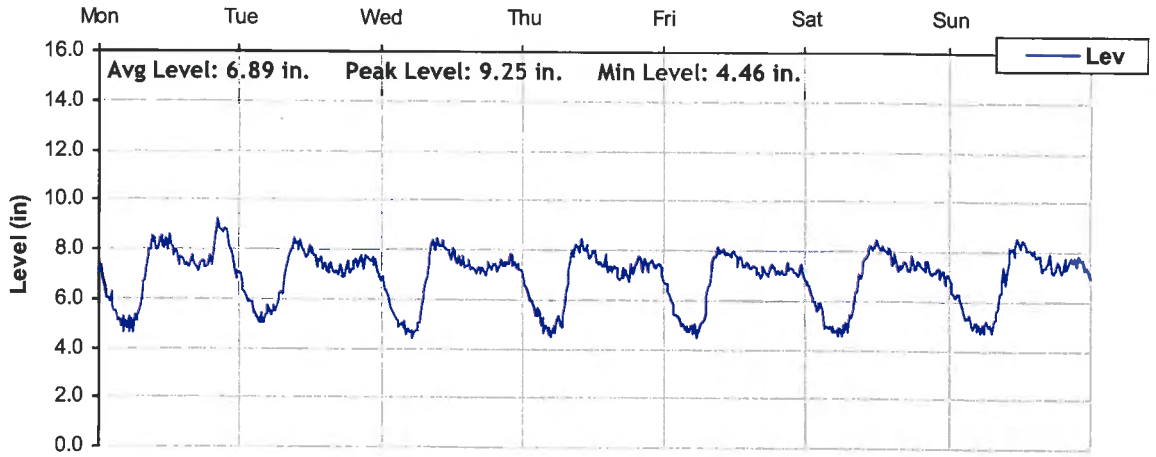


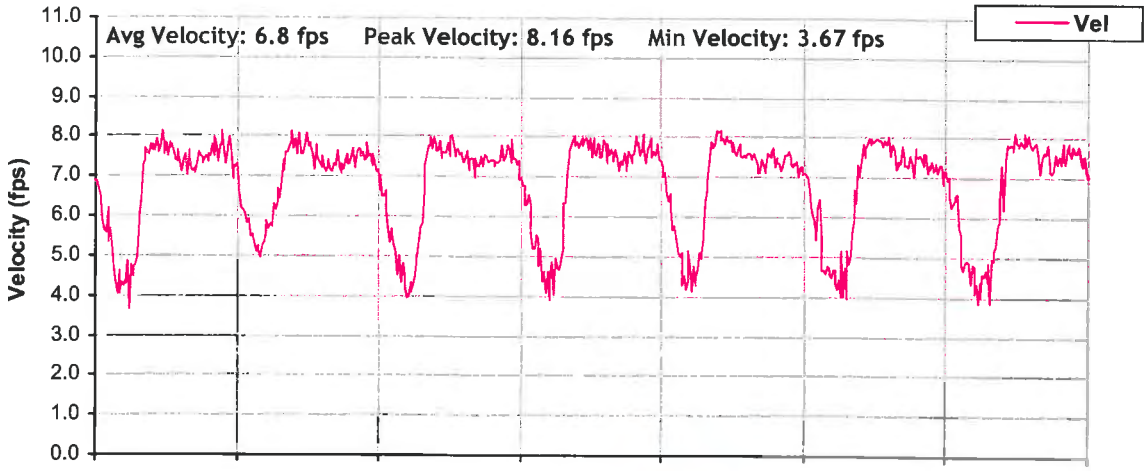
Avg Flow: 3.66 MGD Peak Flow: 6.13 MGD Min Flow: 1.03 MGD

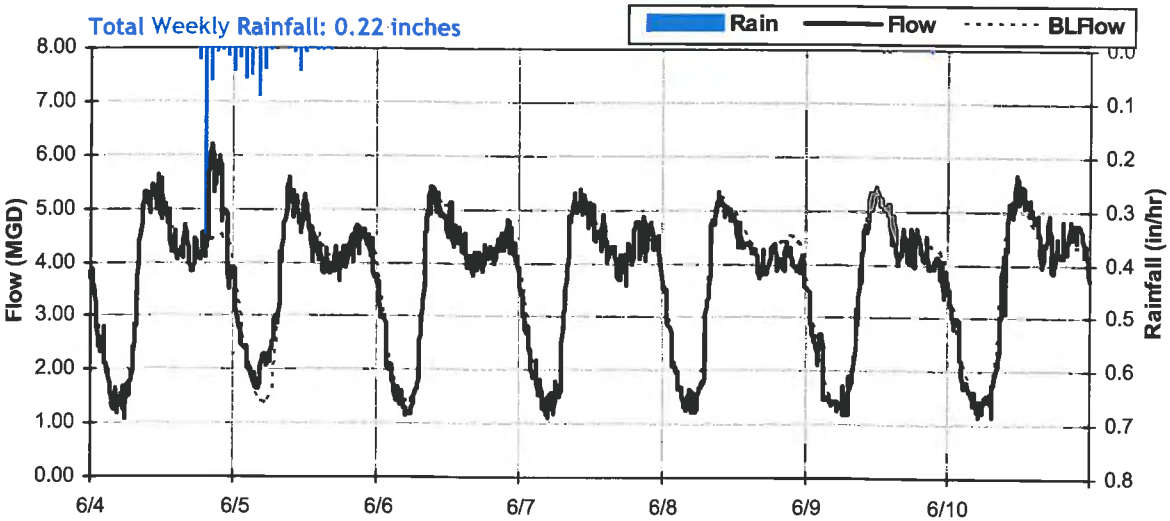
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 3





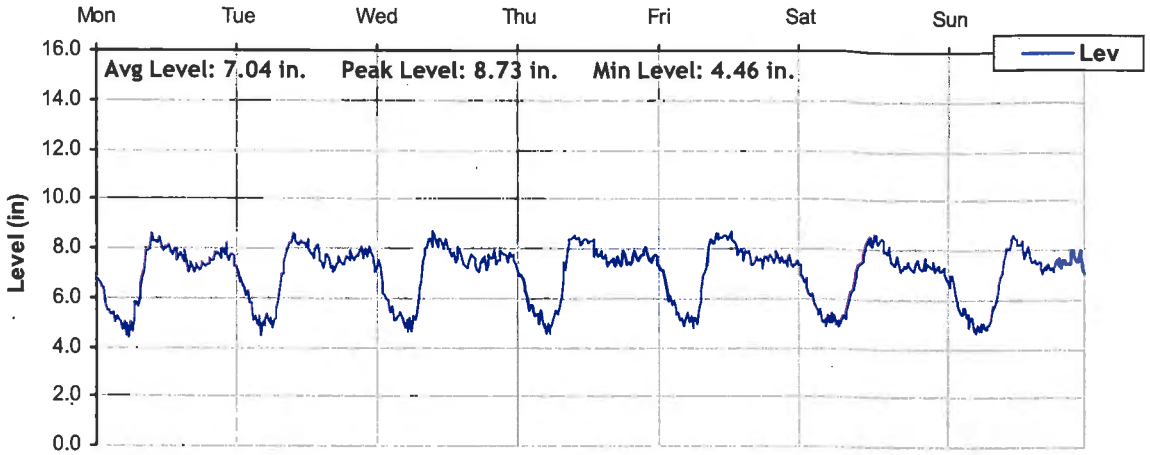


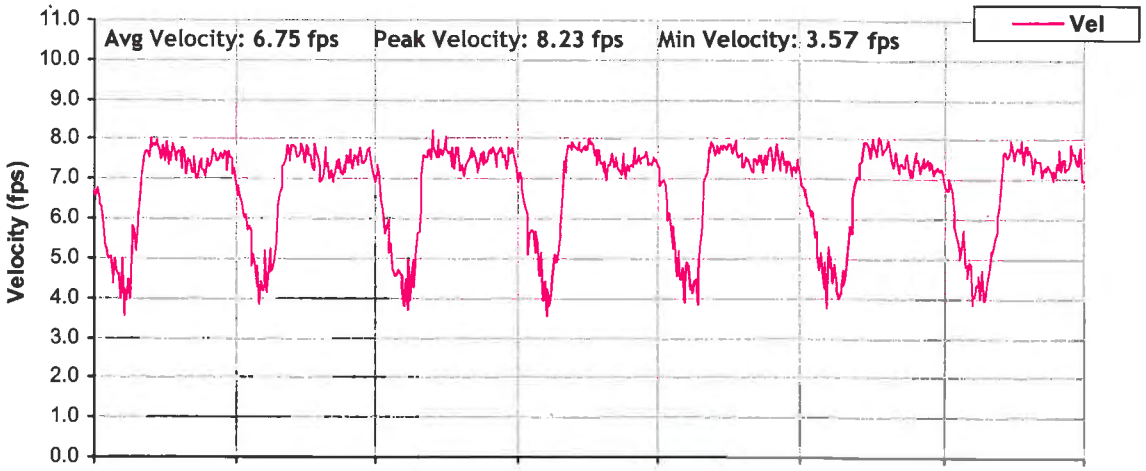
Avg Flow: 3.67 MGD Peak Flow: 6.19 MGD Min Flow: 1.08 MGD

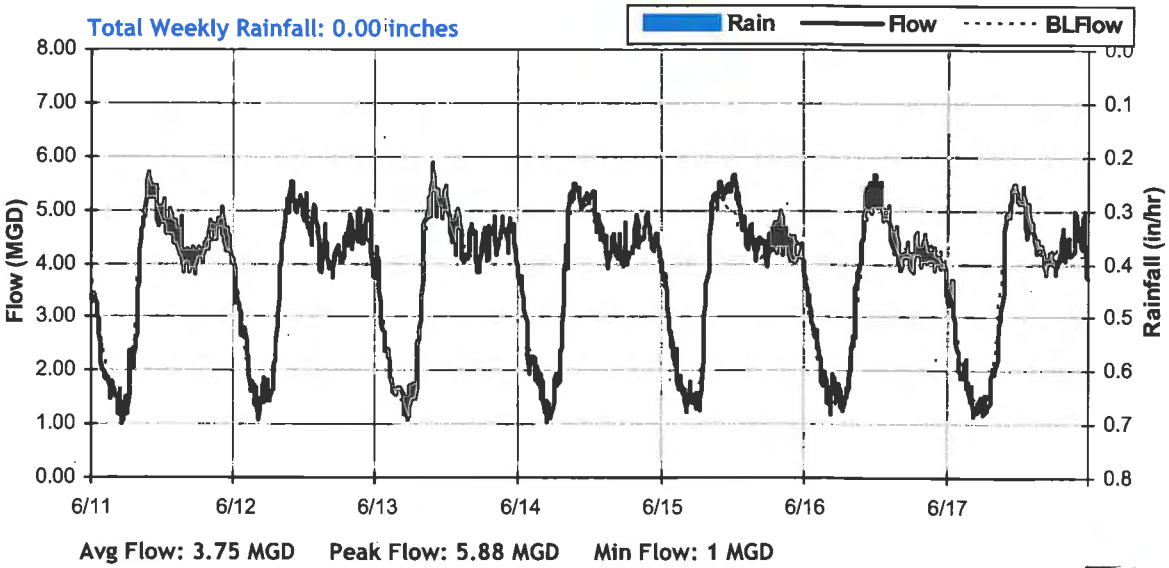
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 3





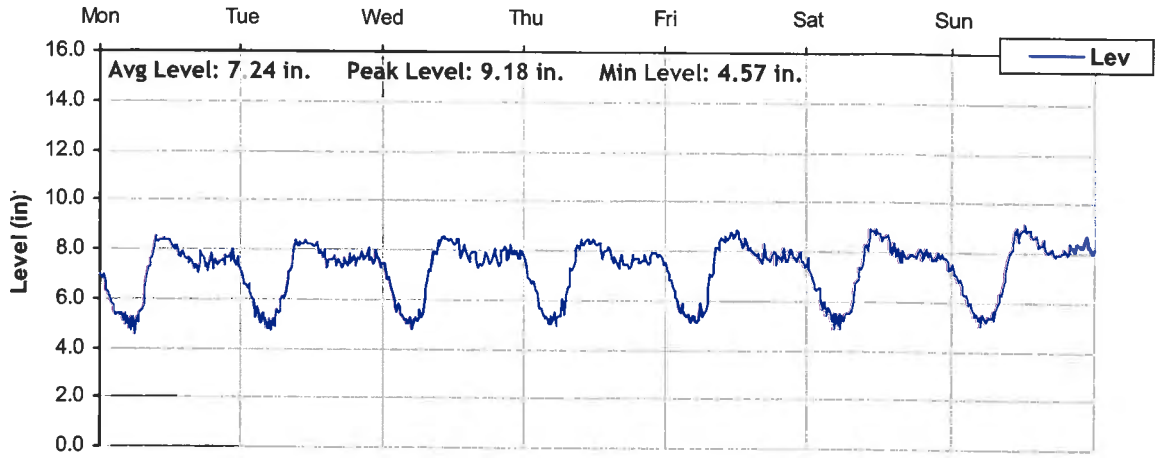


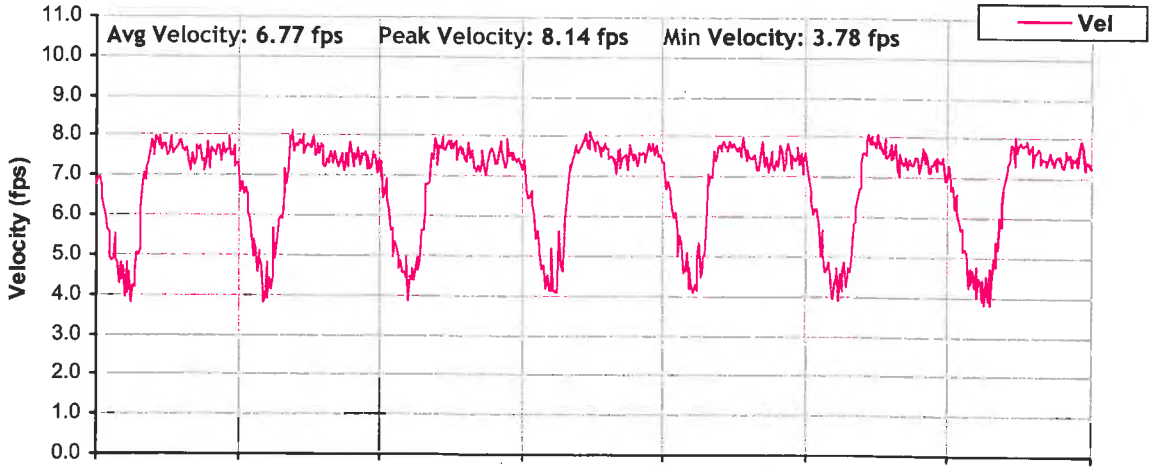
Avg Flow: 3.75 MGD Peak Flow: 5.88 MGD Min Flow: 1 MGD

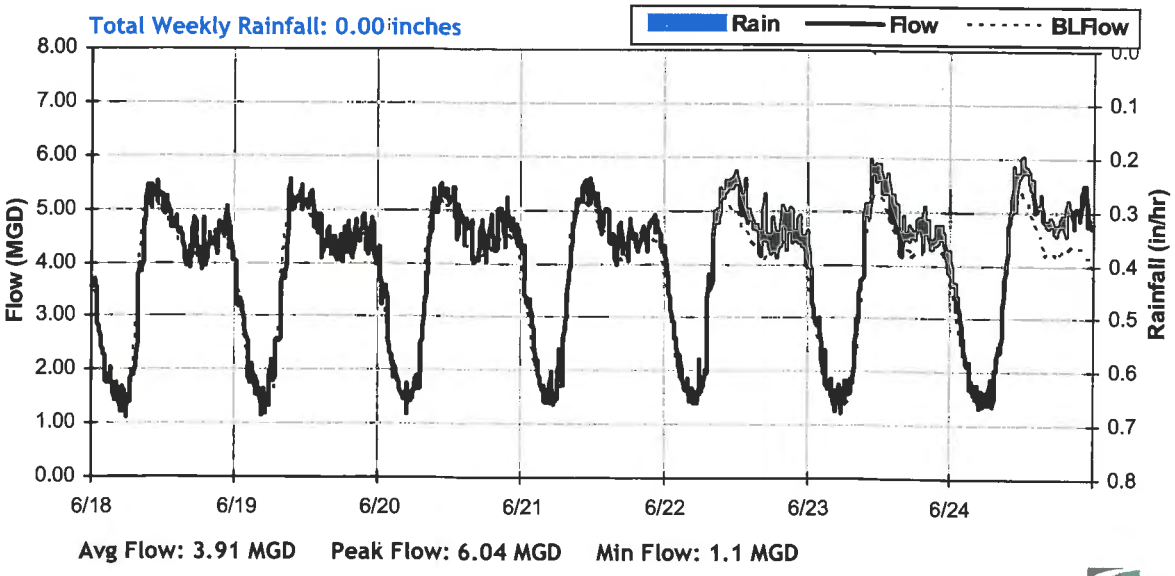
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 3





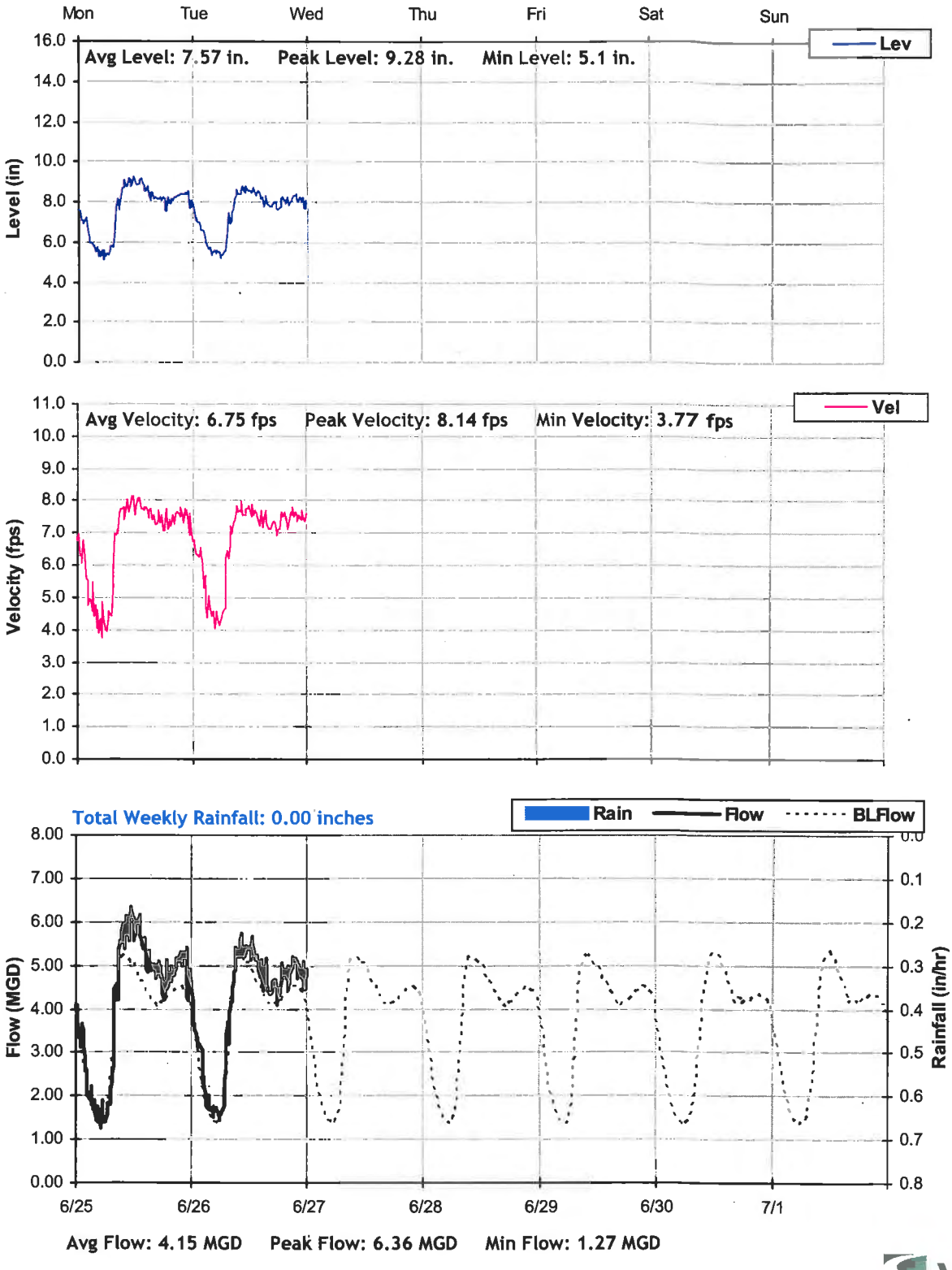


Avg Flow: 3.91 MGD Peak Flow: 6.04 MGD Min Flow: 1.1 MGD

V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 3



	Site Information Report	**Monitoring Site:** Site 4

Location:

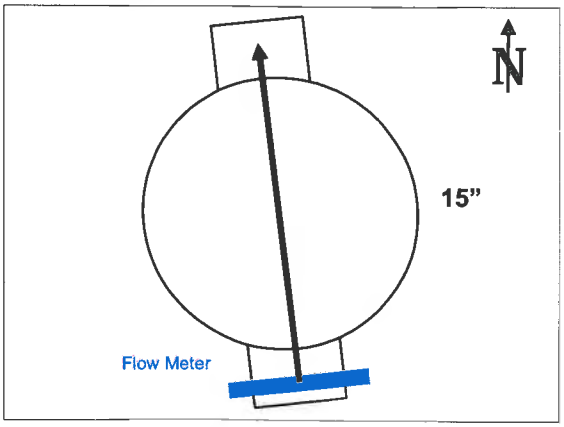
Diameter: 15 inches

Average Dry Weather Flow: 0.614 *MGD*

Peak Measured Flow: 1.372 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

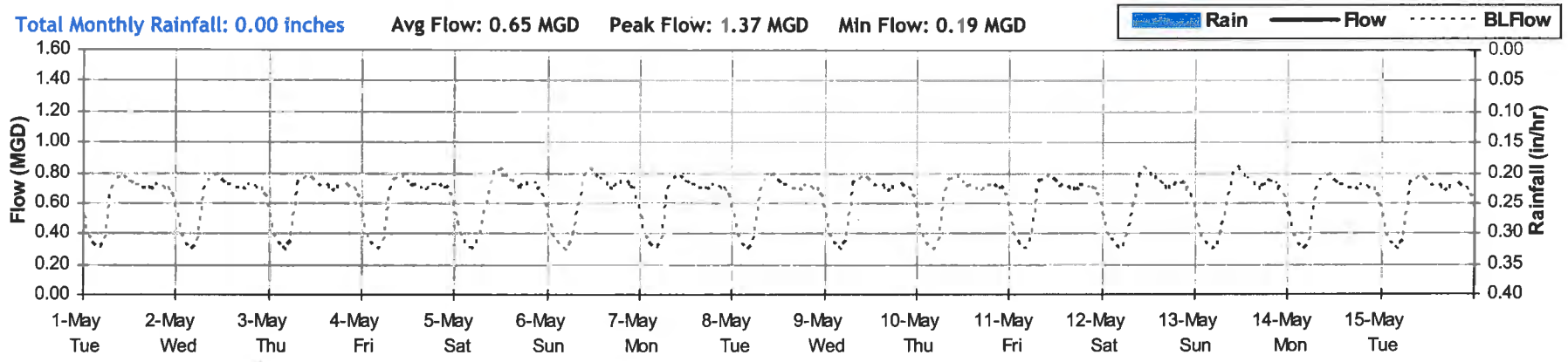
Plan view photo:

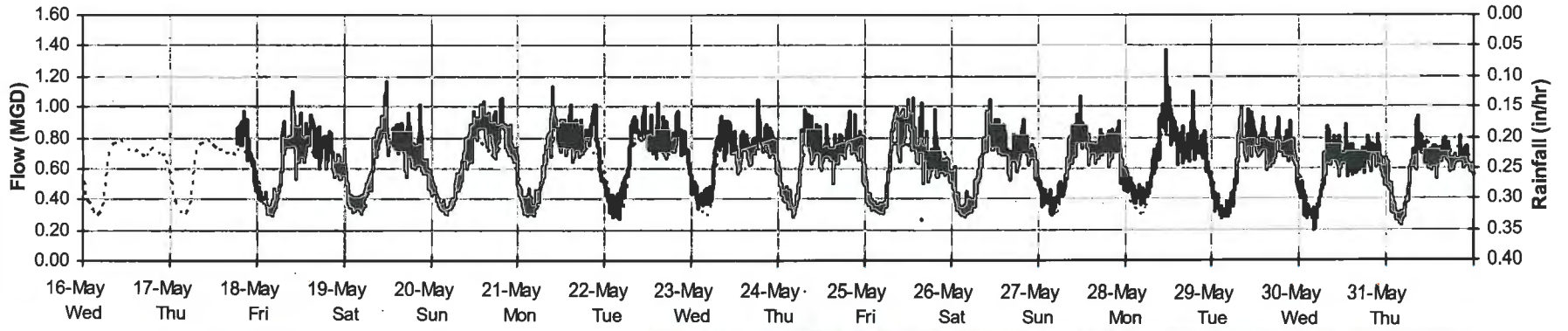
V&A

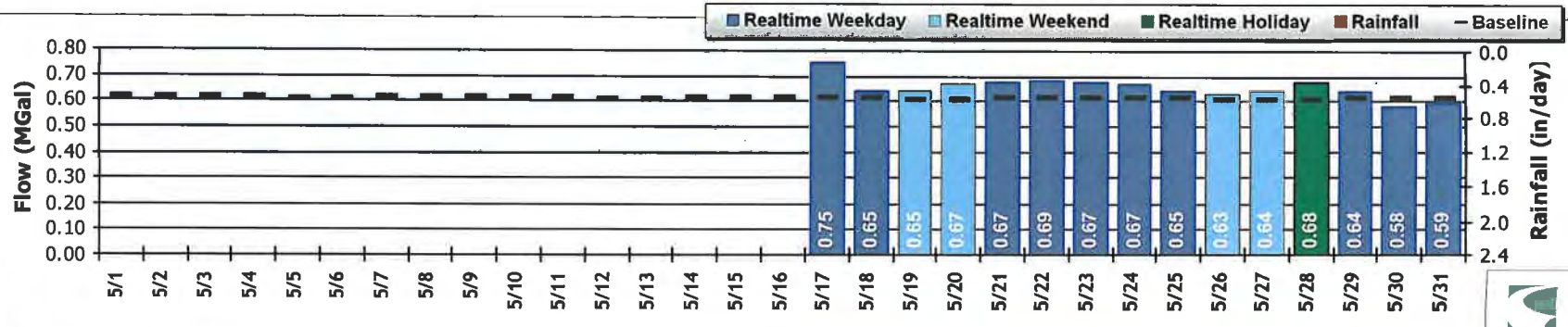
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 4

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.65 MGD Peak Flow: 1.37 MGD Min Flow: 0.19 MGD



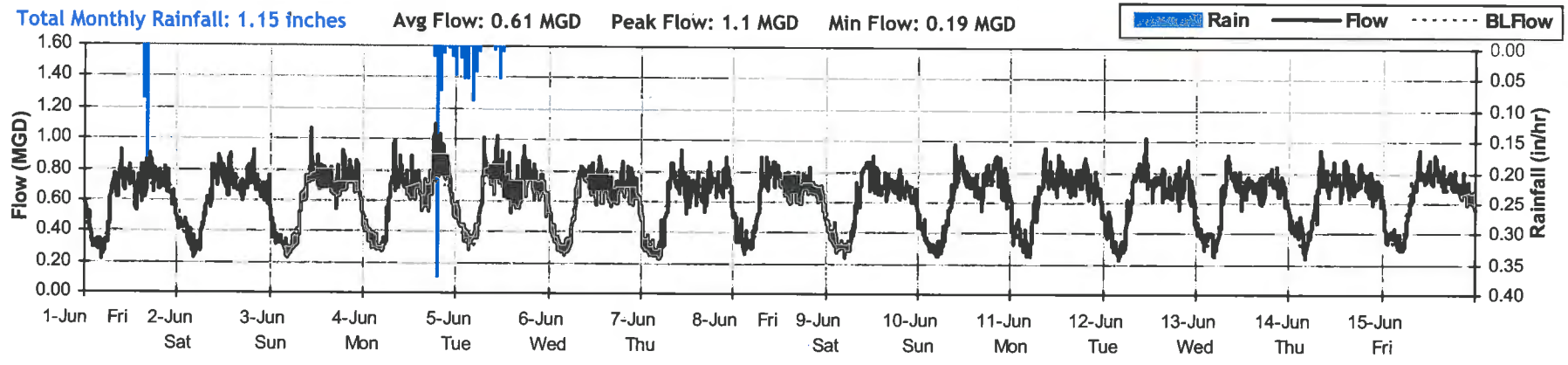


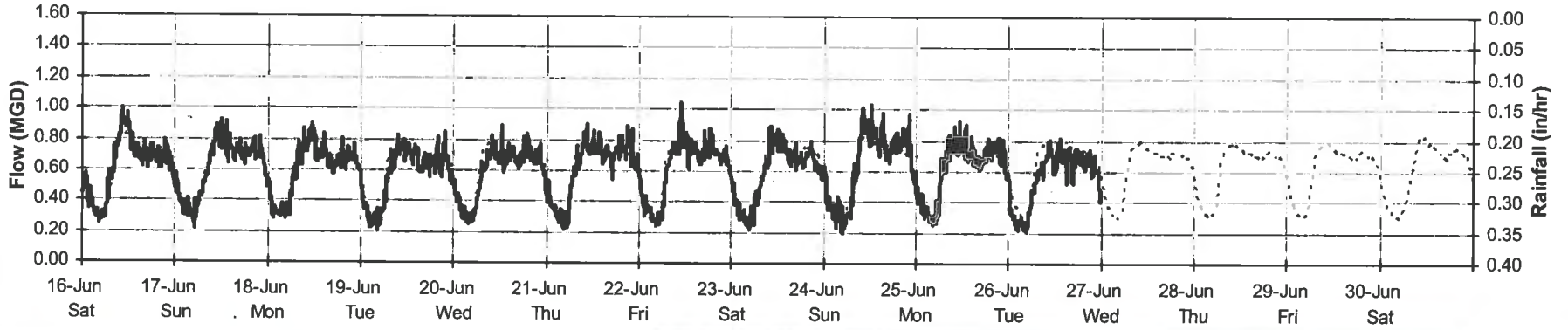


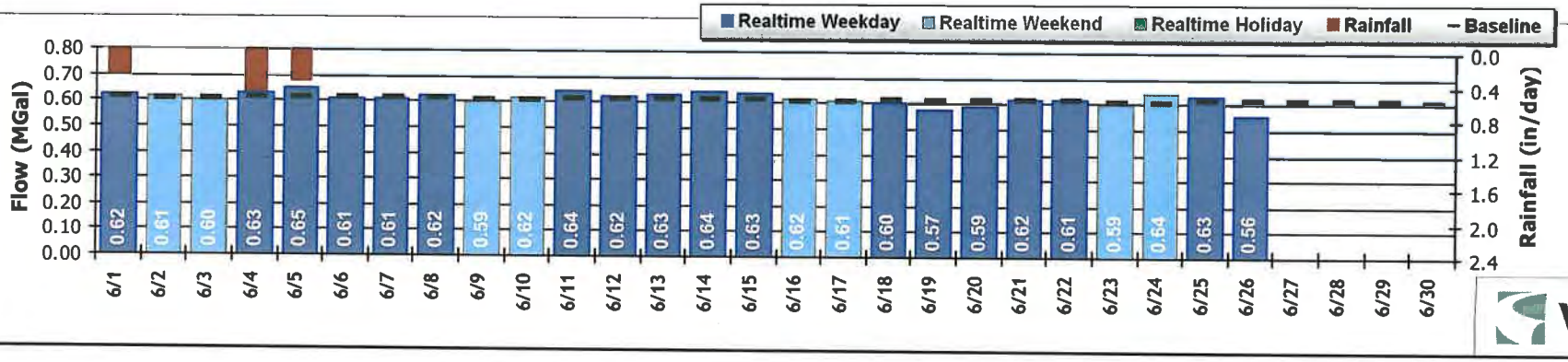
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 4

Total Monthly Rainfall: 1.15 inches Avg Flow: 0.61 MGD Peak Flow: 1.1 MGD Min Flow: 0.19 MGD





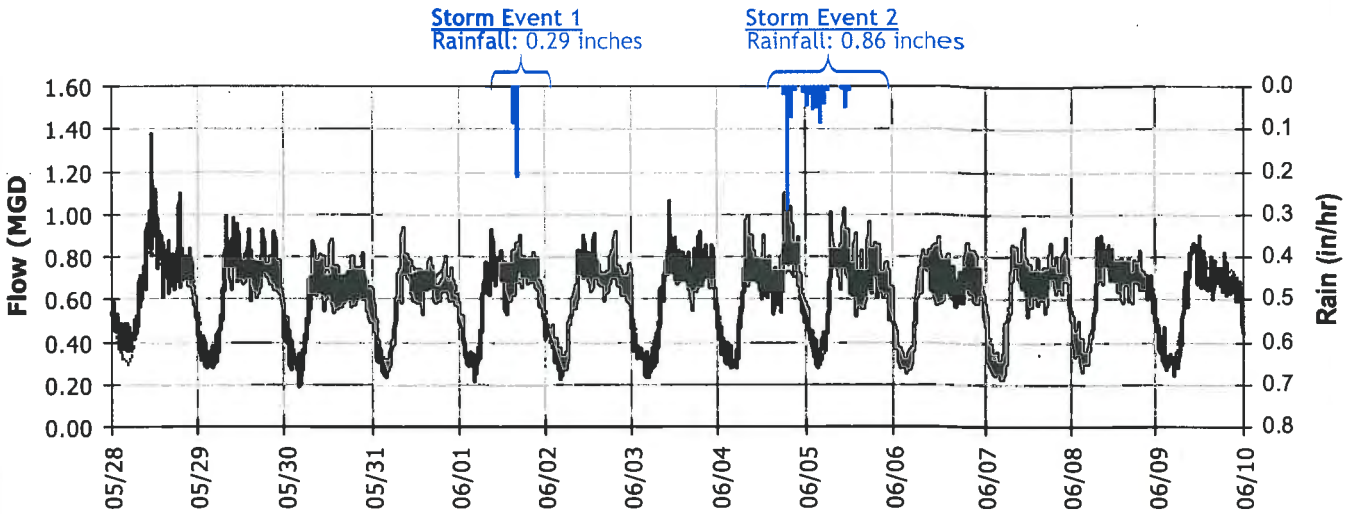


V&A

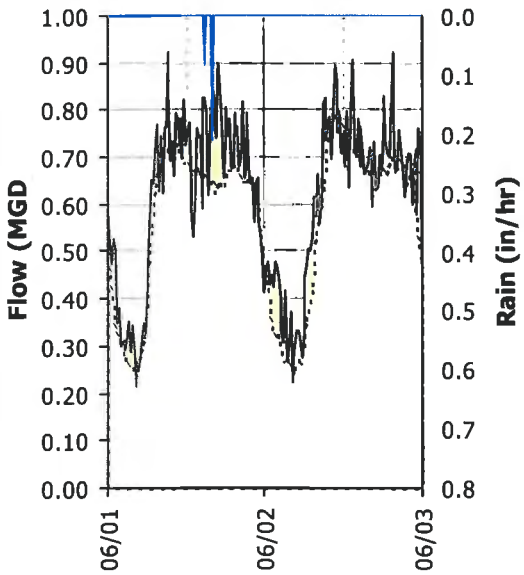
I/I Summary

Monitoring Site:
Site 4

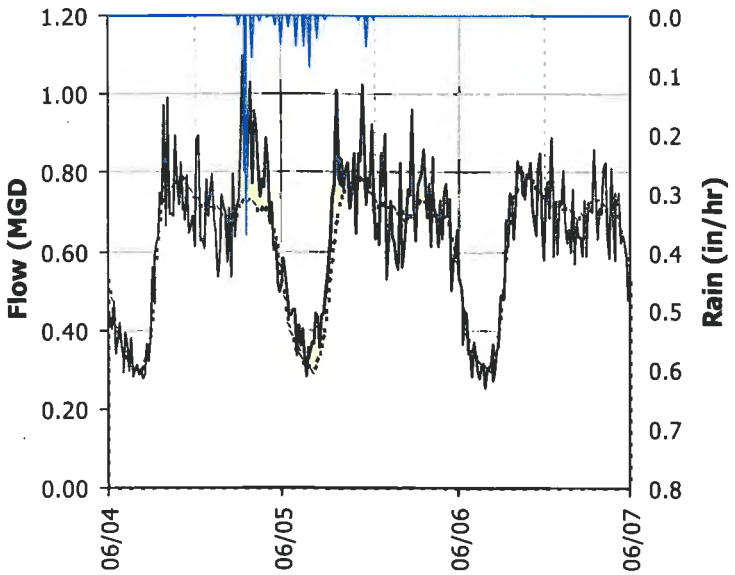
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.29	*inches*
Peak Flow:	0.90	*MGD*
Peak I/I Rate:	0.21	*MGD*
PF:	1.47	
Pk I/I:ADWF:	0.34	
Peak Level:	3.87	*inches*
d/D Ratio:	0.26	
Total I/I:	14,000	*gallons*
RE1 R-Value:	0.1%	

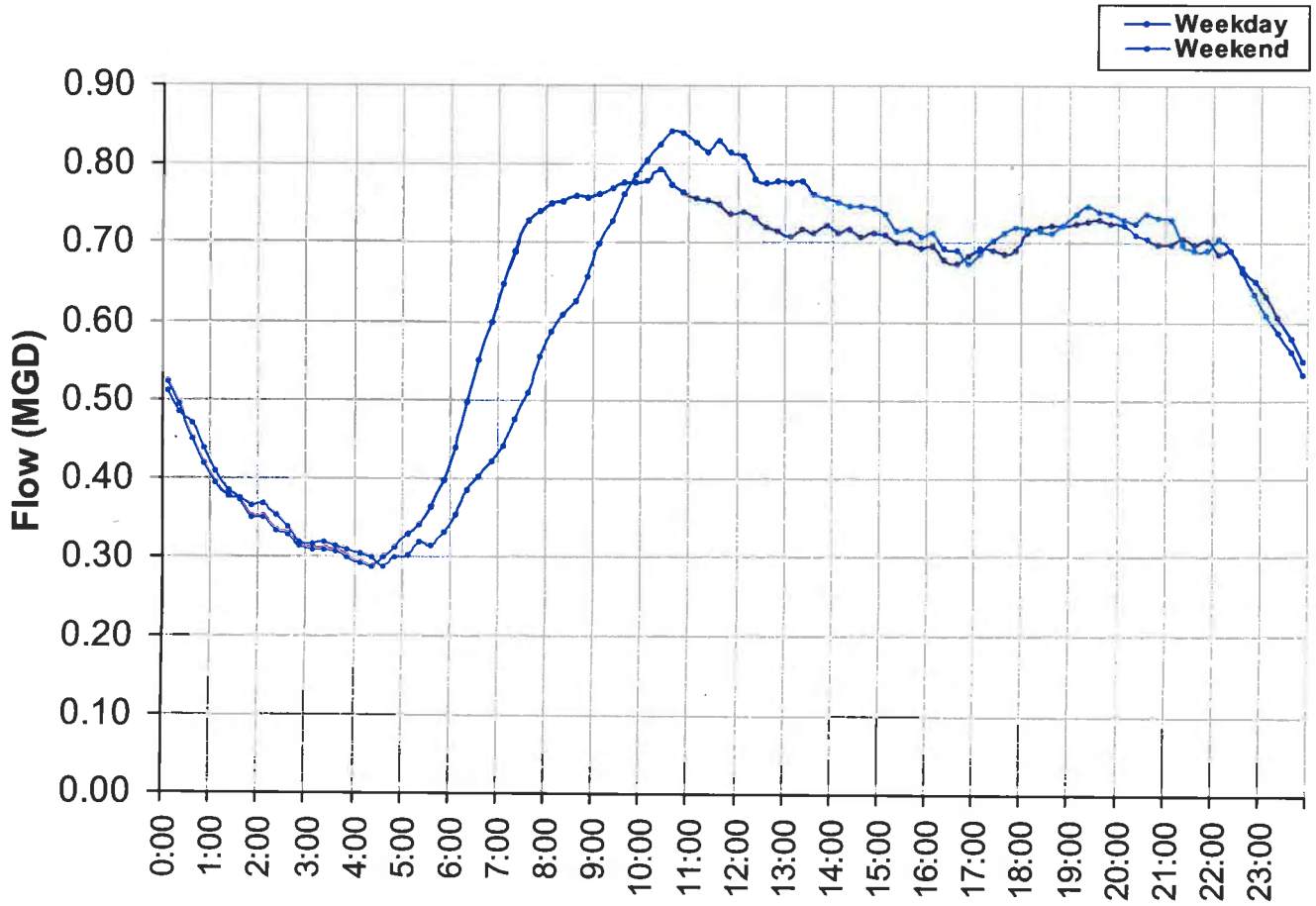
Storm Event #2 I/I Analysis

Rainfall:	0.86	*inches*
Peak Flow:	1.10	*MGD*
Peak I/I Rate:	0.37	*MGD*
PF:	1.79	
Pk I/I:ADWF:	0.61	
Peak Level:	4.32	*inches*
d/D Ratio:	0.29	
Total I/I:	53,000	*gallons*
RE2 R-Value:	0.1%	

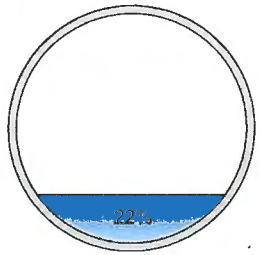
V&A

Average Dry Weather Flow

Monitoring Site:
Site 4



Average Dry Weather Flow:
0.61 *MGD*



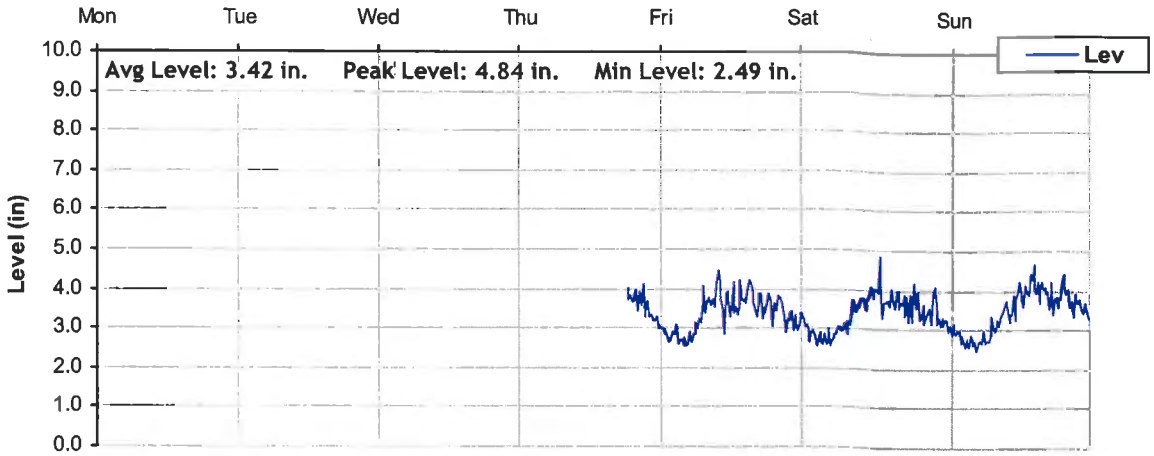
V&A

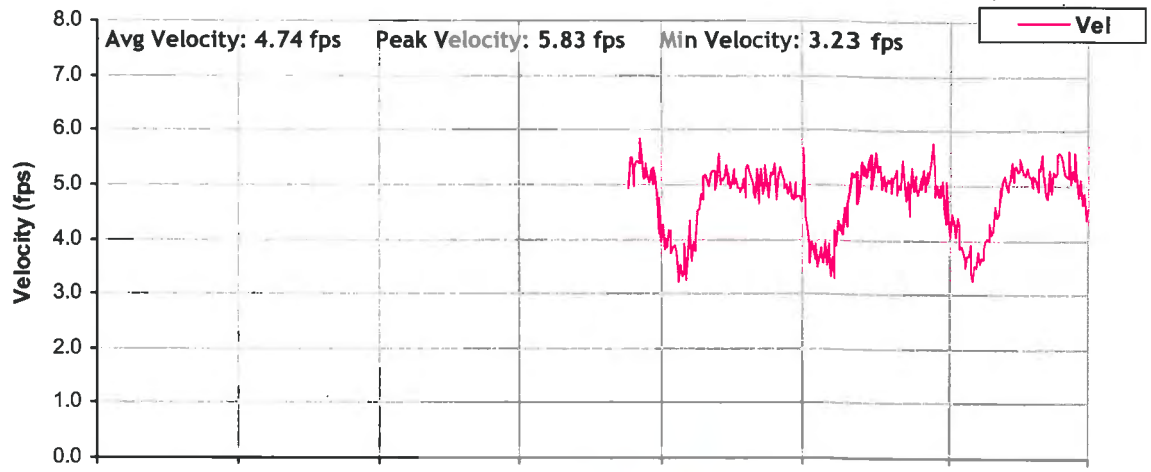
Level, Velocity and Flow

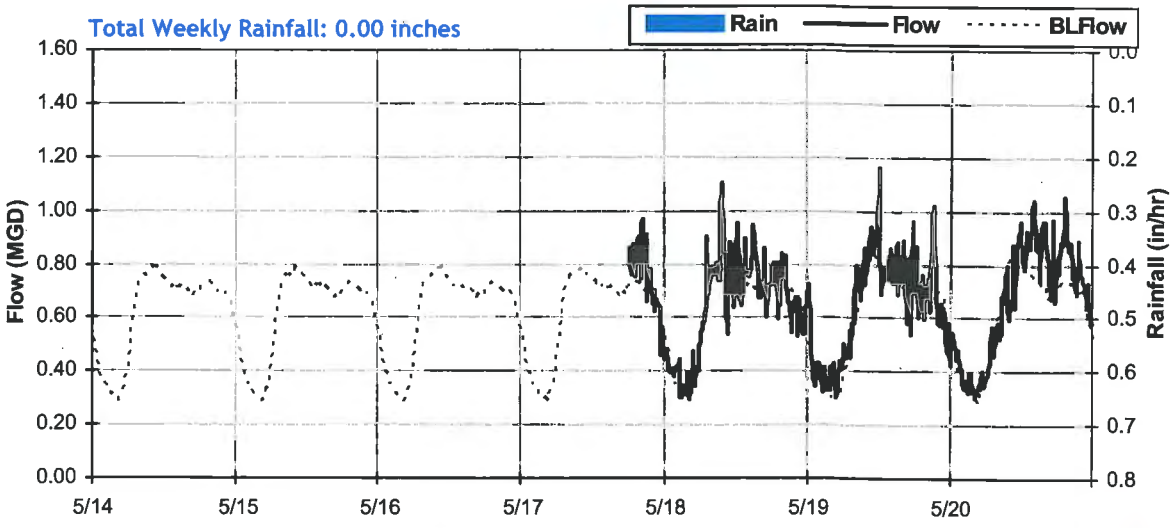
From 5/14/2007 to 5/21/2007

Monitoring Site:

Site 4





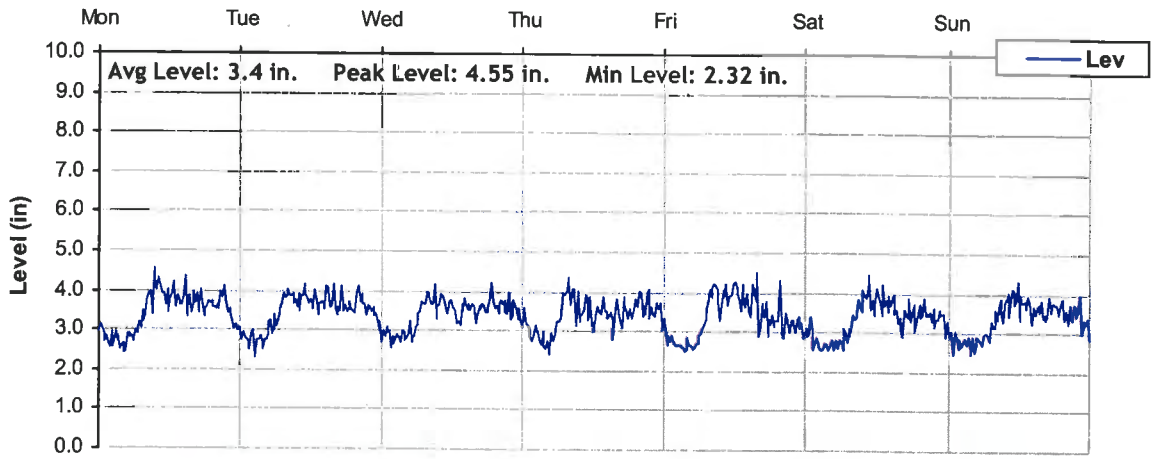


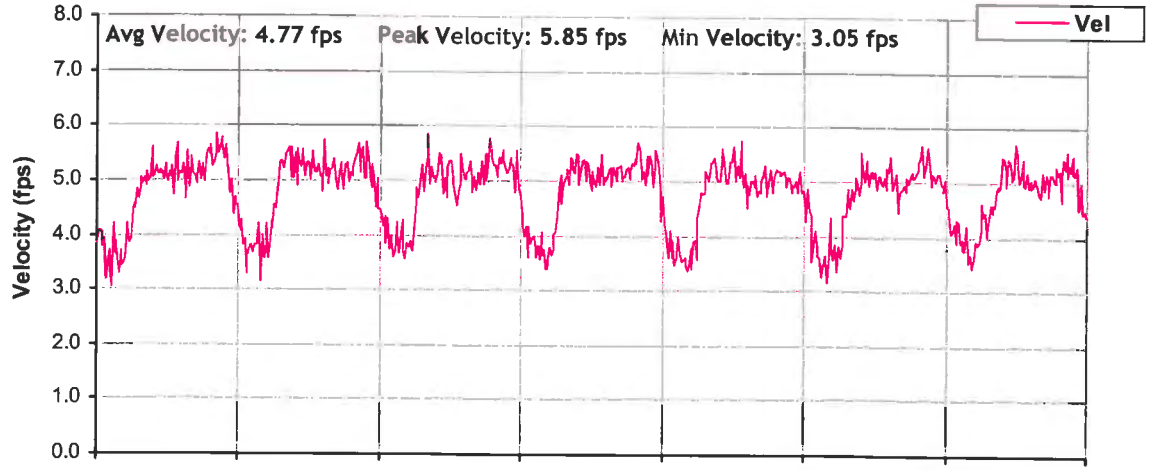
Avg Flow: 0.66 MGD Peak Flow: 1.16 MGD Min Flow: 0.3 MGD

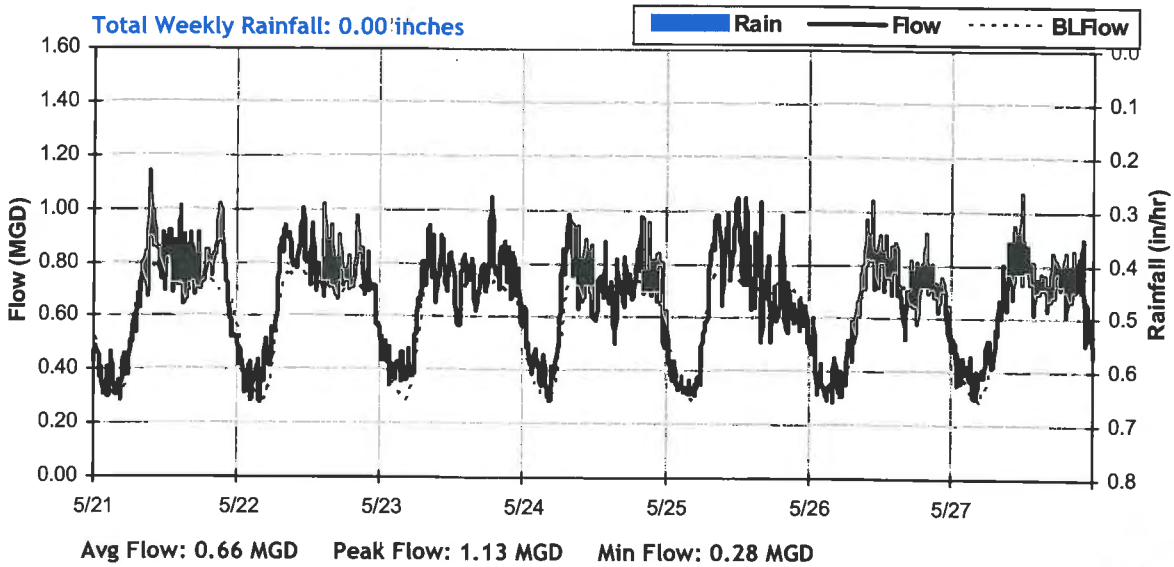
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 4





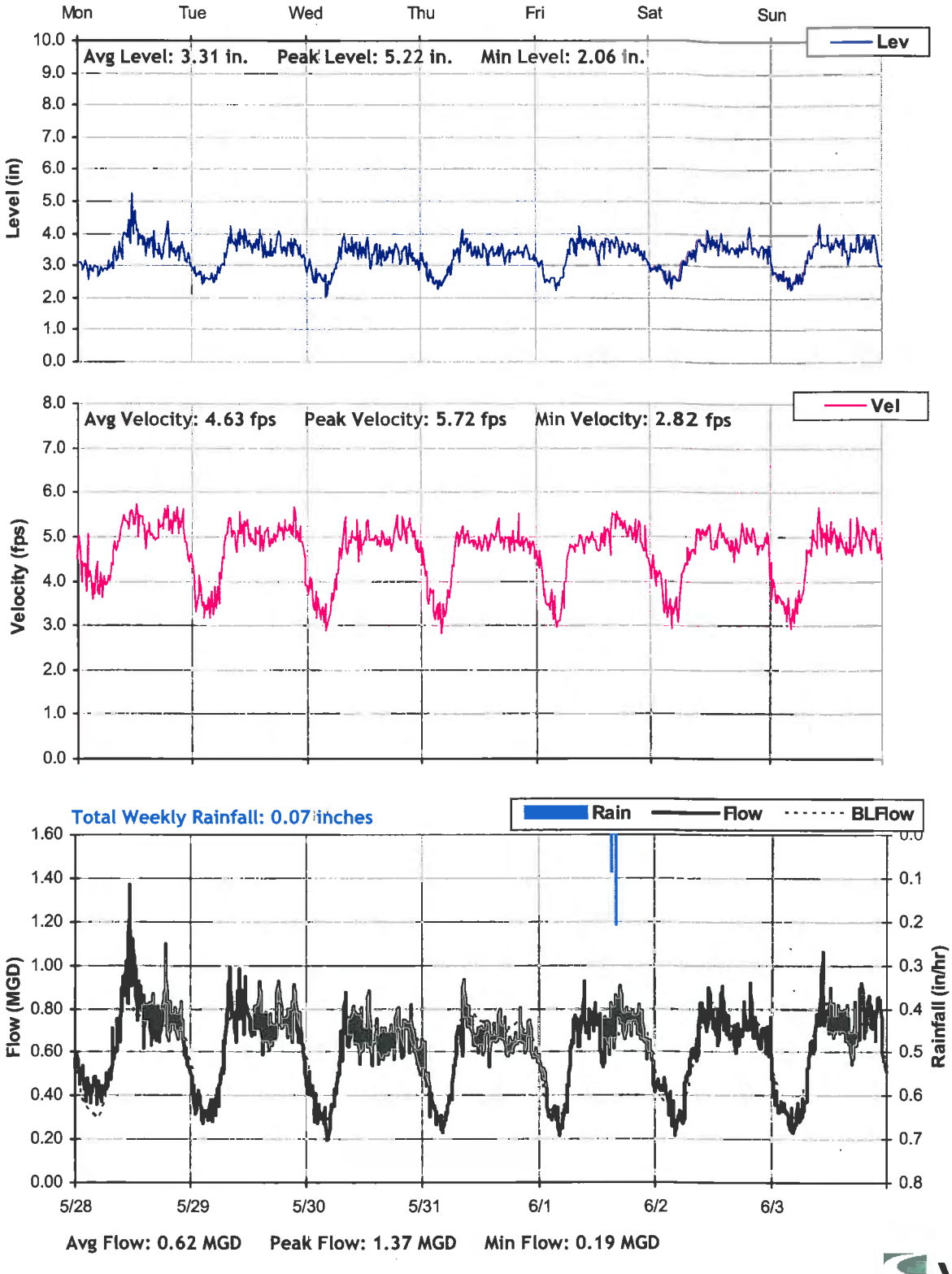


Avg Flow: 0.66 MGD Peak Flow: 1.13 MGD Min Flow: 0.28 MGD

V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

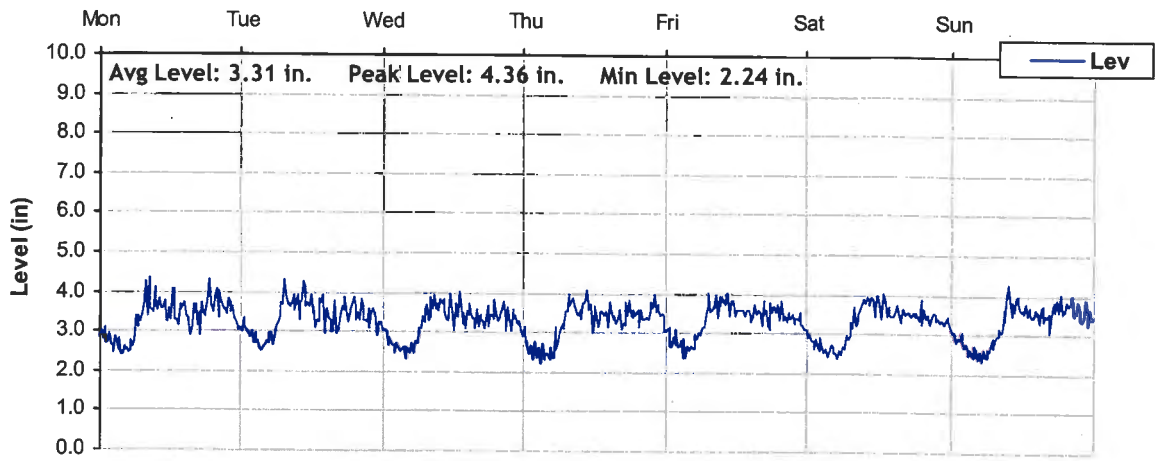
Monitoring Site:
Site 4

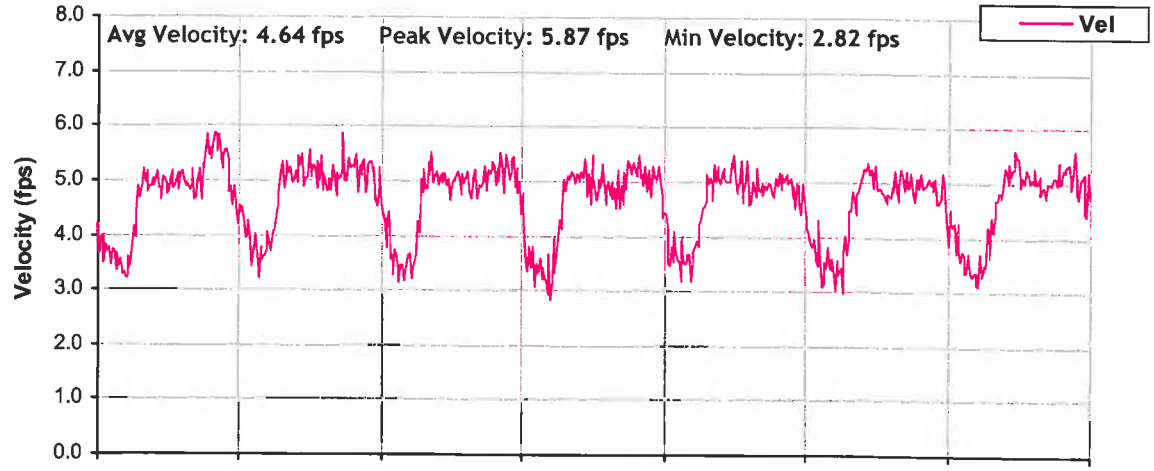


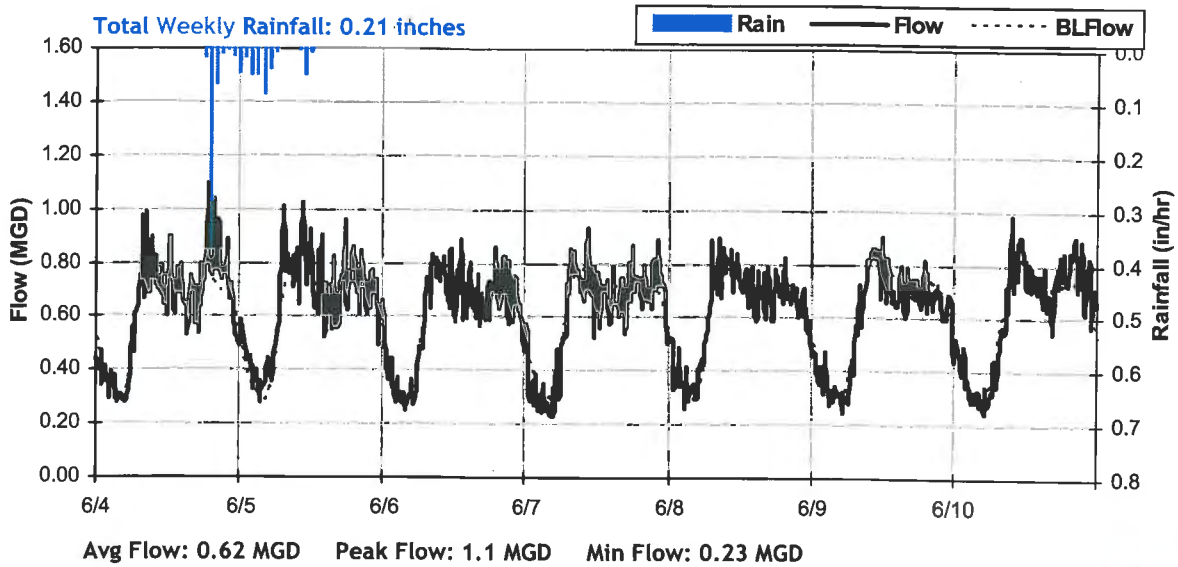
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 4





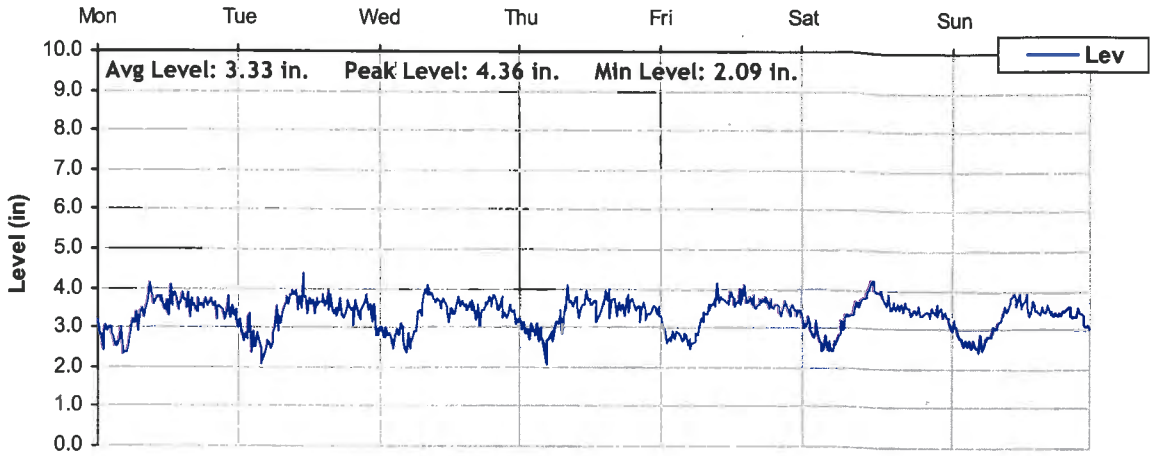


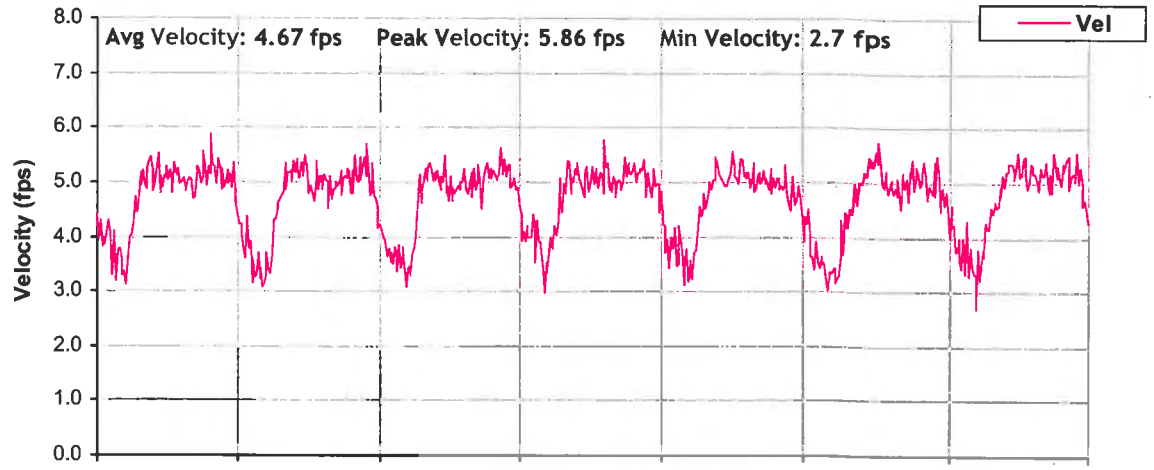
Avg Flow: 0.62 MGD Peak Flow: 1.1 MGD Min Flow: 0.23 MGD

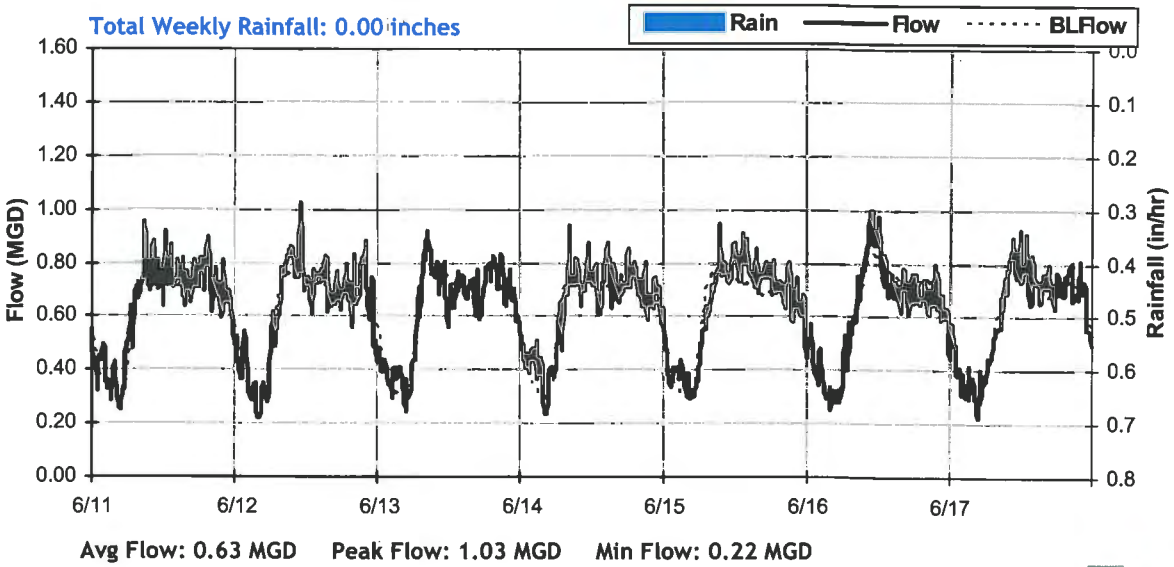
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 4





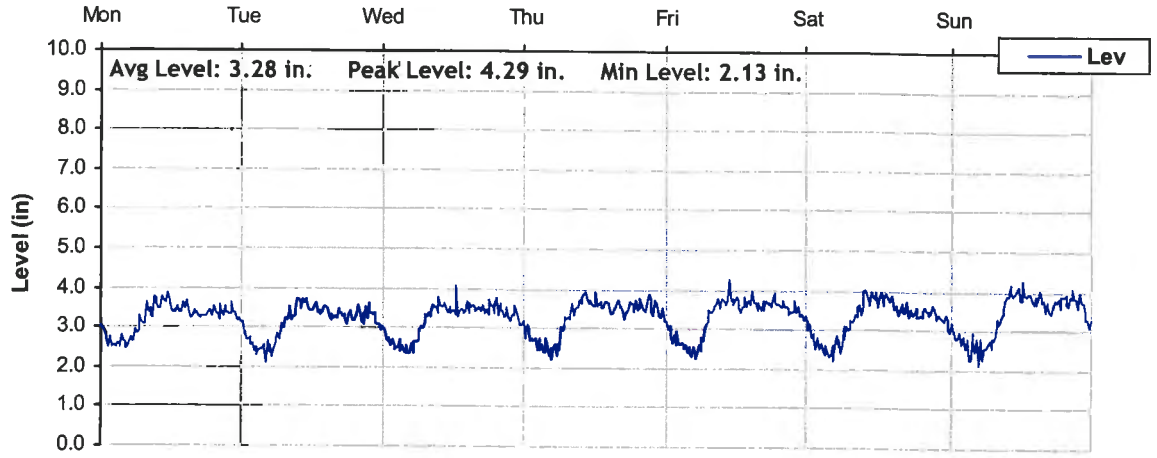


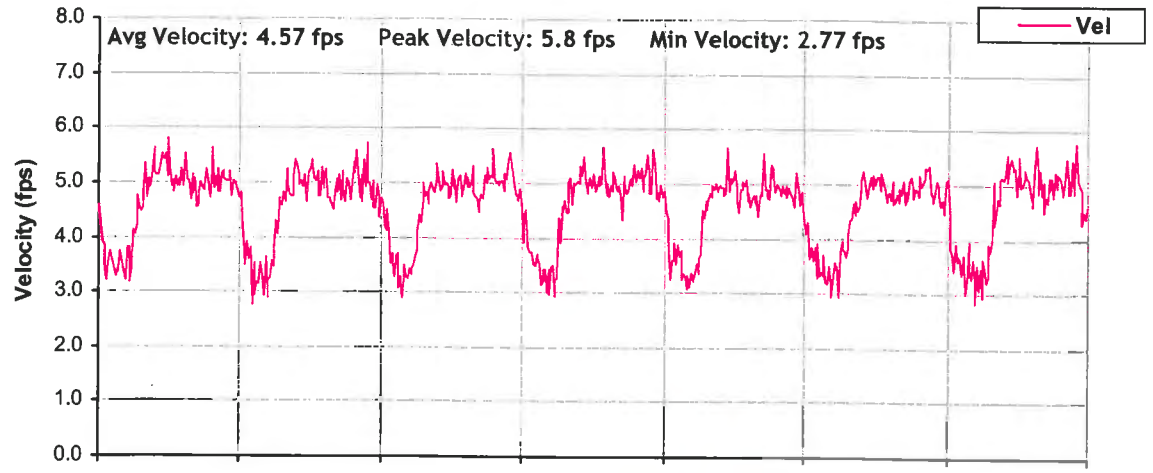
Avg Flow: 0.63 MGD Peak Flow: 1.03 MGD Min Flow: 0.22 MGD

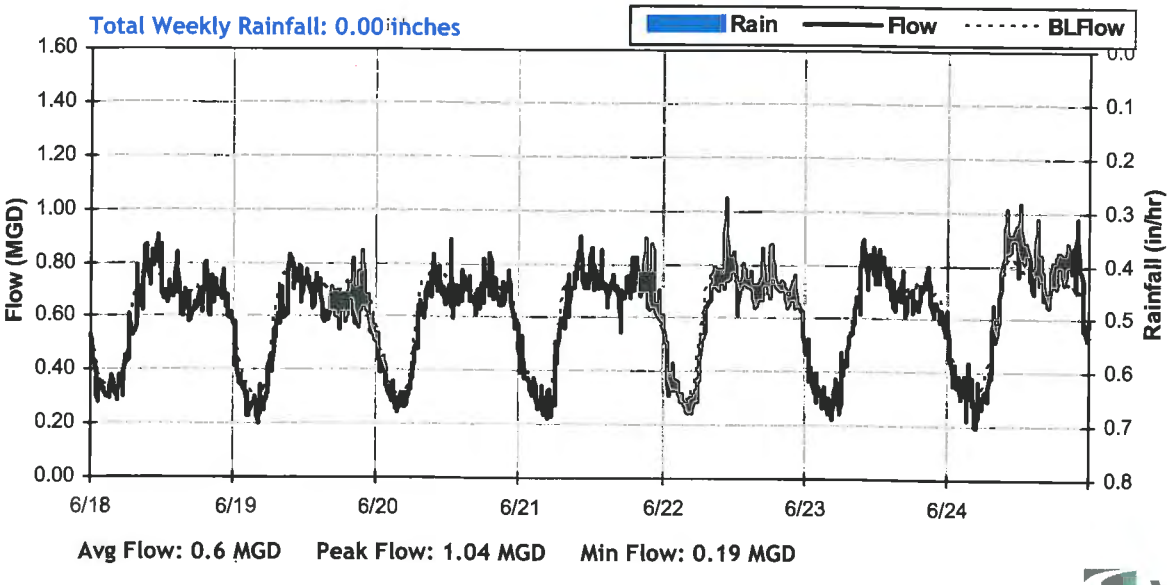
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 4





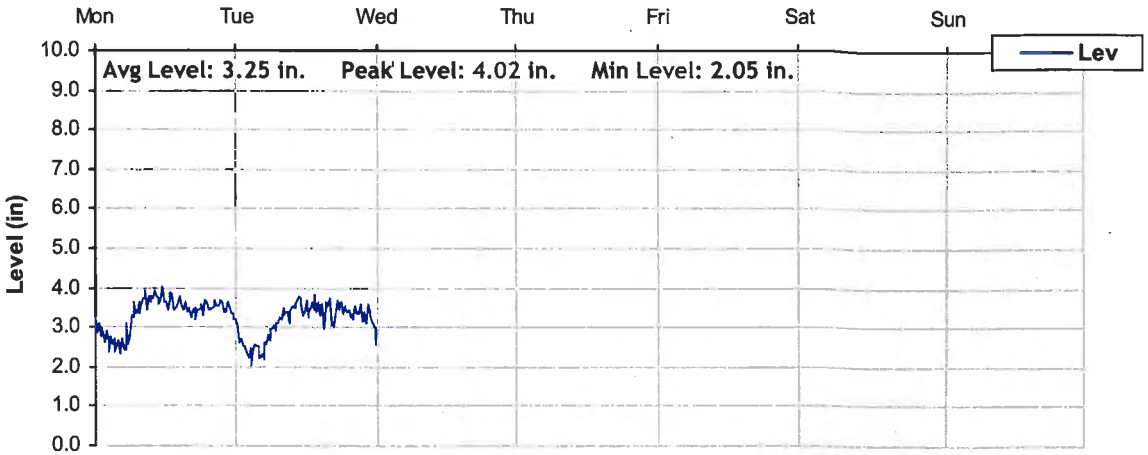


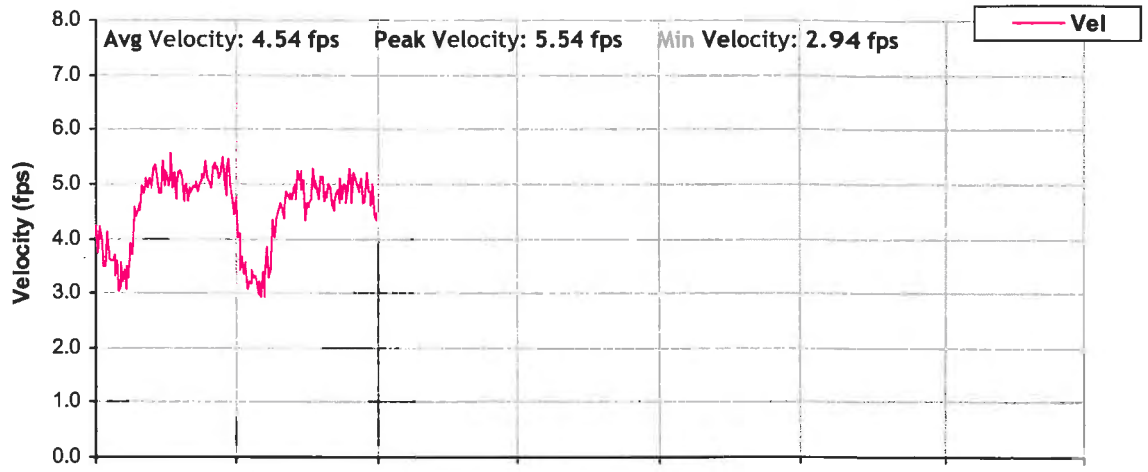
Avg Flow: 0.6 MGD Peak Flow: 1.04 MGD Min Flow: 0.19 MGD

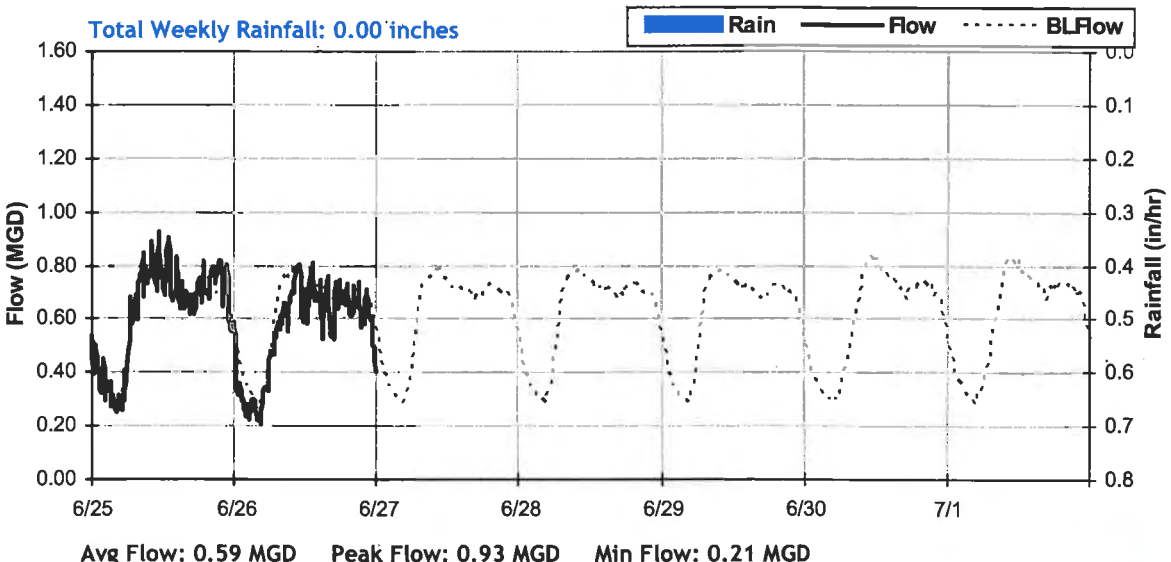
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 4







Avg Flow: 0.59 MGD Peak Flow: 0.93 MGD Min Flow: 0.21 MGD

V&A

	Site Information Report	**Monitoring Site:** Site 5

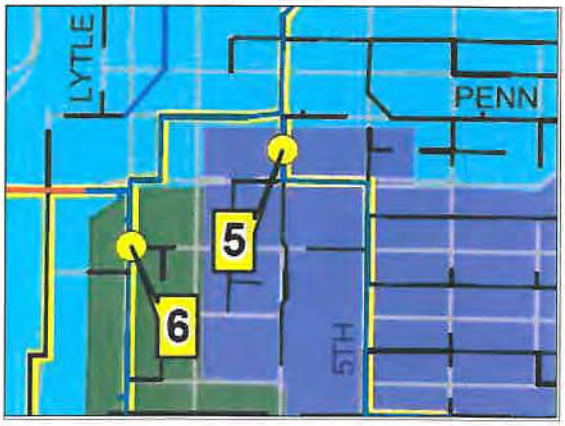
Location:

Diameter: 18 inches

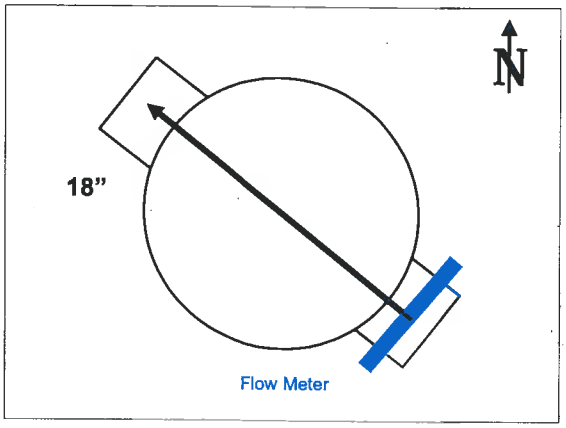
Average Dry Weather Flow: 0.370 *MGD*

Peak Measured Flow: 1.165 *MGD*

Sanitary sewer map:



Flow sketch:



Street-level photo:

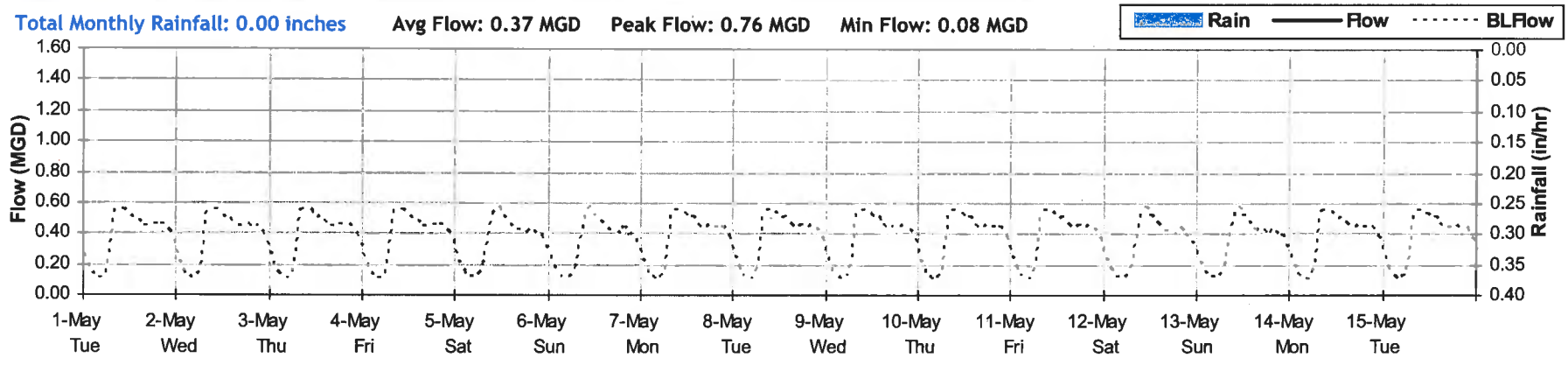
Plan view photo:

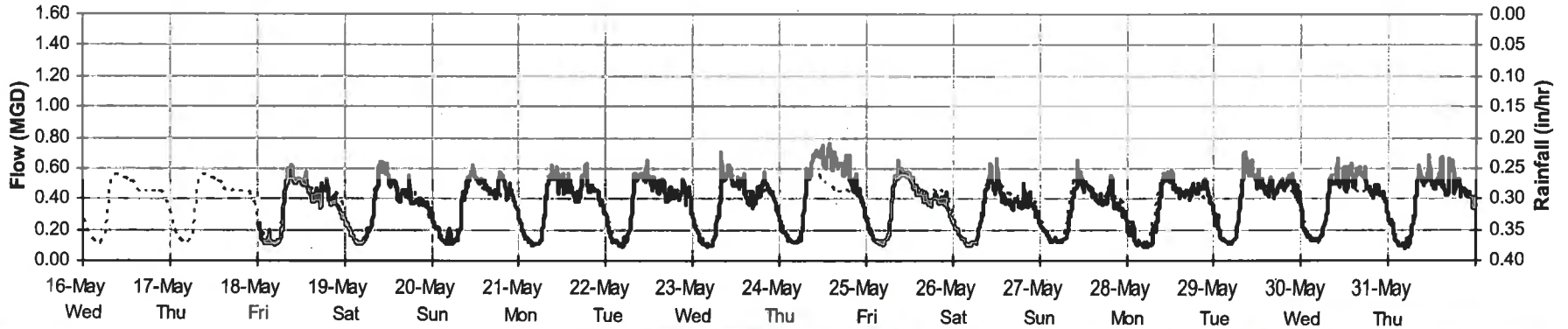
V&A

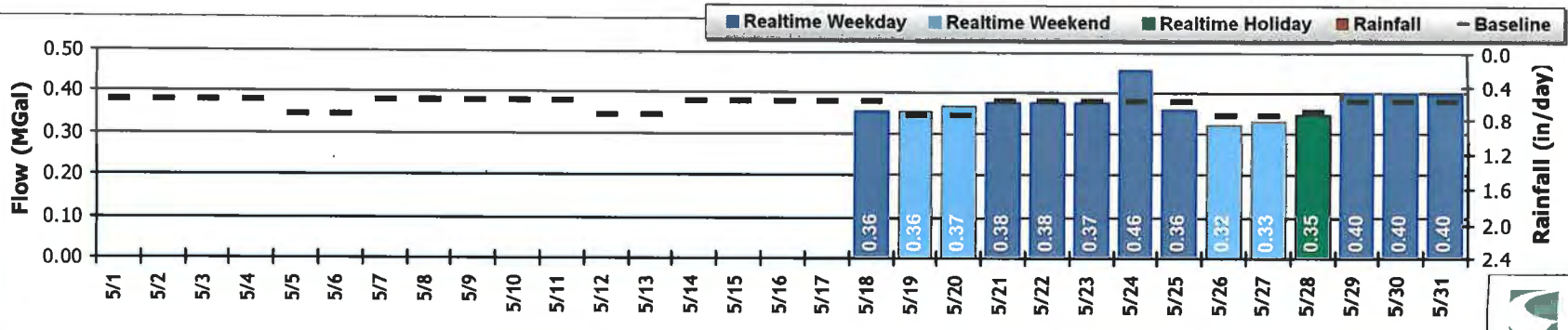
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 5

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.37 MGD Peak Flow: 0.76 MGD Min Flow: 0.08 MGD





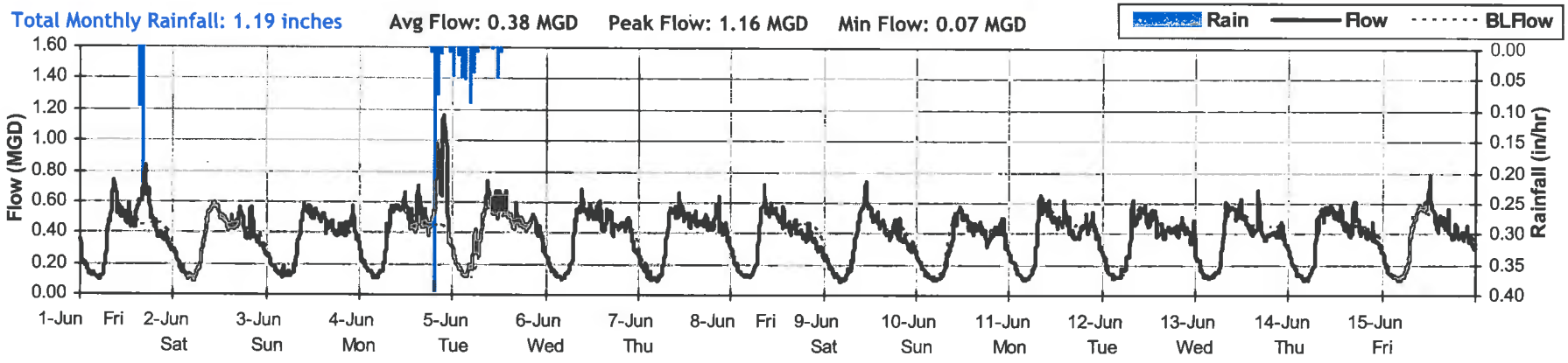


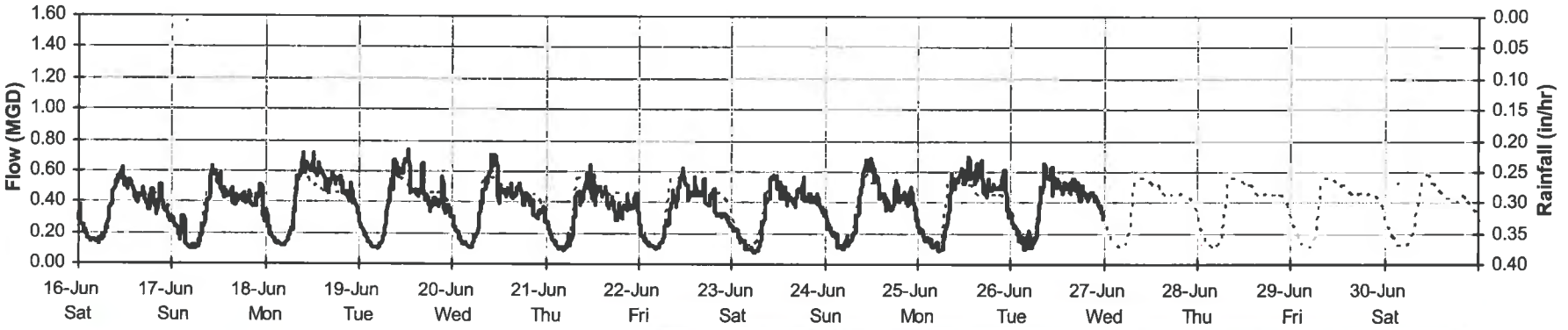
V&A

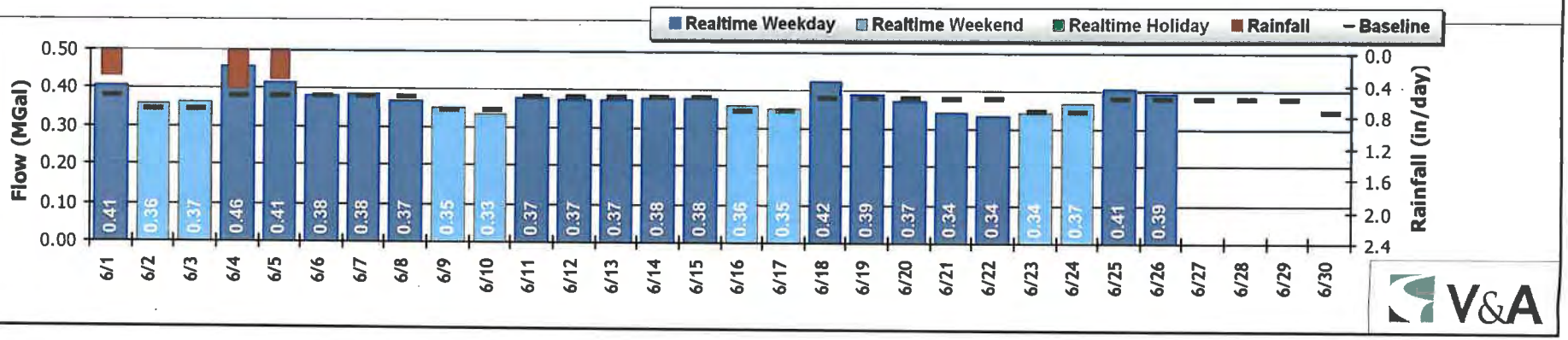
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 5

Total Monthly Rainfall: 1.19 inches Avg Flow: 0.38 MGD Peak Flow: 1.16 MGD Min Flow: 0.07 MGD





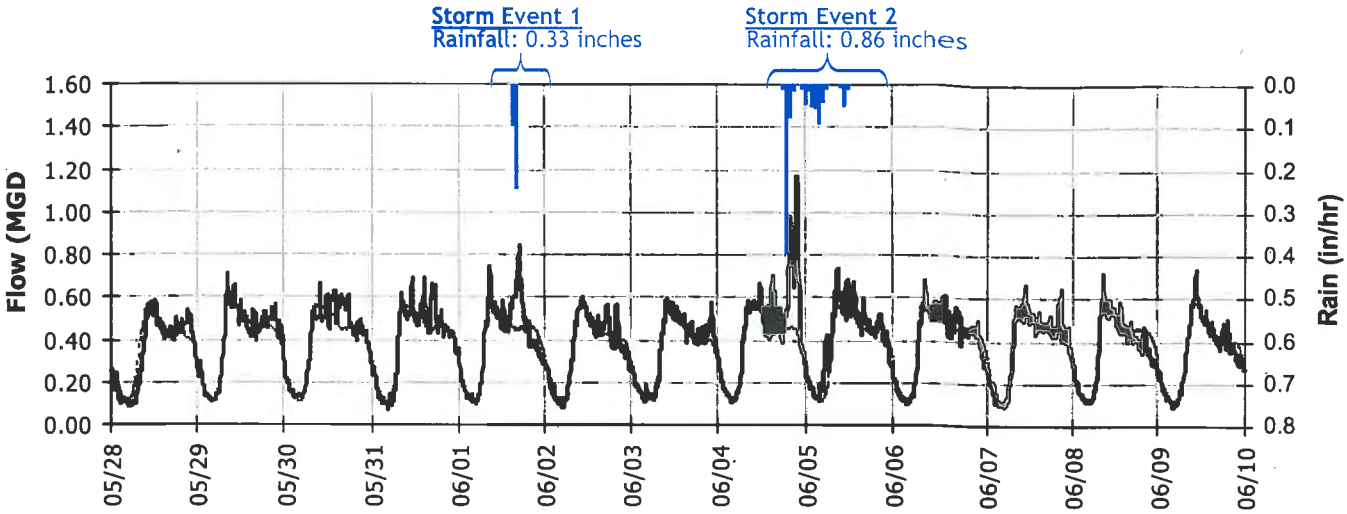


V&A

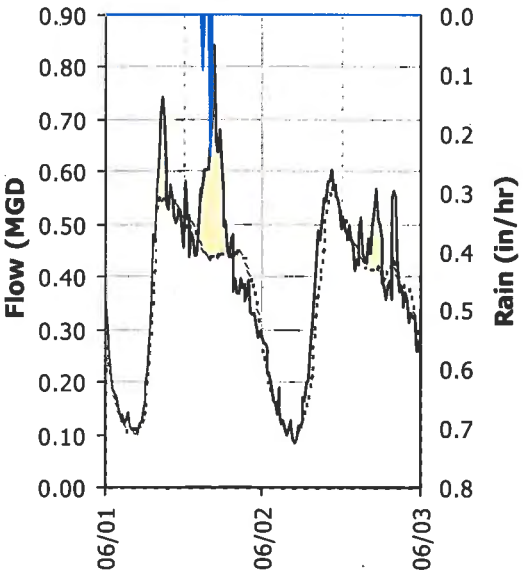
I/I Summary

Monitoring Site:
Site 5

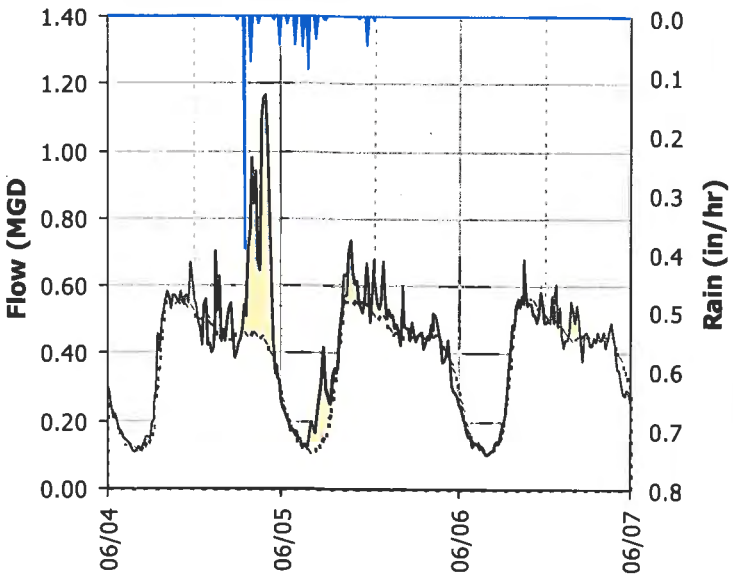
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.33	*inches*
Peak Flow:	0.84	*MGD*
Peak I/I Rate:	0.40	*MGD*
PF:	2.28	
Pk I/I:ADWF:	1.08	
Peak Level:	5.04	*inches*
d/D Ratio:	0.28	
Total I/I:	32,000	*gallons*
RE1 R-Value:	0.4%	

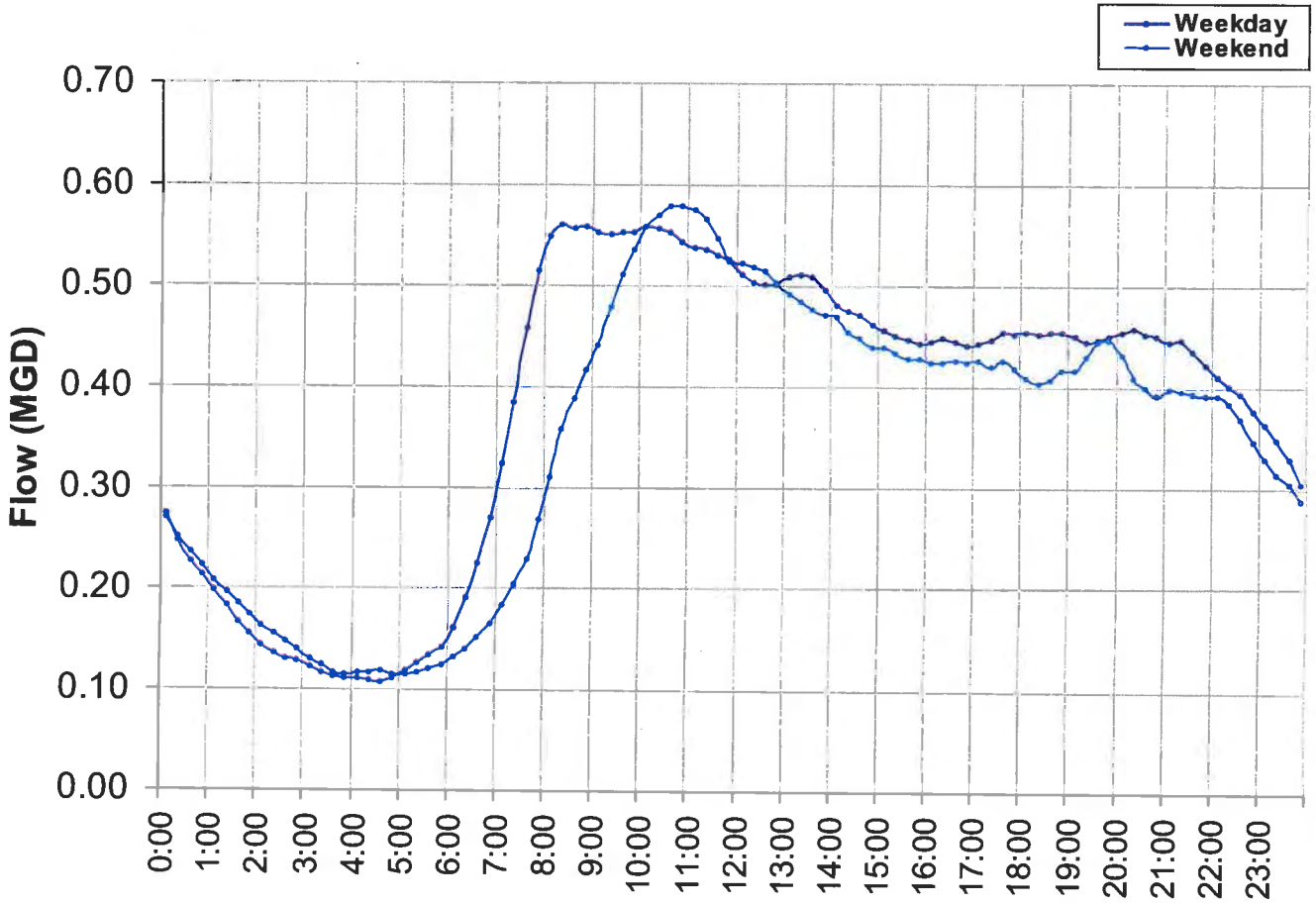
Storm Event #2 I/I Analysis

Rainfall:	0.86	*inches*
Peak Flow:	1.17	*MGD*
Peak I/I Rate:	0.74	*MGD*
PF:	3.15	
Pk I/I:ADWF:	2.01	
Peak Level:	6.39	*inches*
d/D Ratio:	0.36	
Total I/I:	102,000	*gallons*
RE2 R-Value:	0.5%	

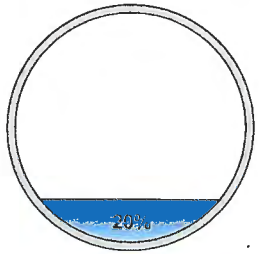
V&A

Average Dry Weather Flow

Monitoring Site:
Site 5



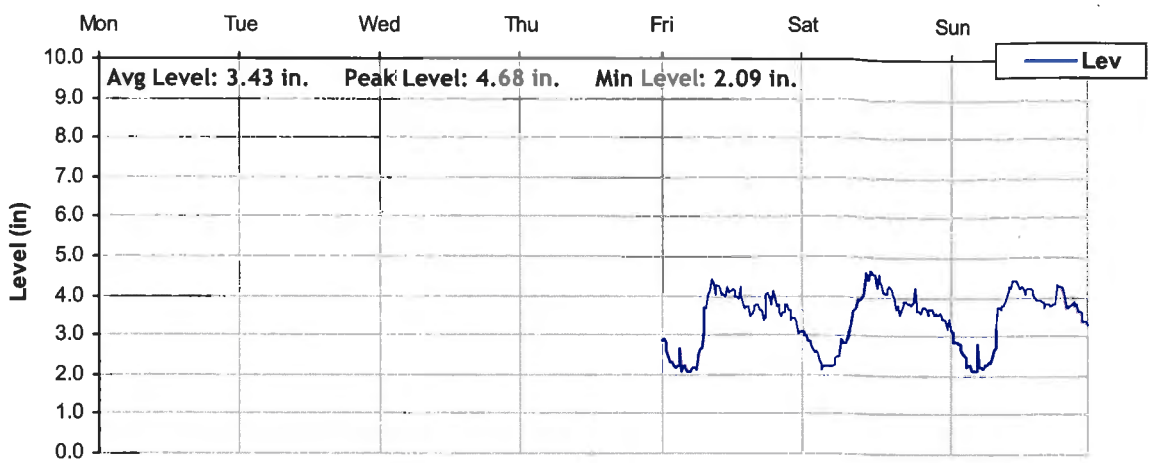
Average Dry Weather Flow:
0.37 *MGD*

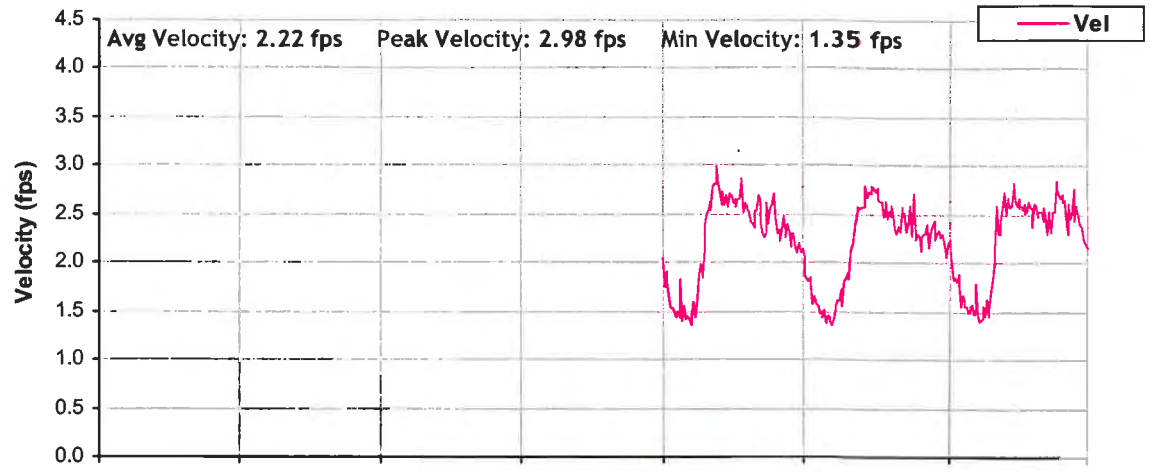


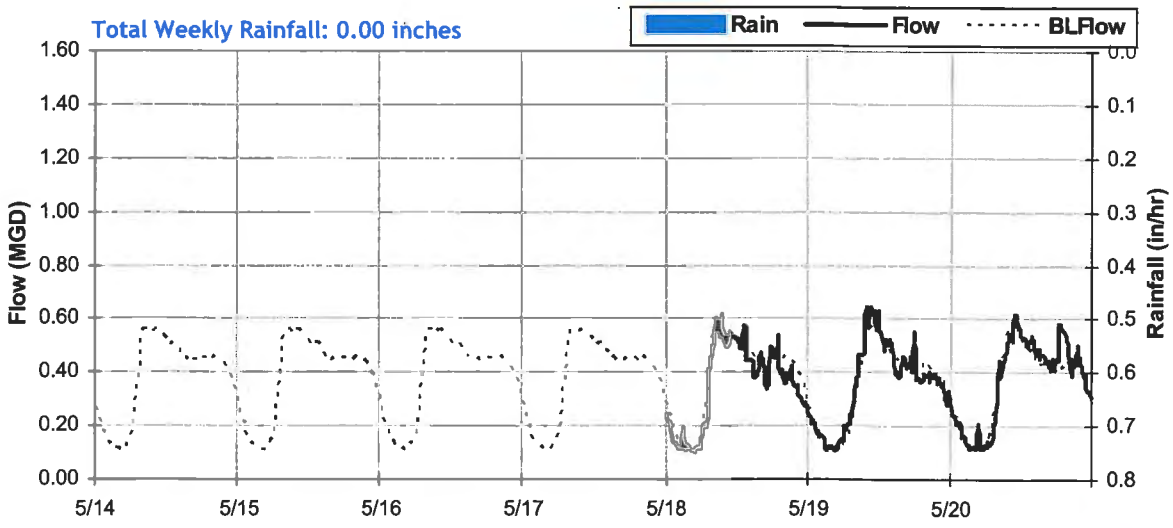
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 5





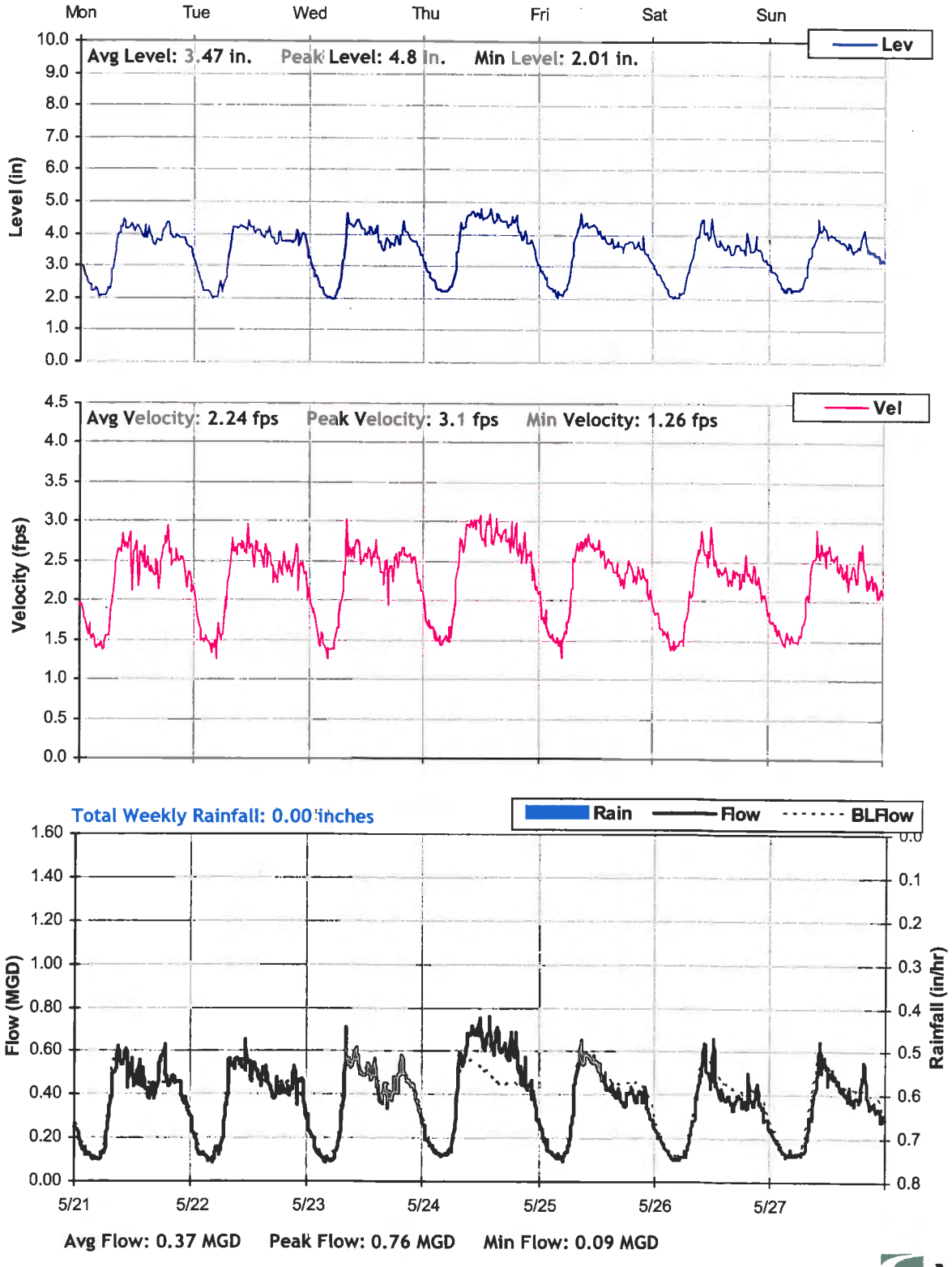


Avg Flow: 0.36 MGD Peak Flow: 0.65 MGD Min Flow: 0.1 MGD

V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

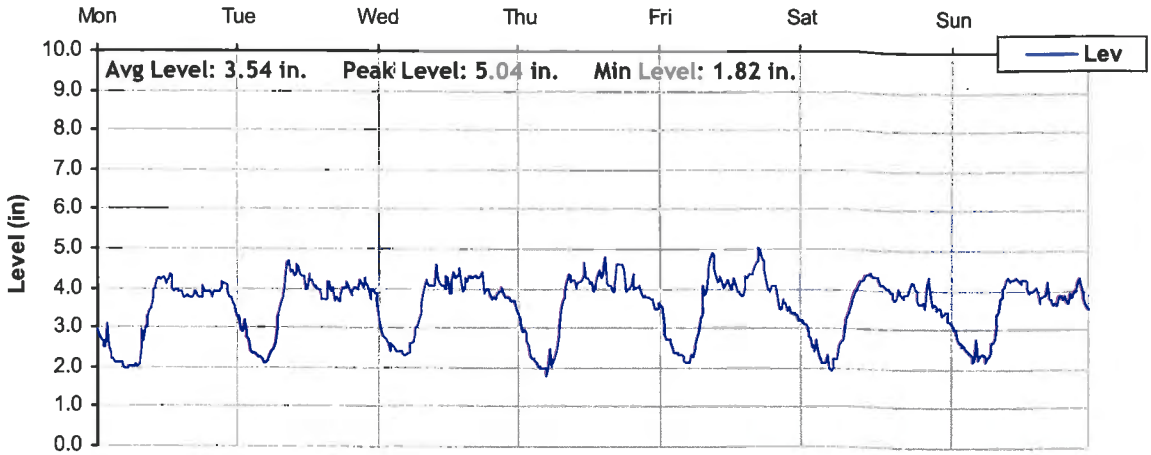
Monitoring Site:
Site 5

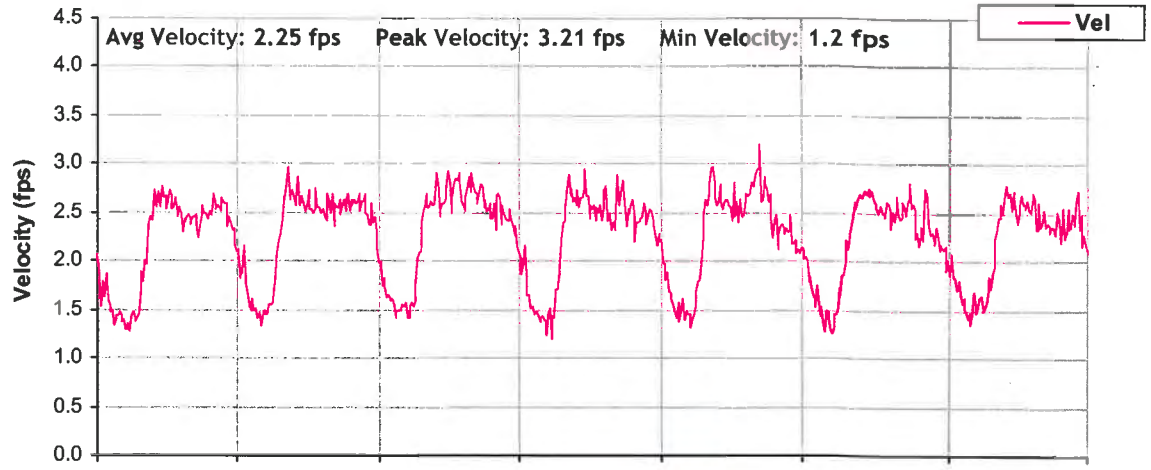


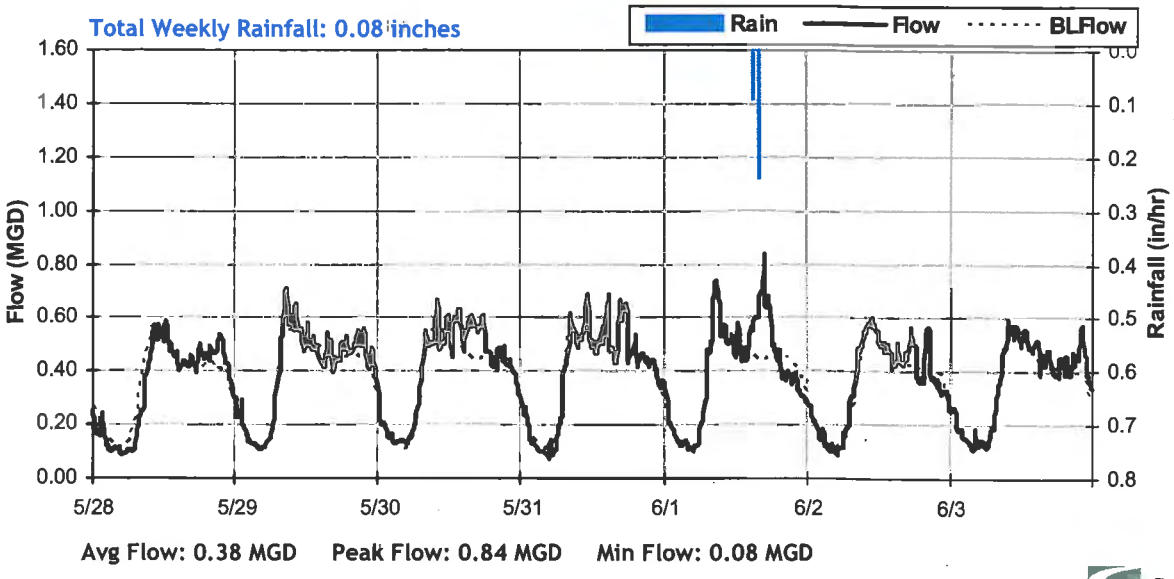
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 5





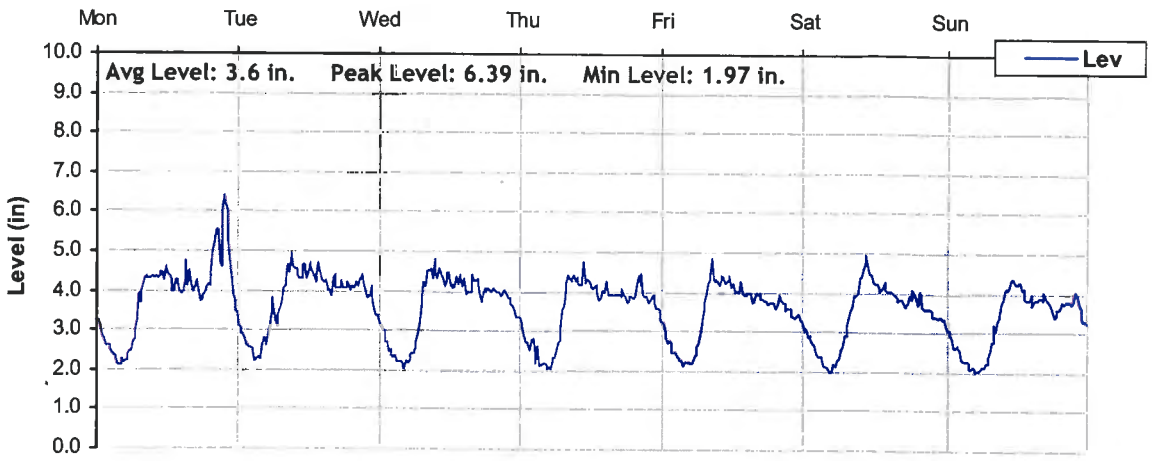


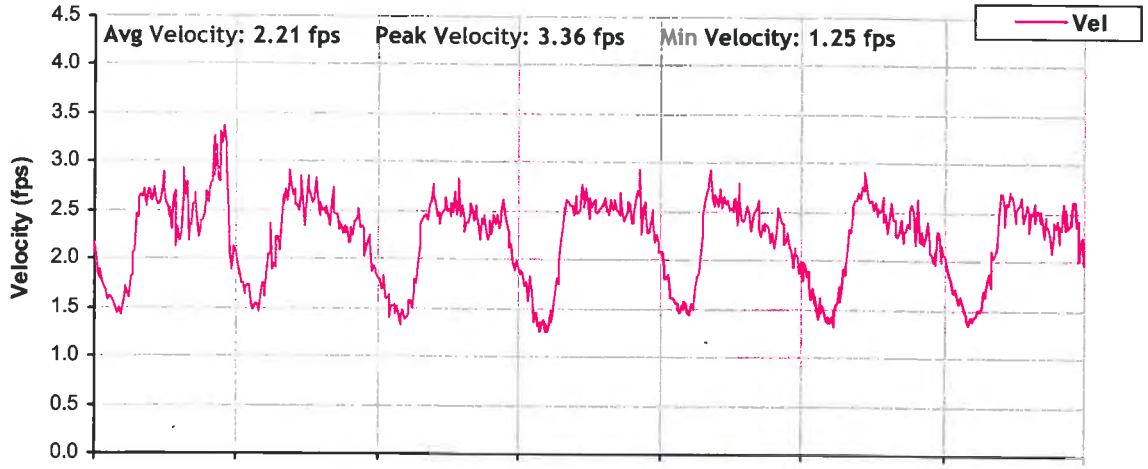
Avg Flow: 0.38 MGD Peak Flow: 0.84 MGD Min Flow: 0.08 MGD

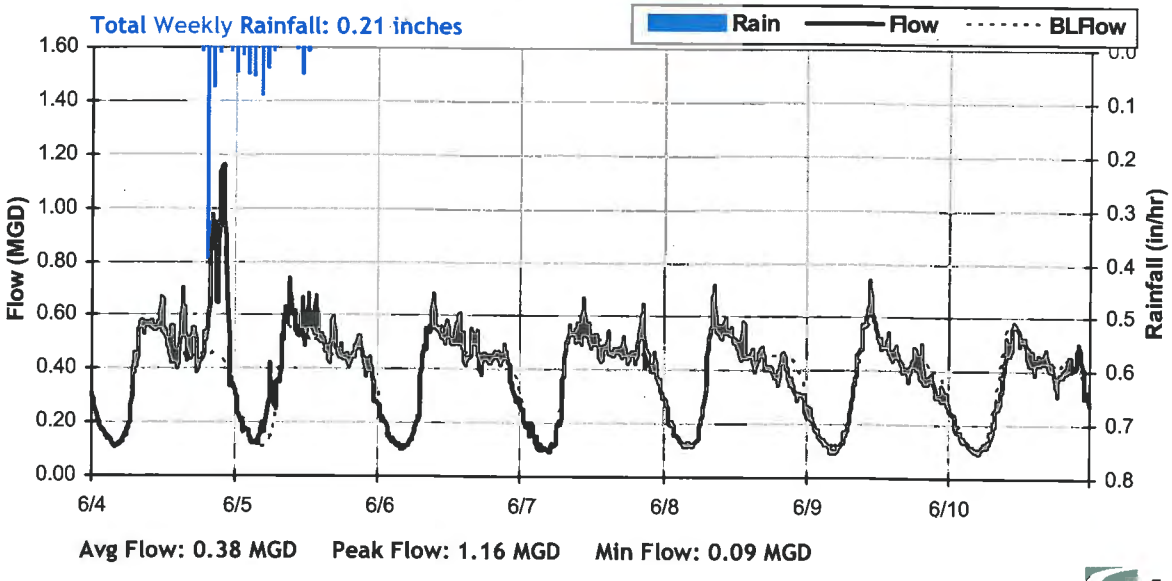
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 5





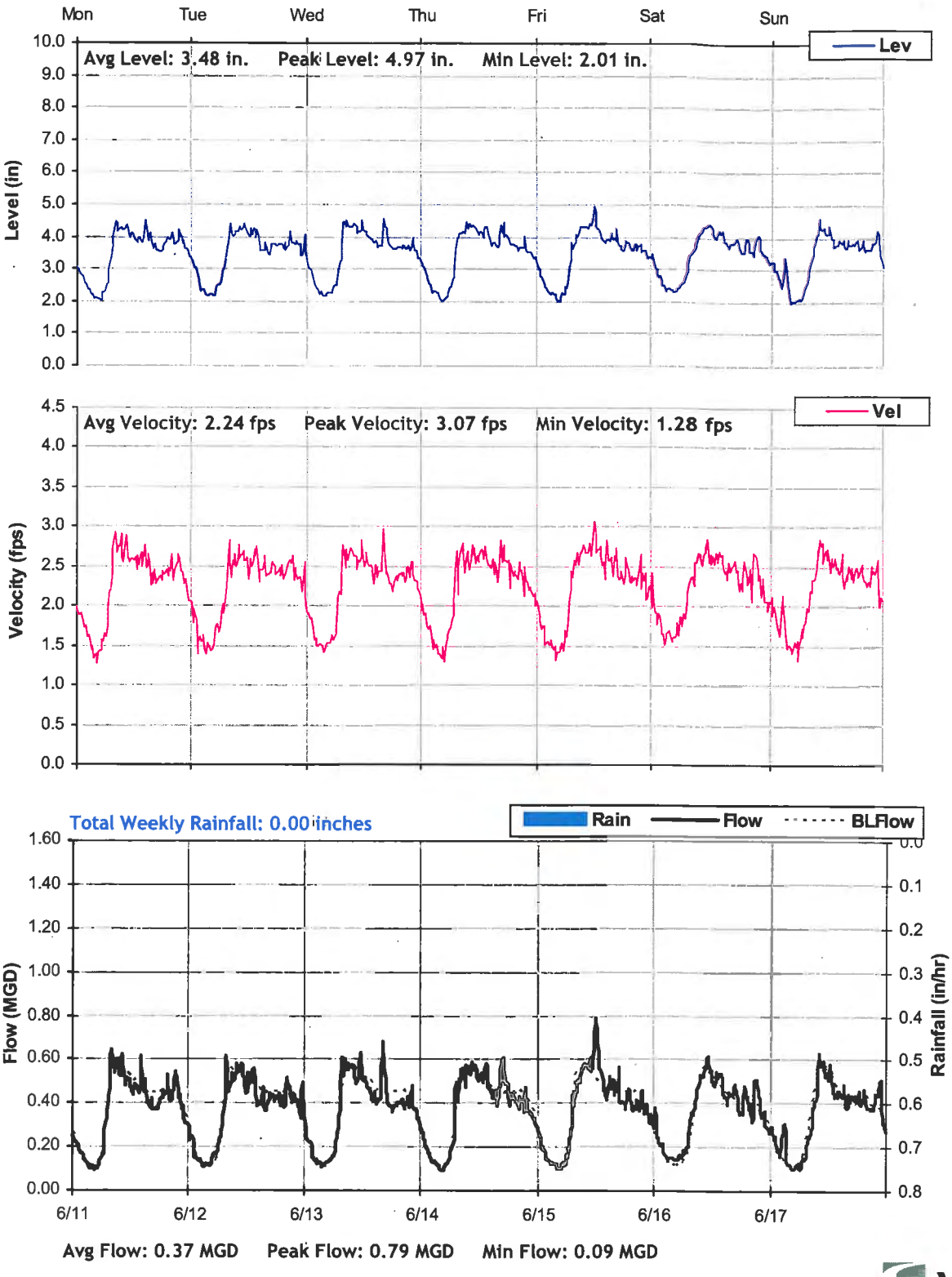


Avg Flow: 0.38 MGD Peak Flow: 1.16 MGD Min Flow: 0.09 MGD

V&A

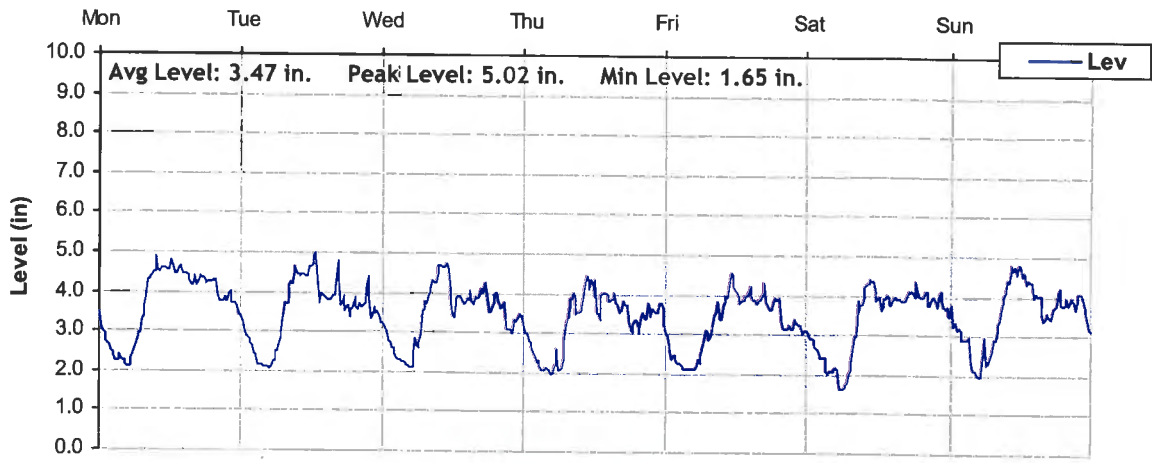
Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

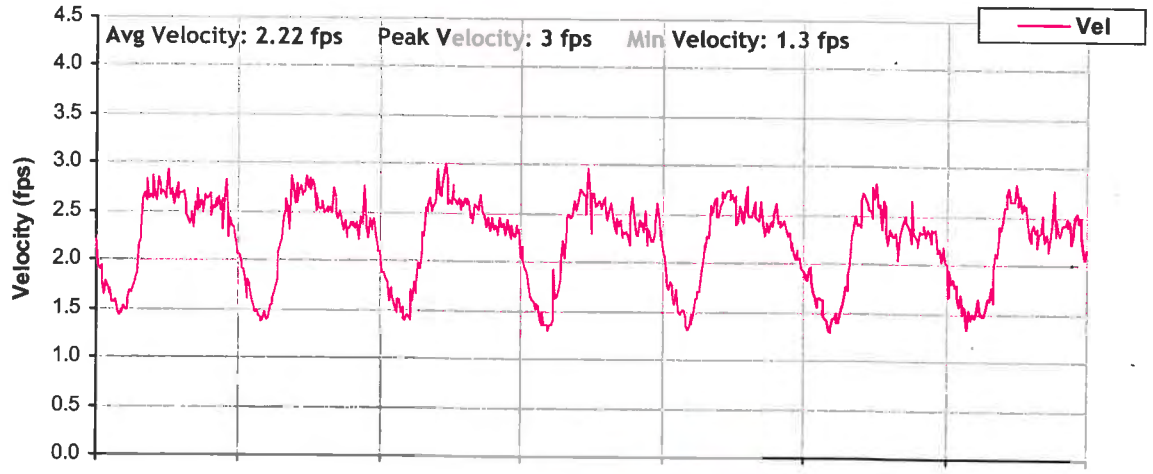
Monitoring Site:
Site 5

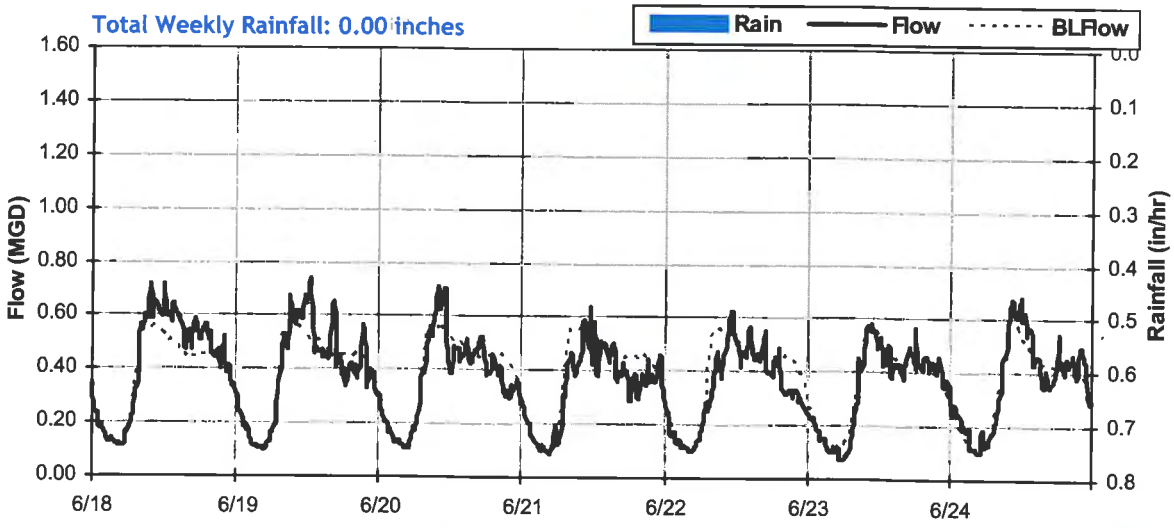


Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 5





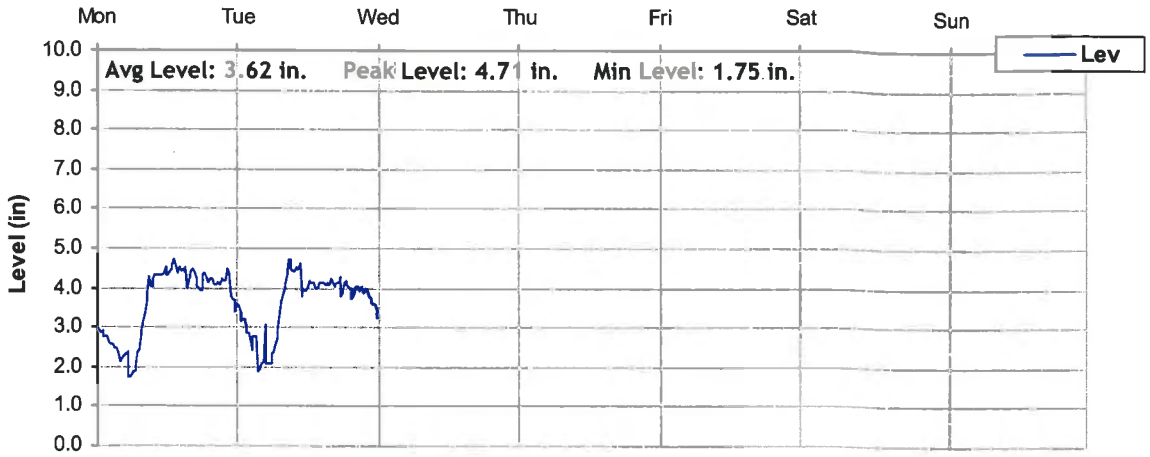


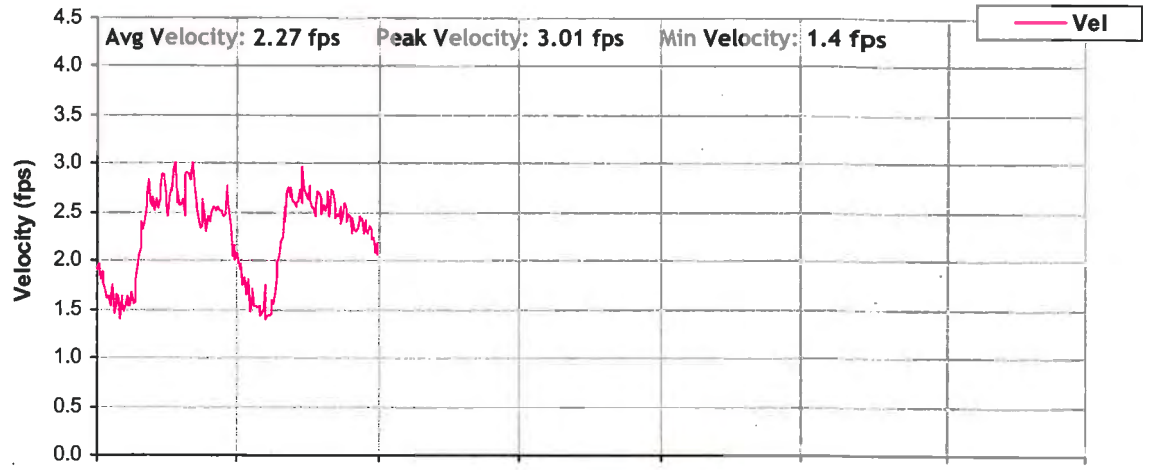
Avg Flow: 0.37 MGD Peak Flow: 0.74 MGD Min Flow: 0.07 MGD

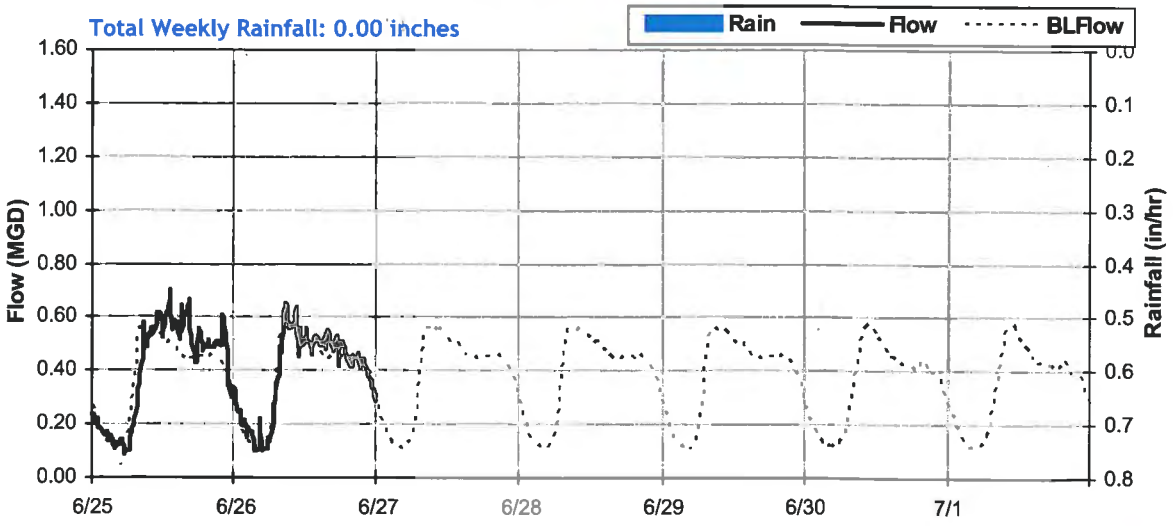
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 5







Avg Flow: 0.4 MGD Peak Flow: 0.7 MGD Min Flow: 0.09 MGD

V&A

Site Information Report

Monitoring Site: Site 6

Location:

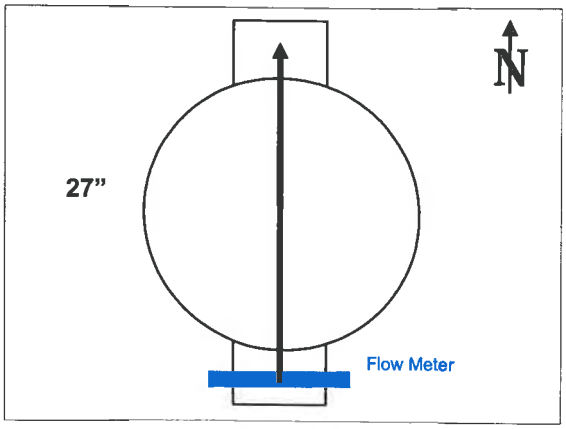
Diameter: 27 inches

Average Dry Weather Flow: 1.434 *MGD*

Peak Measured Flow: 2.825 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

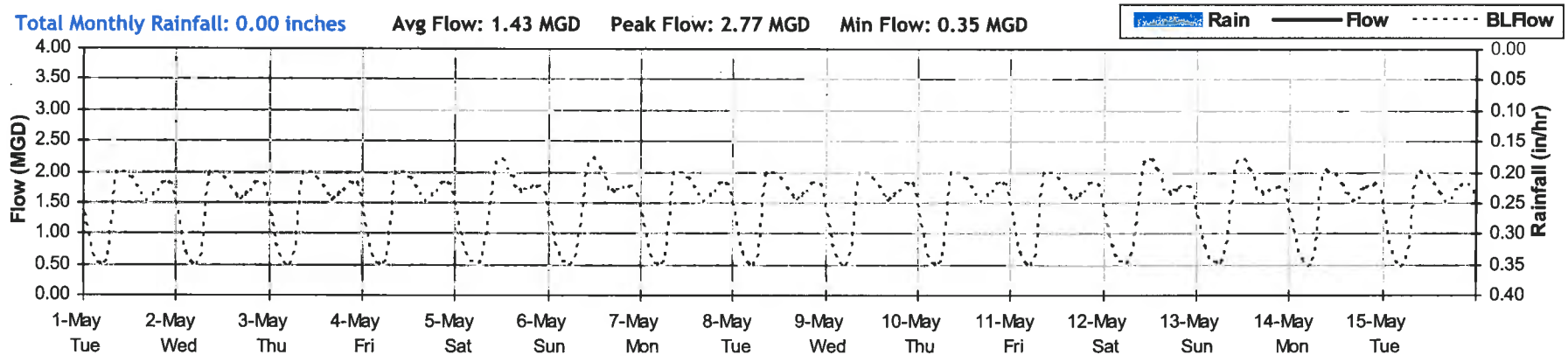
Plan view photo:

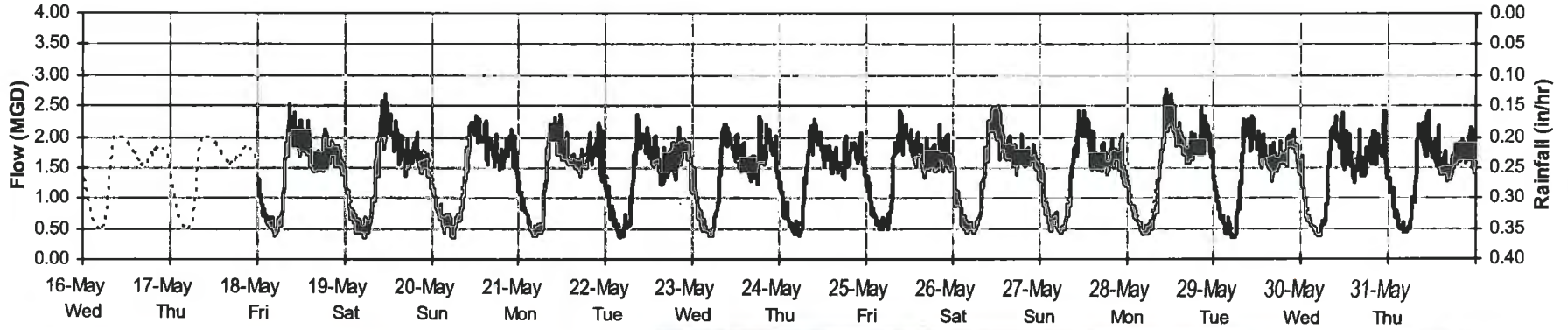
V&A

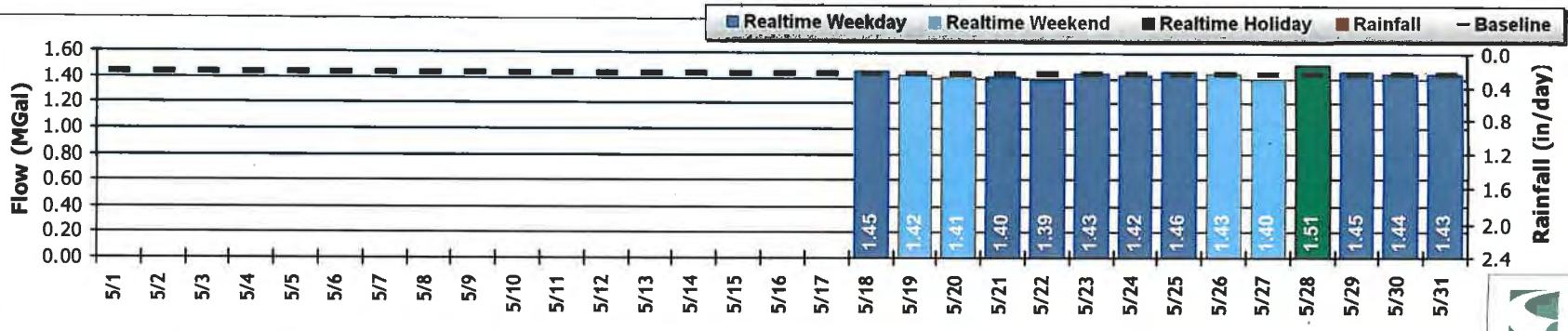
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 6

Total Monthly Rainfall: 0.00 inches Avg Flow: 1.43 MGD Peak Flow: 2.77 MGD Min Flow: 0.35 MGD





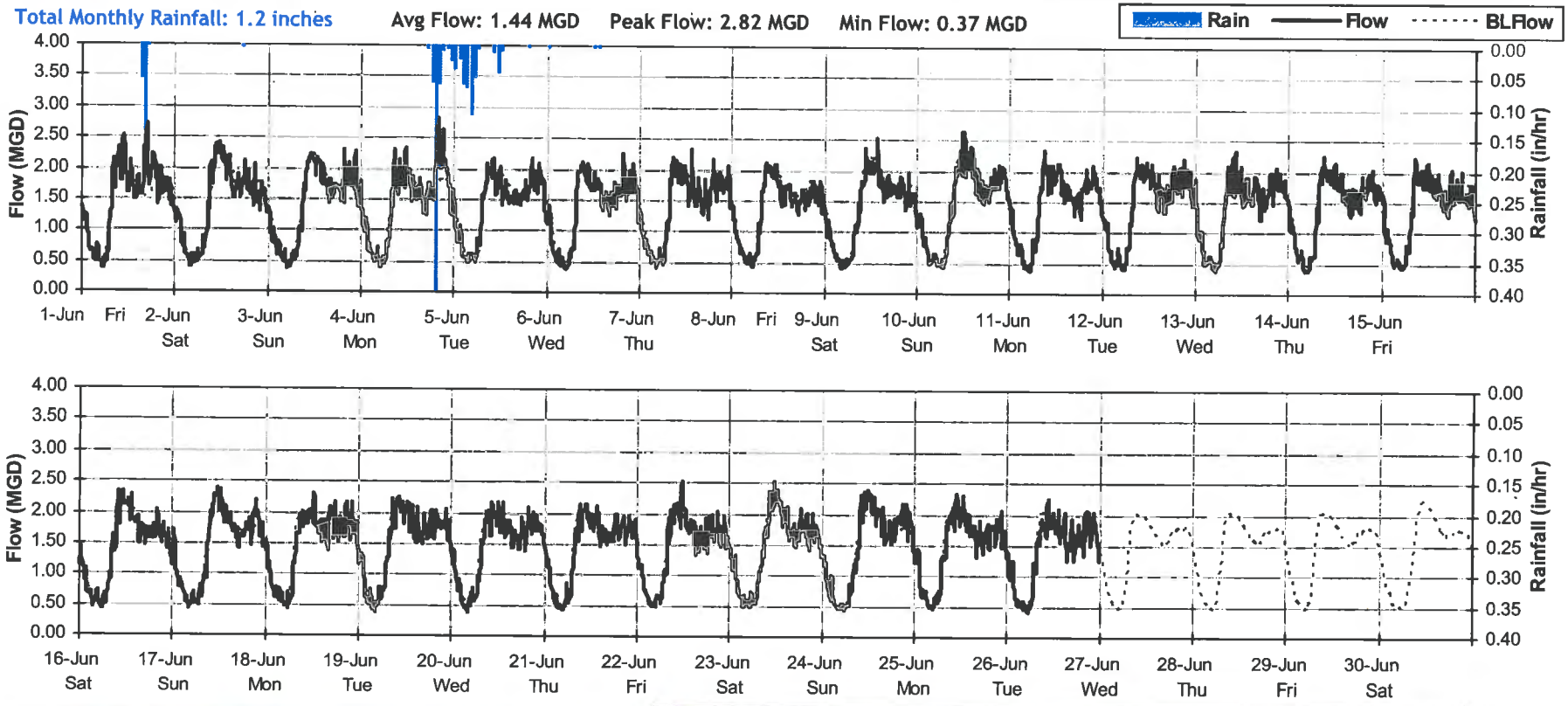


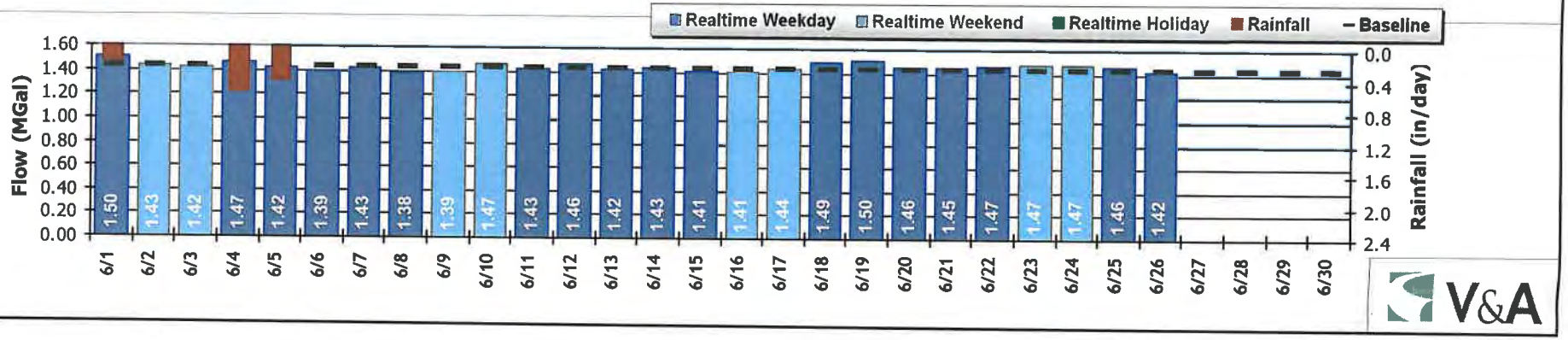
V&A

Monthly Flow Summary
June, 2007

Monitoring Site:
Site 6

Total Monthly Rainfall: 1.2 inches Avg Flow: 1.44 MGD Peak Flow: 2.82 MGD Min Flow: 0.37 MGD



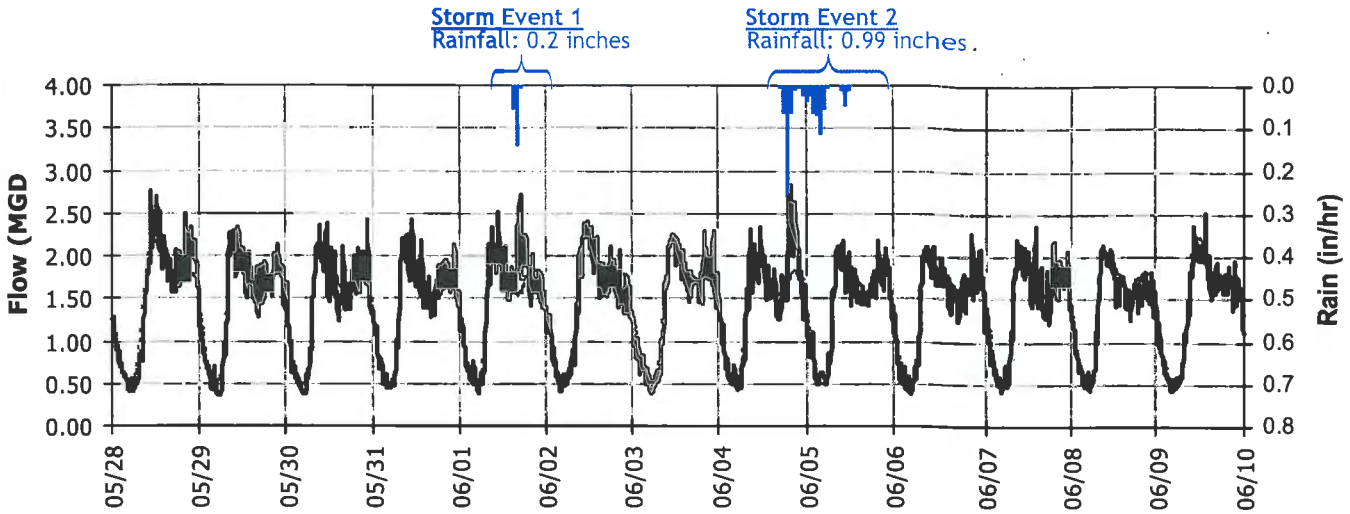


V&A

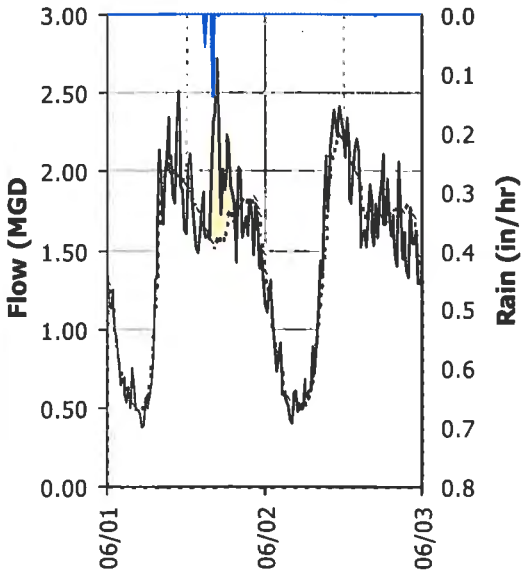
I/I Summary

Monitoring Site:
Site 6

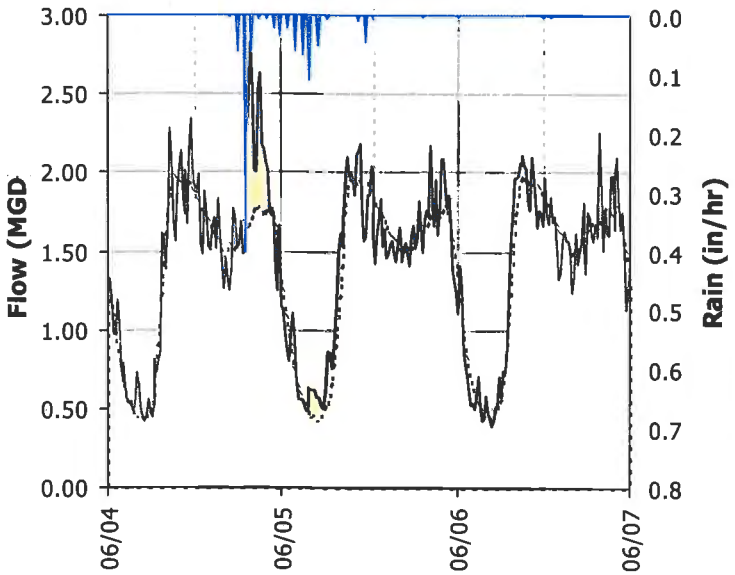
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.20	*inches*
Peak Flow:	2.72	*MGD*
Peak I/I Rate:	1.14	*MGD*
PF:	1.89	
Pk I/I:ADWF:	0.79	
Peak Level:	9.87	*inches*
d/D Ratio:	0.37	
Total I/I:	76,000	*gallons*
RE1 R-Value:	0.3%	

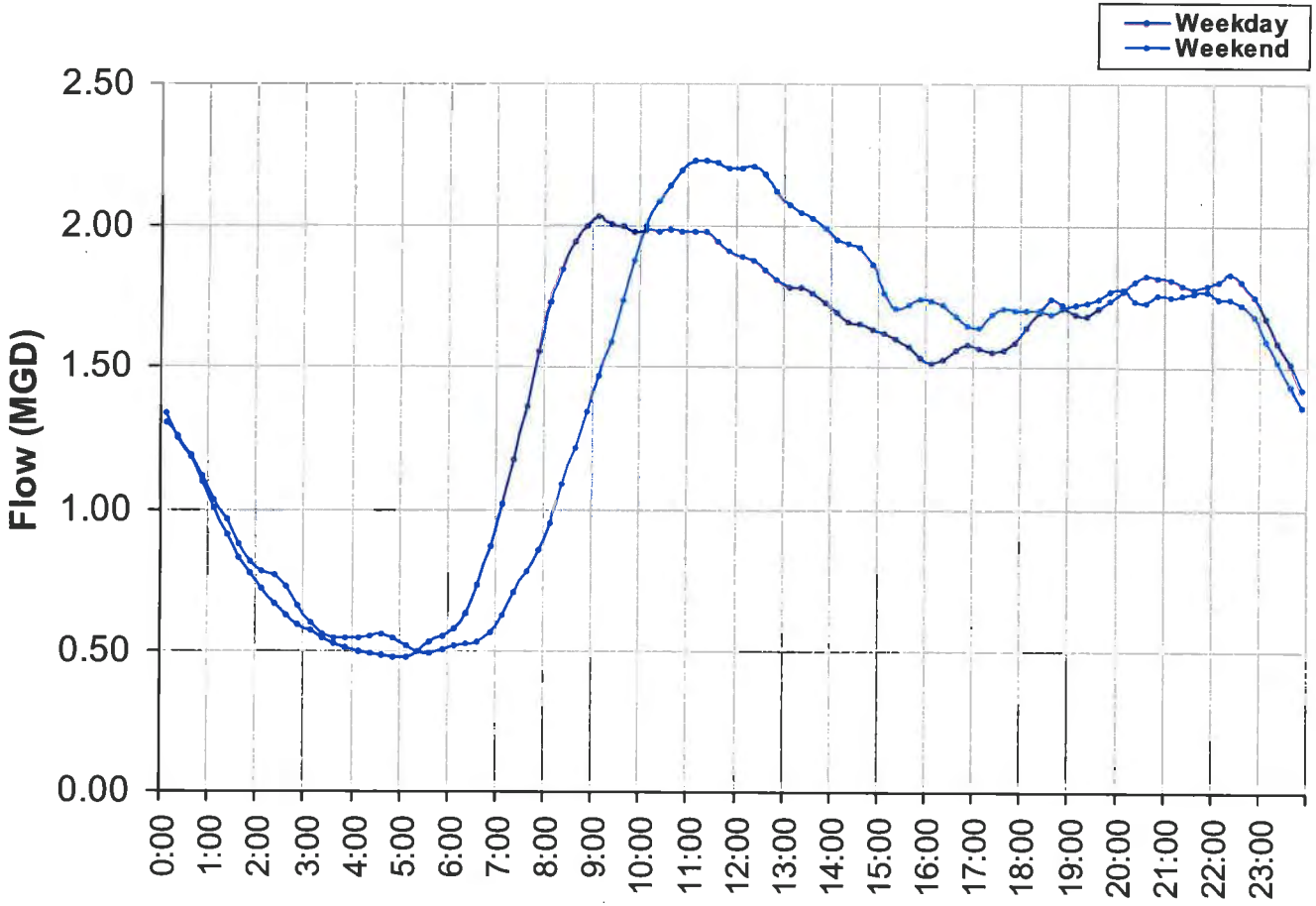
Storm Event #2 I/I Analysis

Rainfall:	0.99	*inches*
Peak Flow:	2.82	*MGD*
Peak I/I Rate:	1.08	*MGD*
PF:	1.97	
Pk I/I:ADWF:	0.76	
Peak Level:	9.63	*inches*
d/D Ratio:	0.36	
Total I/I:	106,000	*gallons*
RE2 R-Value:	0.1%	

V&A

Average Dry Weather Flow

Monitoring Site:
Site 6



Average Dry Weather Flow:
1.43 *MGD*

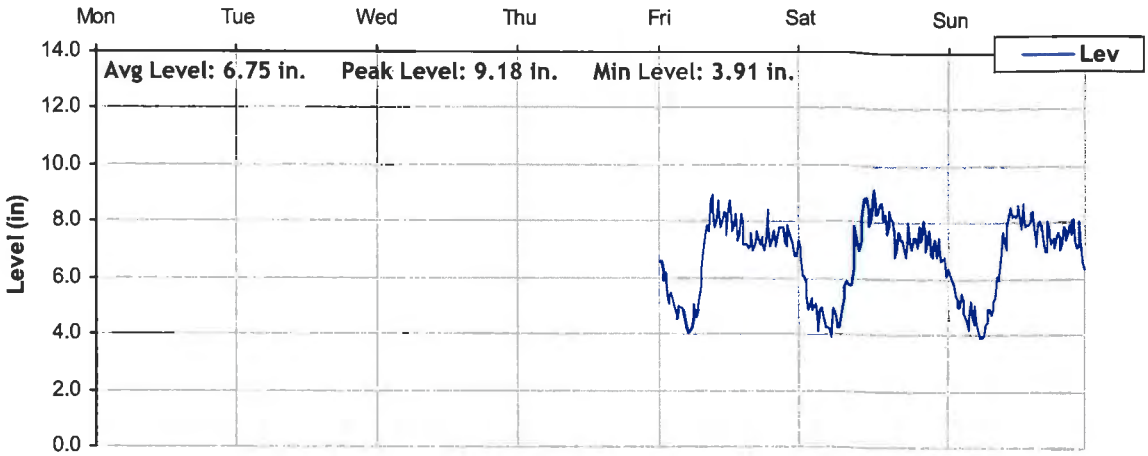
V&A

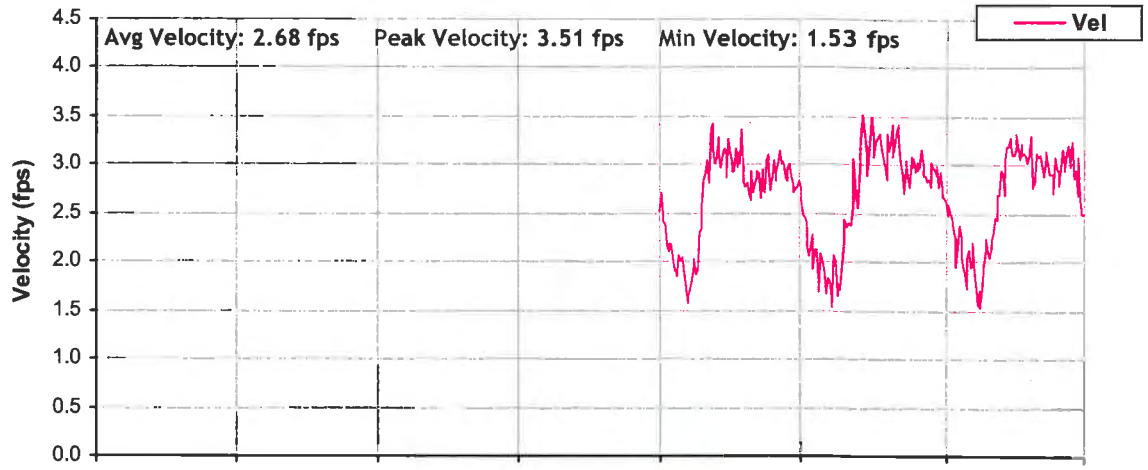
Level, Velocity and Flow

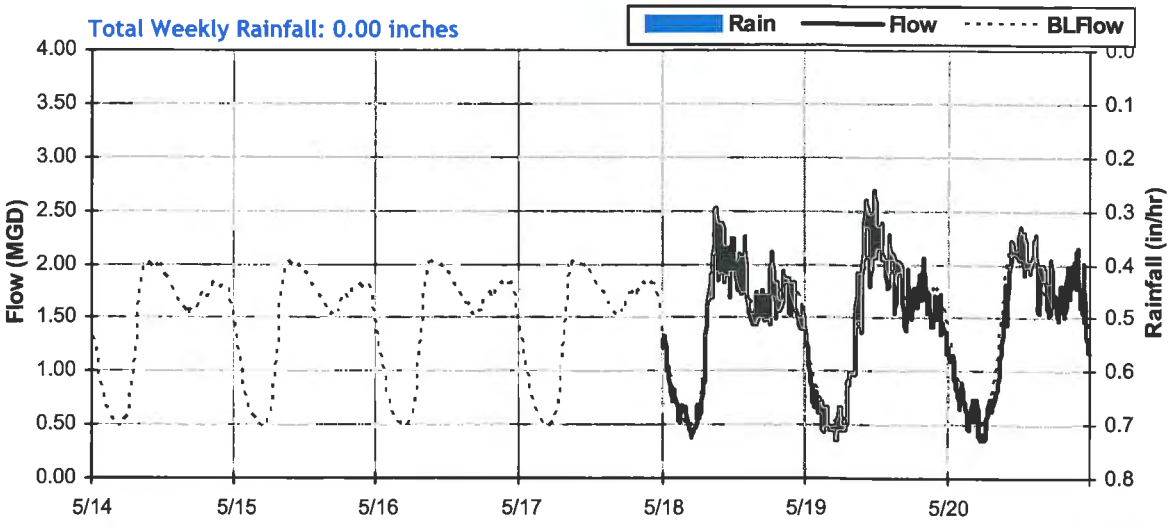
From 5/14/2007 to 5/21/2007

Monitoring Site:

Site 6





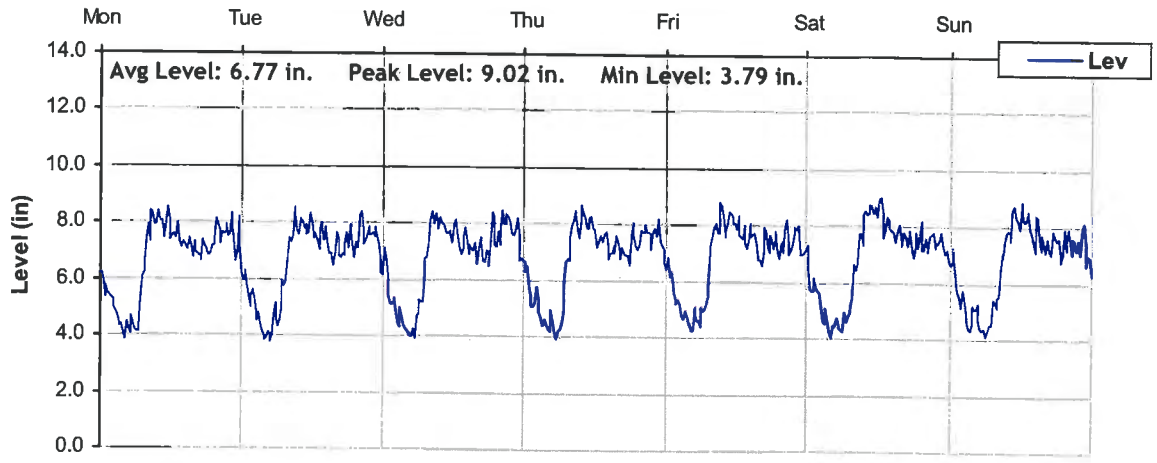


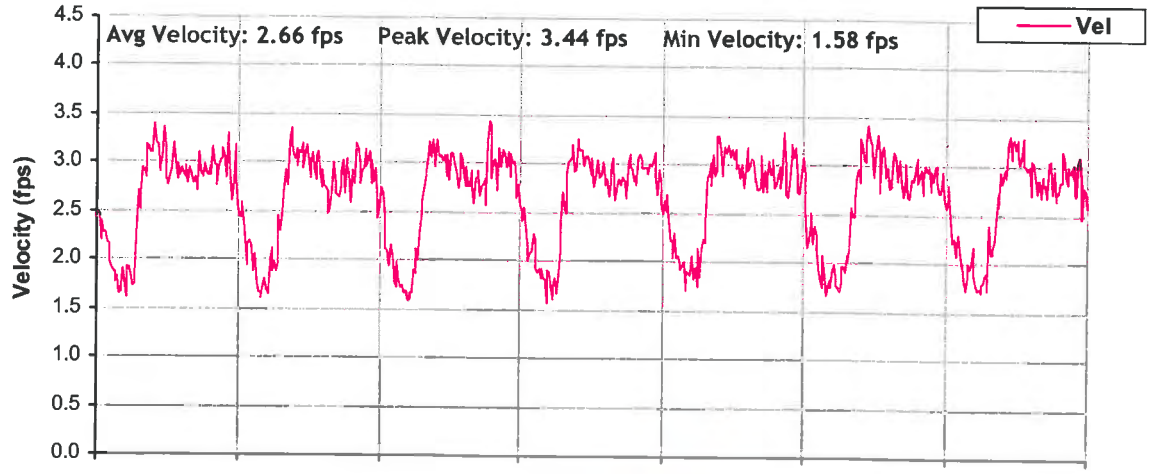
Avg Flow: 1.43 MGD Peak Flow: 2.7 MGD Min Flow: 0.35 MGD

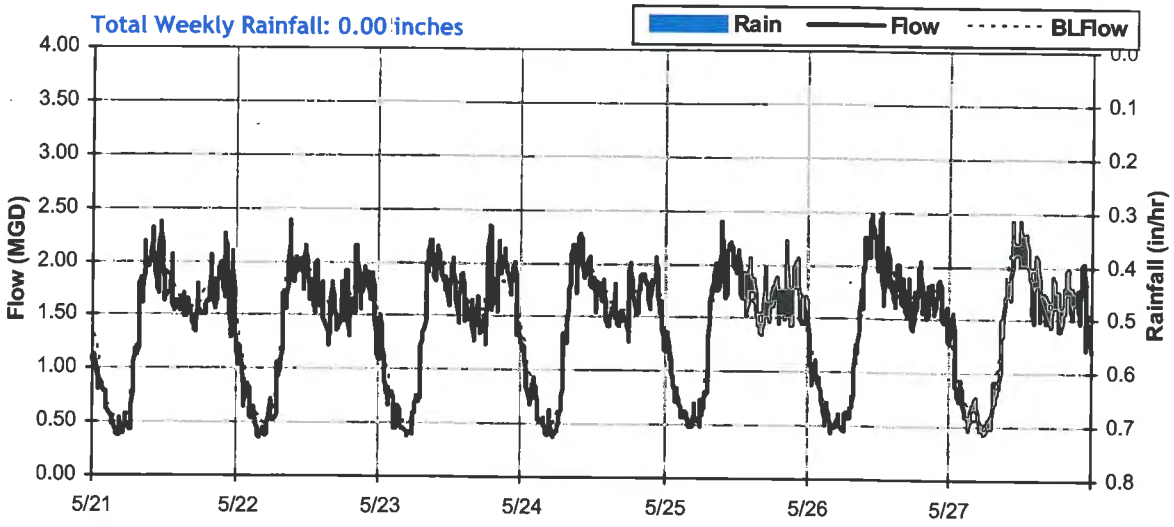
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 6





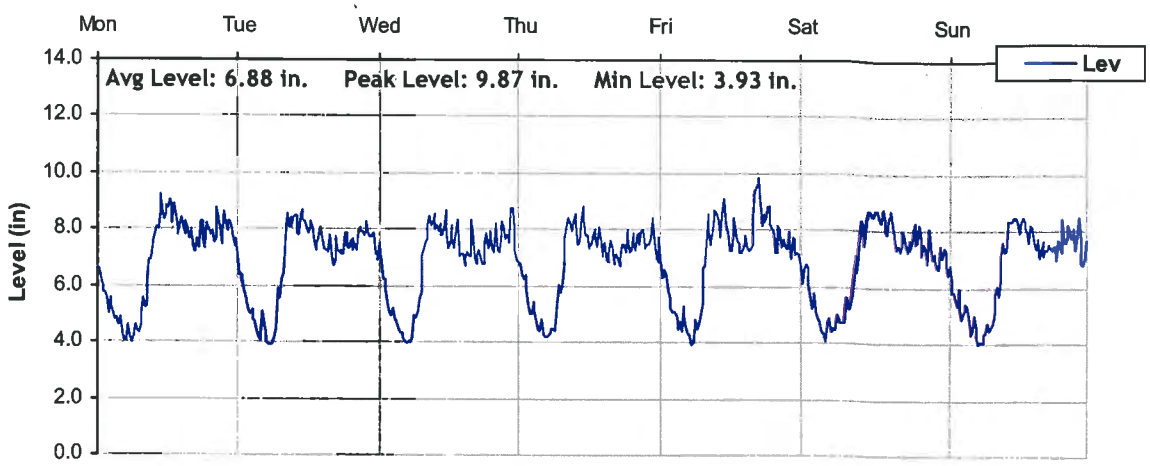


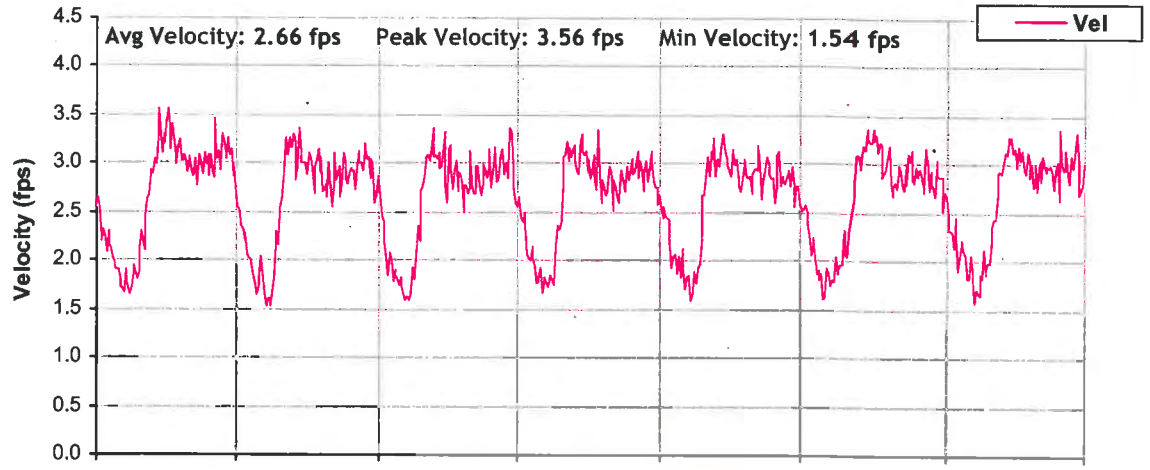
Avg Flow: 1.42 MGD Peak Flow: 2.5 MGD Min Flow: 0.37 MGD

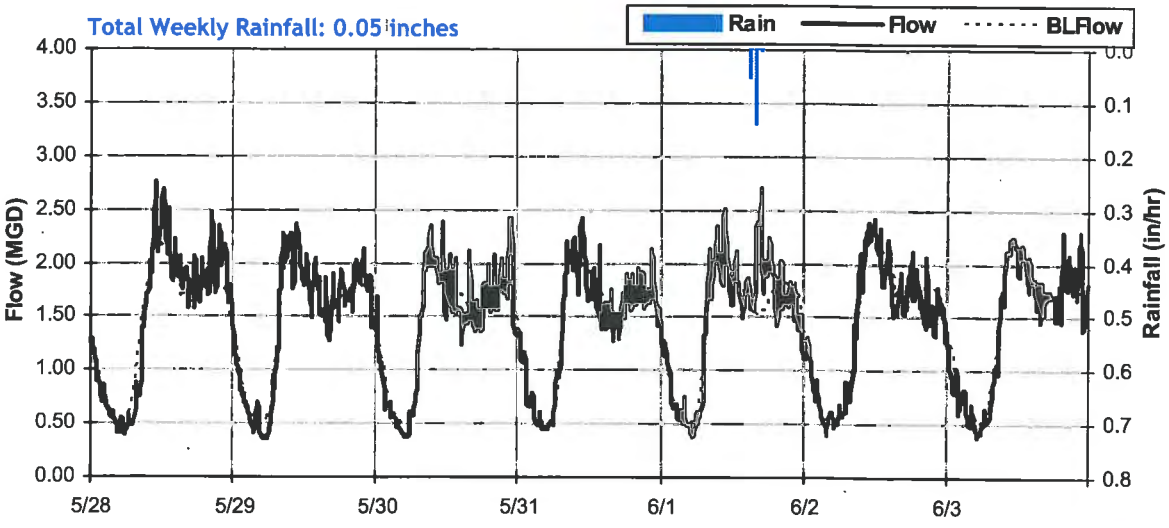
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 6





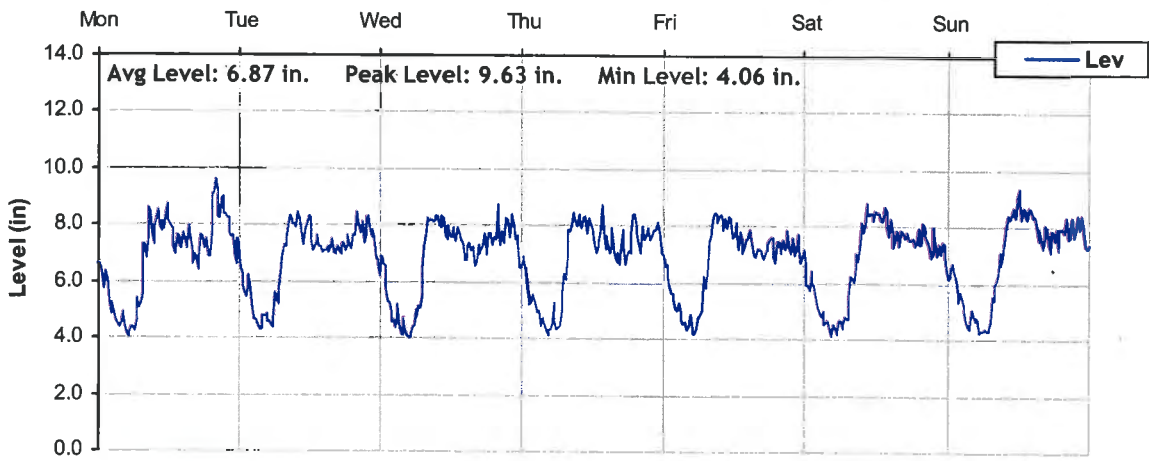


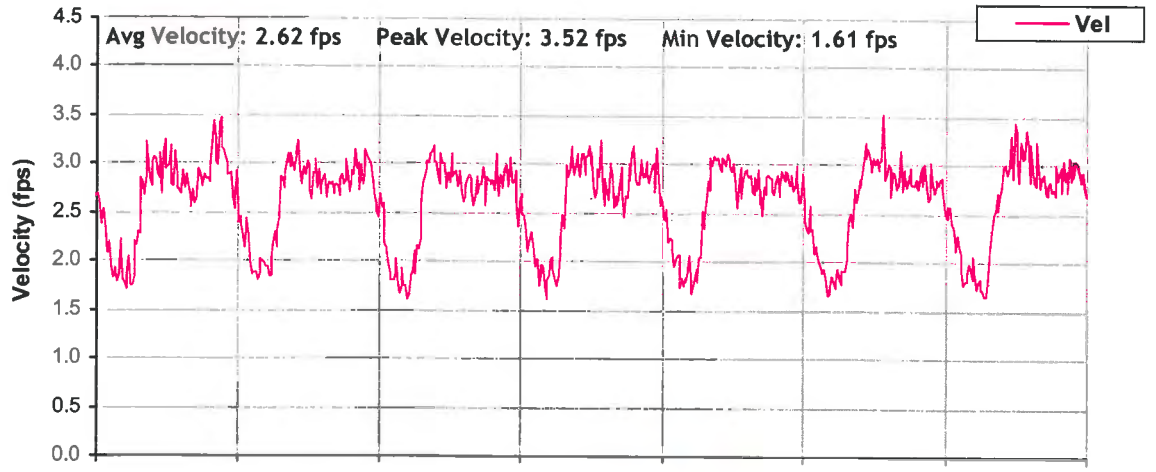
Avg Flow: 1.45 MGD Peak Flow: 2.77 MGD Min Flow: 0.36 MGD

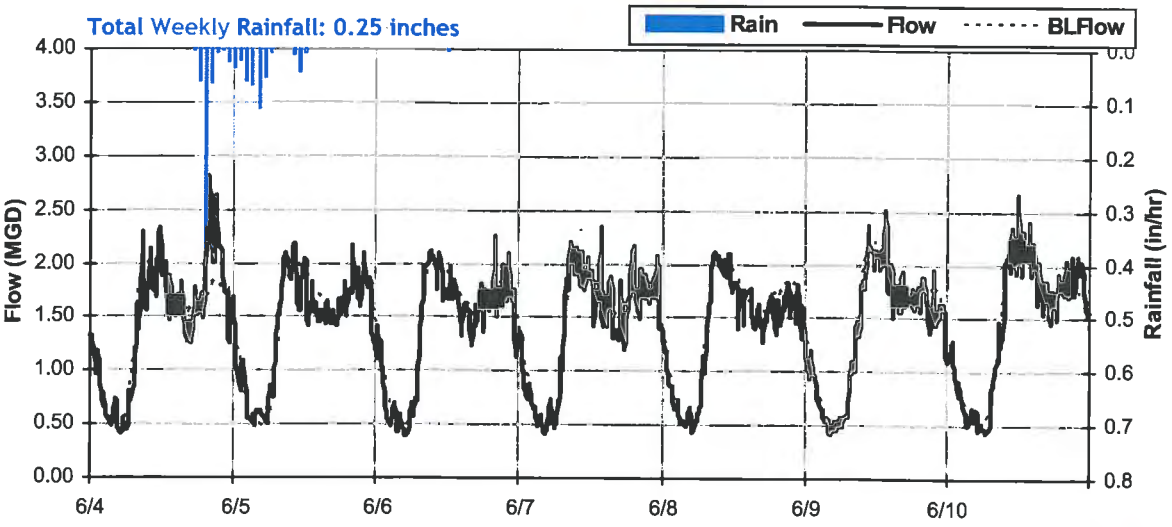
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 6





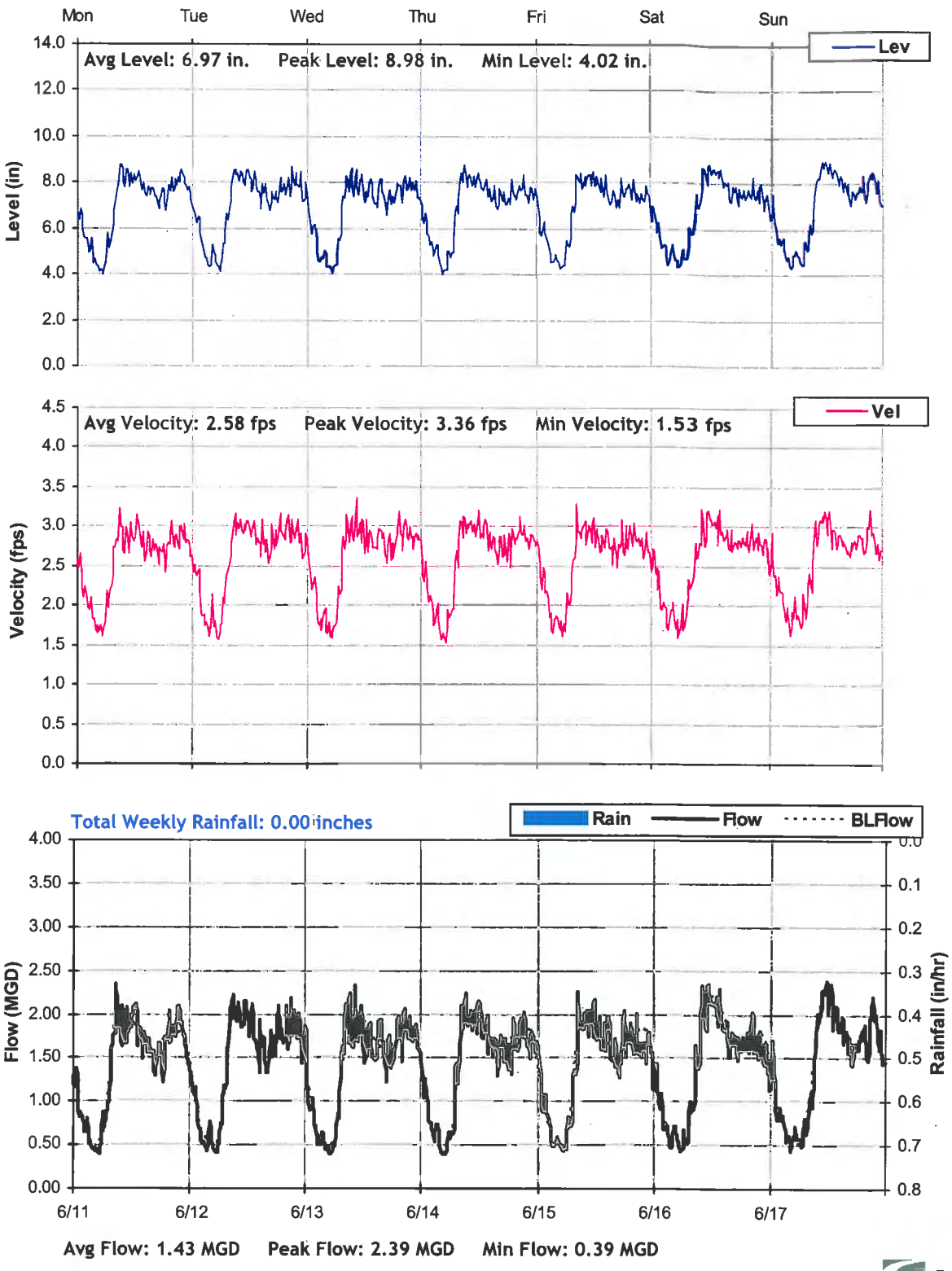


Avg Flow: 1.42 MGD Peak Flow: 2.82 MGD Min Flow: 0.39 MGD

V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

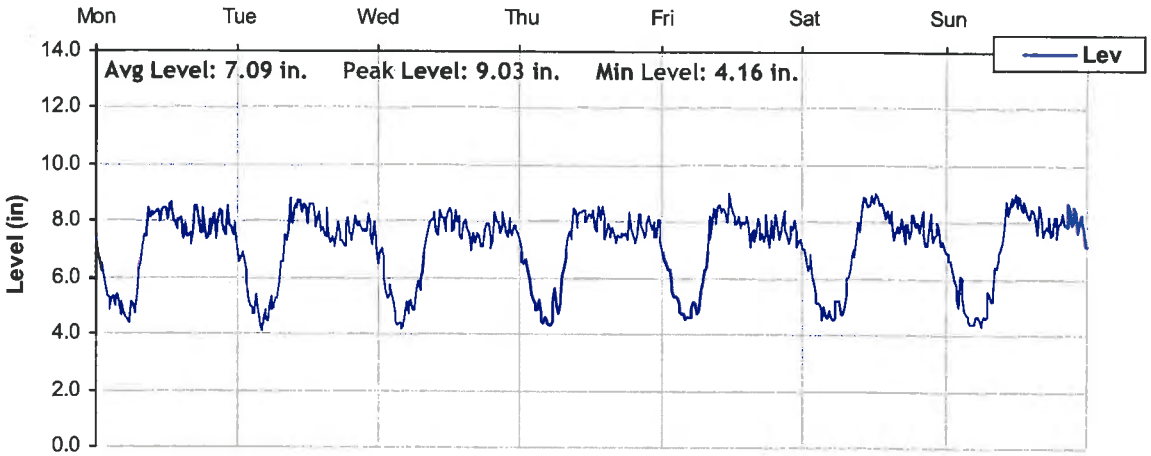
Monitoring Site:
Site 6

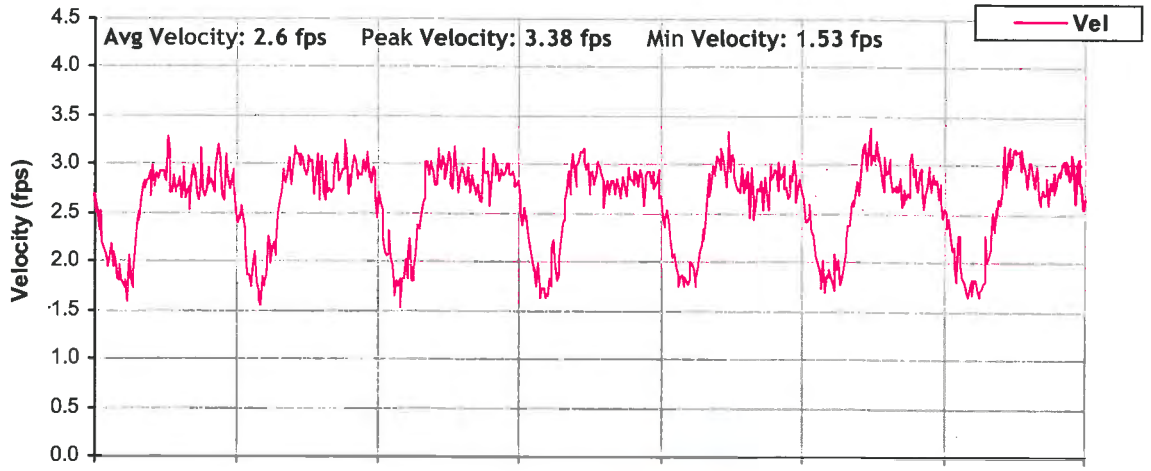


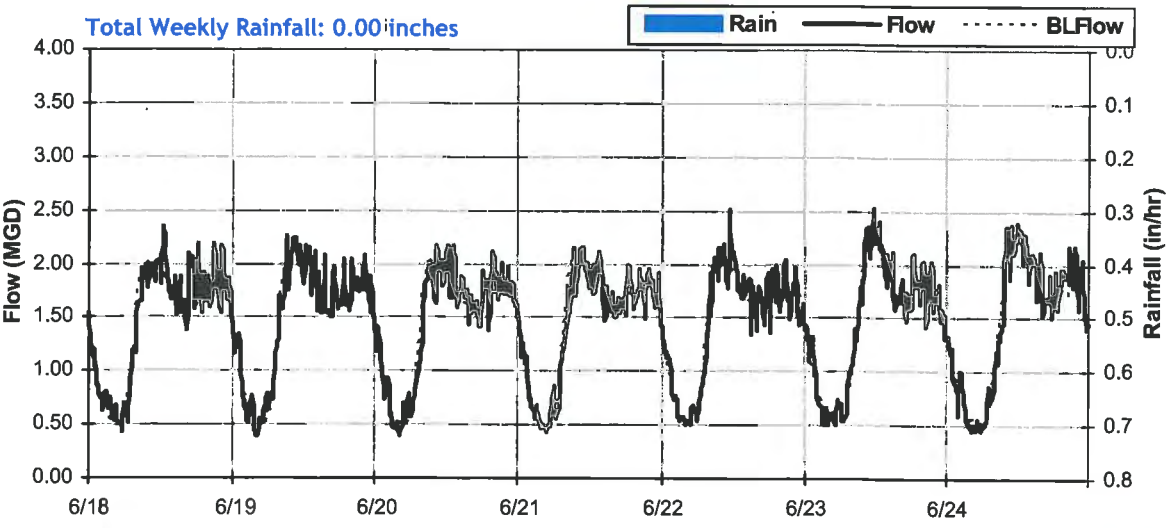
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 6





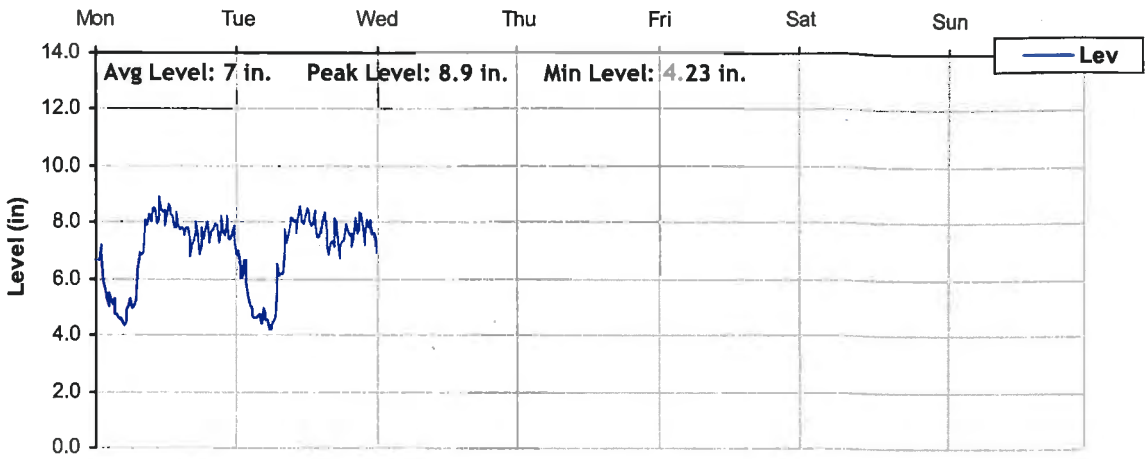


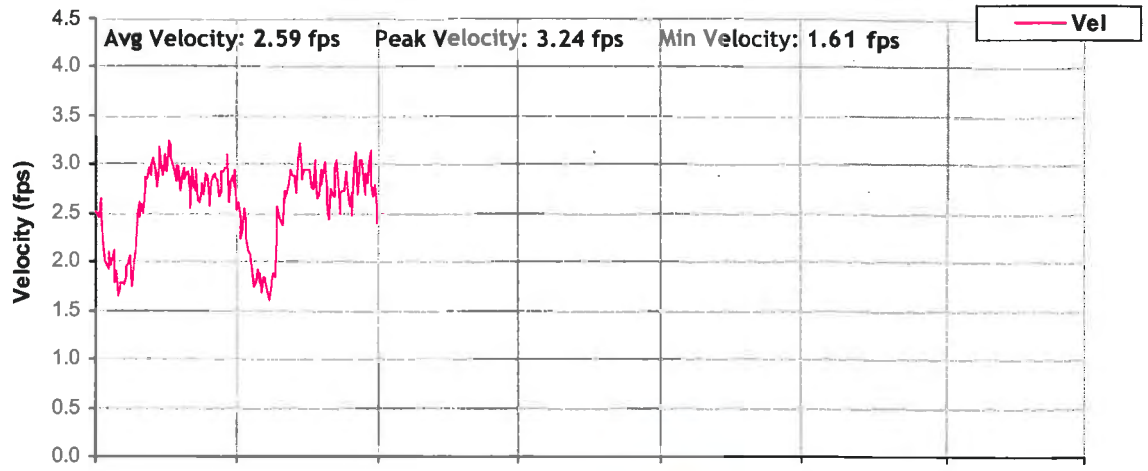
Avg Flow: 1.47 MGD Peak Flow: 2.54 MGD Min Flow: 0.39 MGD

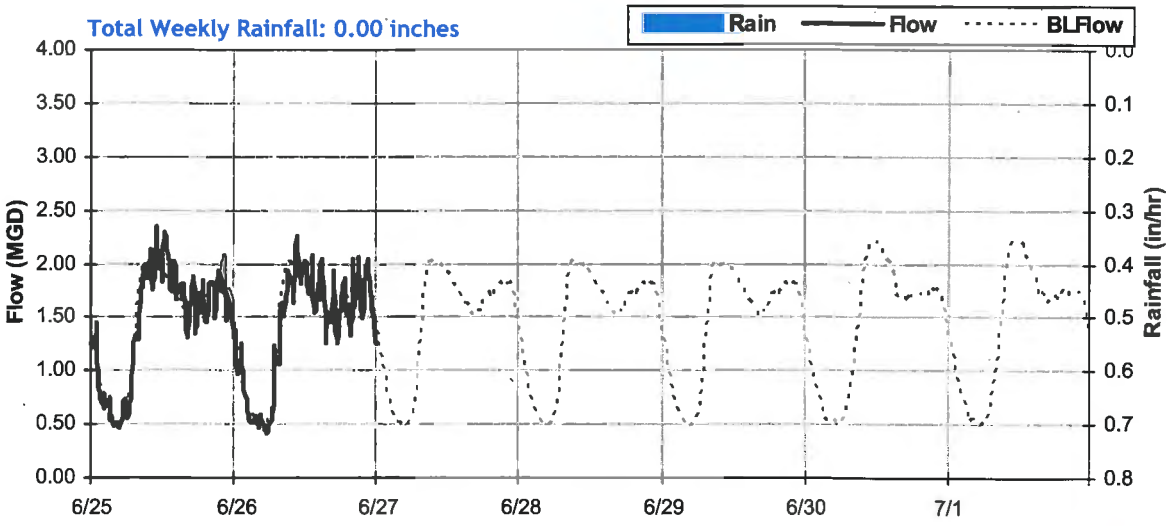
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 6







Avg Flow: 1.44 MGD Peak Flow: 2.35 MGD Min Flow: 0.41 MGD

V&A

	Site Information Report	**Monitoring Site:** Site 7

Location:

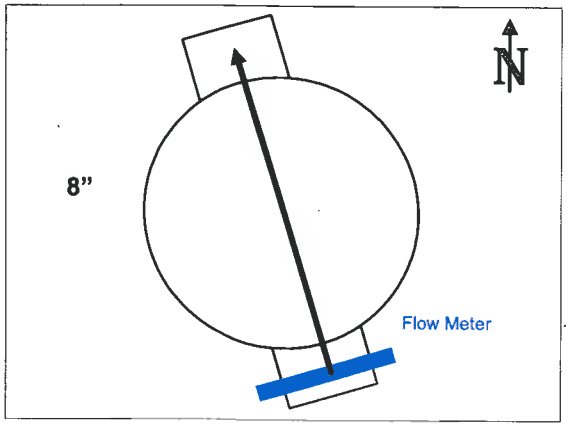
Diameter: 8 inches

Average Dry Weather Flow: 0.107 *MGD*

Peak Measured Flow: 0.429 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

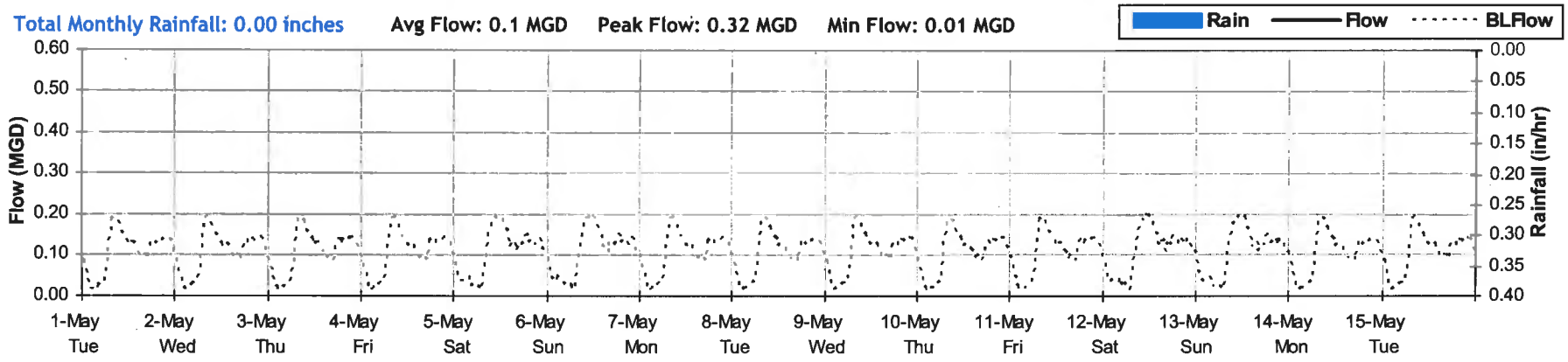
Plan view photo:

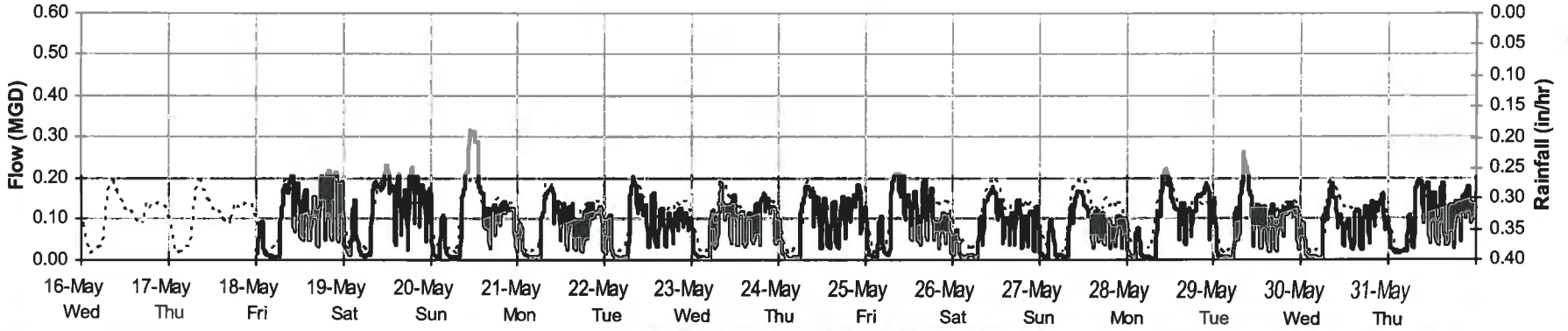
V&A

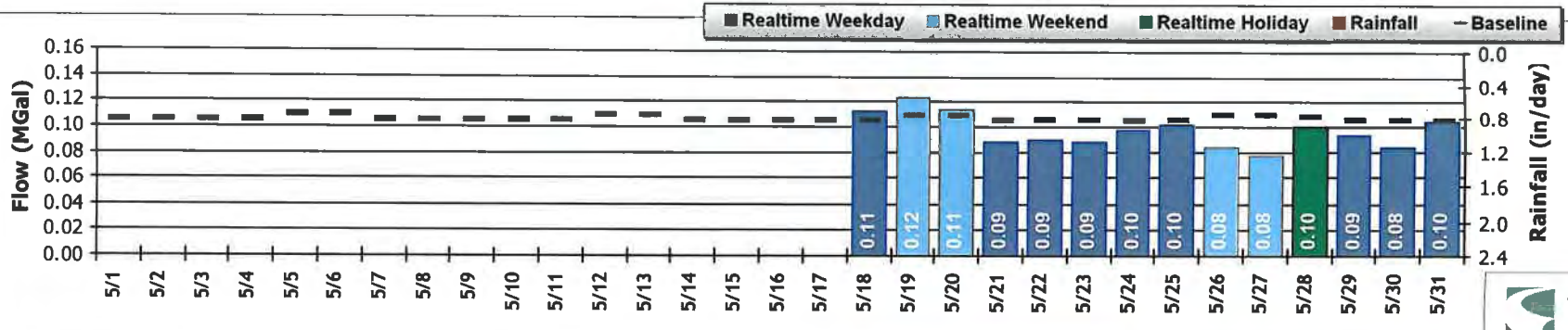
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 7

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.1 MGD Peak Flow: 0.32 MGD Min Flow: 0.01 MGD





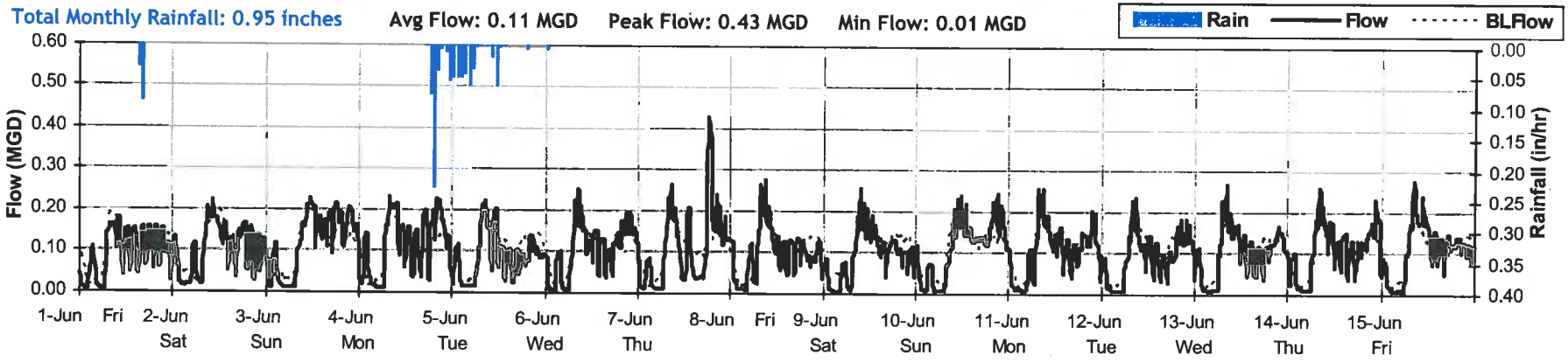


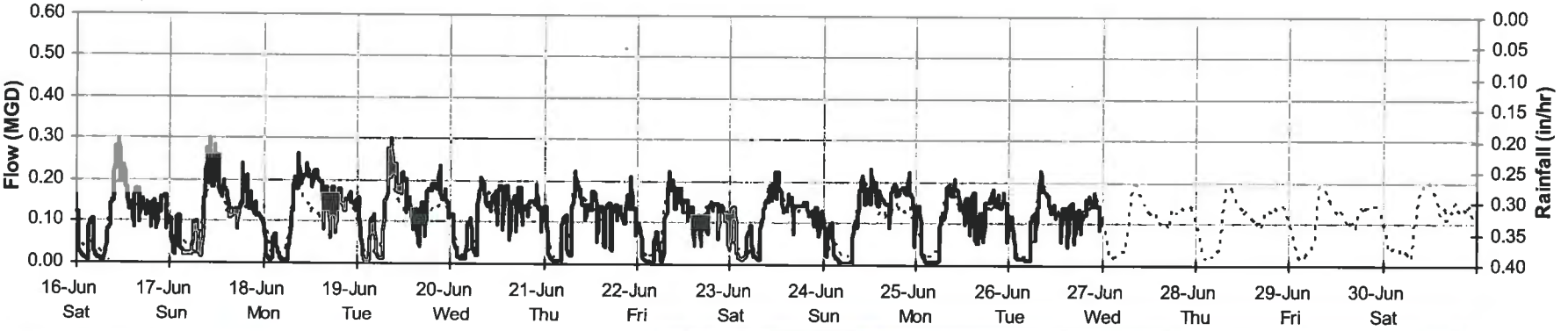
V&A

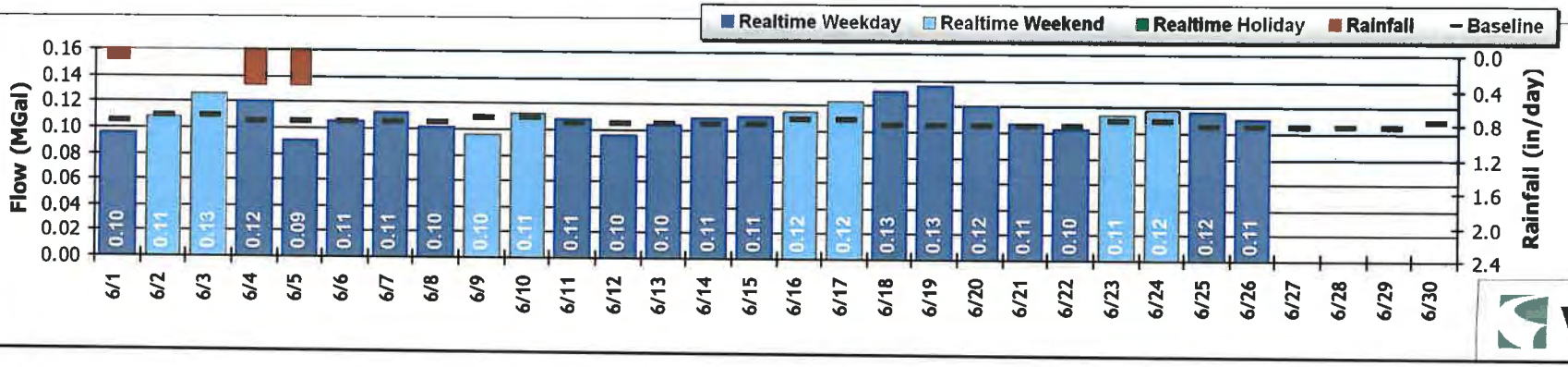
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 7

Total Monthly Rainfall: 0.95 inches Avg Flow: 0.11 MGD Peak Flow: 0.43 MGD Min Flow: 0.01 MGD





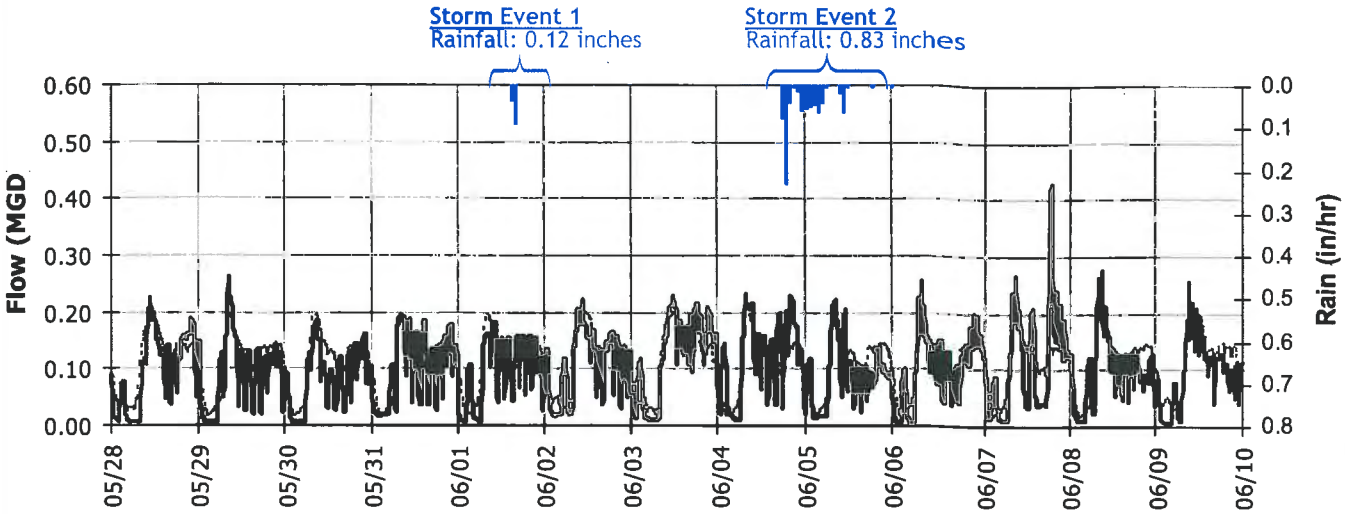


V&A

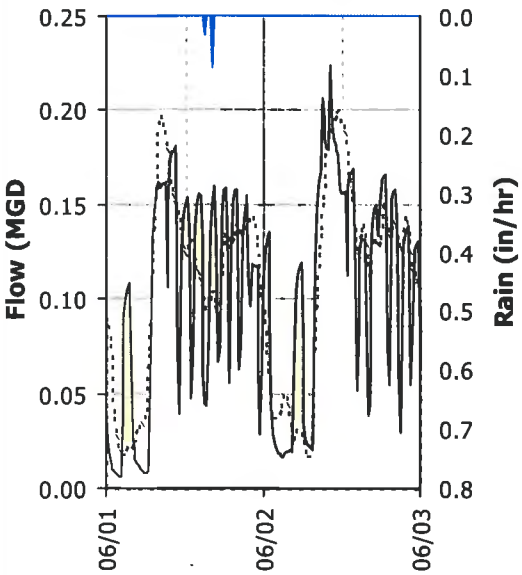
I/I Summary

Monitoring Site:
Site 7

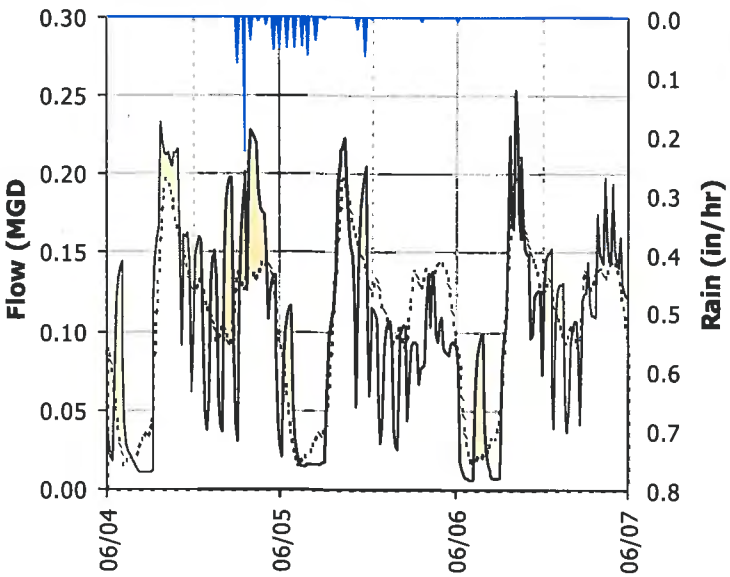
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.12	*inches*
Peak Flow:	0.04	*MGD*
Peak I/I Rate:	-0.05	*MGD*
PF:	0.42	
Pk I/I:ADWF:	-0.46	
Peak Level:	1.72	*inches*
d/D Ratio:	0.22	
Total I/I:	-1,000	*gallons*
RE1 R-Value:	0.0%	

Storm Event #2 I/I Analysis

Rainfall:	0.83	*inches*
Peak Flow:	0.23	*MGD*
Peak I/I Rate:	0.09	*MGD*
PF:	2.14	
Pk I/I:ADWF:	0.85	
Peak Level:	4.08	*inches*
d/D Ratio:	0.51	
Total I/I:	8,000	*gallons*
RE2 R-Value:	0.1%	

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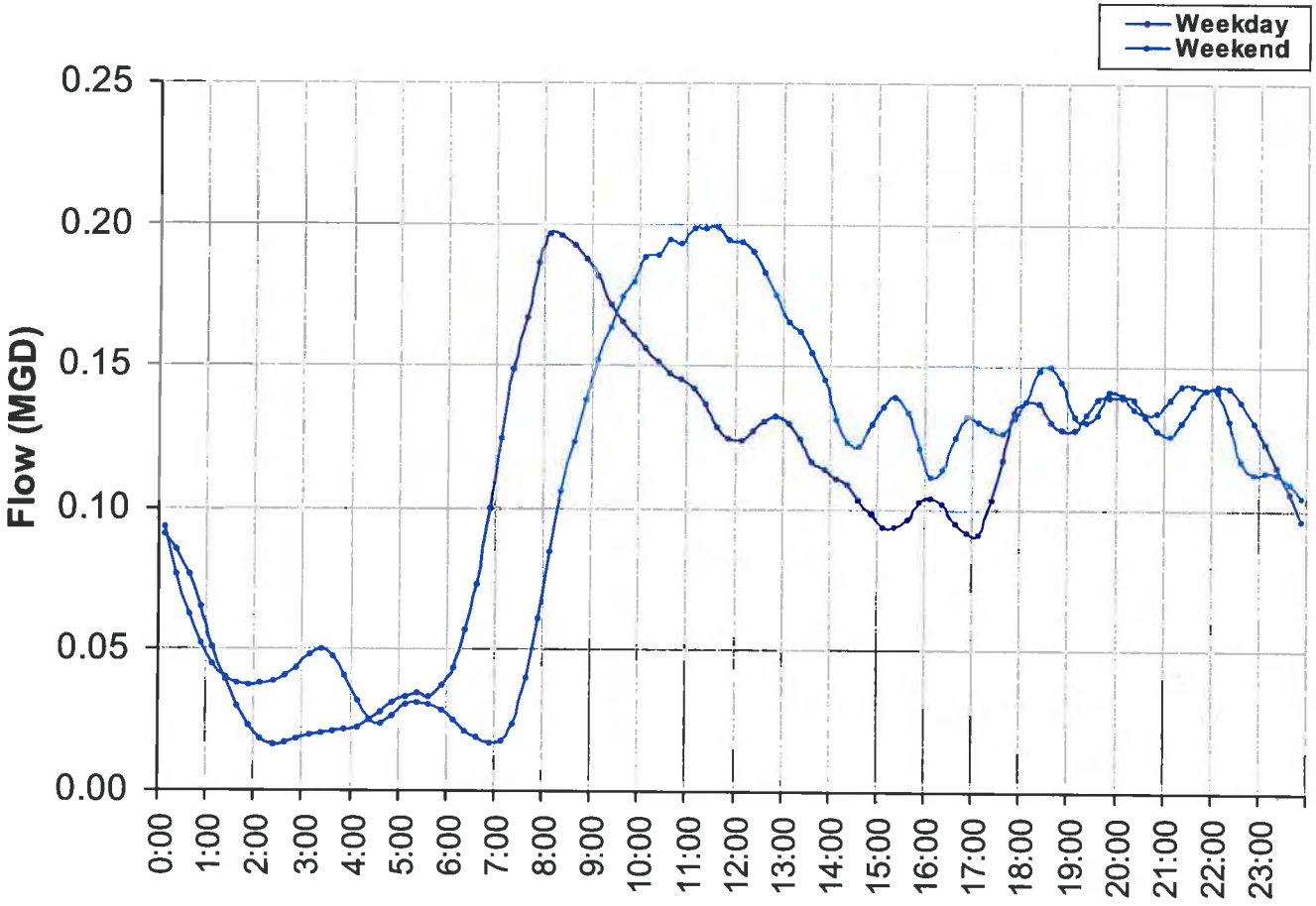
Average Dry Weather Flow

Monitoring Site:
Site 7

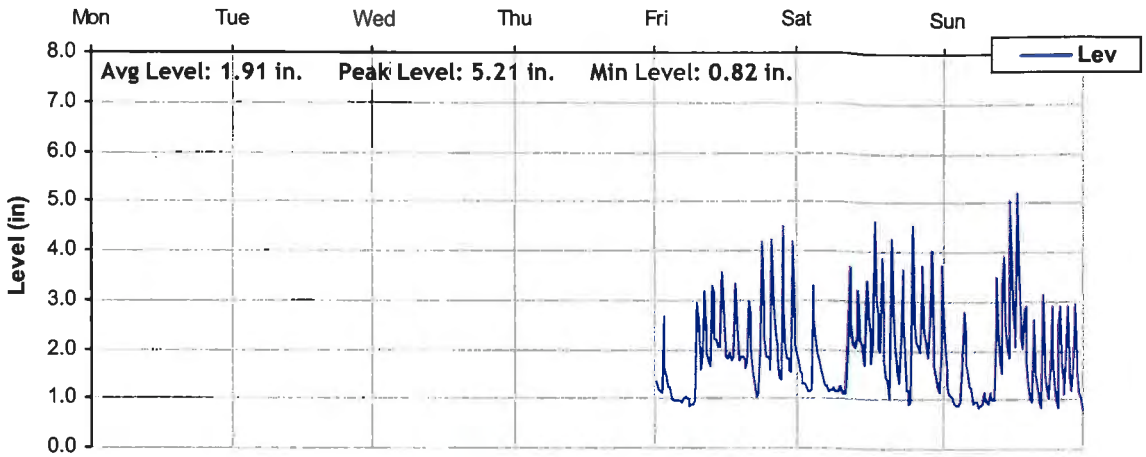


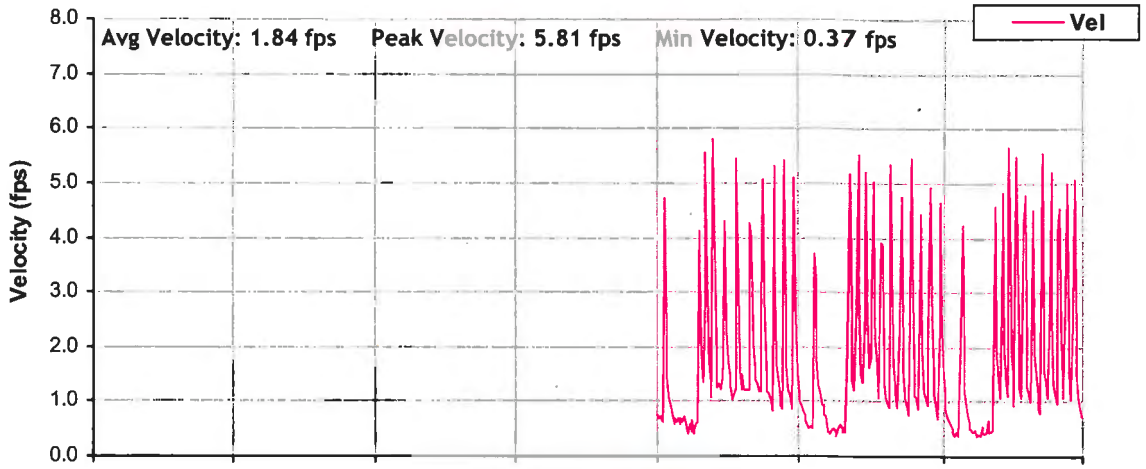
Average Dry Weather Flow:
0.11 *MGD*

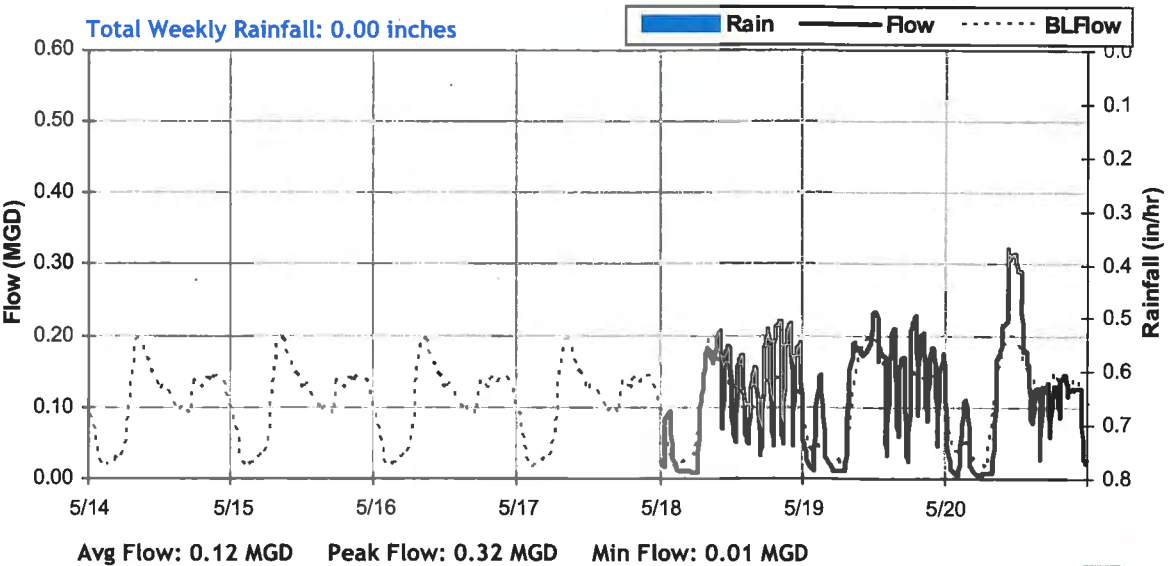
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 7





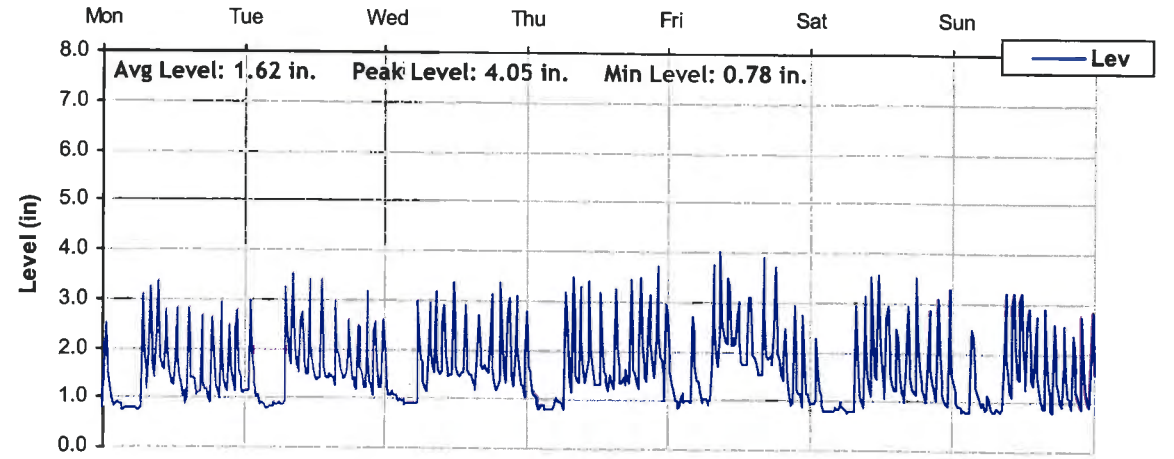


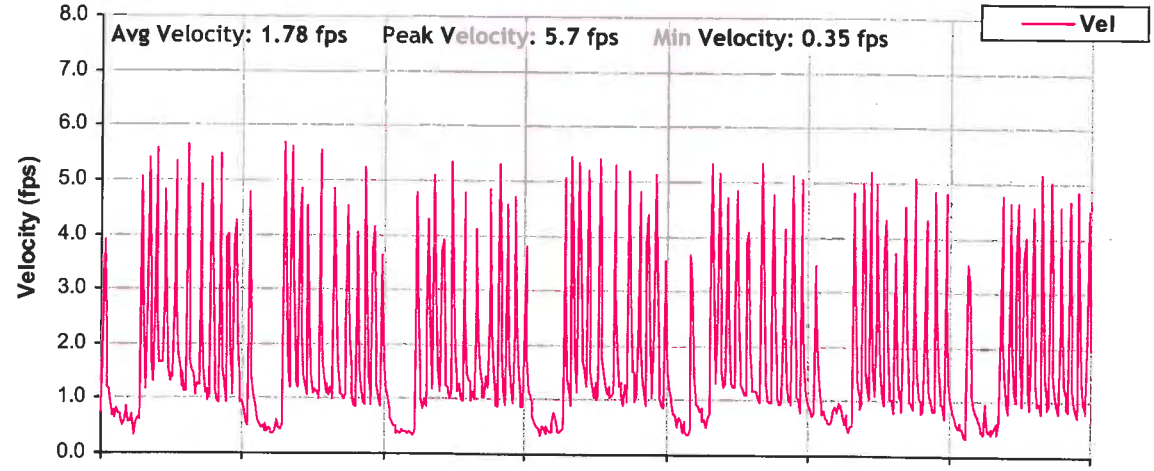
Avg Flow: 0.12 MGD Peak Flow: 0.32 MGD Min Flow: 0.01 MGD

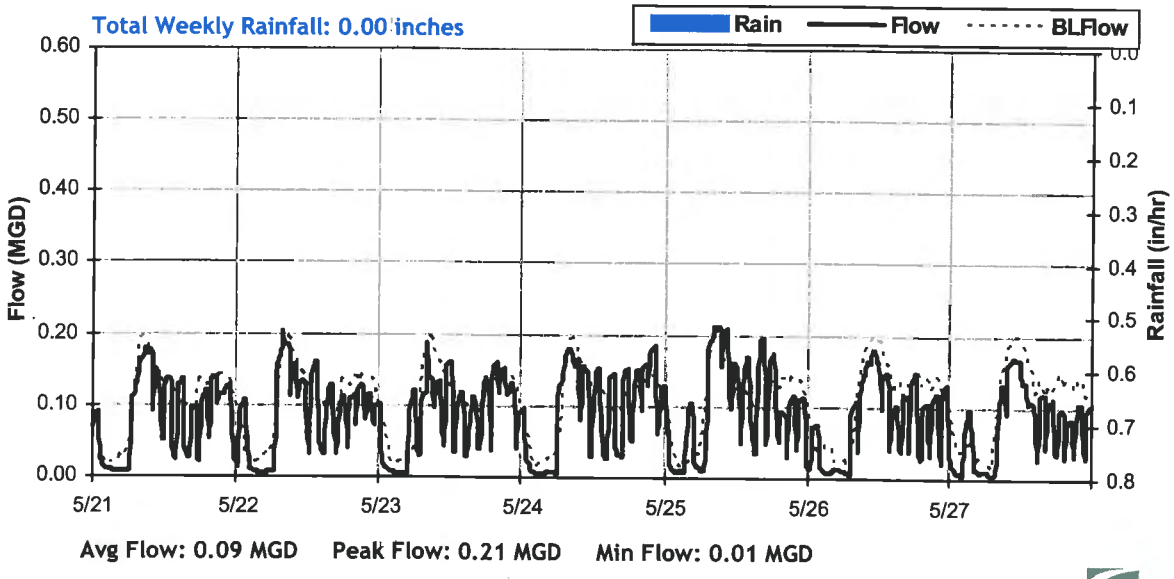
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 7





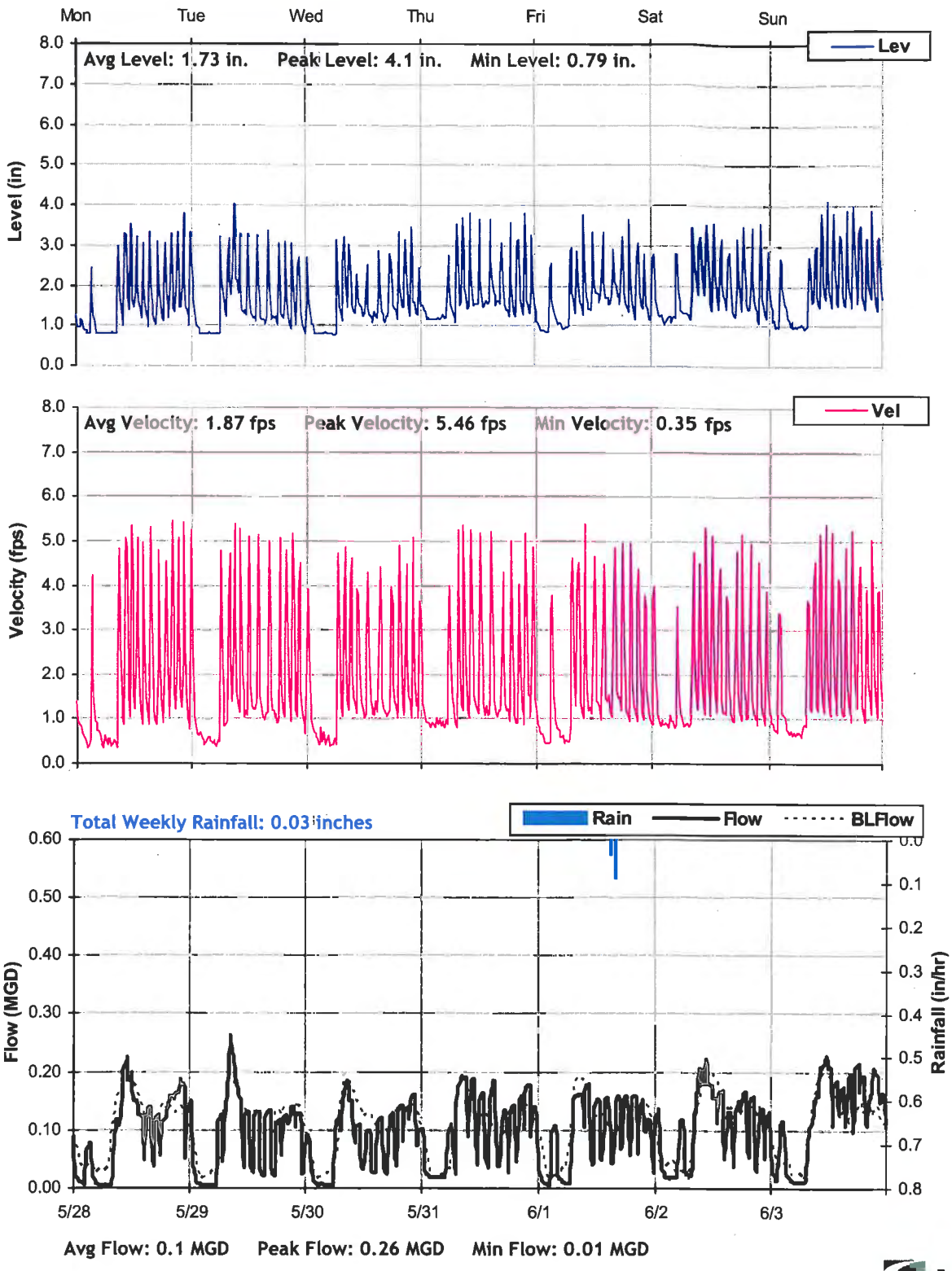


Avg Flow: 0.09 MGD Peak Flow: 0.21 MGD Min Flow: 0.01 MGD

V&A

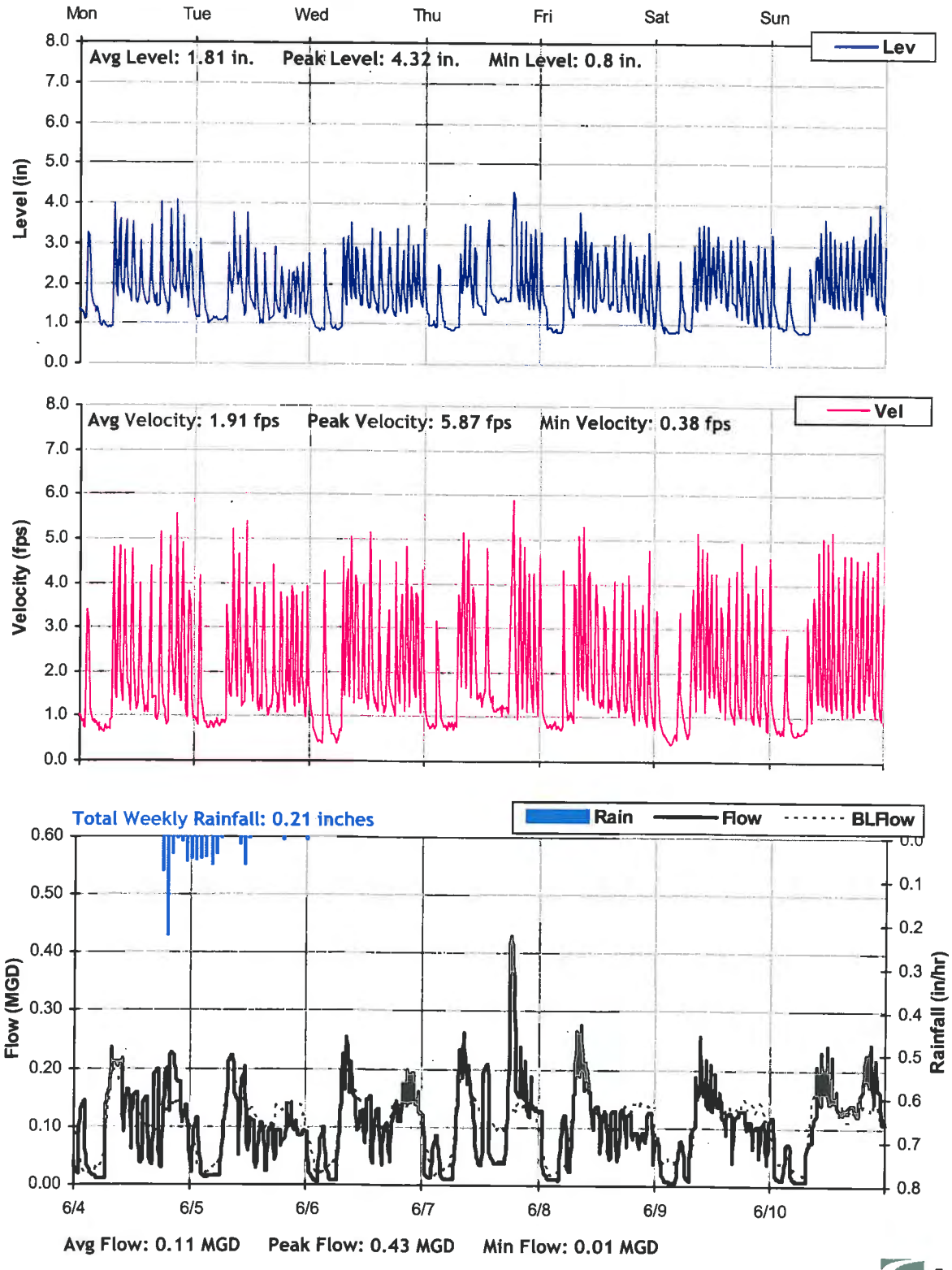
Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 7



Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 7



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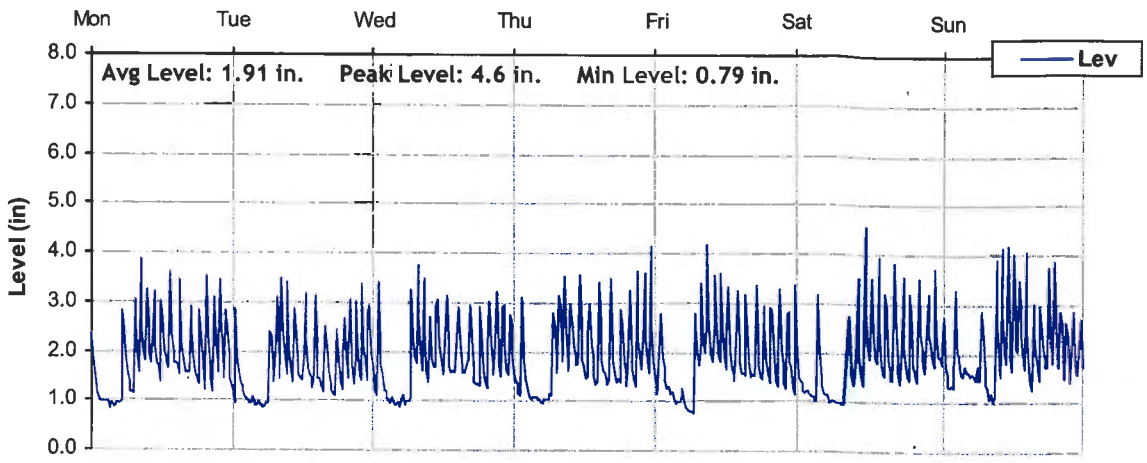
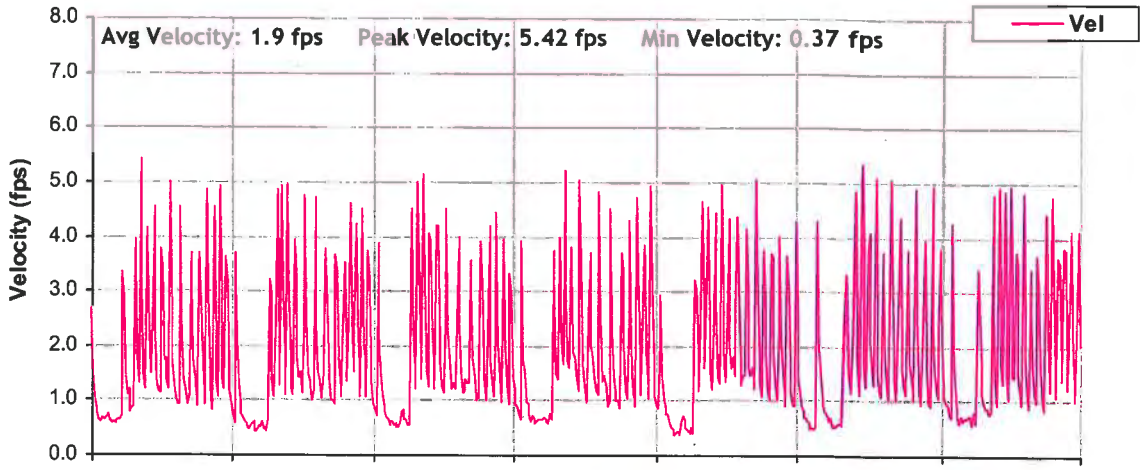
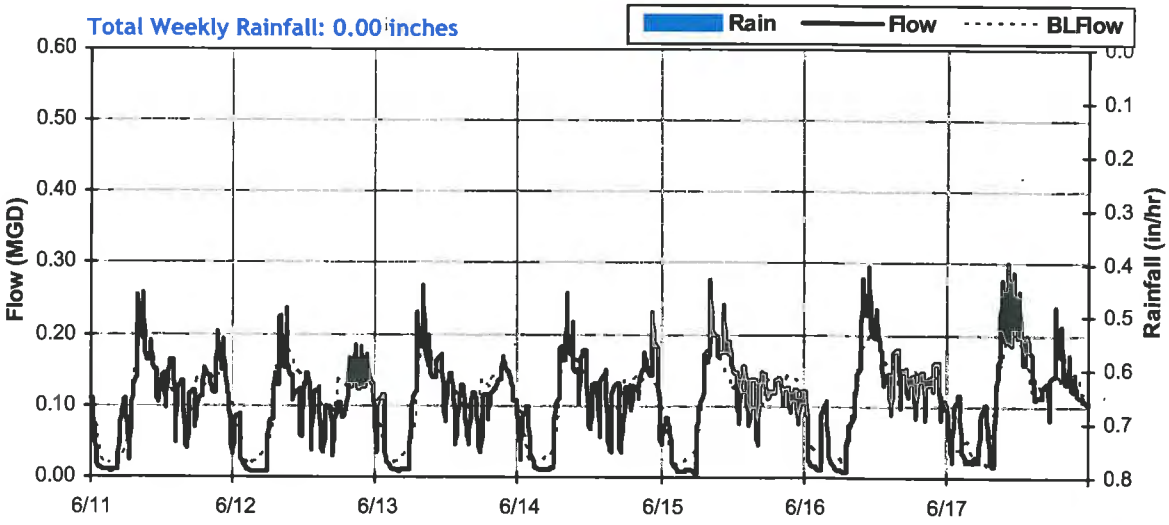
Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 7





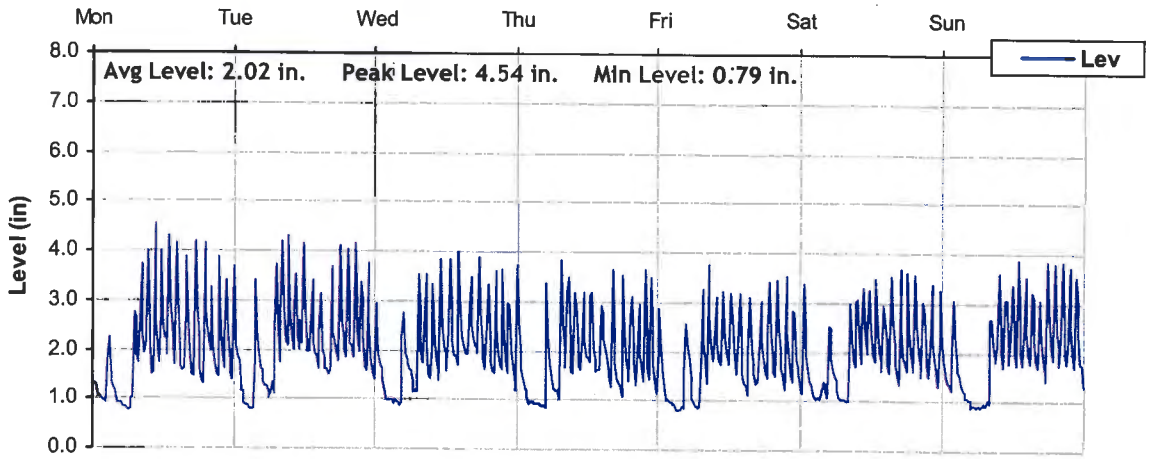


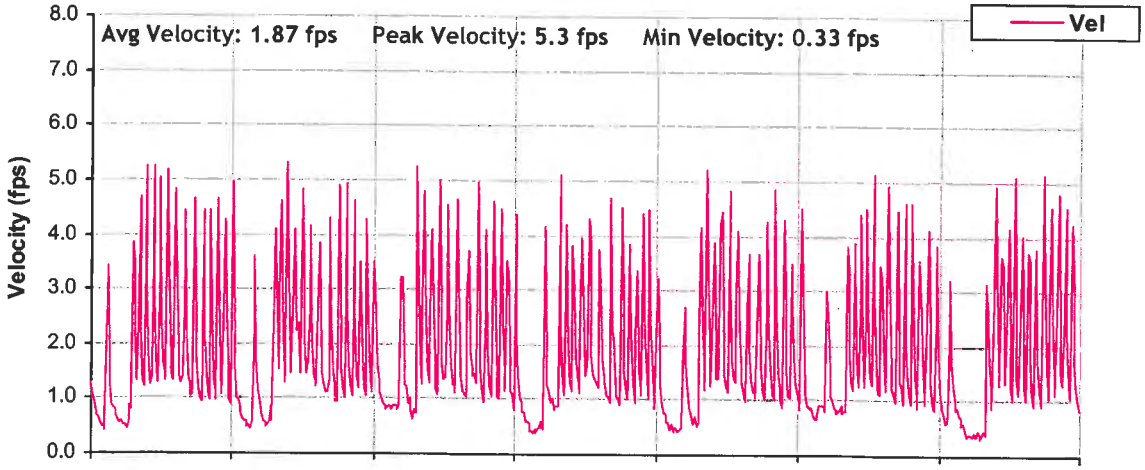
Avg Flow: 0.11 MGD Peak Flow: 0.3 MGD Min Flow: 0.01 MGD

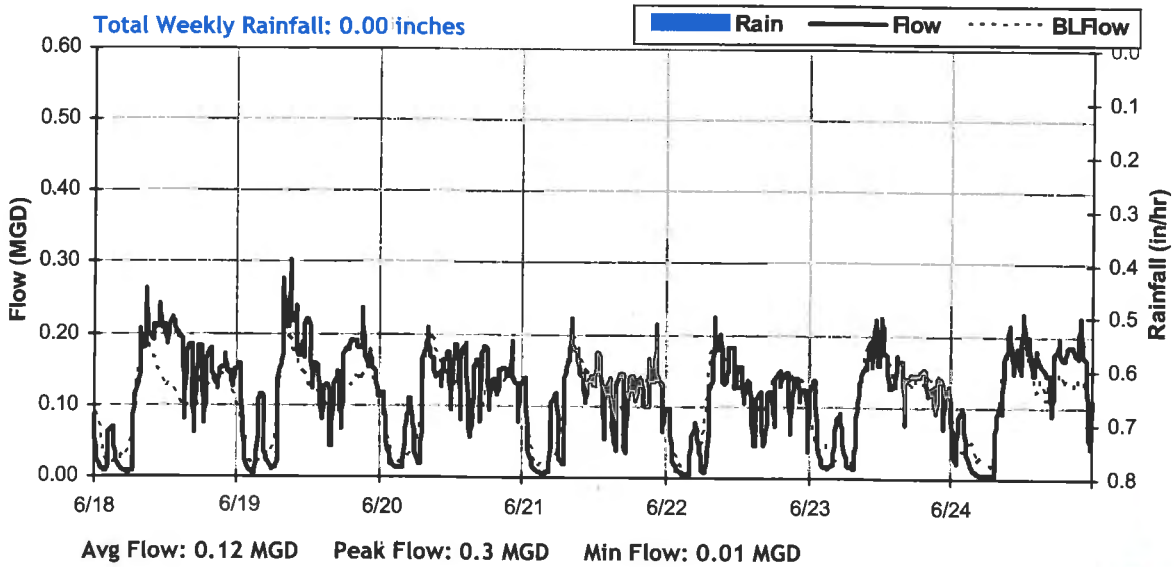
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 7





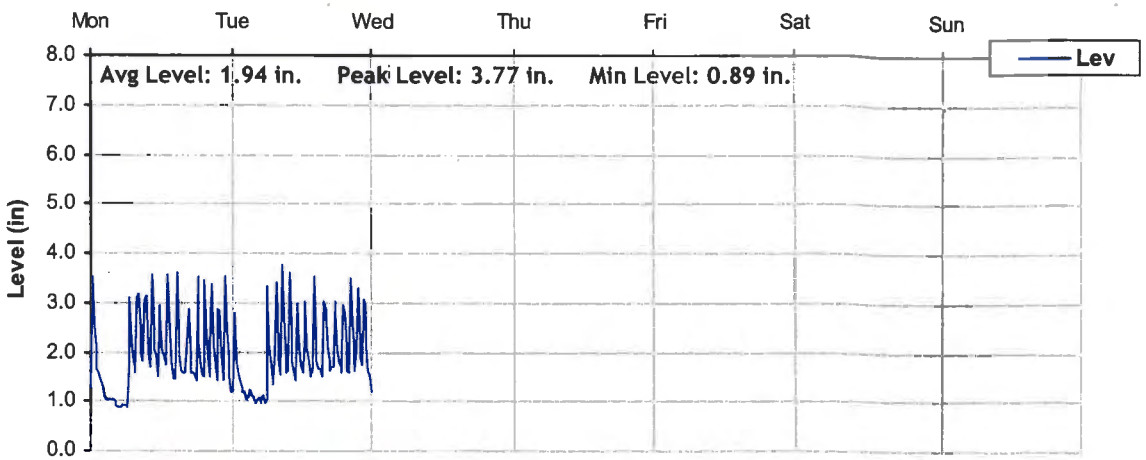


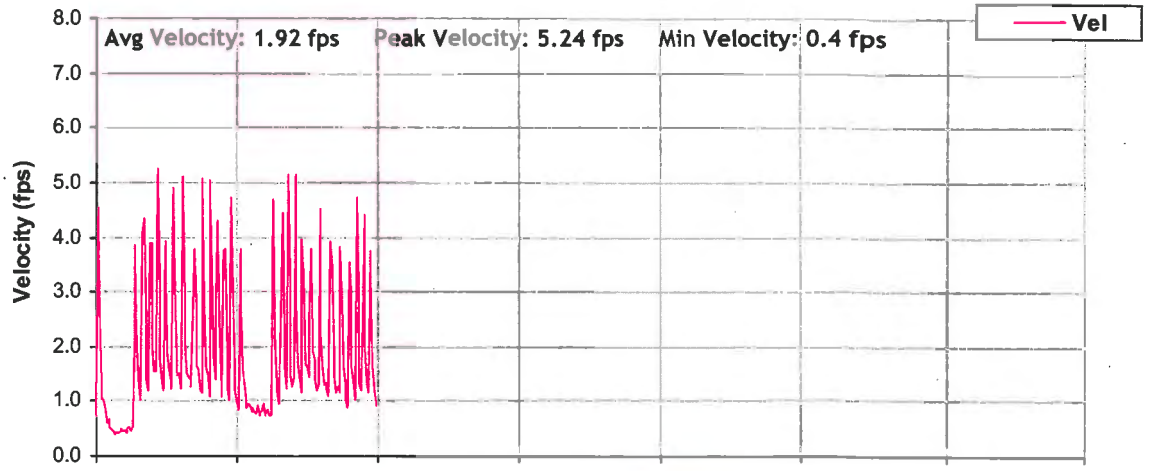
Avg Flow: 0.12 MGD Peak Flow: 0.3 MGD Min Flow: 0.01 MGD

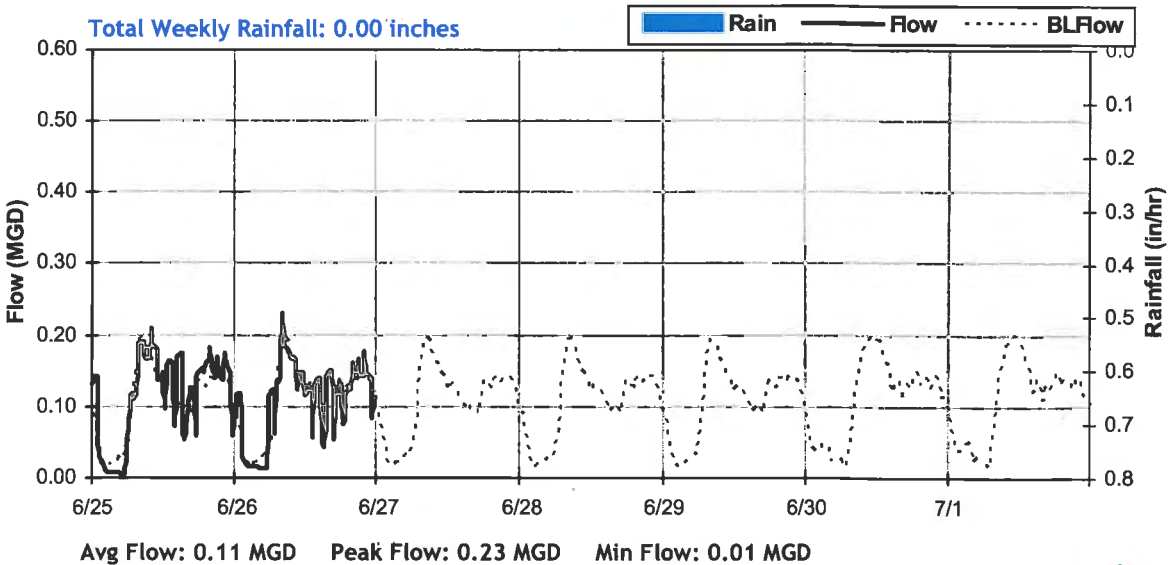
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 7







Avg Flow: 0.11 MGD Peak Flow: 0.23 MGD Min Flow: 0.01 MGD

V&A

Site Information Report

Monitoring Site: Site 8

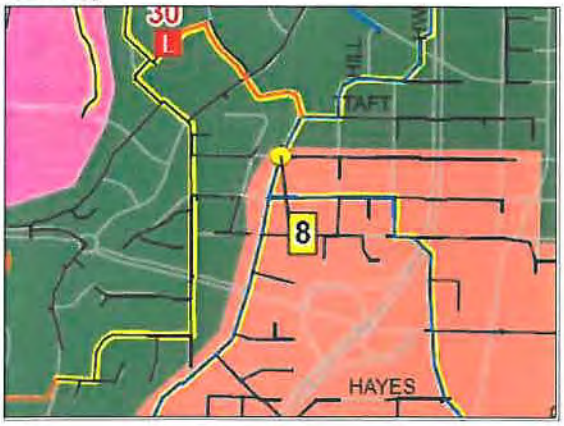
Location:

Diameter: 24 inches

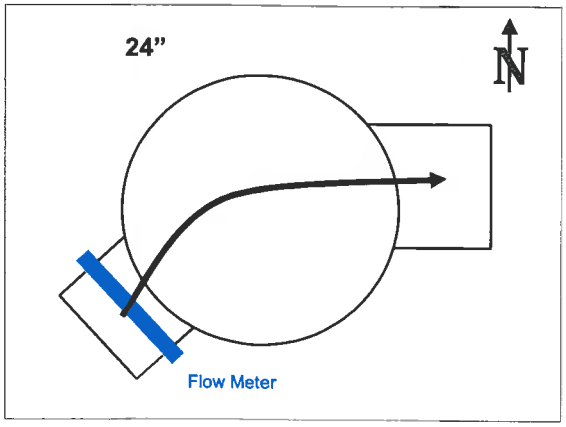
Average Dry Weather Flow: 0.617 *MGD*

Peak Measured Flow: 1.717 *MGD*

Sanitary sewer map:



Flow sketch:



Street-level photo:

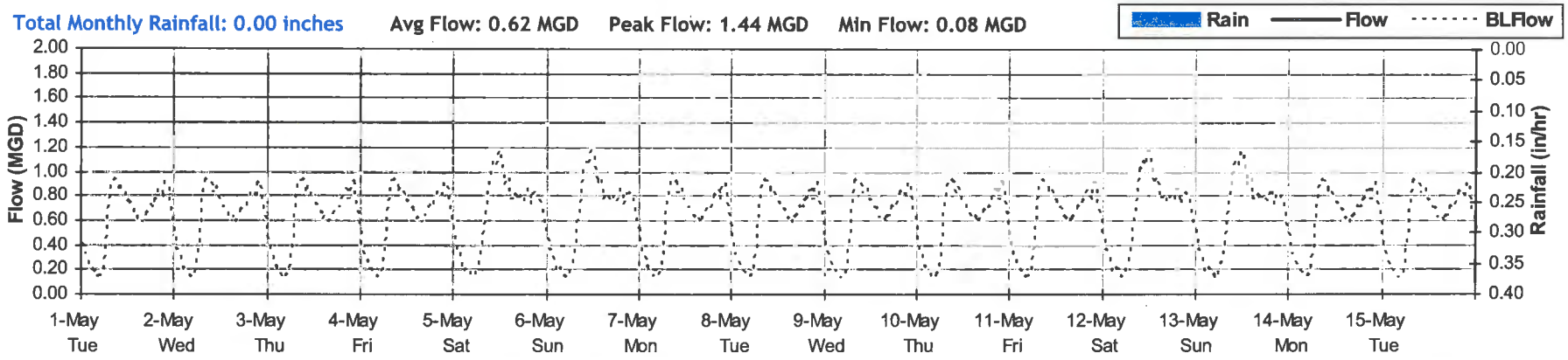
Plan view photo:

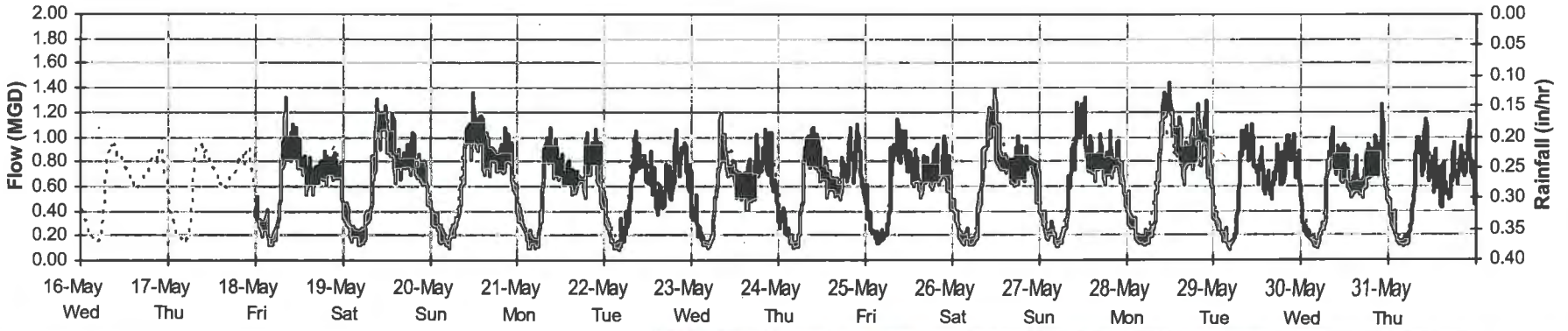
V&A

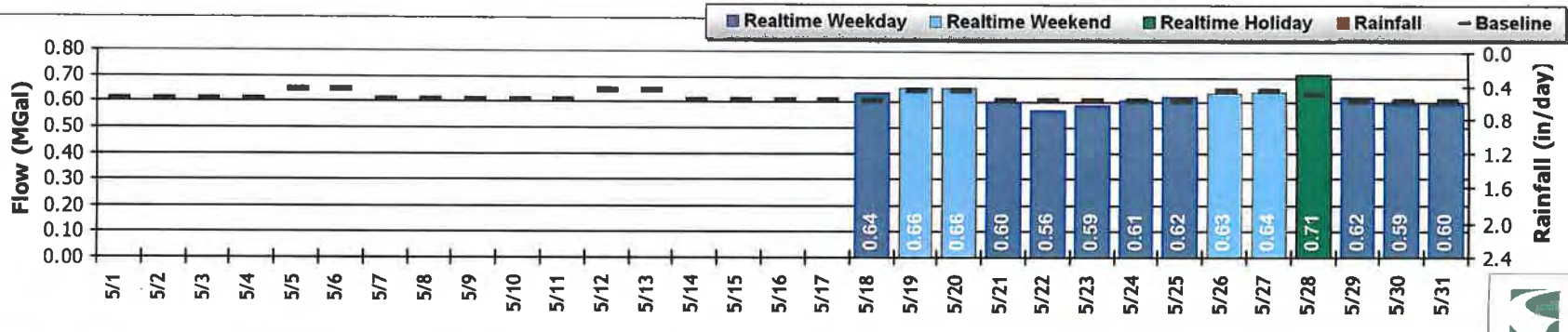
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 8

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.62 MGD Peak Flow: 1.44 MGD Min Flow: 0.08 MGD







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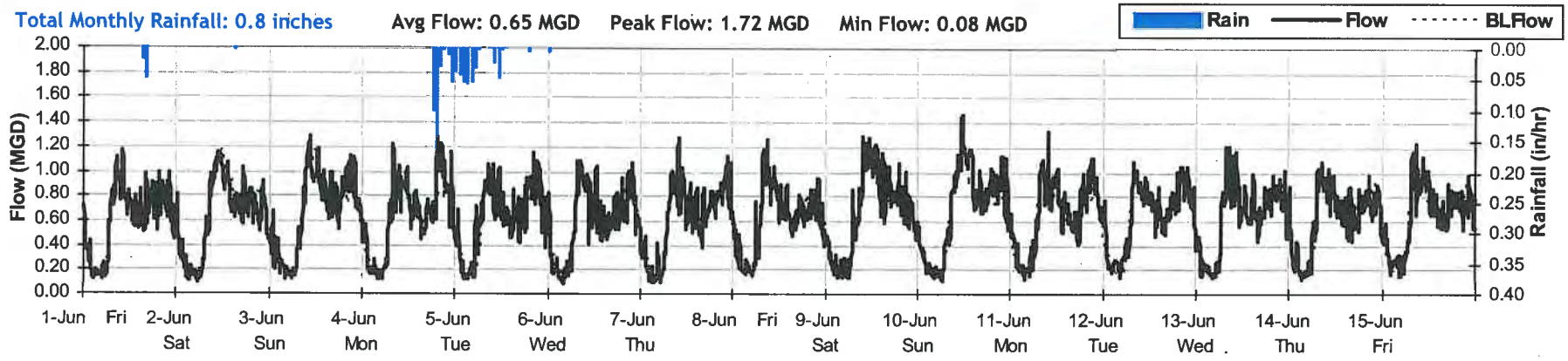
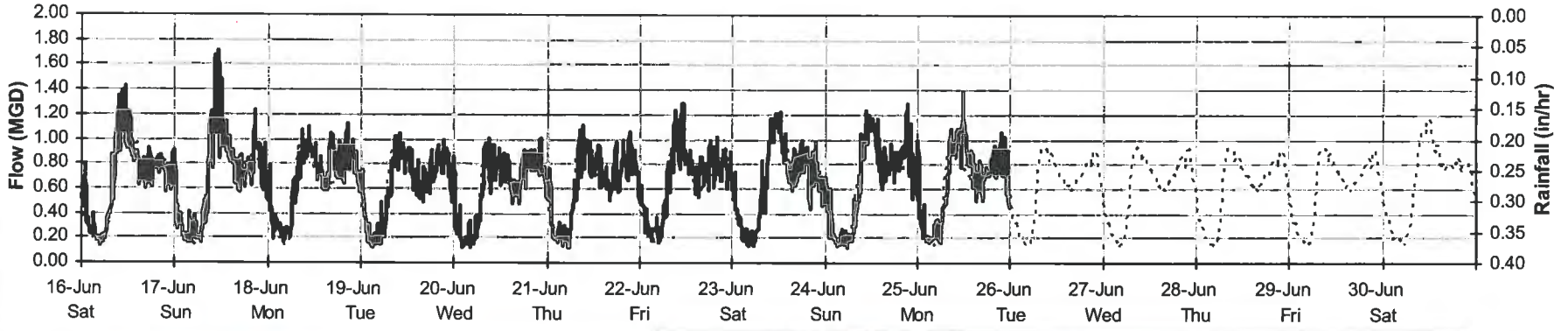
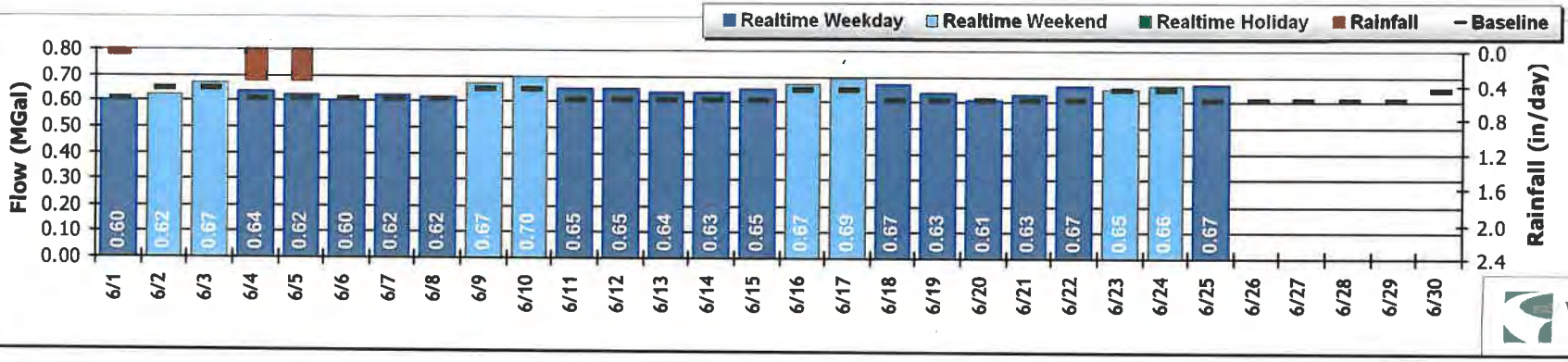
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 8

Total Monthly Rainfall: 0.8 inches Avg Flow: 0.65 MGD Peak Flow: 1.72 MGD Min Flow: 0.08 MGD







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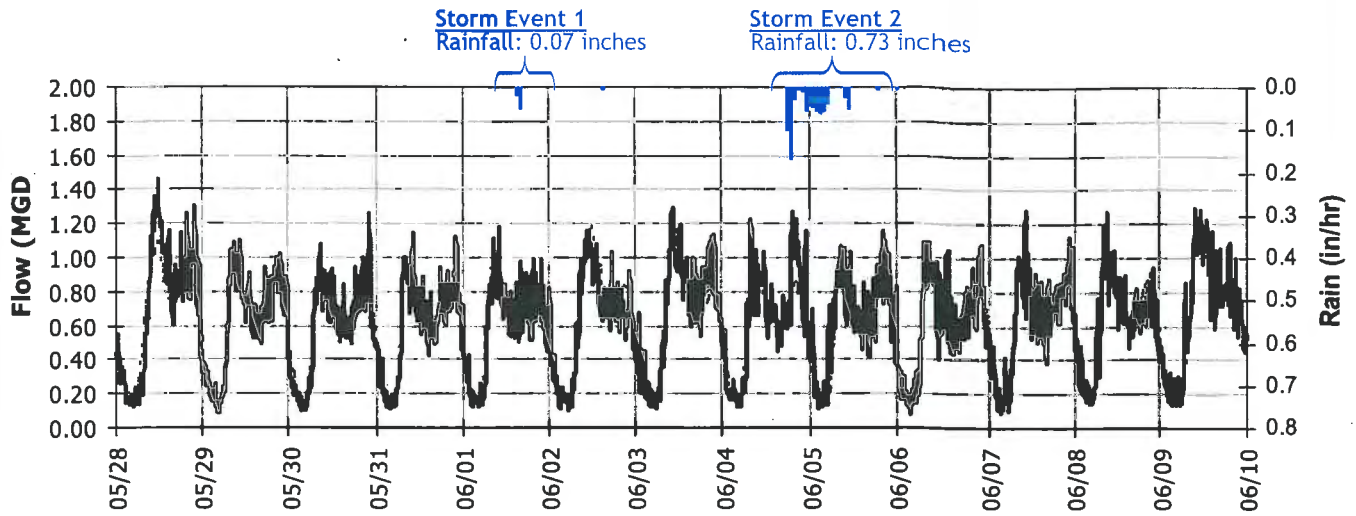
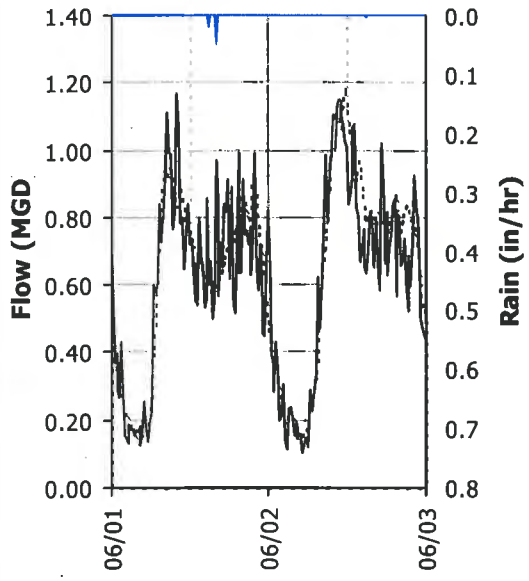
I/I Summary

Monitoring Site:
Site 8

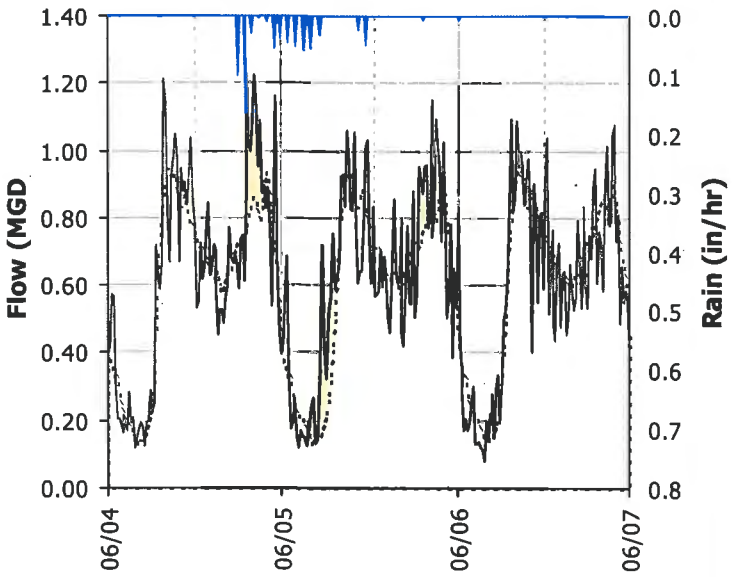
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.07	*inches*
Peak Flow:	0.60	*MGD*
Peak I/I Rate:	-0.03	*MGD*
PF:	0.97	
Pk I/I:ADWF:	-0.05	
Peak Level:	4.41	*inches*
d/D Ratio:	0.18	
Total I/I:	0	*gallons*
RE1 R-Value:	0.0%	

Storm Event #2 I/I Analysis

Rainfall:	0.73	*inches*
Peak Flow:	1.27	*MGD*
Peak I/I Rate:	0.56	*MGD*
PF:	2.06	
Pk I/I:ADWF:	0.90	
Peak Level:	6.79	*inches*
d/D Ratio:	0.28	
Total I/I:	41,000	*gallons*
RE2 R-Value:	0.1%	

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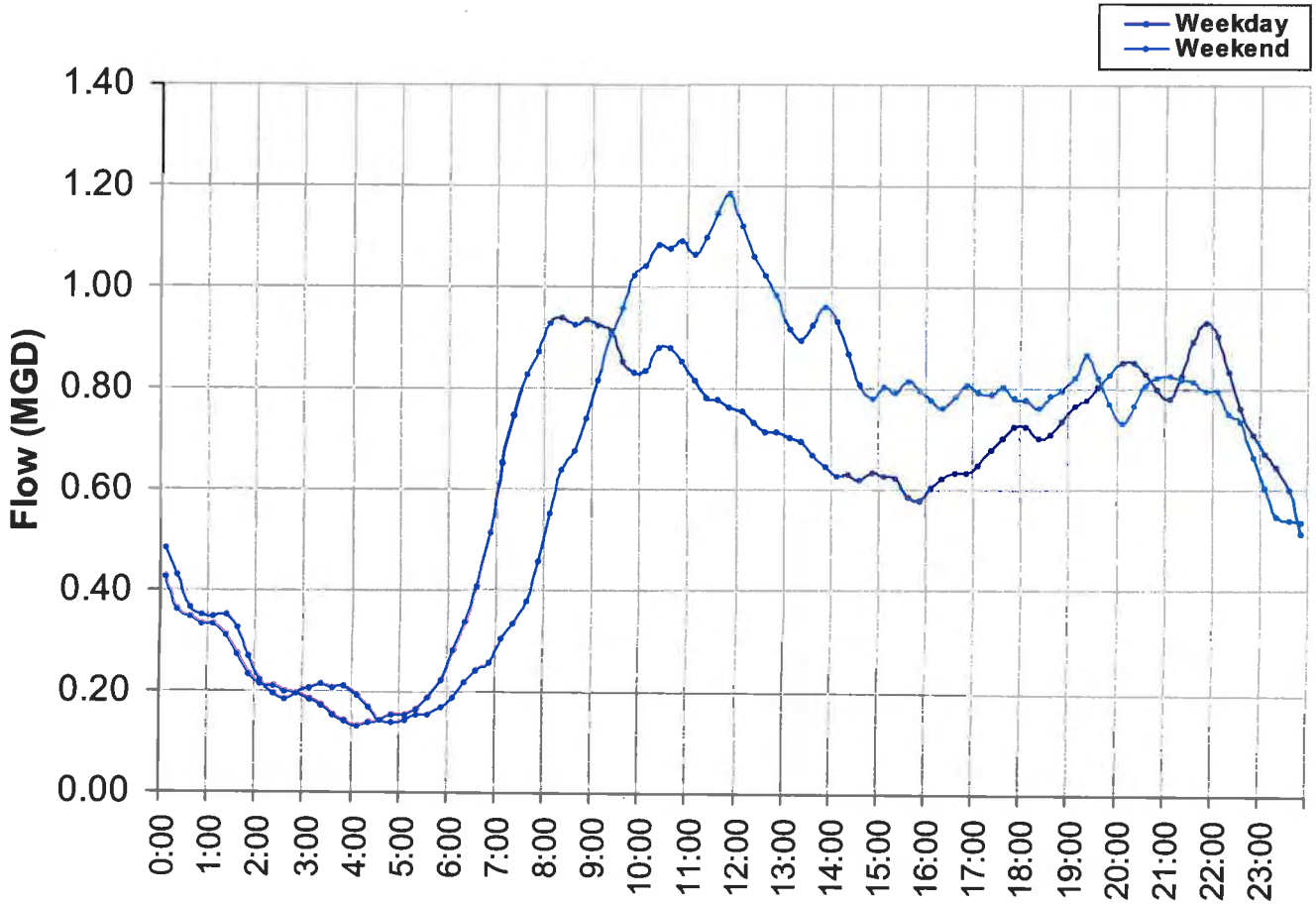
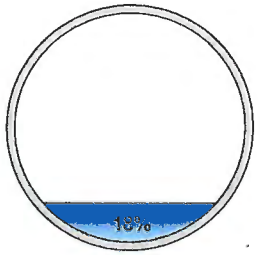
Average Dry Weather Flow

Monitoring Site:
Site 8



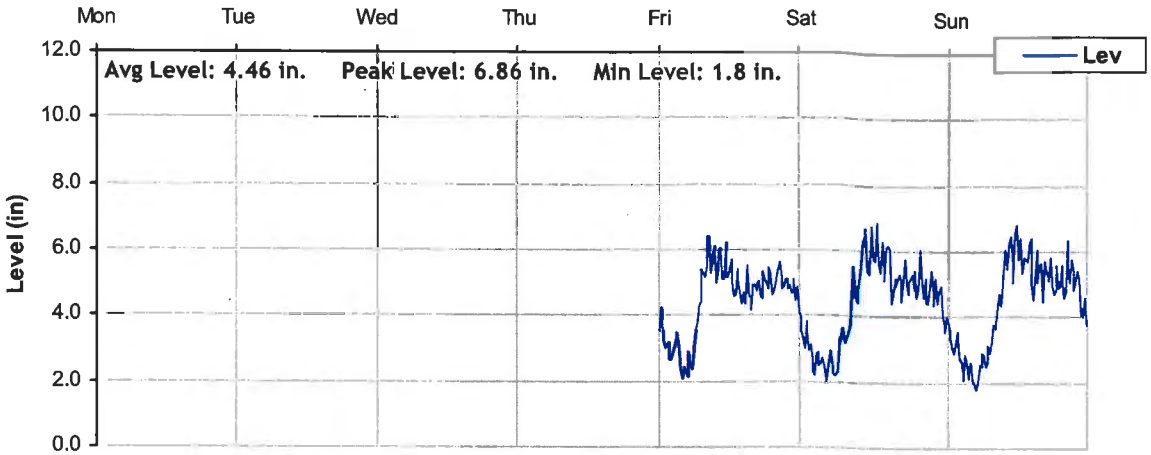
Average Dry Weather Flow:
0.62 *MGD*

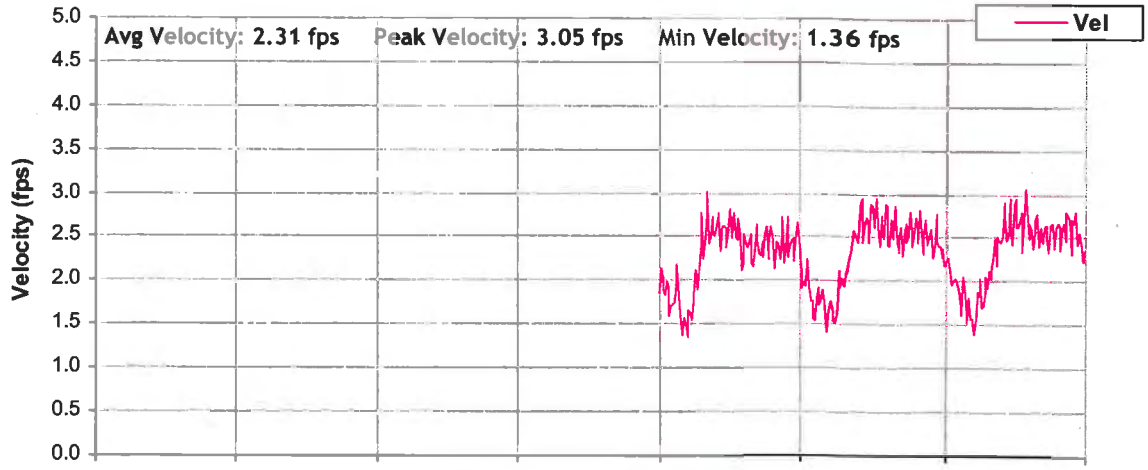


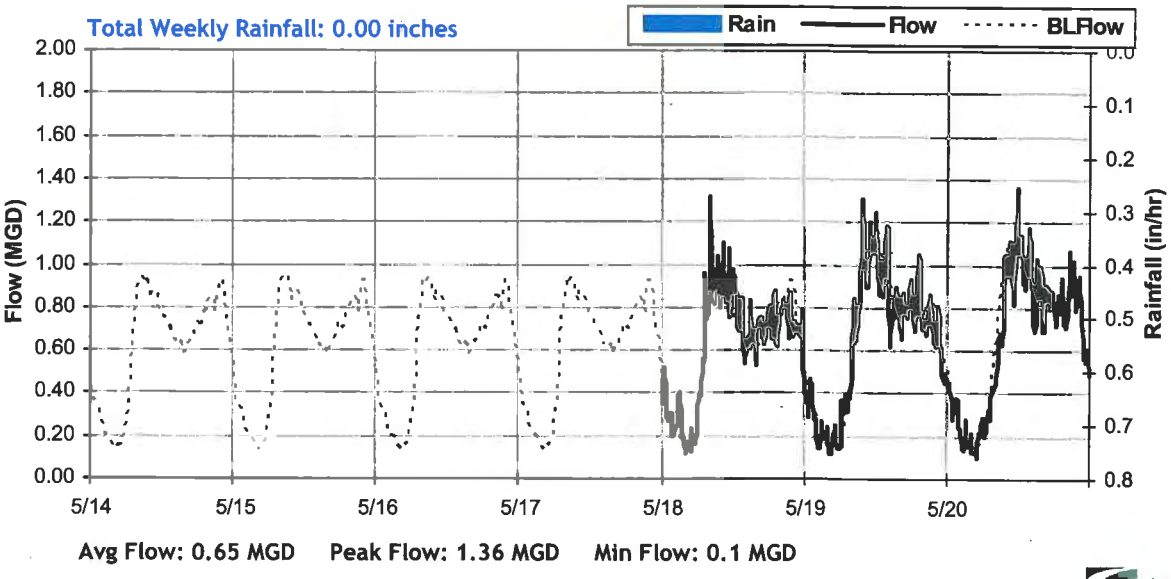
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 8





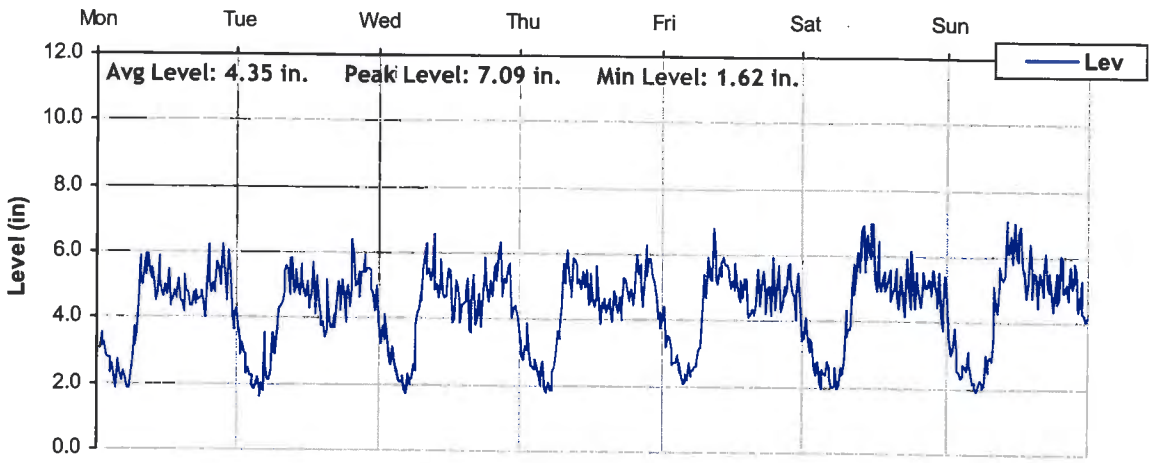


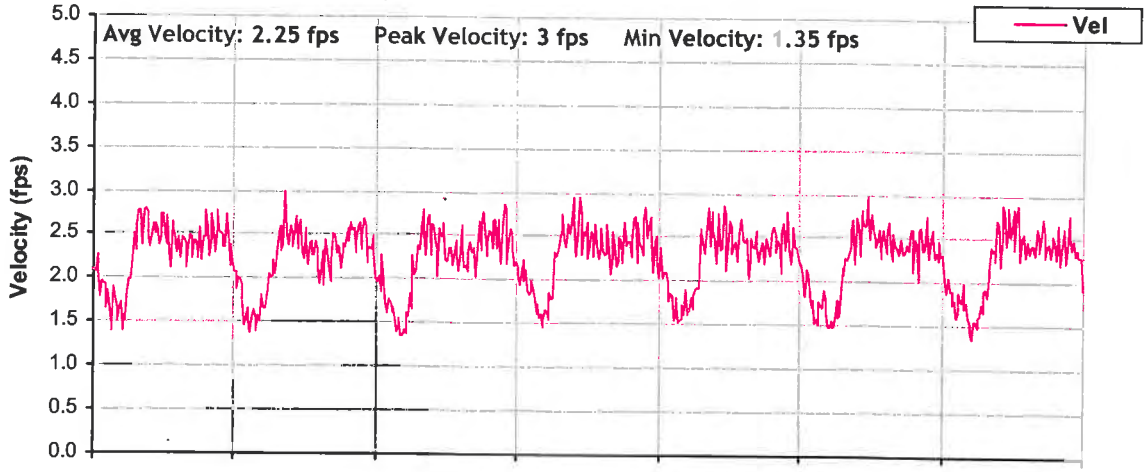
Avg Flow: 0.65 MGD Peak Flow: 1.36 MGD Min Flow: 0.1 MGD

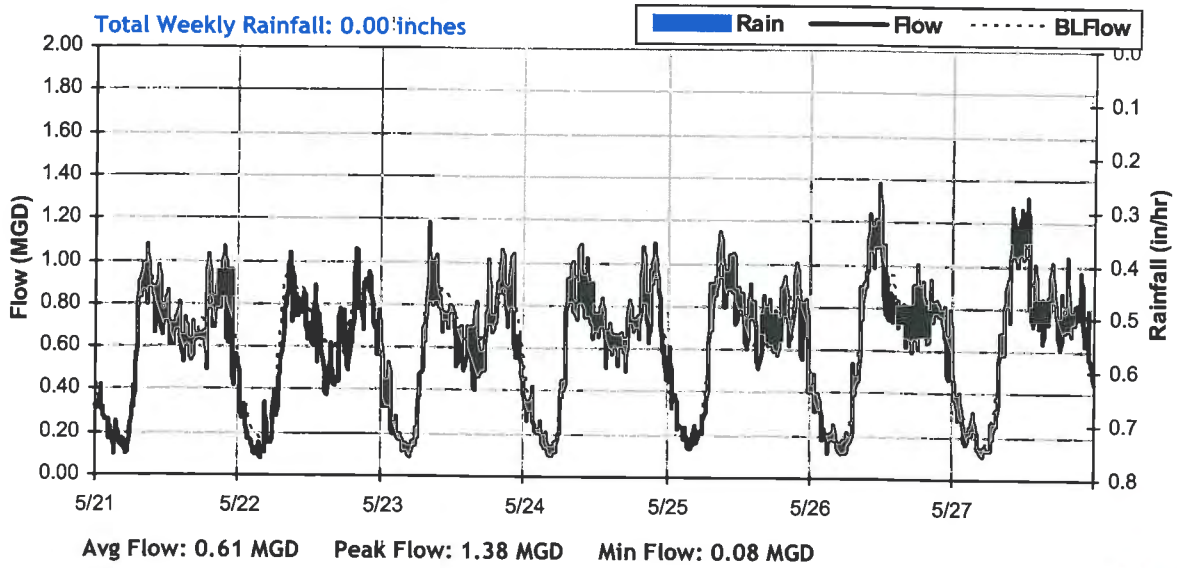
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 8





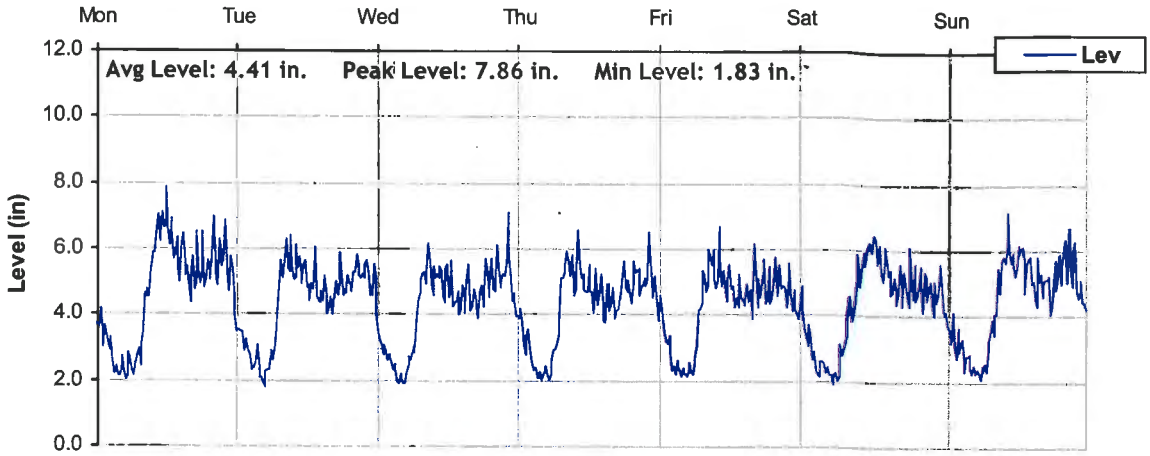


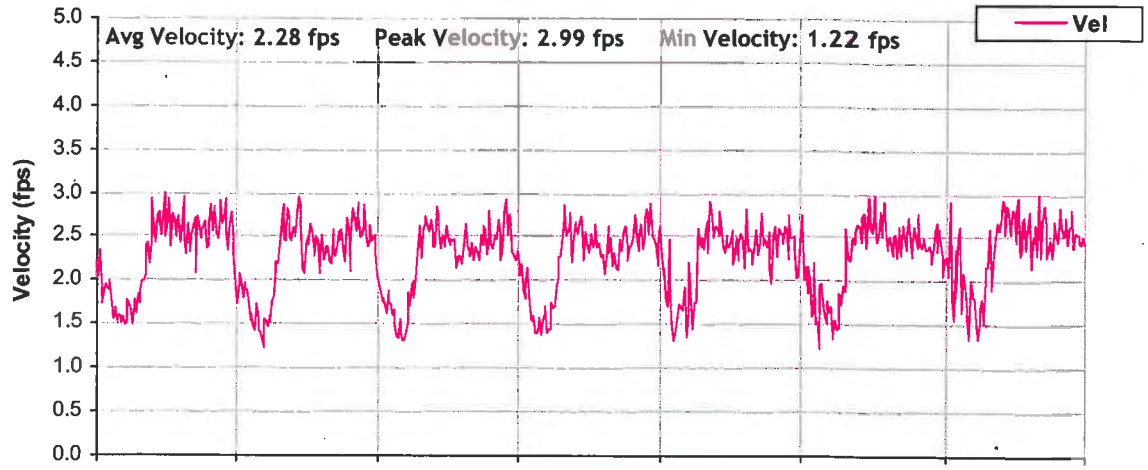
Avg Flow: 0.61 MGD Peak Flow: 1.38 MGD Min Flow: 0.08 MGD

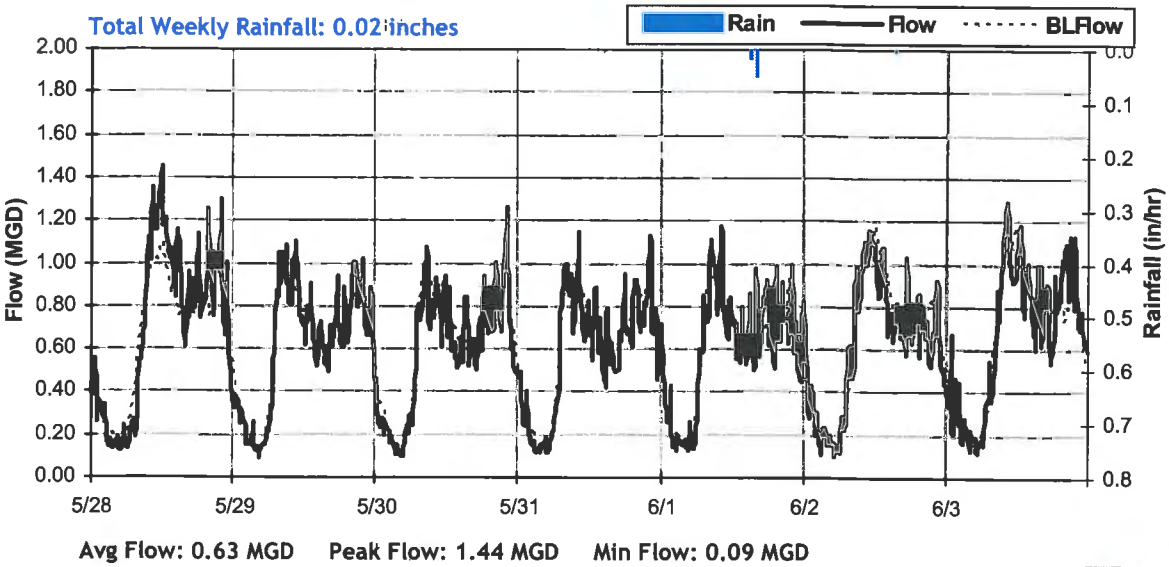
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 8





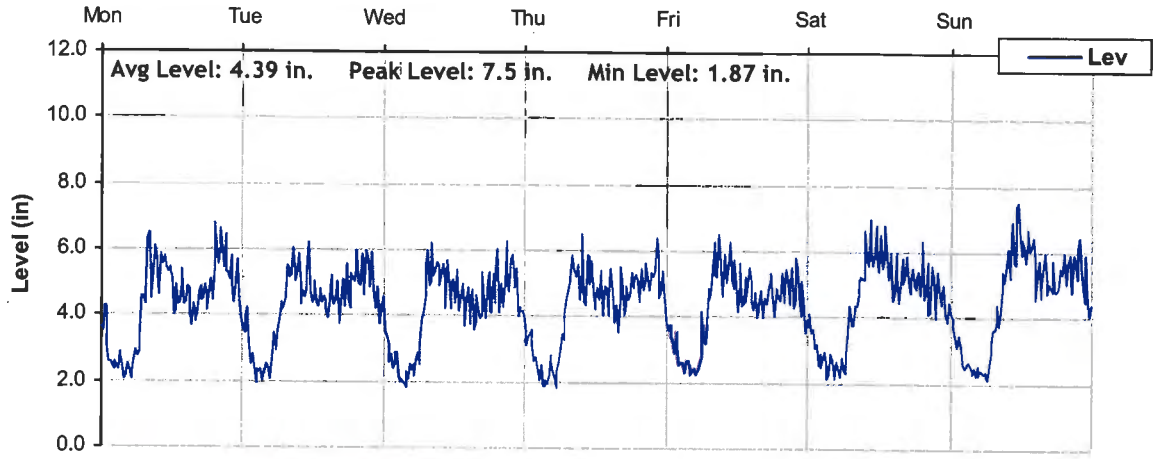


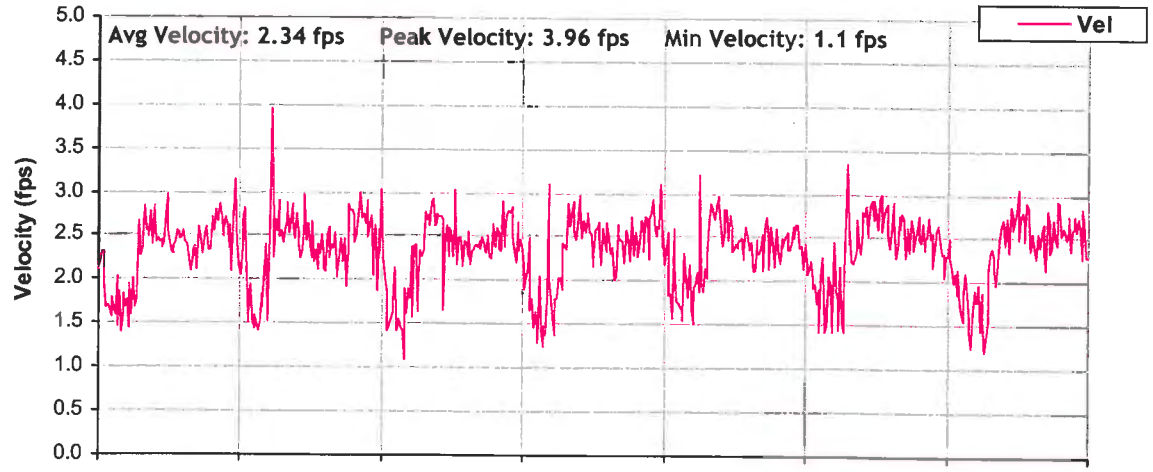
Avg Flow: 0.63 MGD Peak Flow: 1.44 MGD Min Flow: 0.09 MGD

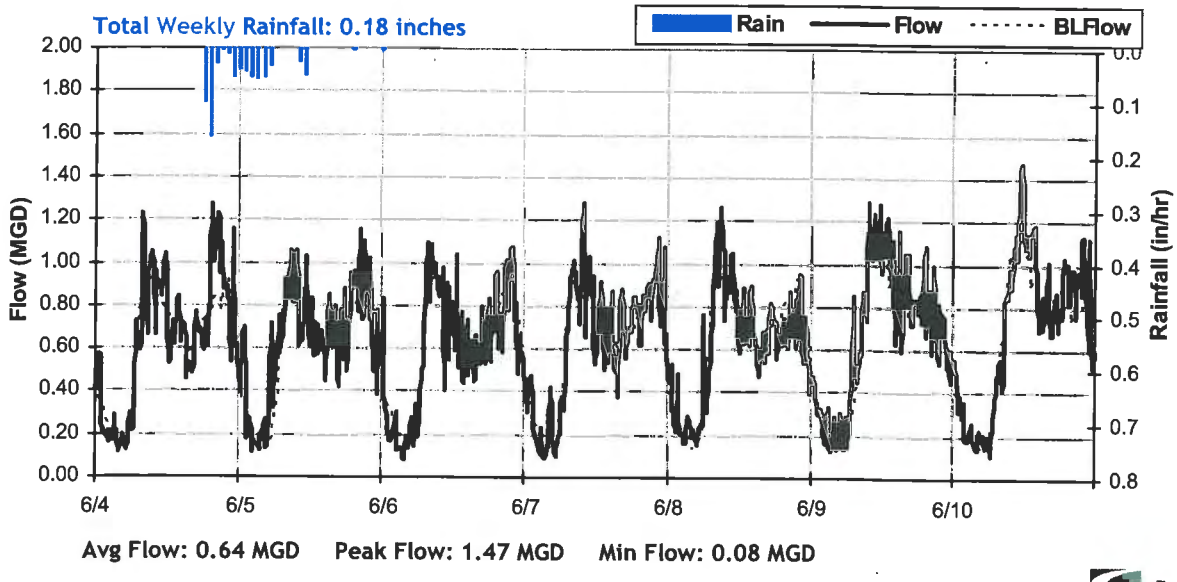
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 8





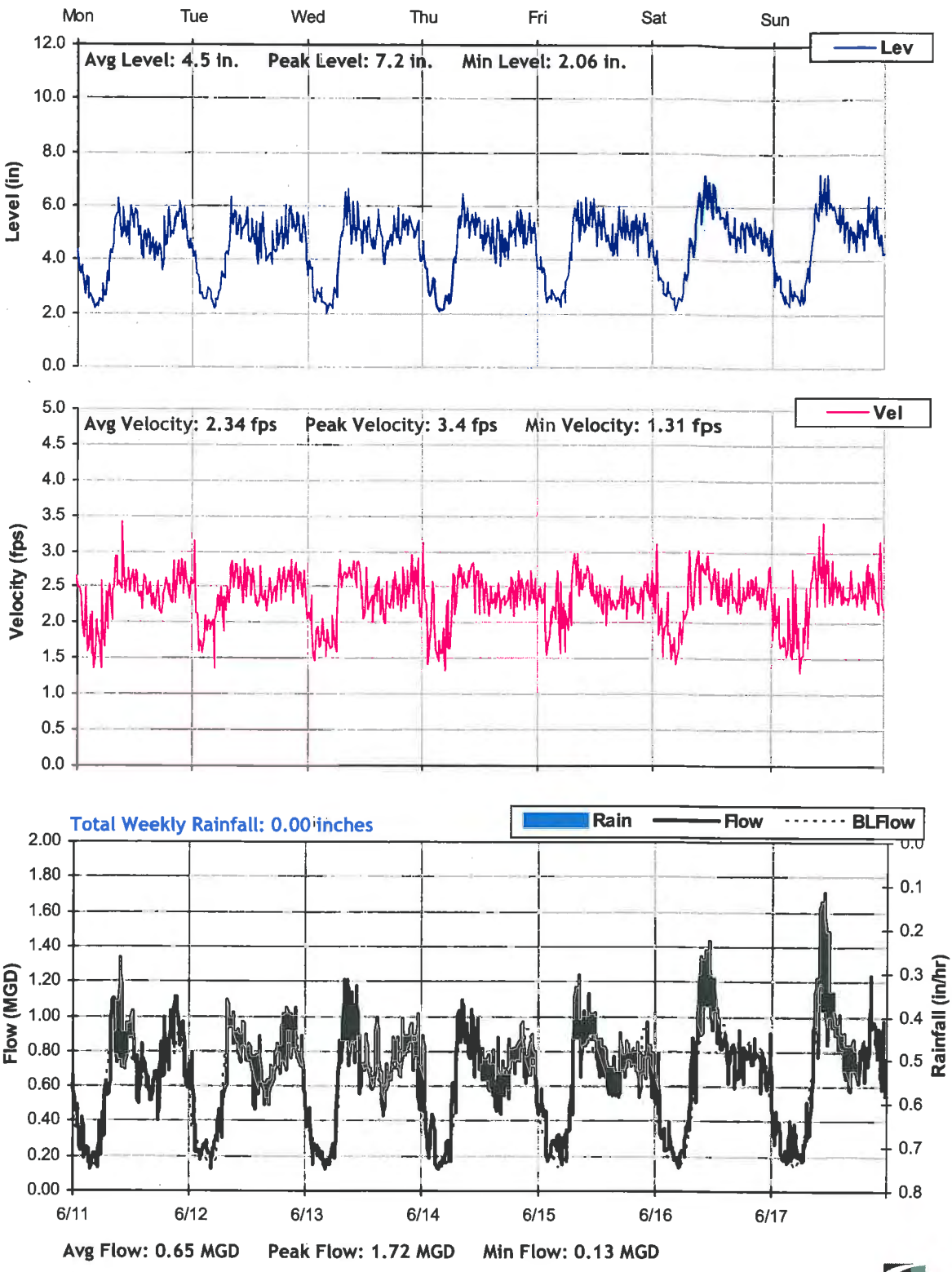


Avg Flow: 0.64 MGD Peak Flow: 1.47 MGD Min Flow: 0.08 MGD

V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

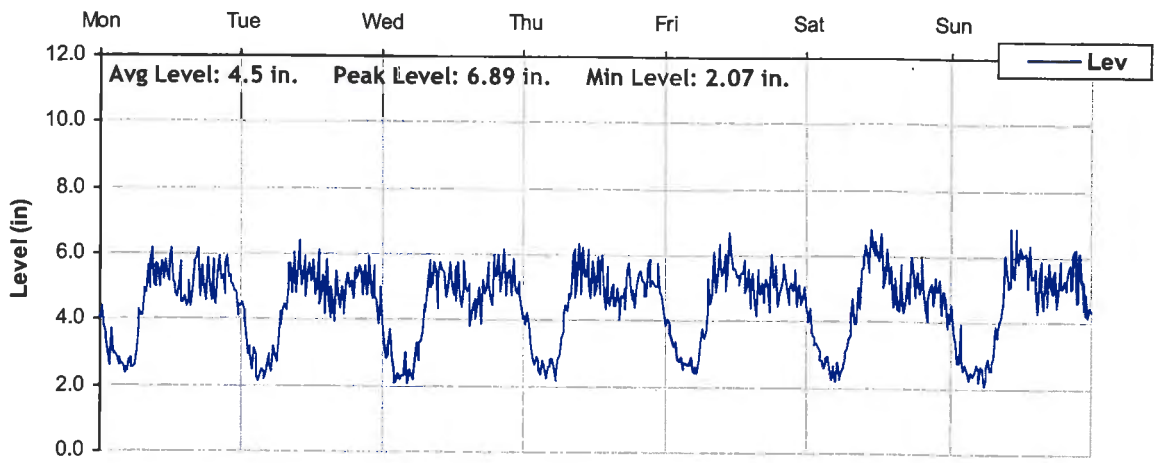
Monitoring Site:
Site 8

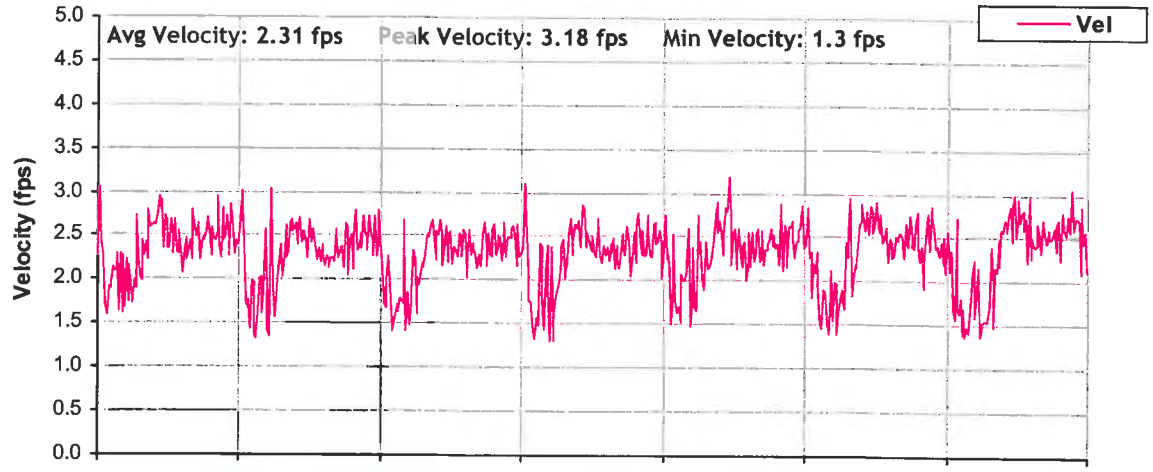


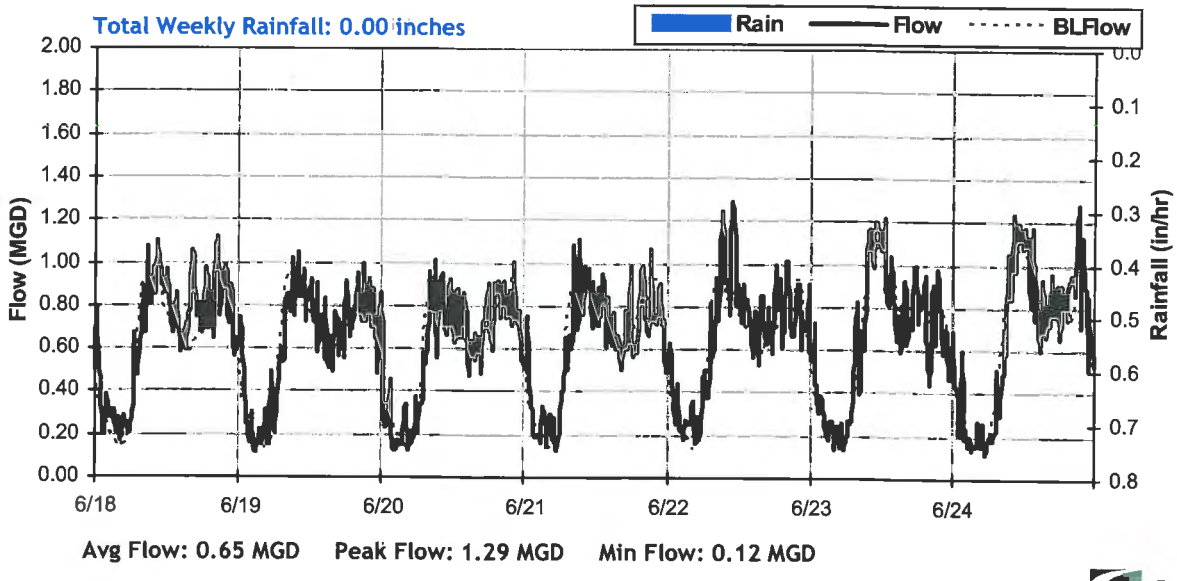
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 8





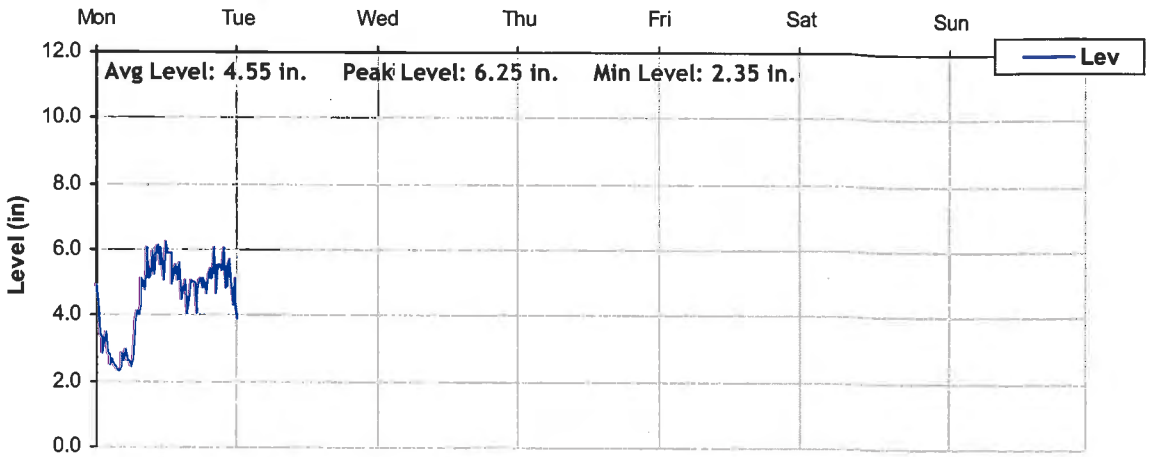


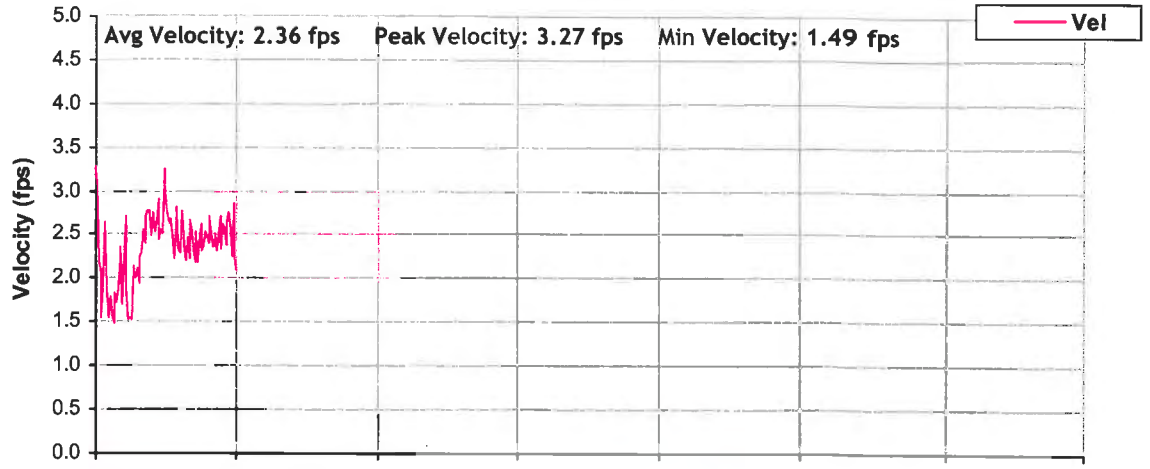
Avg Flow: 0.65 MGD Peak Flow: 1.29 MGD Min Flow: 0.12 MGD

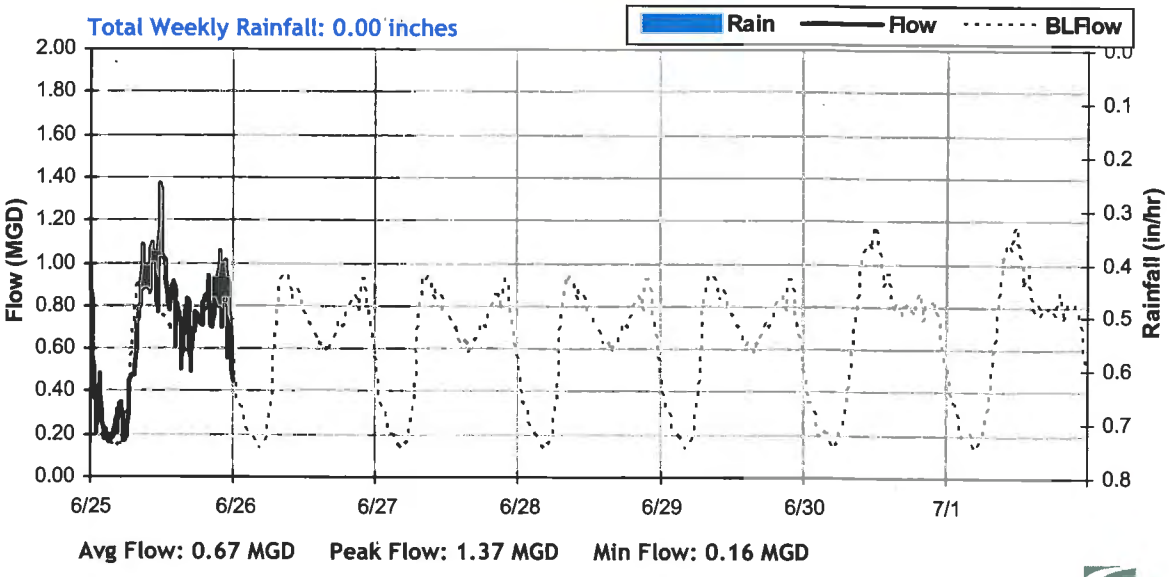
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 8







Avg Flow: 0.67 MGD Peak Flow: 1.37 MGD Min Flow: 0.16 MGD

V&A

	Site Information Report	**Monitoring Site:** Site 9

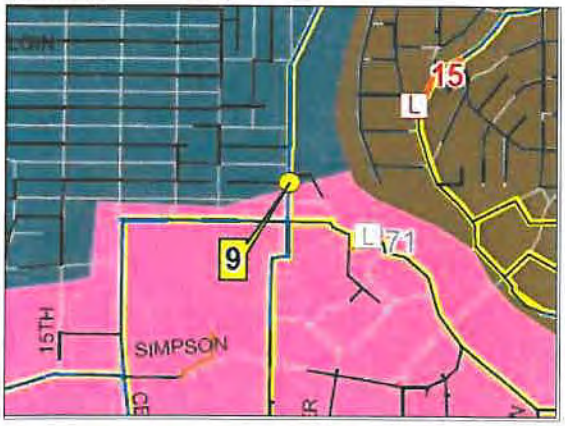
Location:

Diameter: 21 inches

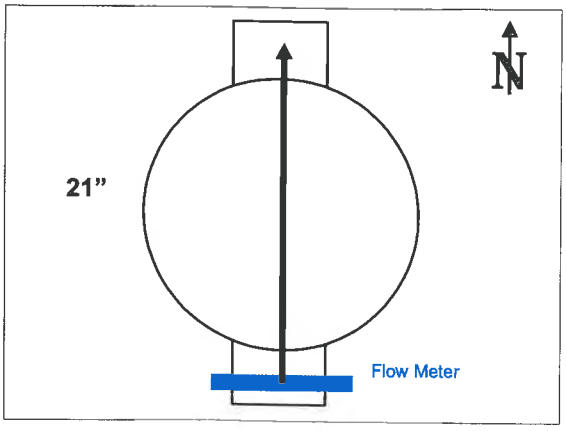
Average Dry Weather Flow: 0.451 *MGD*

Peak Measured Flow: 1.241 *MGD*

Sanitary sewer map:



Flow sketch:



Street-level photo:

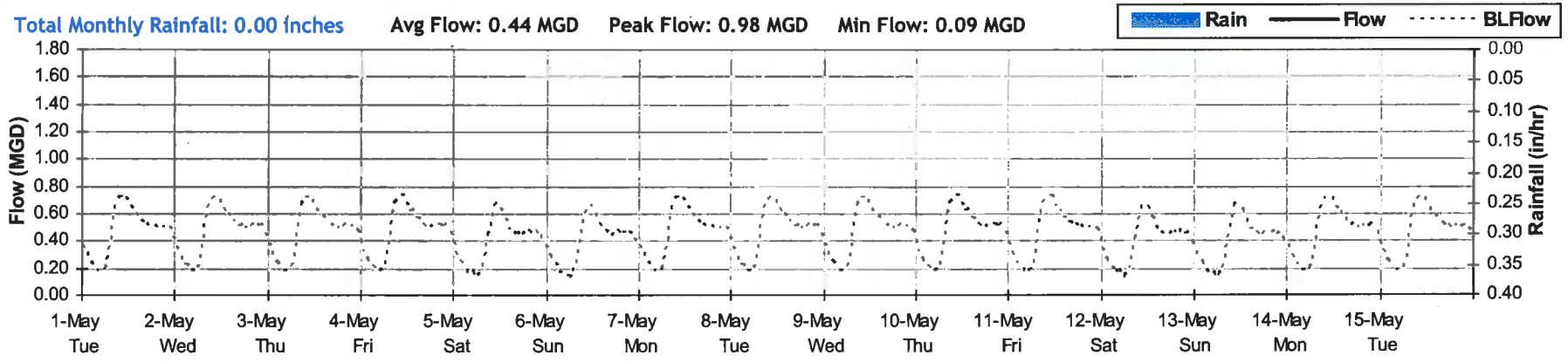
Plan view photo:

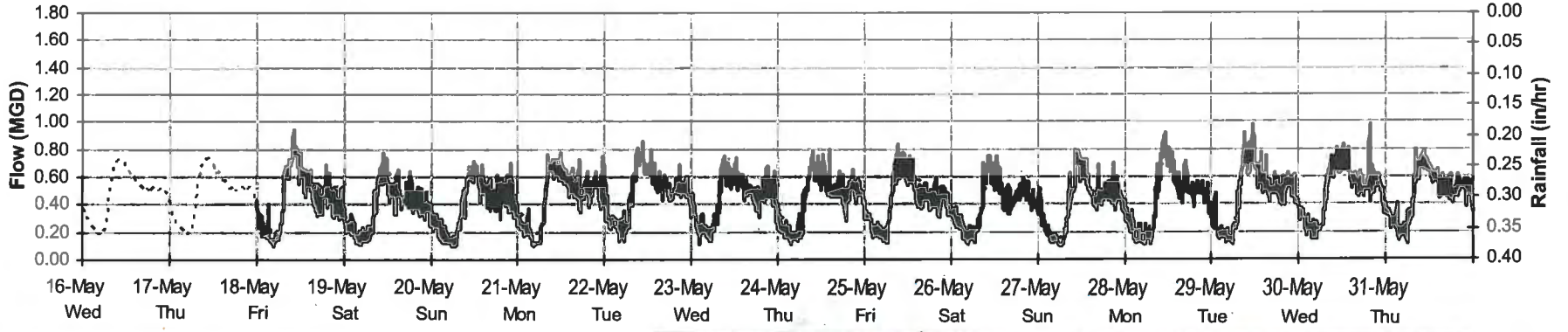
V&A

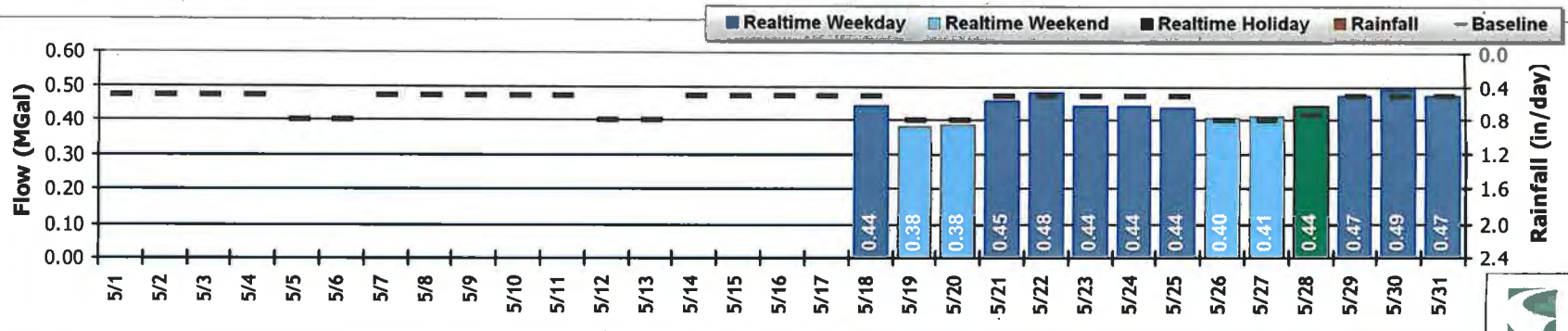
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 9

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.44 MGD Peak Flow: 0.98 MGD Min Flow: 0.09 MGD





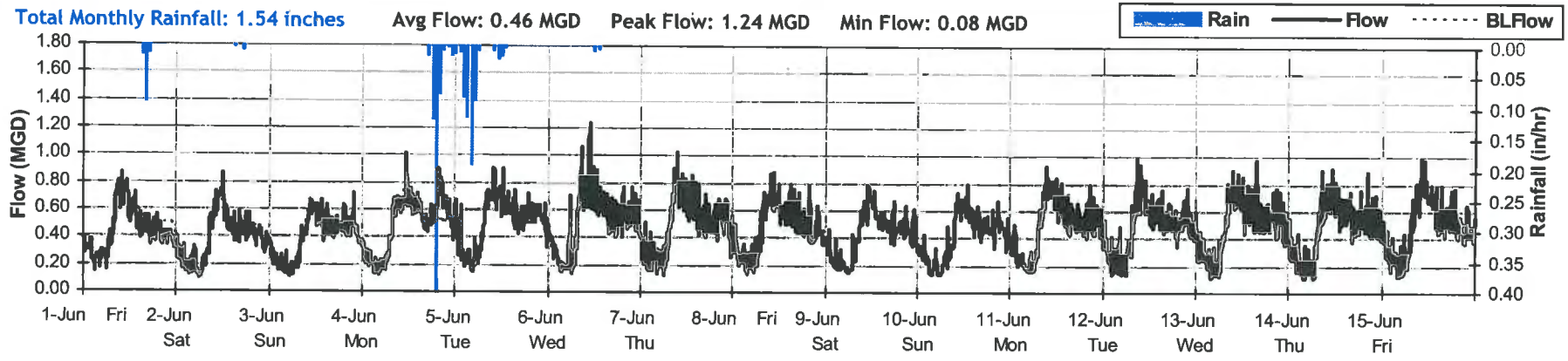


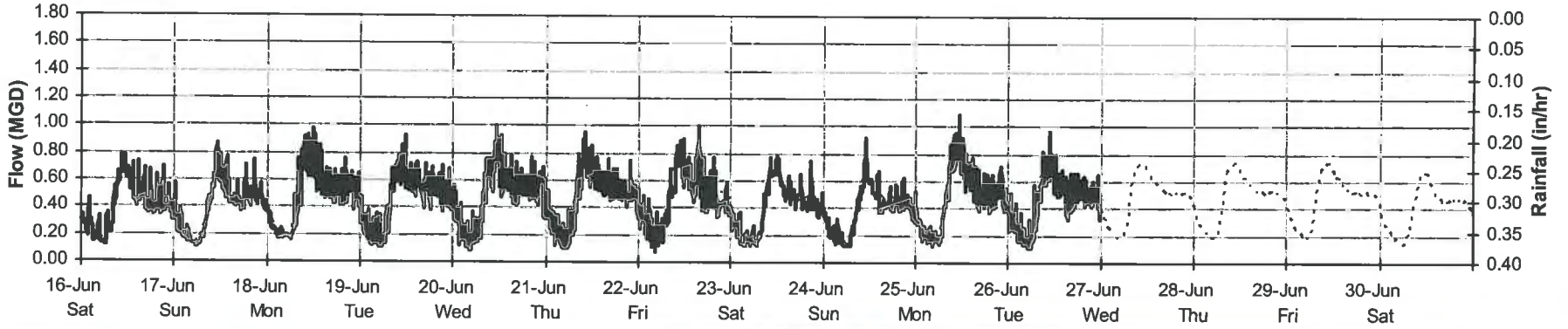
V&A

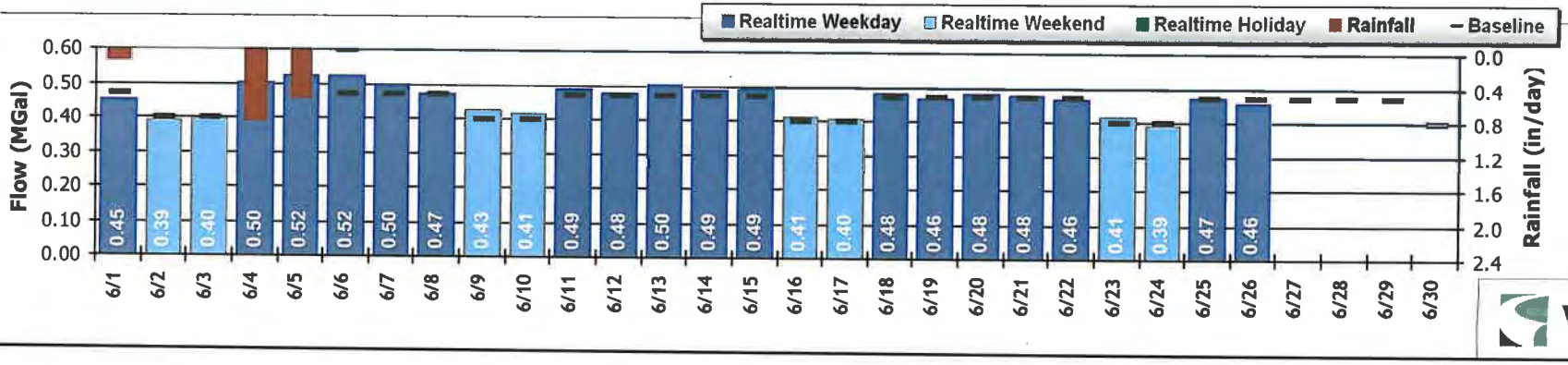
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 9

Total Monthly Rainfall: 1.54 inches Avg Flow: 0.46 MGD Peak Flow: 1.24 MGD Min Flow: 0.08 MGD





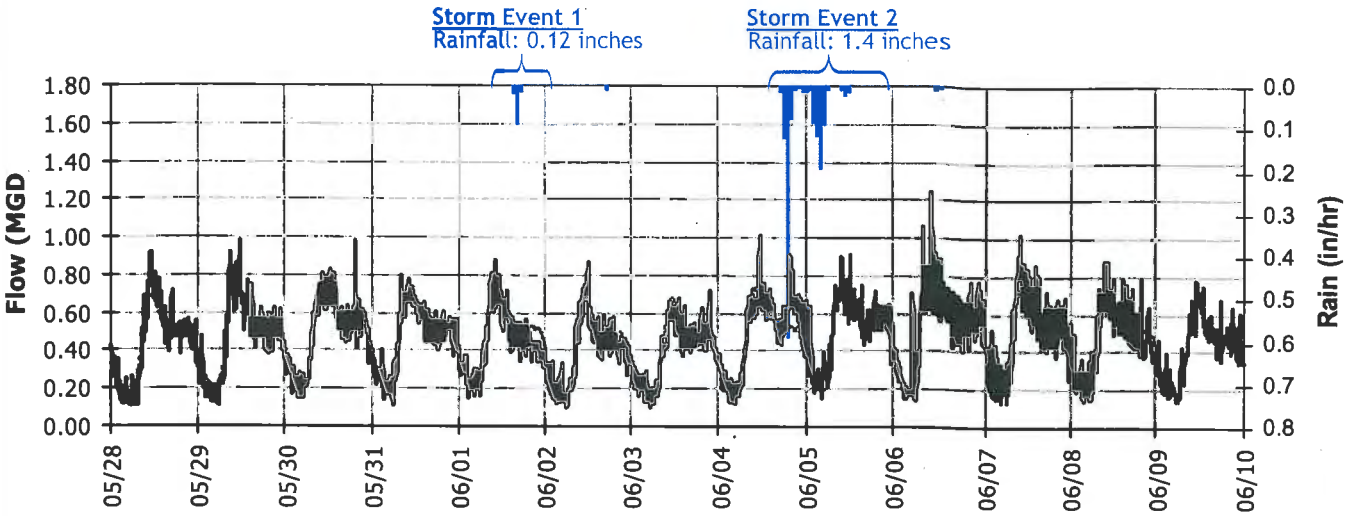


V&A

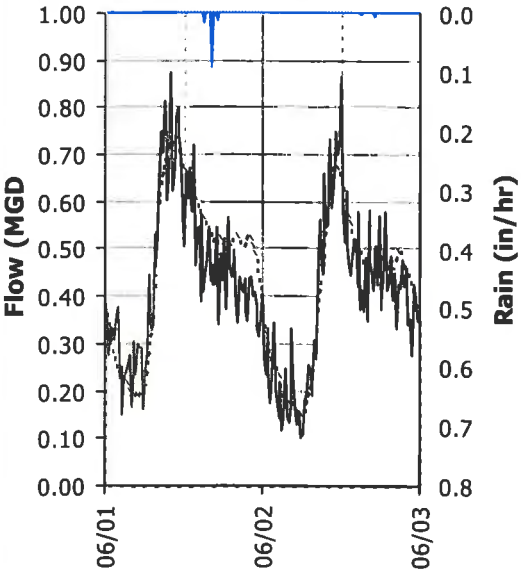
I/I Summary

Monitoring Site:
Site 9

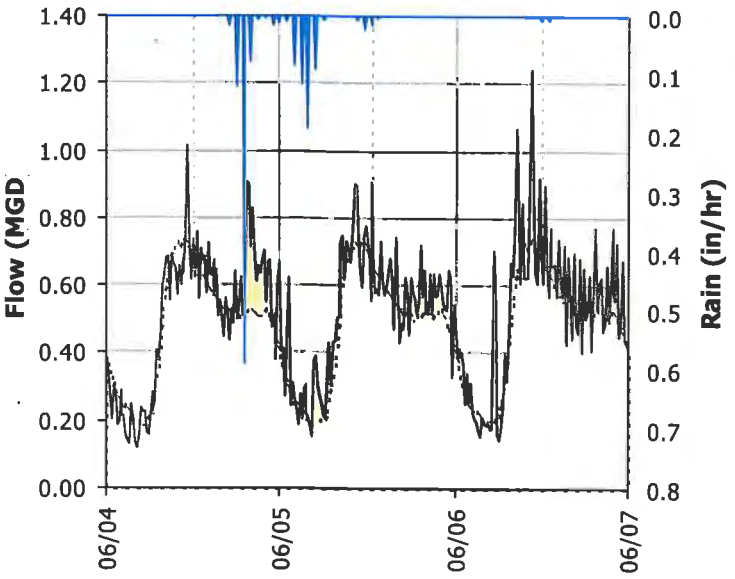
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.12	*inches*
Peak Flow:	0.41	*MGD*
Peak I/I Rate:	-0.15	*MGD*
PF:	0.91	
Pk I/I:ADWF:	-0.32	
Peak Level:	3.65	*inches*
d/D Ratio:	0.17	
Total I/I:	-2,000	*gallons*
RE1 R-Value:	0.0%	

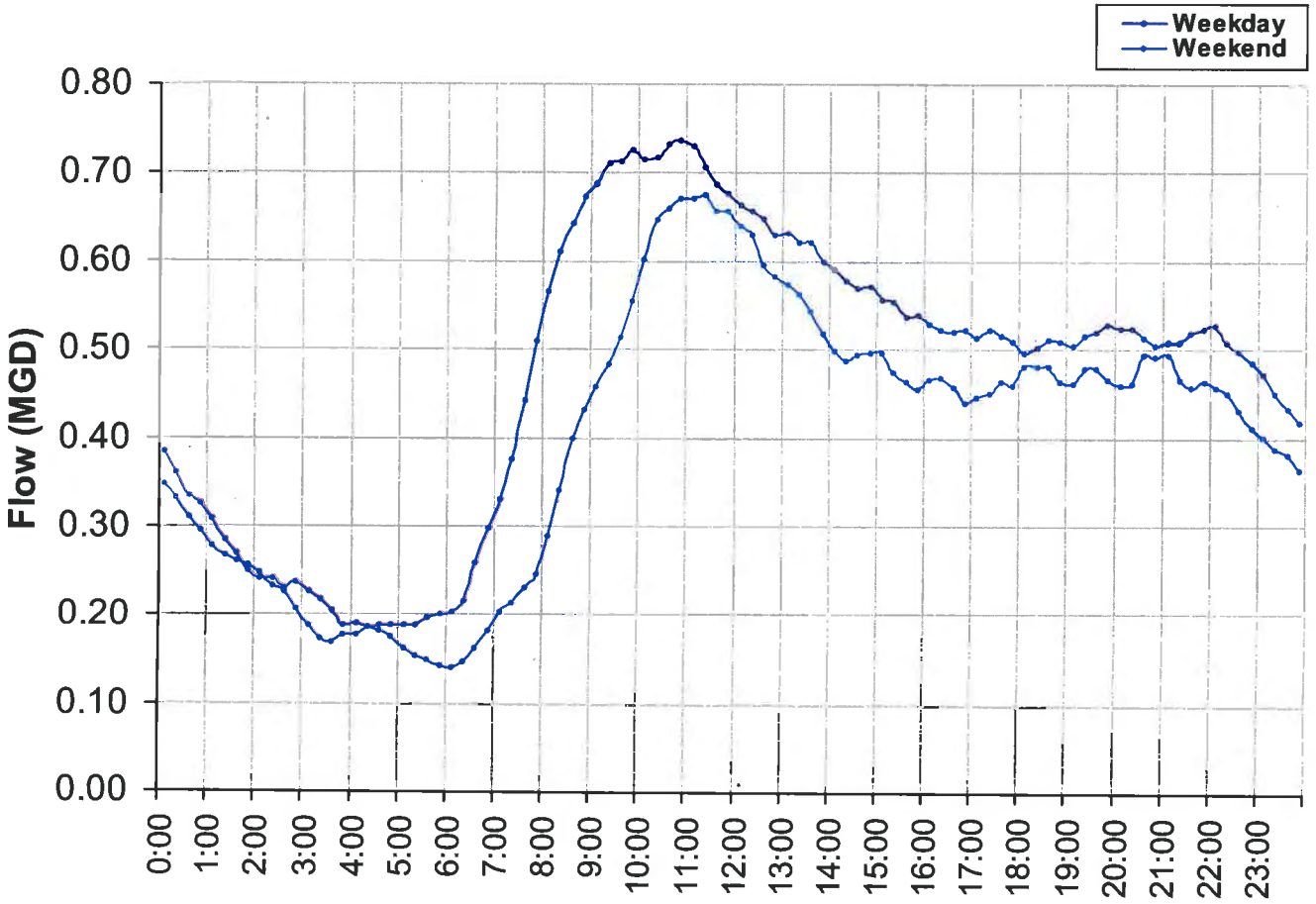
Storm Event #2 I/I Analysis

Rainfall:	1.40	*inches*
Peak Flow:	0.91	*MGD*
Peak I/I Rate:	0.39	*MGD*
PF:	2.01	
Pk I/I:ADWF:	0.86	
Peak Level:	5.33	*inches*
d/D Ratio:	0.25	
Total I/I:	61,000	*gallons*
RE2 R-Value:	0.1%	

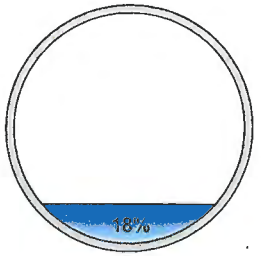
V&A

Average Dry Weather Flow

Monitoring Site:
Site 9



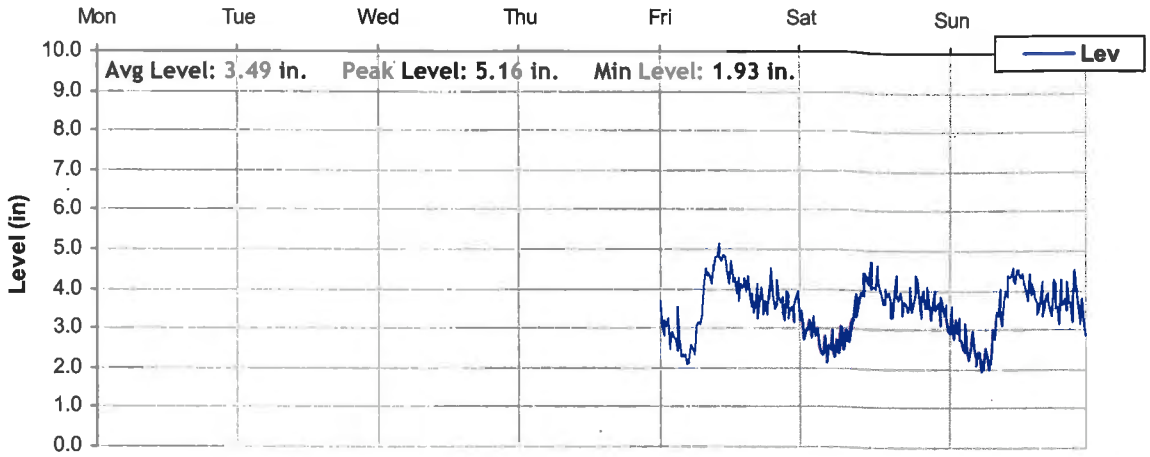
Average Dry Weather Flow:
0.45 *MGD*

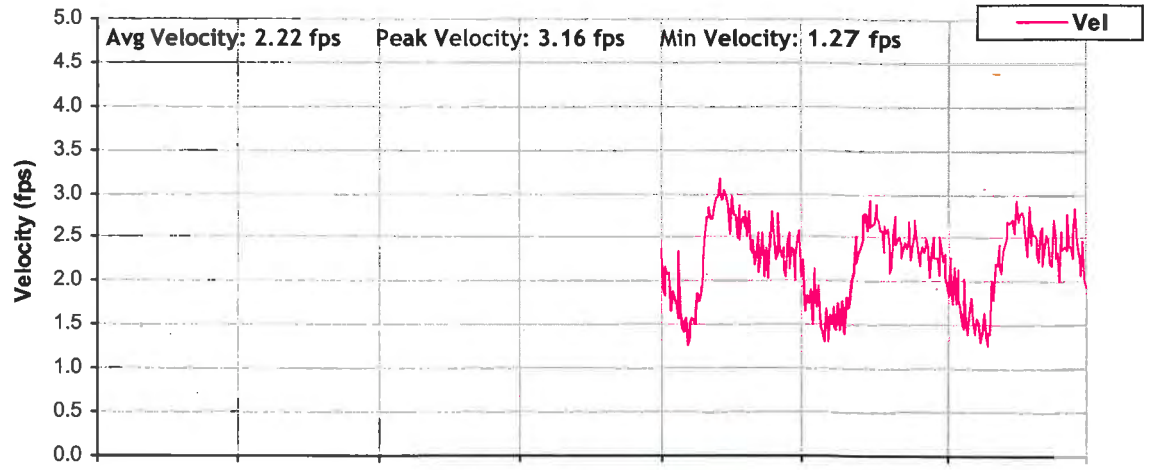


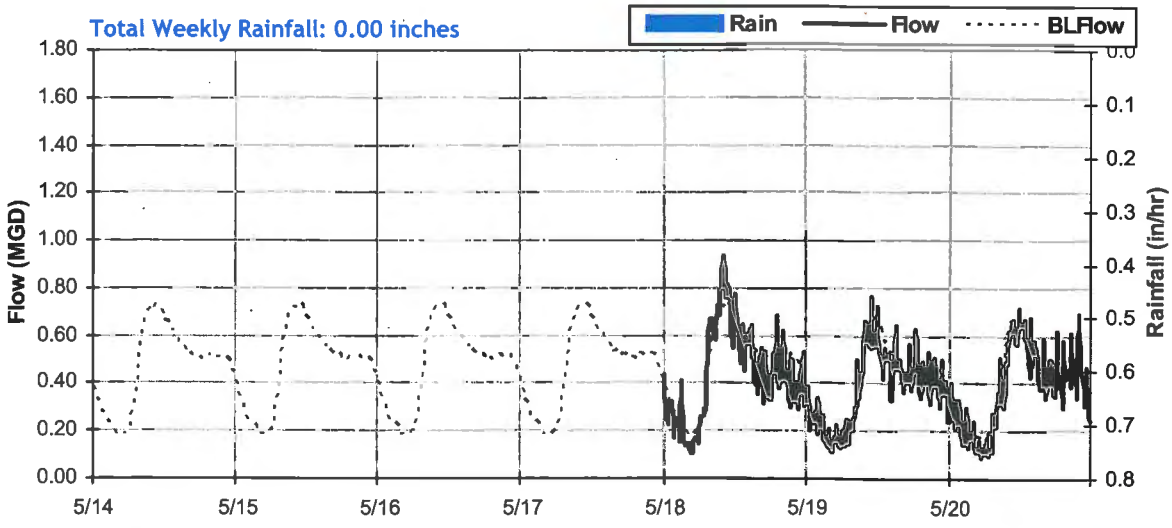
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 9





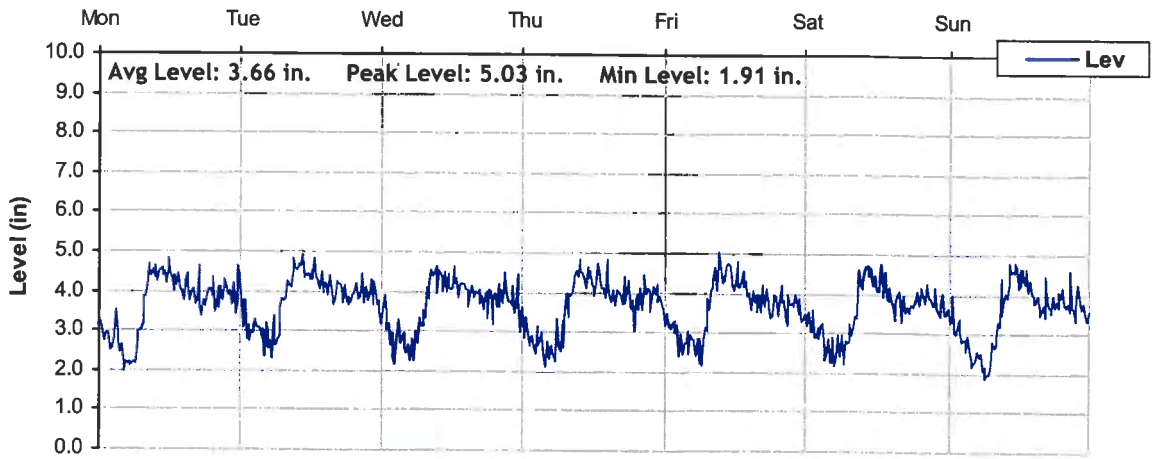


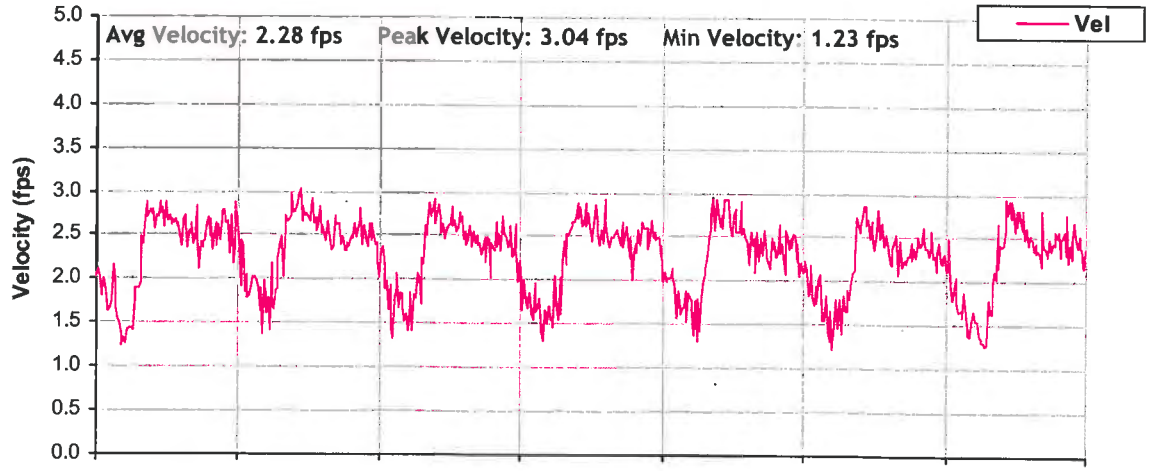
Avg Flow: 0.4 MGD Peak Flow: 0.94 MGD Min Flow: 0.09 MGD

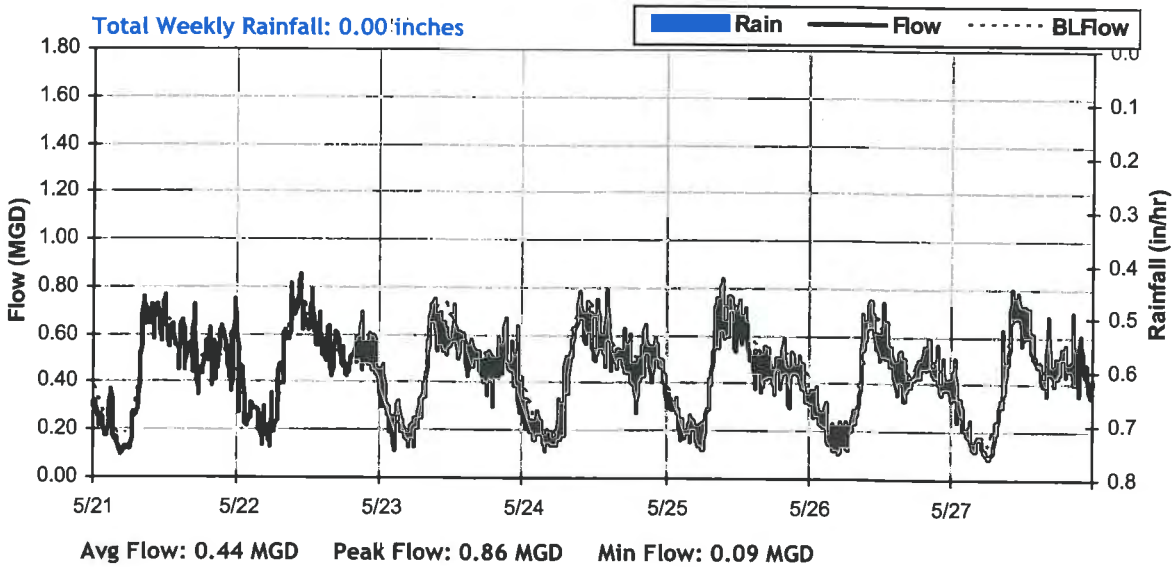
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 9





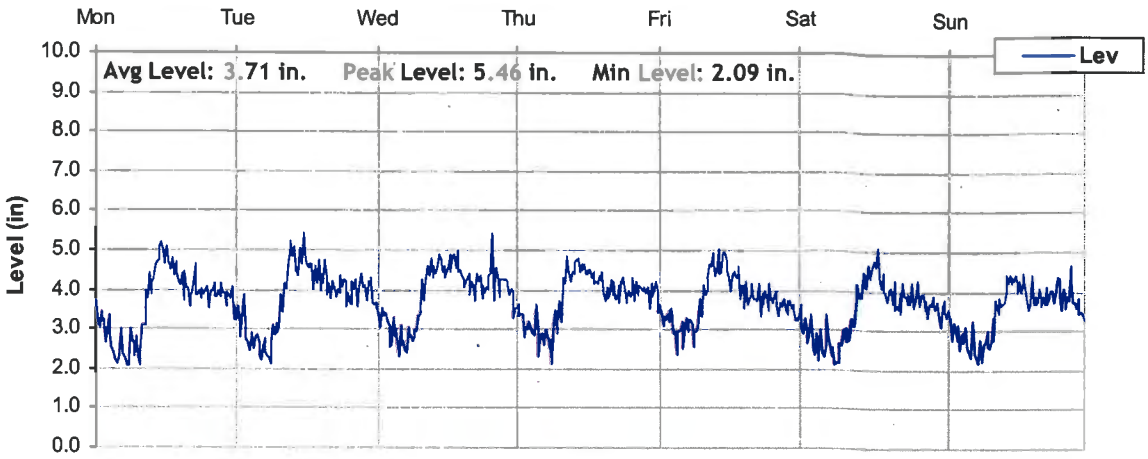


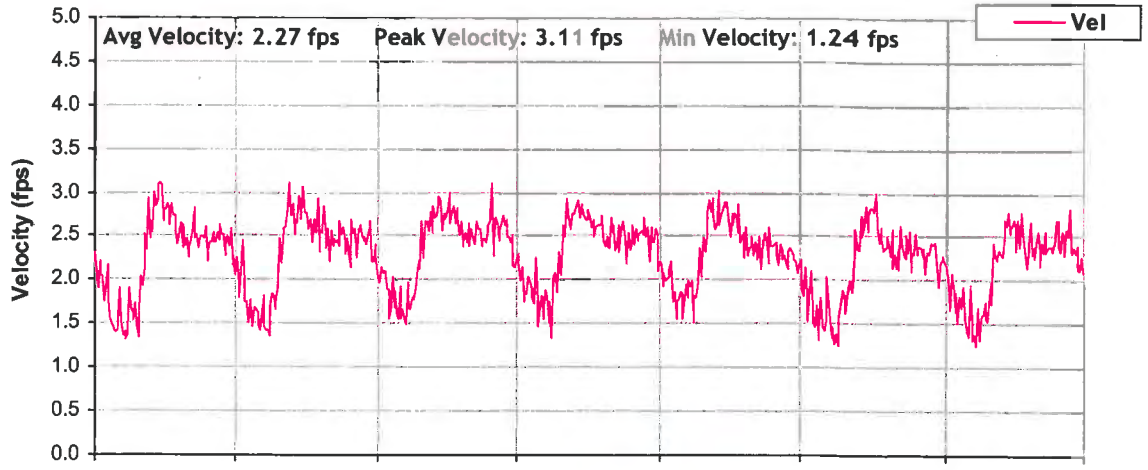
Avg Flow: 0.44 MGD Peak Flow: 0.86 MGD Min Flow: 0.09 MGD

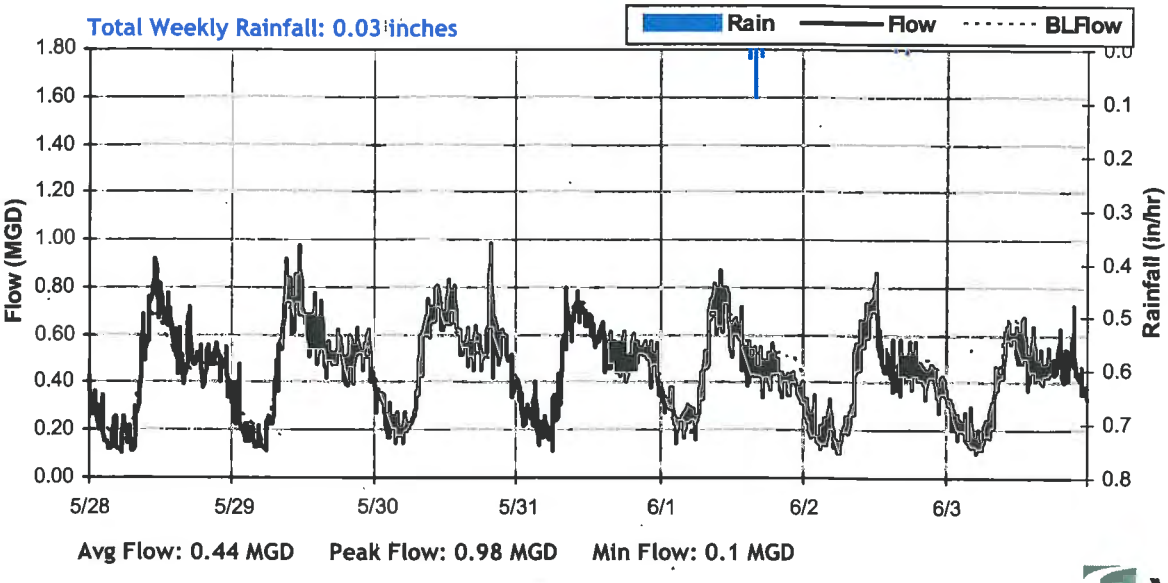
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 9



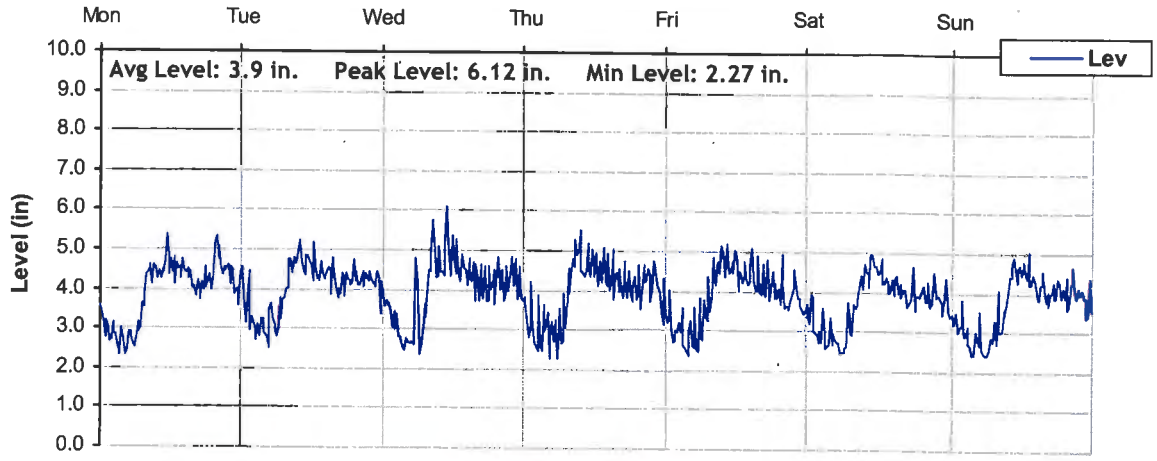


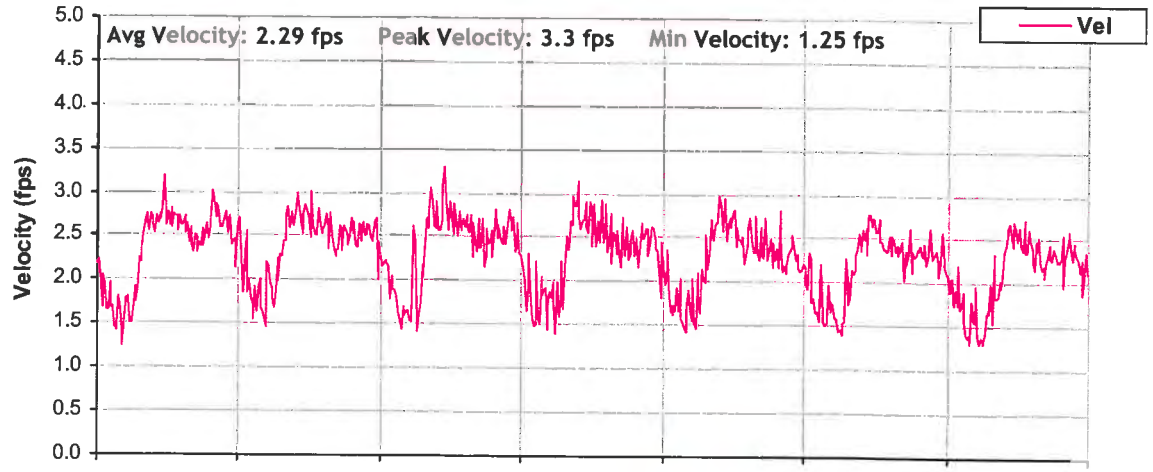


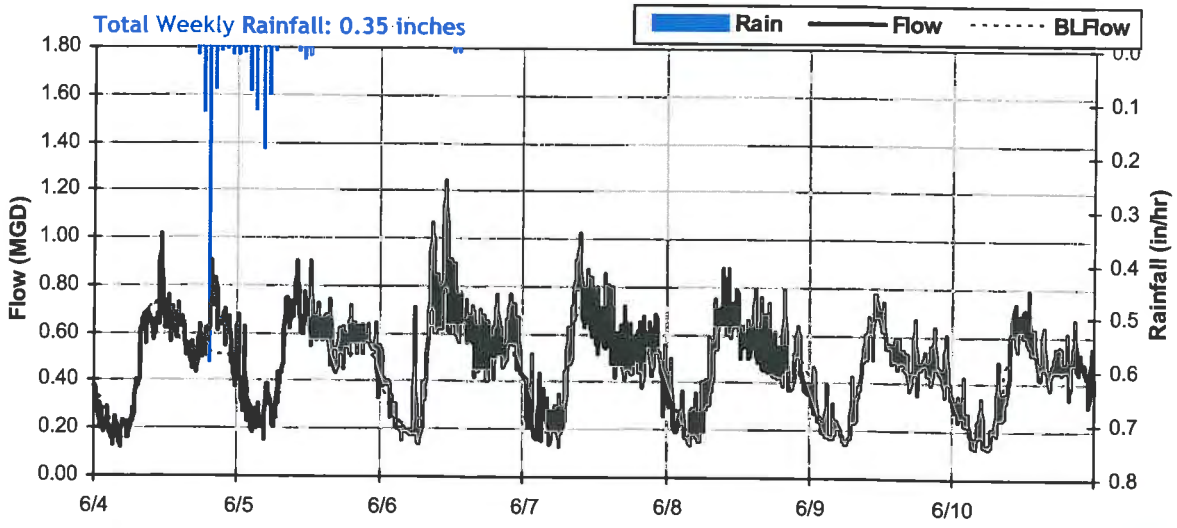
Avg Flow: 0.44 MGD Peak Flow: 0.98 MGD Min Flow: 0.1 MGD

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 9





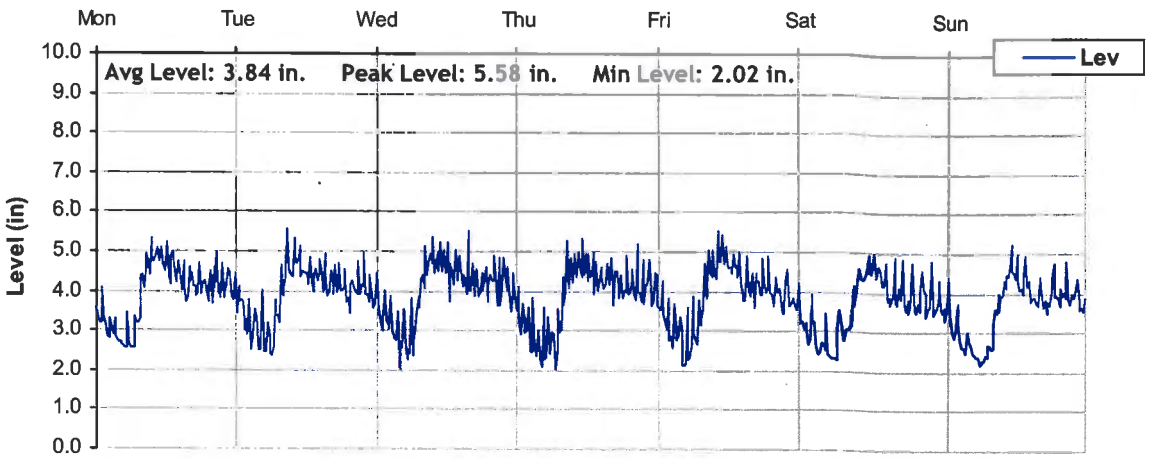


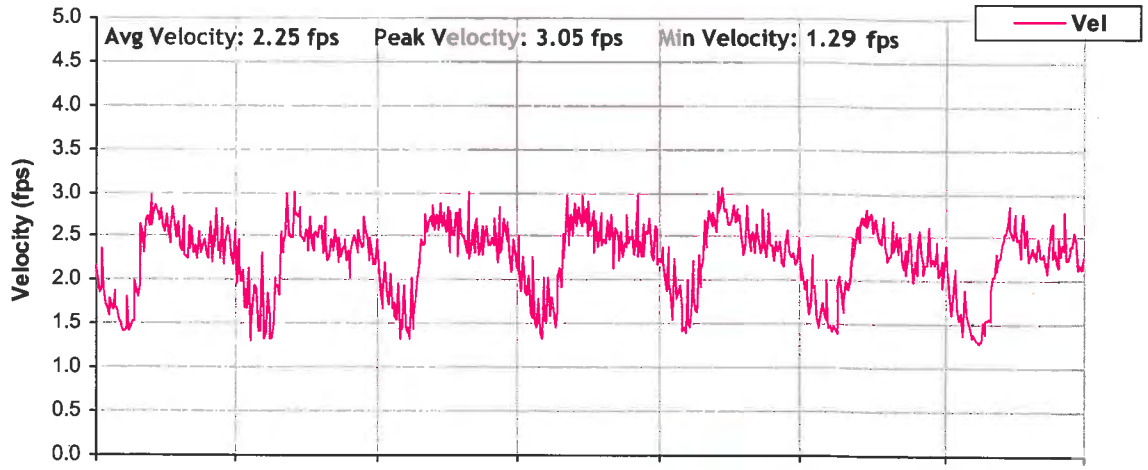
Avg Flow: 0.48 MGD Peak Flow: 1.24 MGD Min Flow: 0.12 MGD

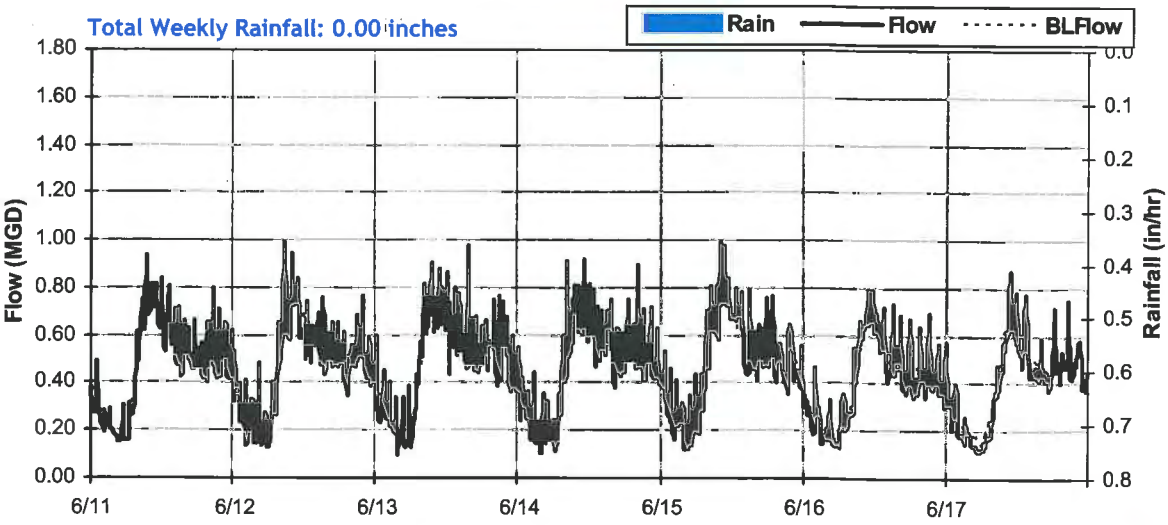
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 9





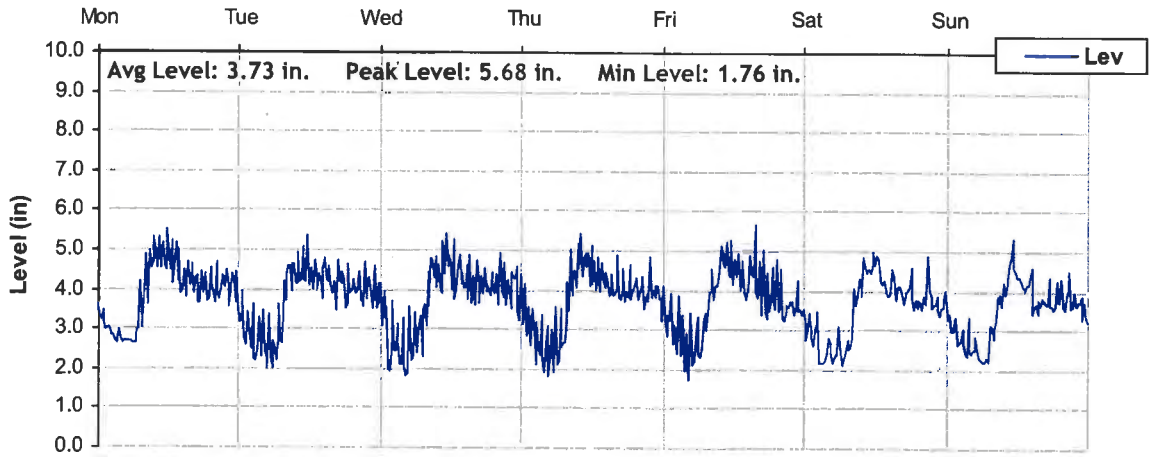


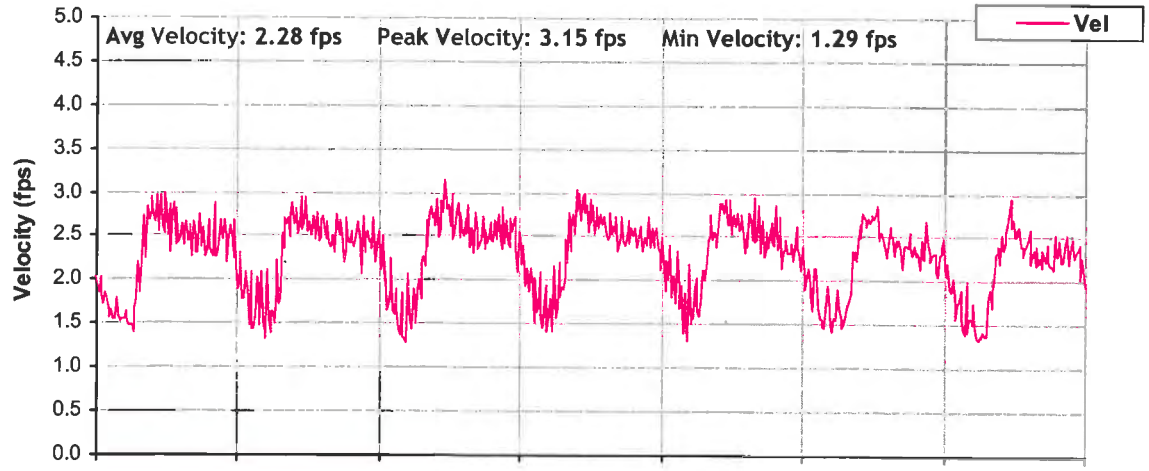
Avg Flow: 0.47 MGD Peak Flow: 0.99 MGD Min Flow: 0.11 MGD

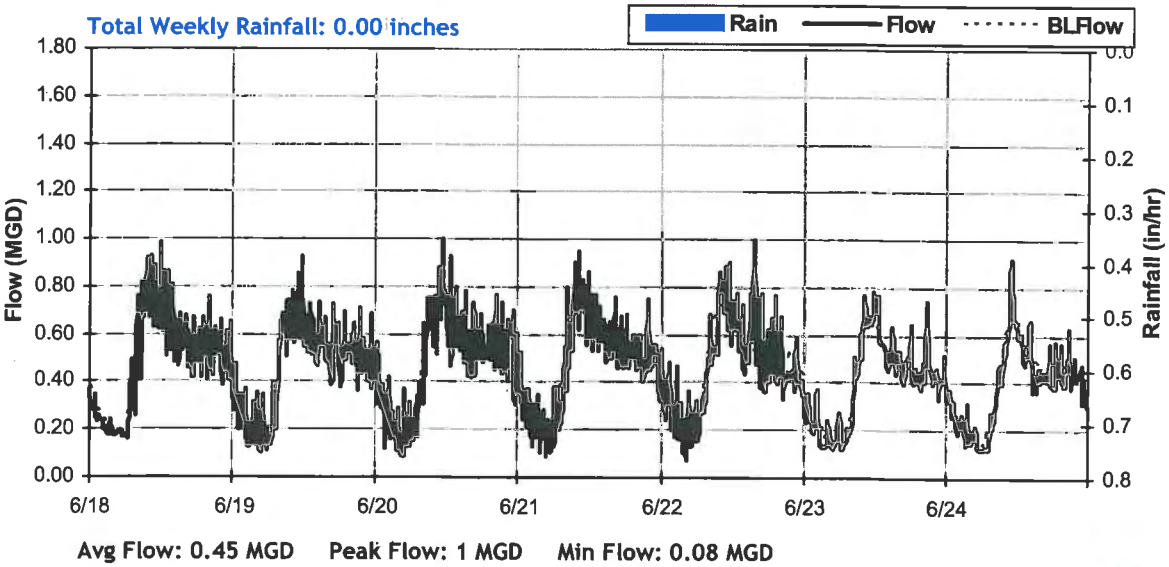
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 9





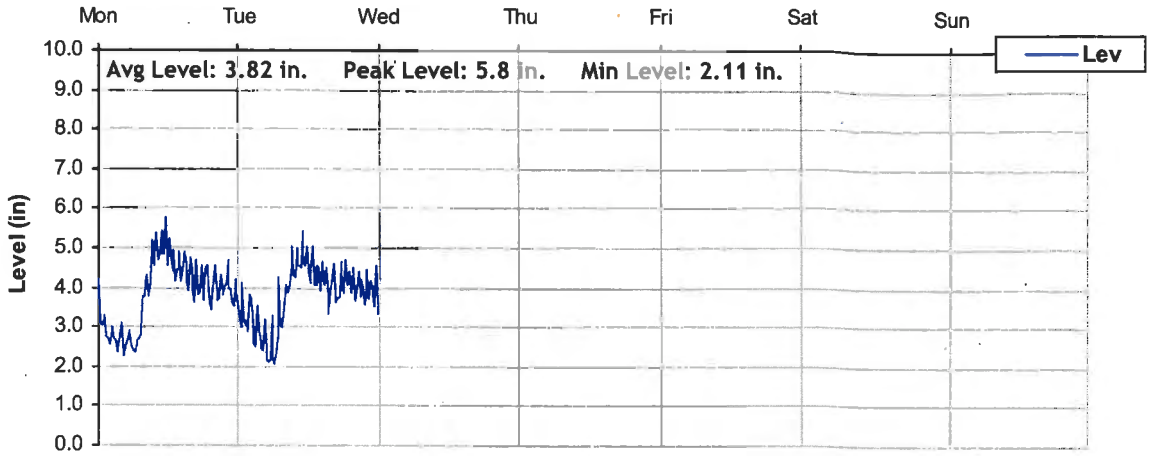


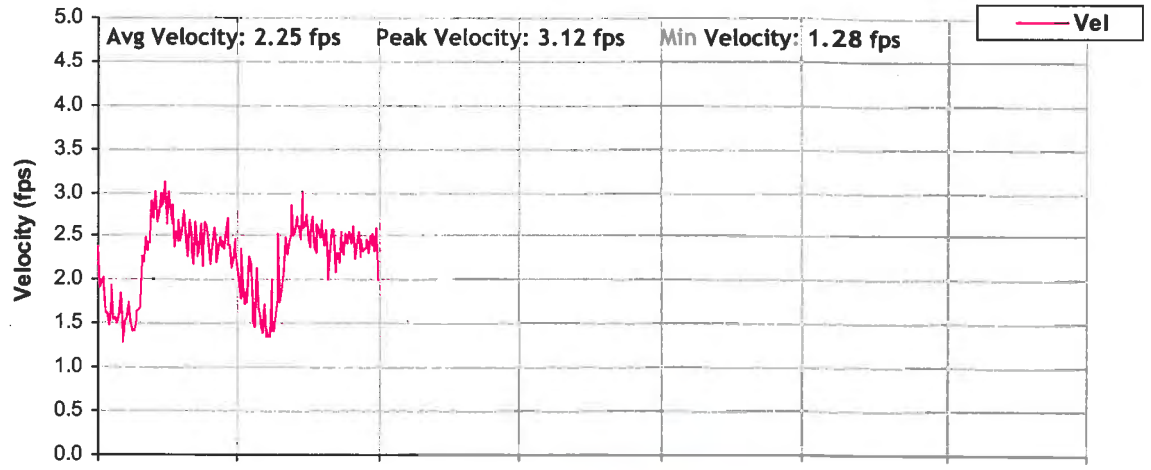
Avg Flow: 0.45 MGD Peak Flow: 1 MGD Min Flow: 0.08 MGD

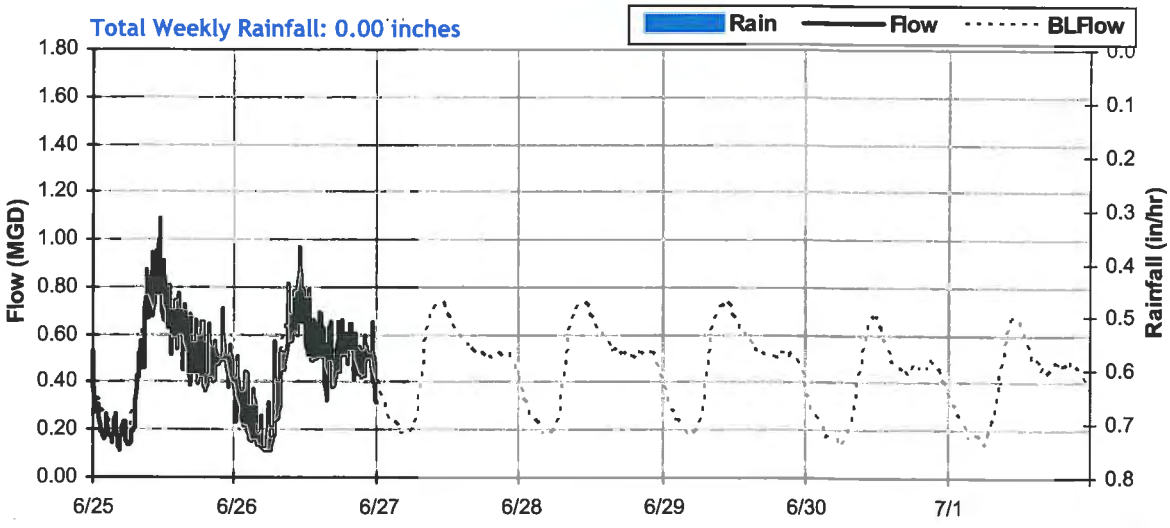
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 9







Avg Flow: 0.46 MGD Peak Flow: 1.09 MGD Min Flow: 0.11 MGD

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	Site Information Report	**Monitoring Site:** Site 10

Location:

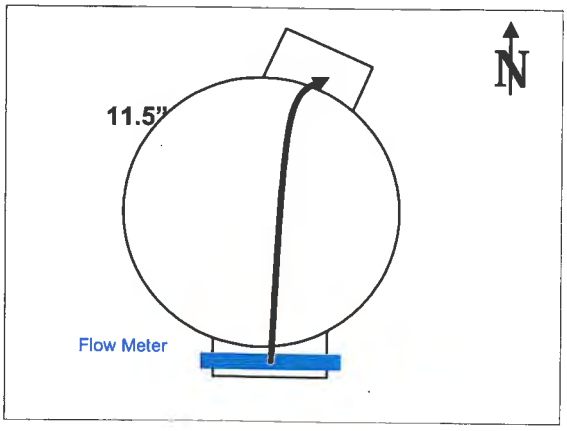
Diameter: 11.5 inches

Average Dry Weather Flow: 0.291 *MGD*

Peak Measured Flow: 0.791 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

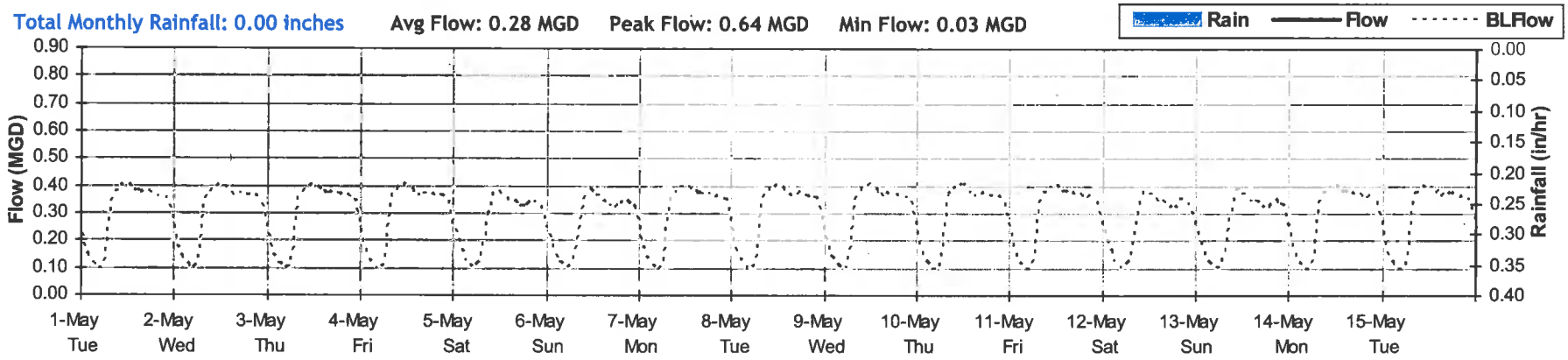
Plan view photo:

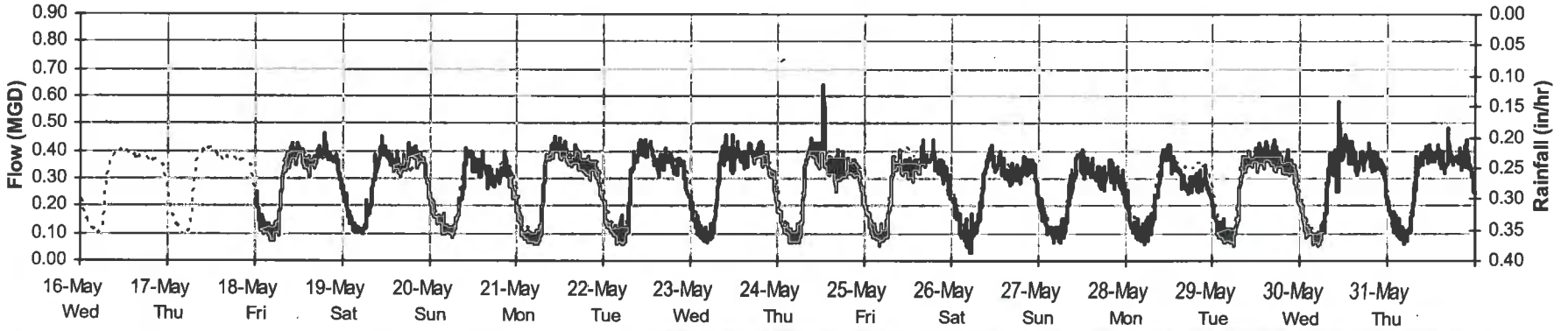
V&A

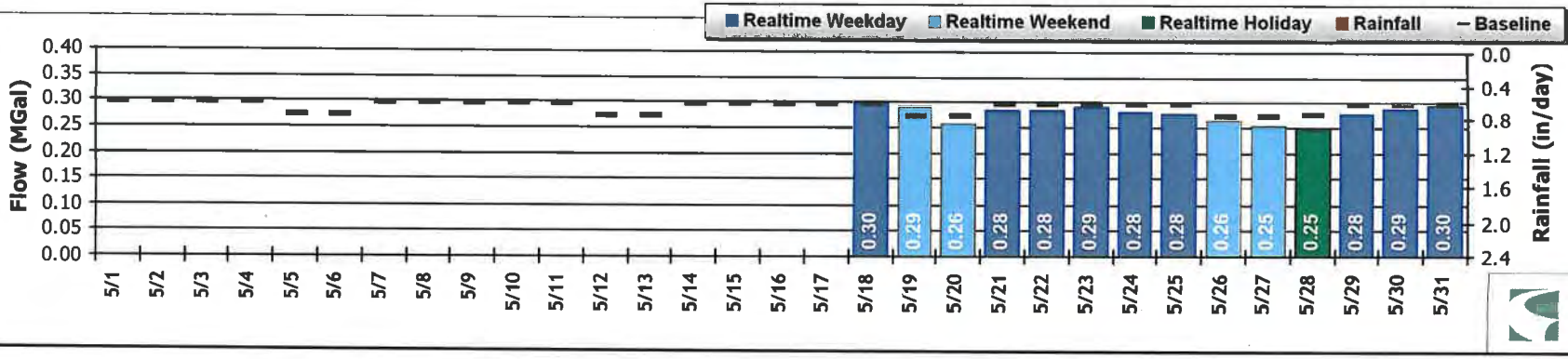
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 10

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.28 MGD Peak Flow: 0.64 MGD Min Flow: 0.03 MGD





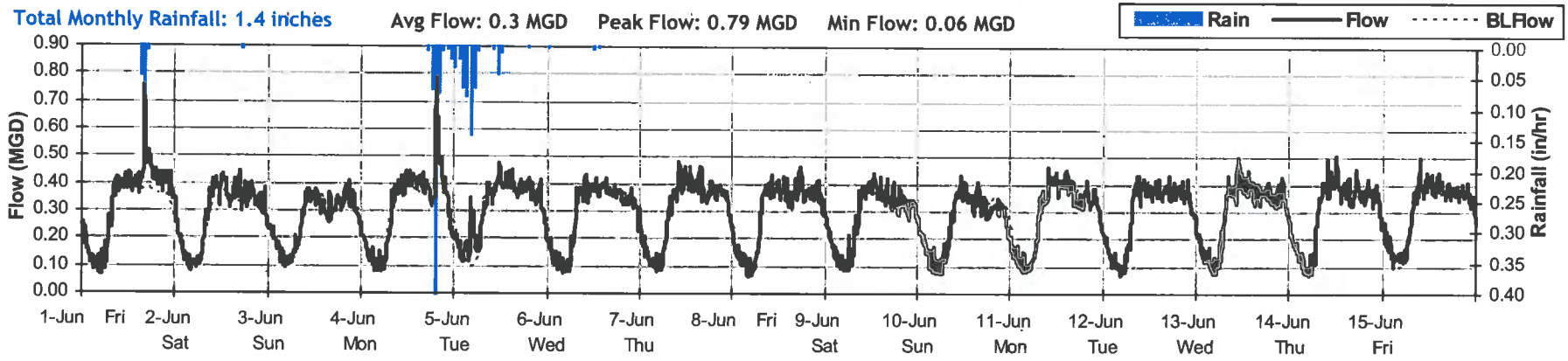


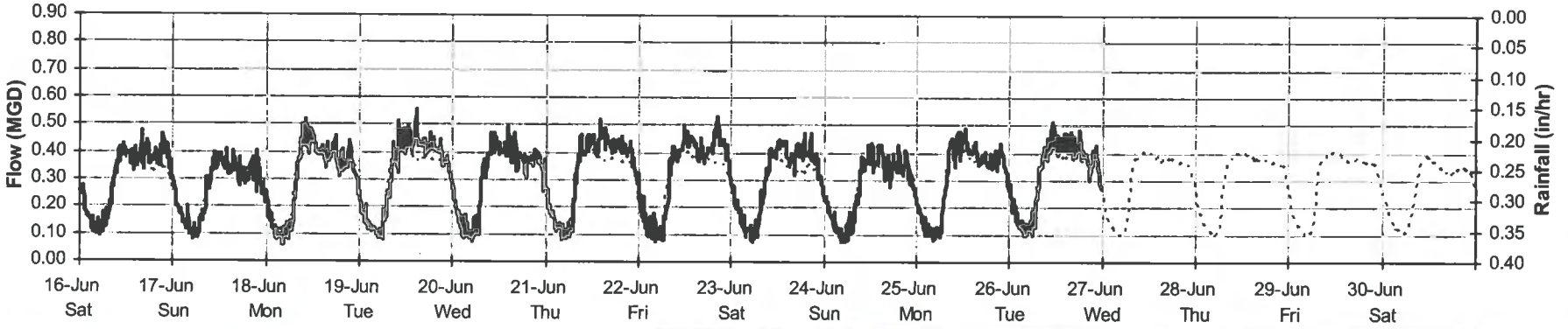
V&A

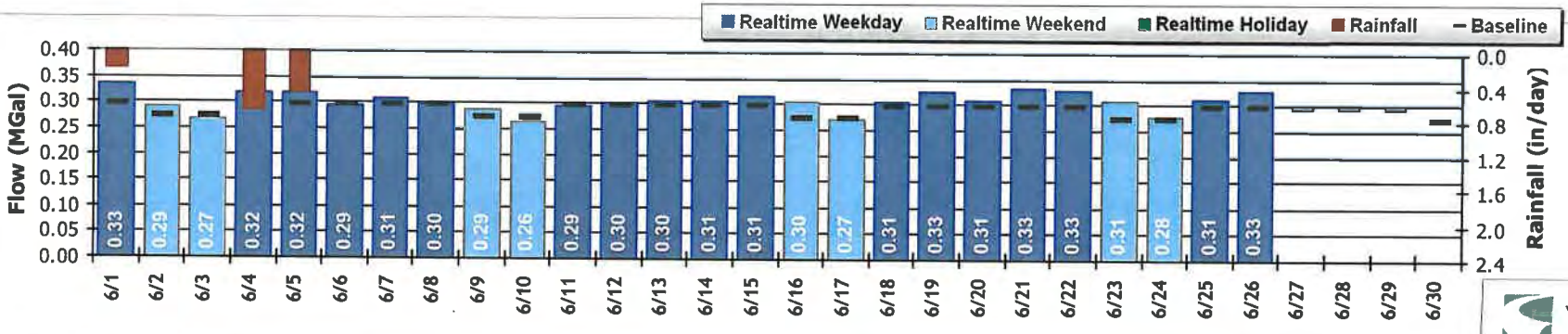
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 10

Total Monthly Rainfall: 1.4 inches Avg Flow: 0.3 MGD Peak Flow: 0.79 MGD Min Flow: 0.06 MGD





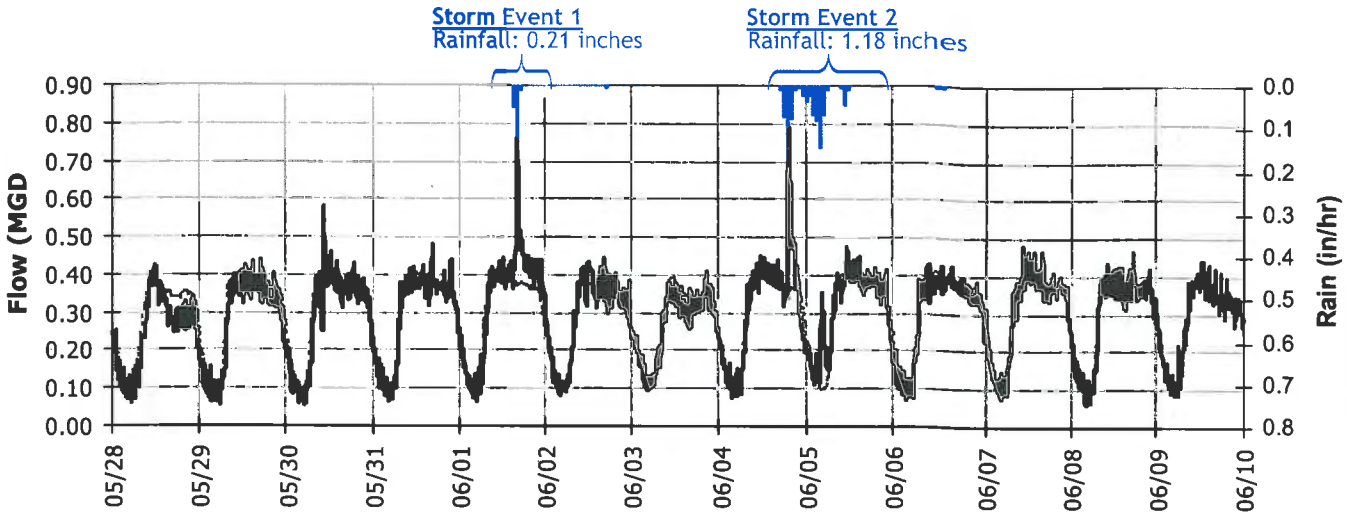


V&A

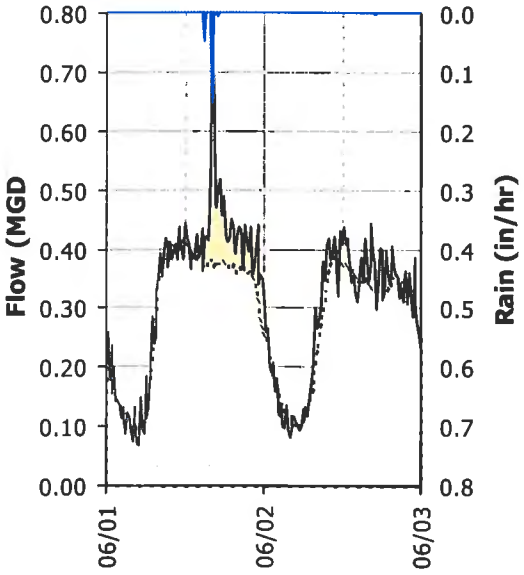
I/I Summary

Monitoring Site:
Site 10

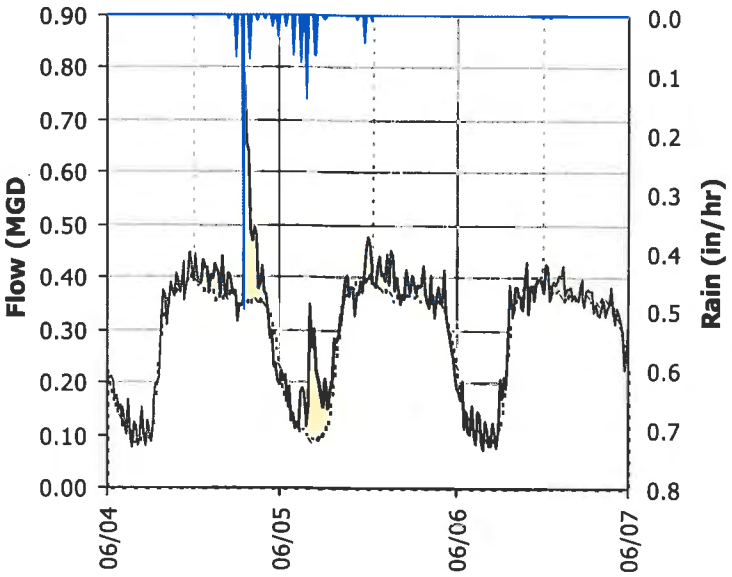
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.21	*inches*
Peak Flow:	0.75	*MGD*
Peak I/I Rate:	0.38	*MGD*
PF:	2.59	
Pk I/I:ADWF:	1.31	
Peak Level:	14.63	*inches*
d/D Ratio:	1.27	
Total I/I:	34,000	*gallons*
RE1 R-Value:	1.6%	

Storm Event #2 I/I Analysis

Rainfall:	1.18	*inches*
Peak Flow:	0.79	*MGD*
Peak I/I Rate:	0.42	*MGD*
PF:	2.72	
Pk I/I:ADWF:	1.45	
Peak Level:	13.19	*inches*
d/D Ratio:	1.15	
Total I/I:	46,000	*gallons*
RE2 R-Value:	0.4%	

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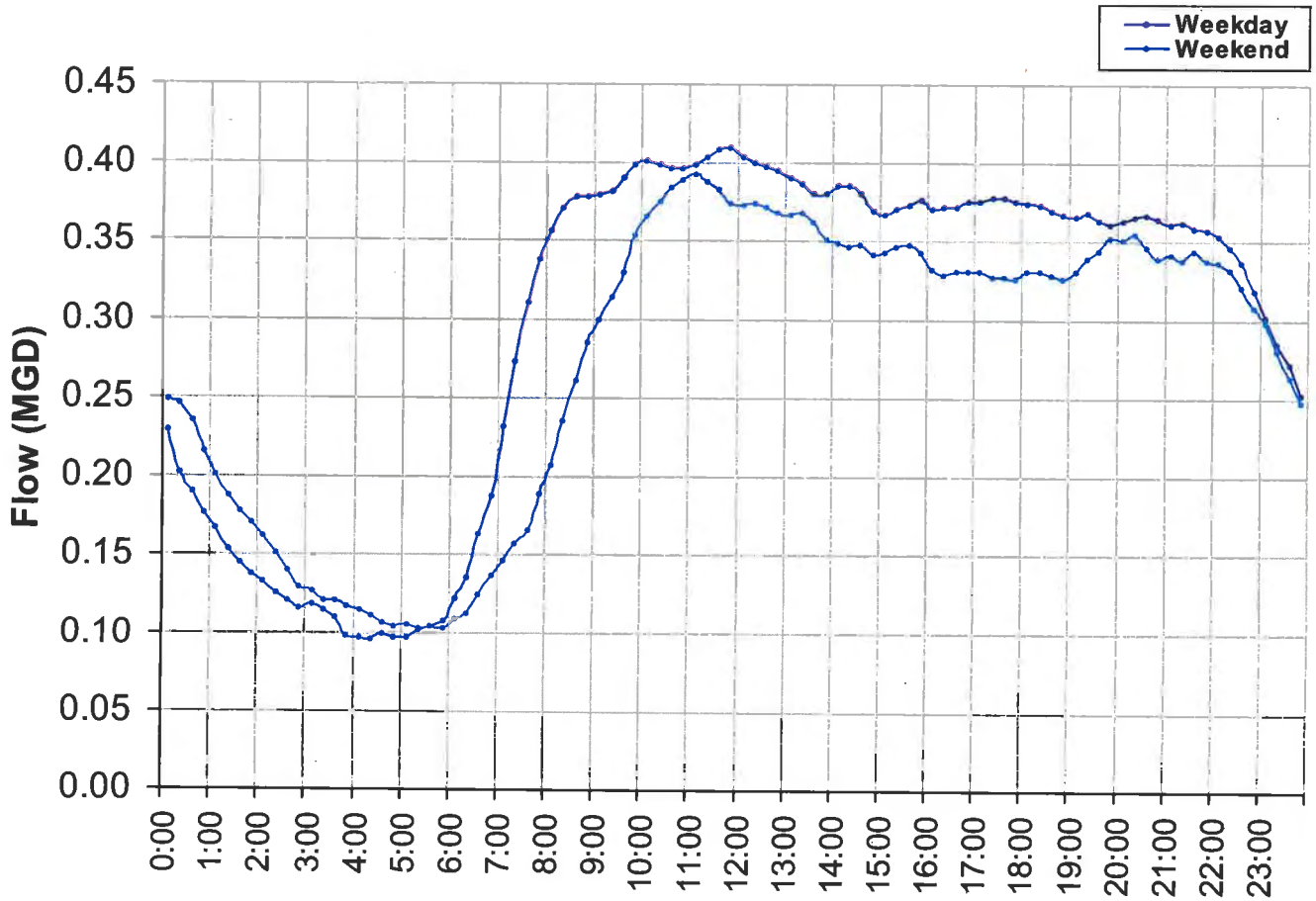
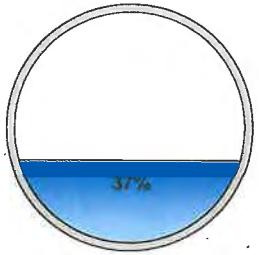
Average Dry Weather Flow

Monitoring Site:
Site 10

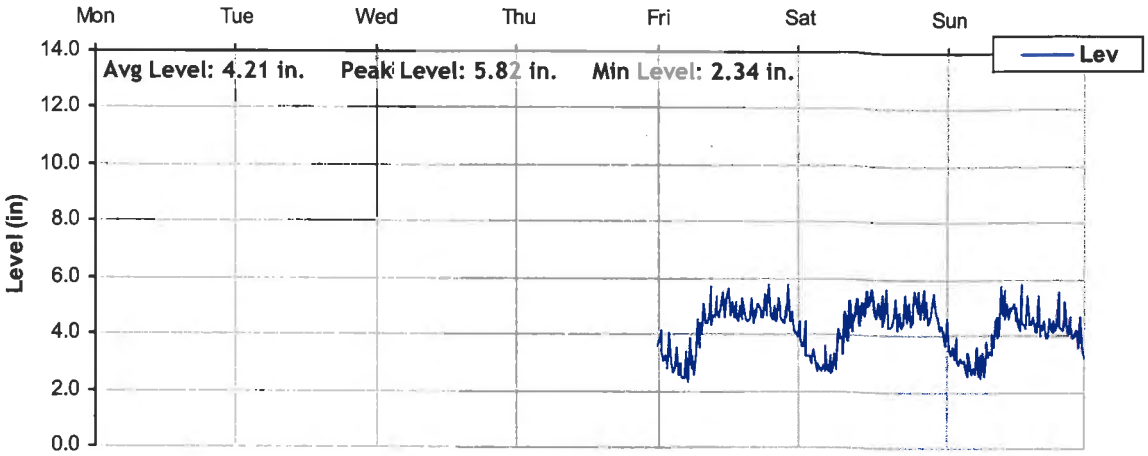


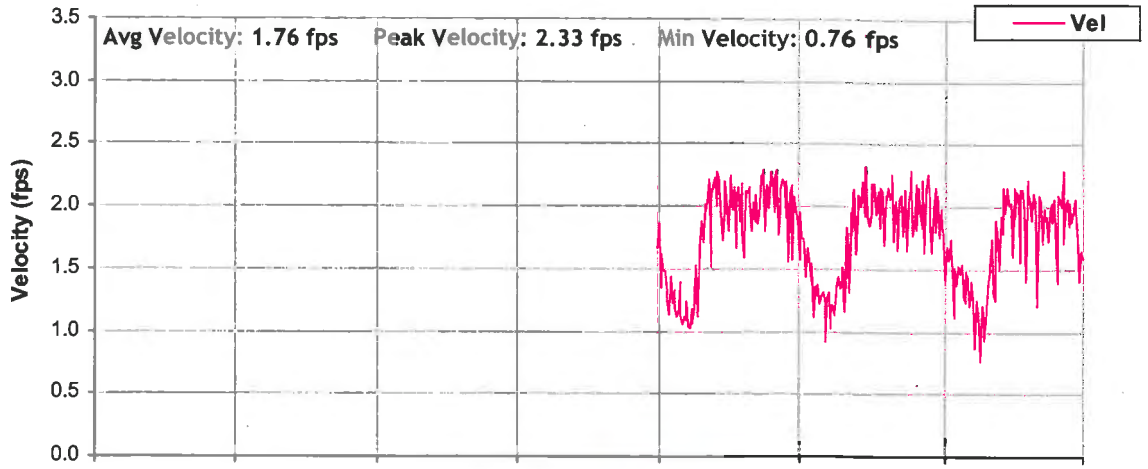
Average Dry Weather Flow:
0.29 *MGD*

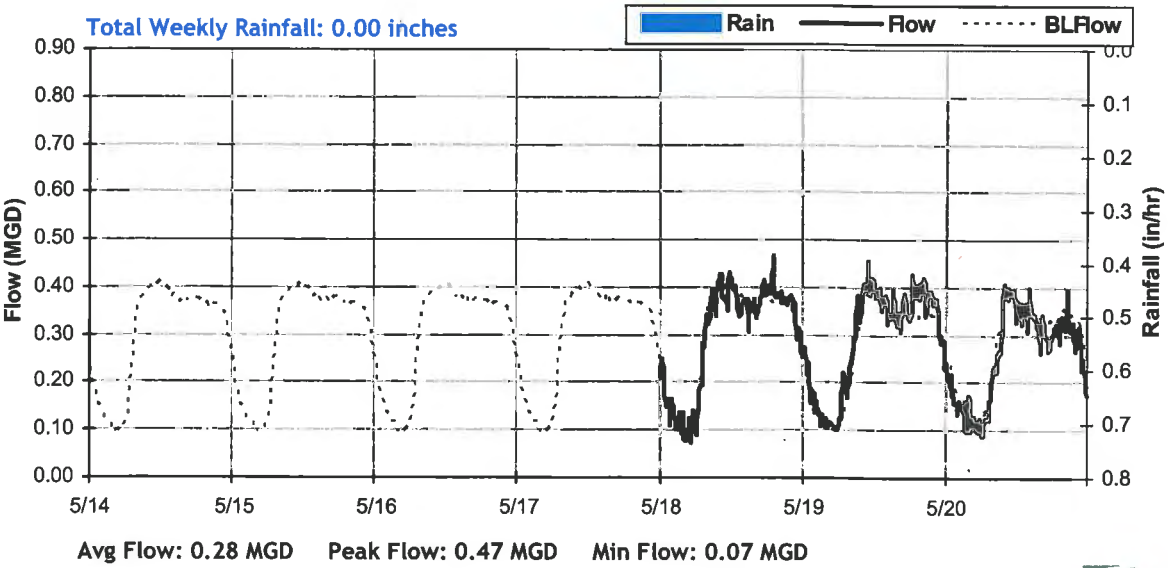


Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 10





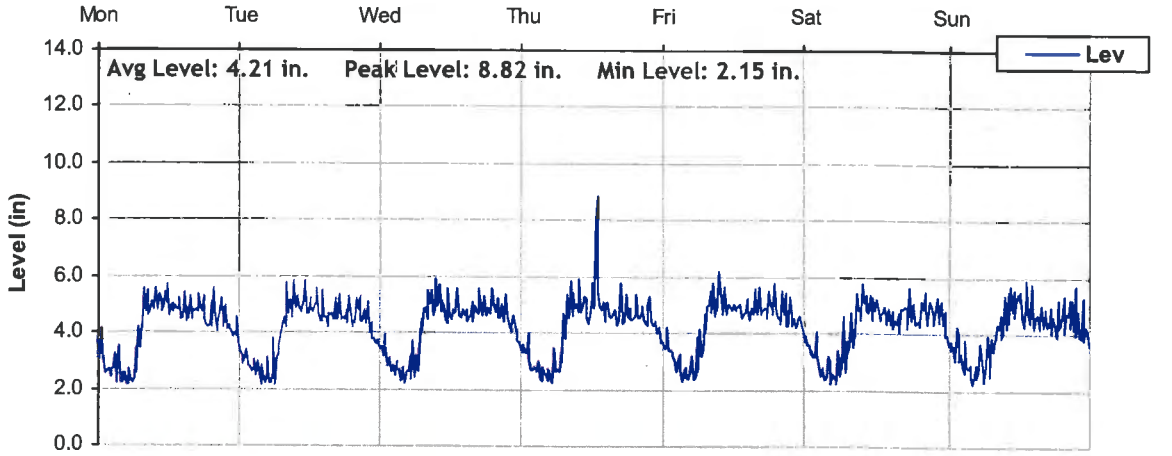


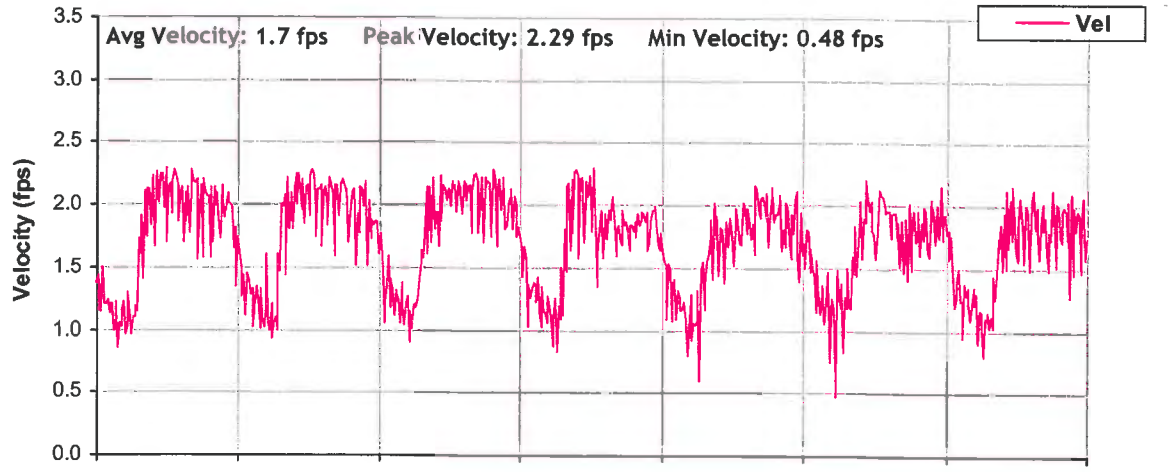
Avg Flow: 0.28 MGD Peak Flow: 0.47 MGD Min Flow: 0.07 MGD

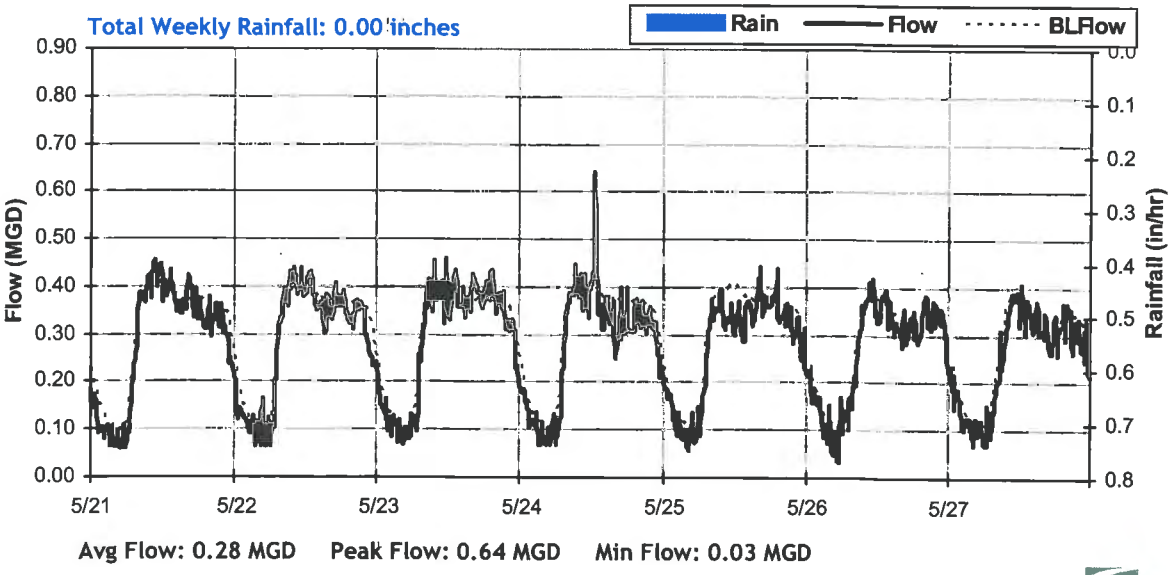
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 10





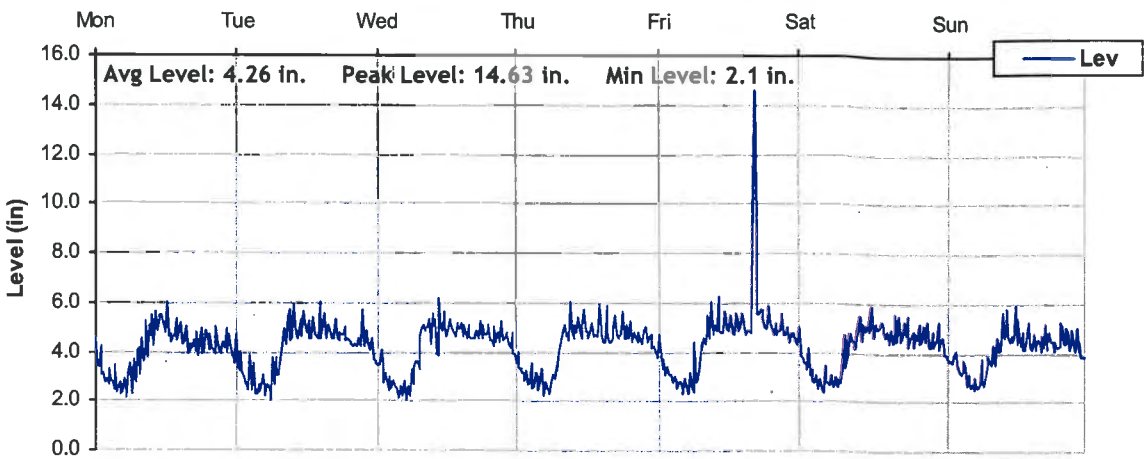


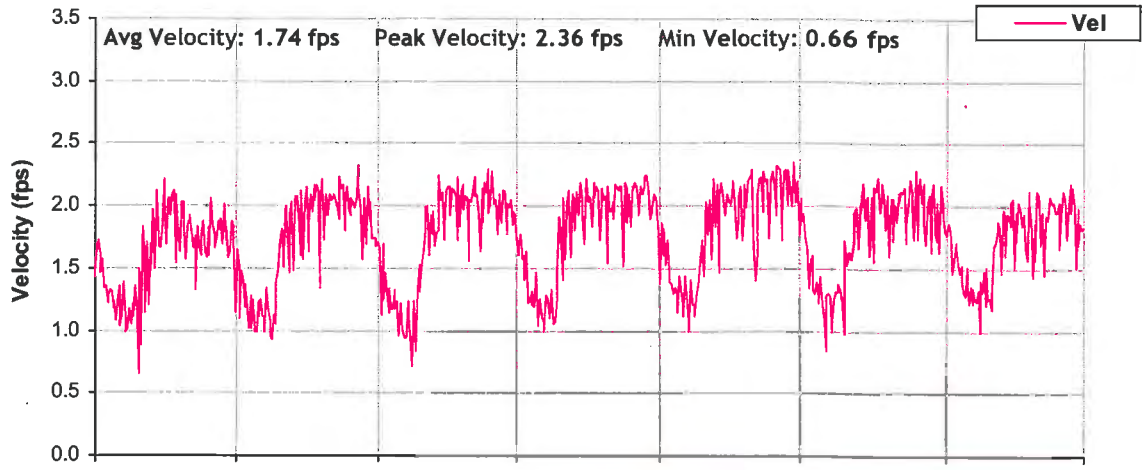
Avg Flow: 0.28 MGD Peak Flow: 0.64 MGD Min Flow: 0.03 MGD

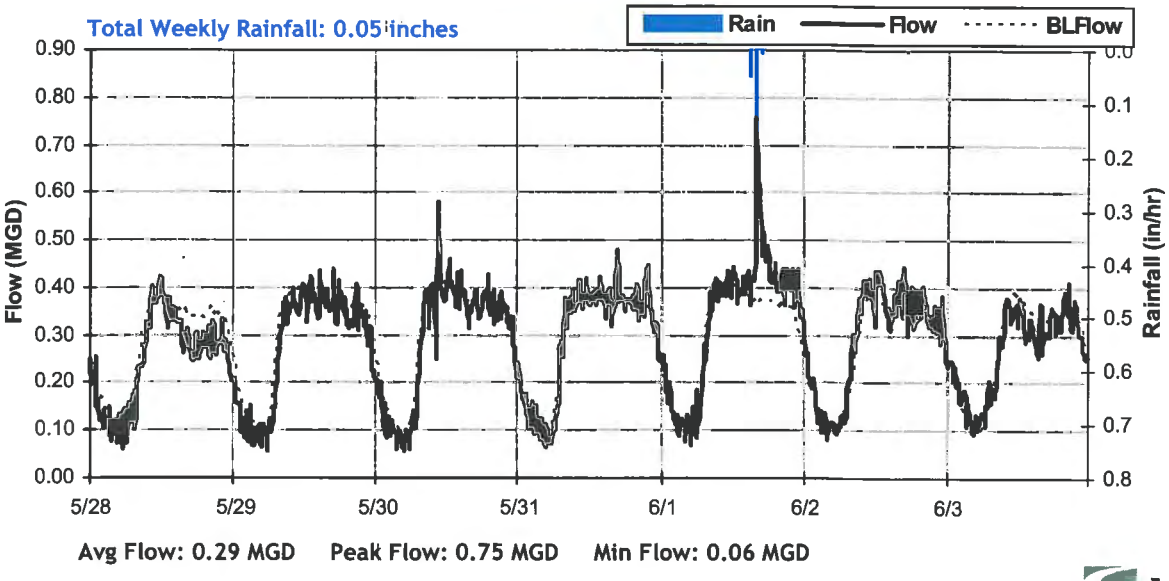
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 10





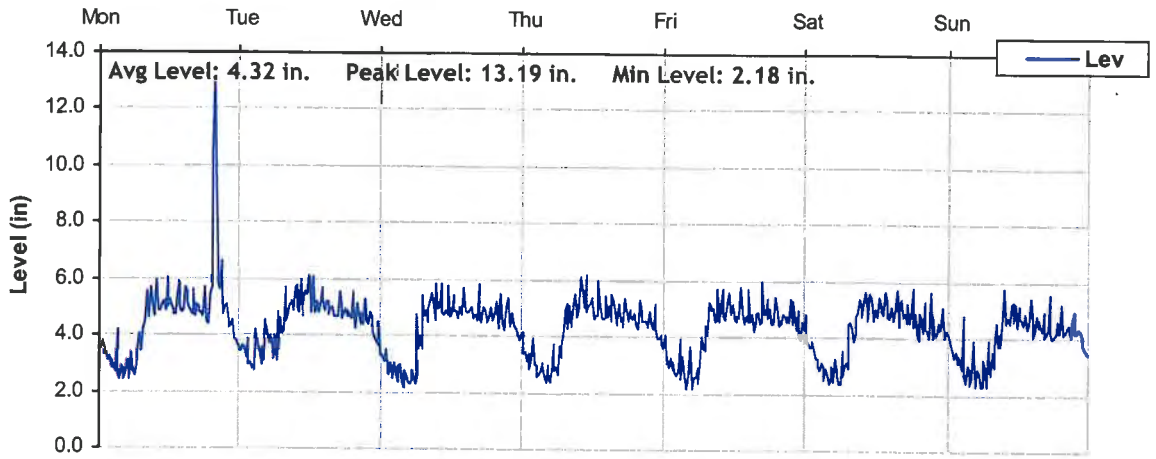


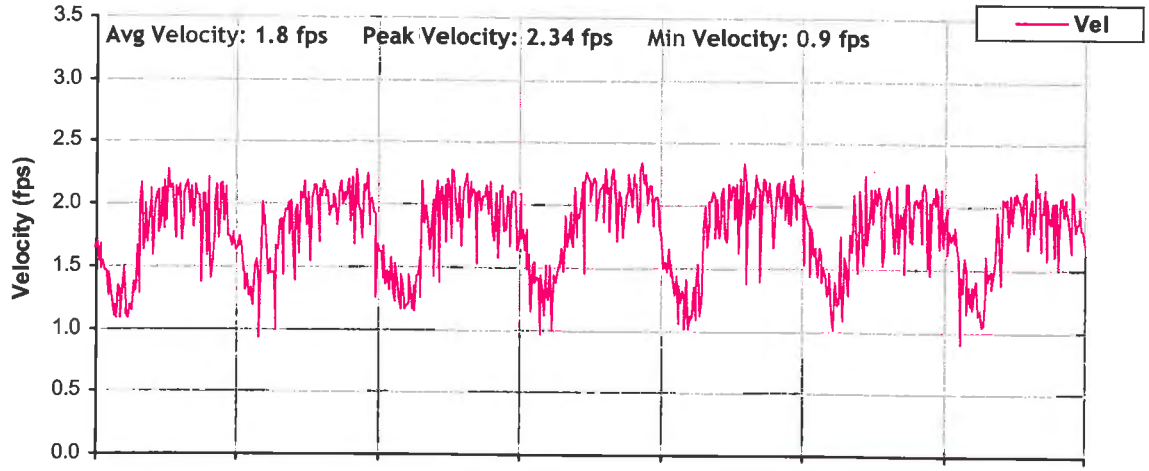
Avg Flow: 0.29 MGD Peak Flow: 0.75 MGD Min Flow: 0.06 MGD

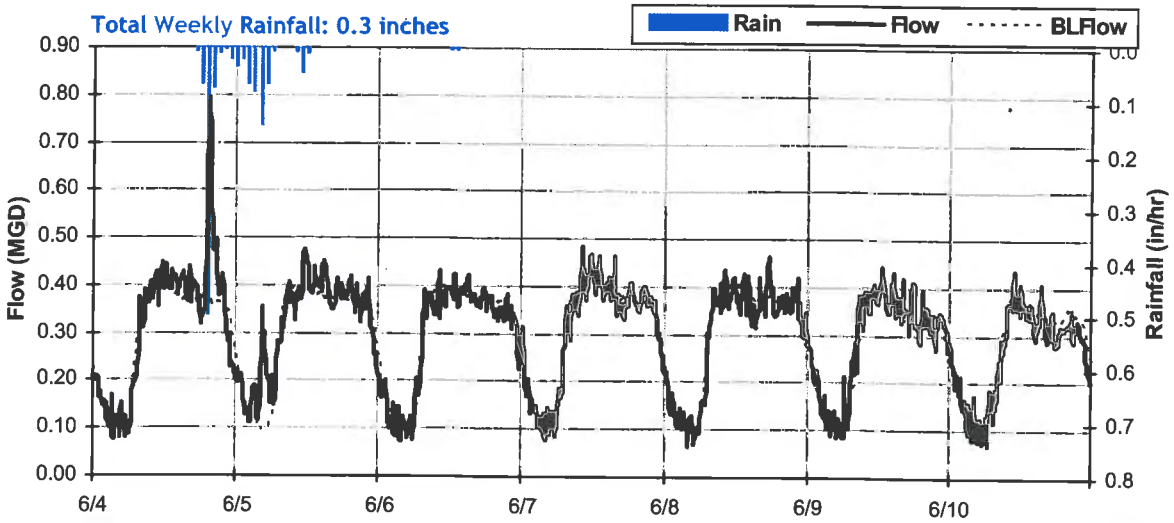
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 10





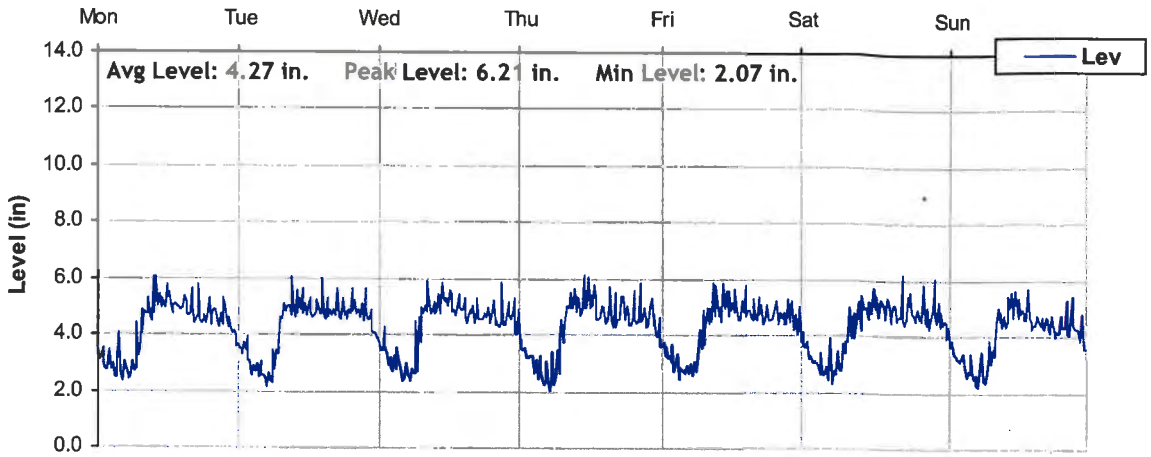


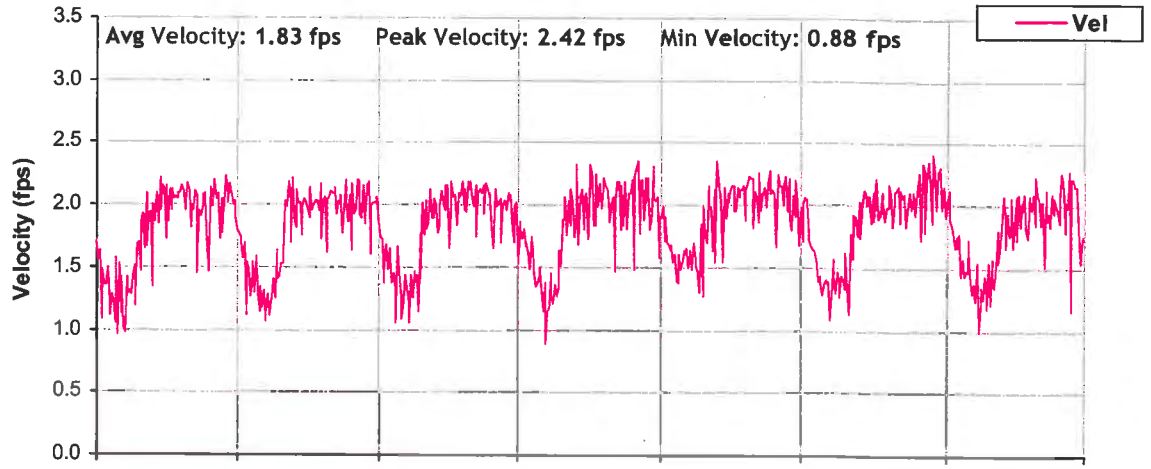
Avg Flow: 0.3 MGD Peak Flow: 0.79 MGD Min Flow: 0.06 MGD

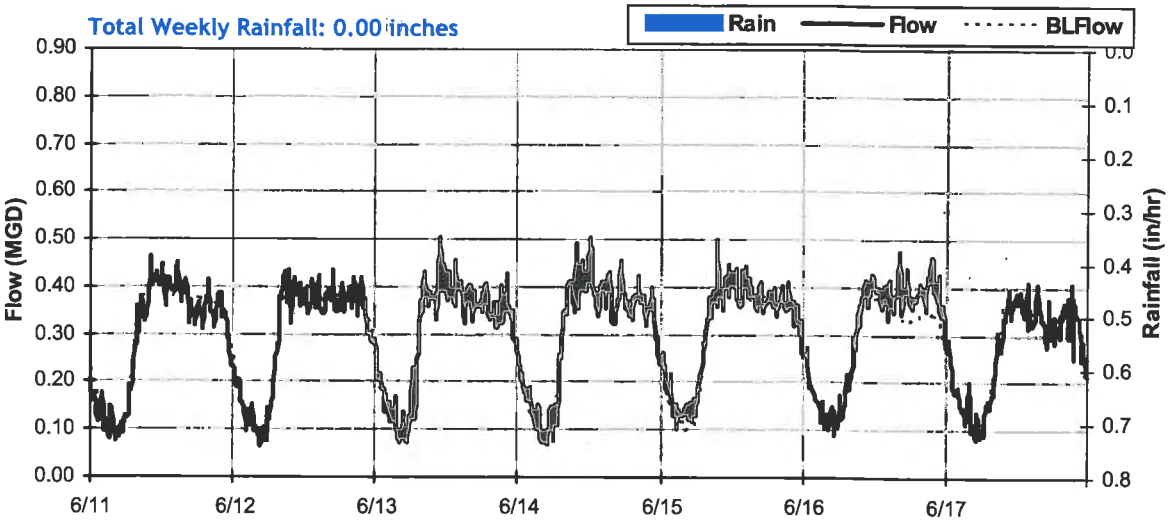
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 10





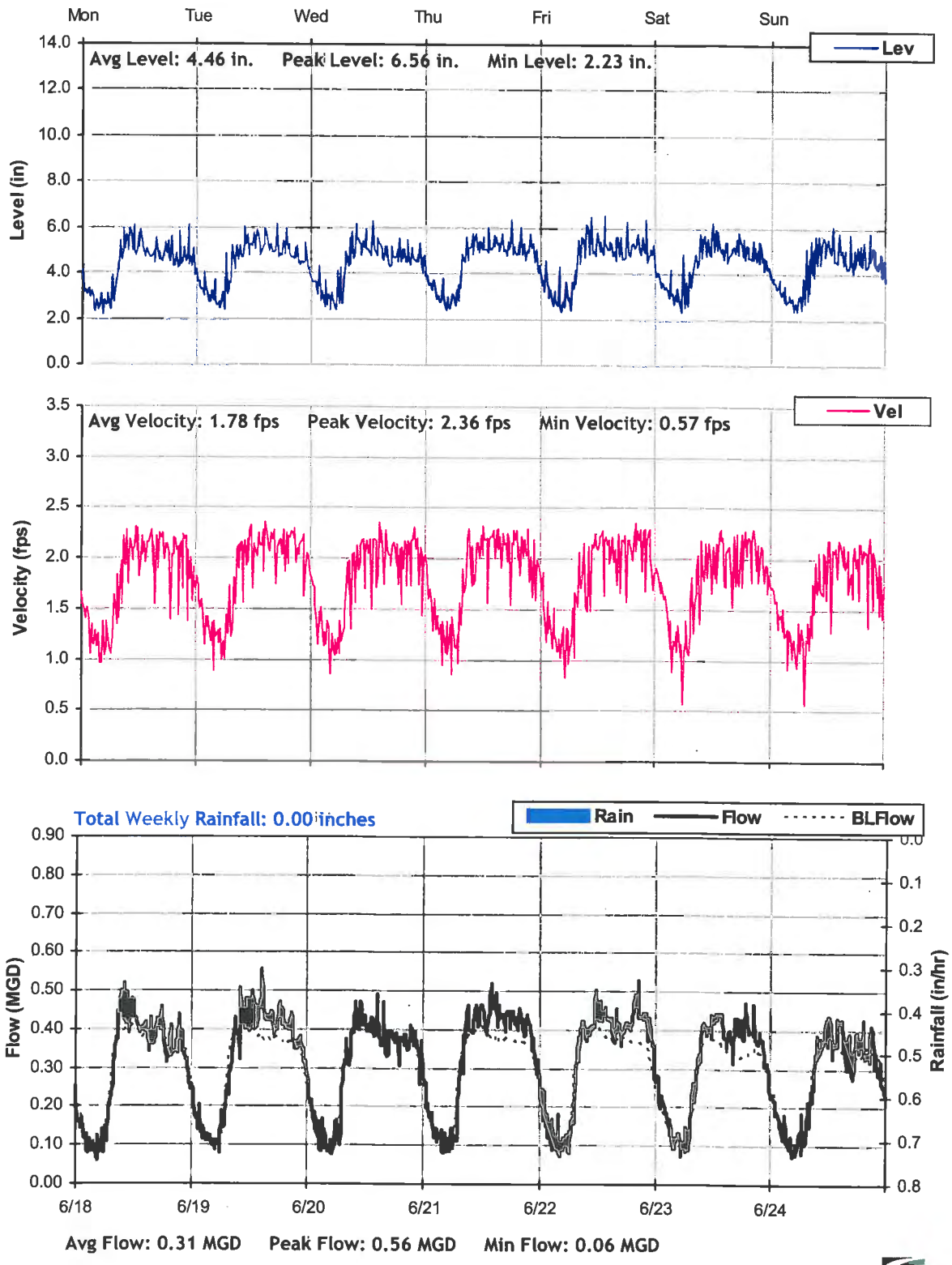


Avg Flow: 0.3 MGD Peak Flow: 0.51 MGD Min Flow: 0.07 MGD

V&A

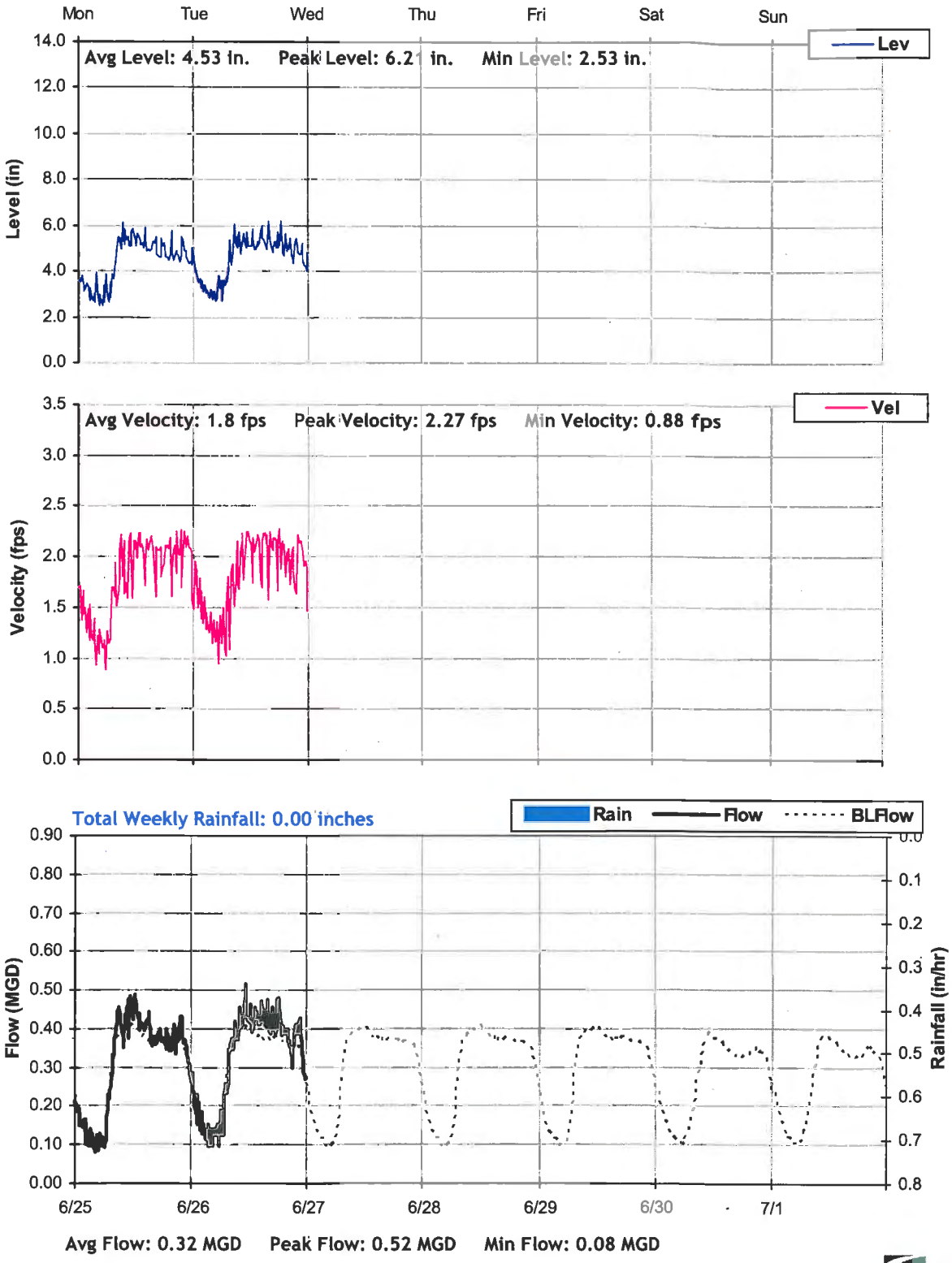
Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 10



Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 10



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	Site Information Report	**Monitoring Site:** Site 11

Location:

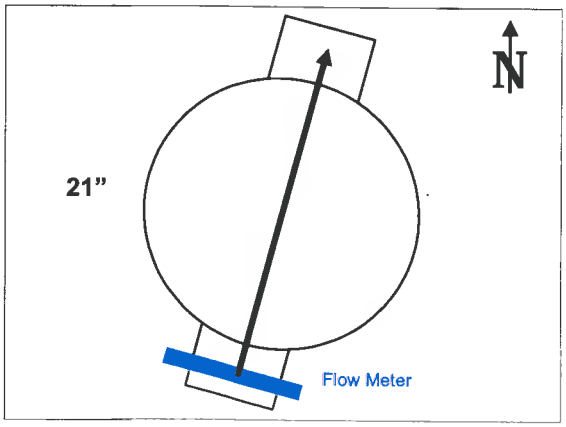
Diameter: 21 inches

Average Dry Weather Flow: 0.648 *MGD*

Peak Measured Flow: 1.444 *MGD*

Sanitary sewer map:

Flow sketch:



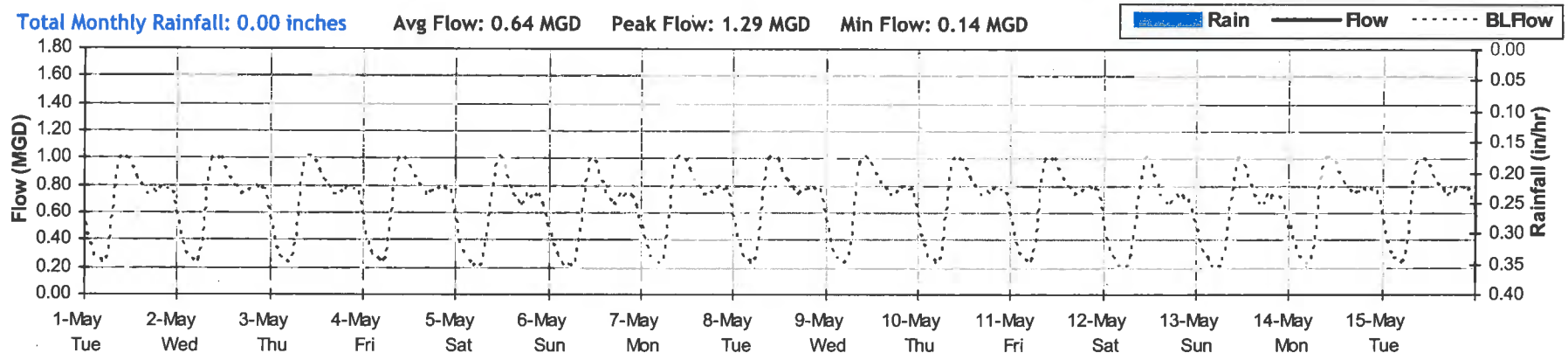
Street-level photo:

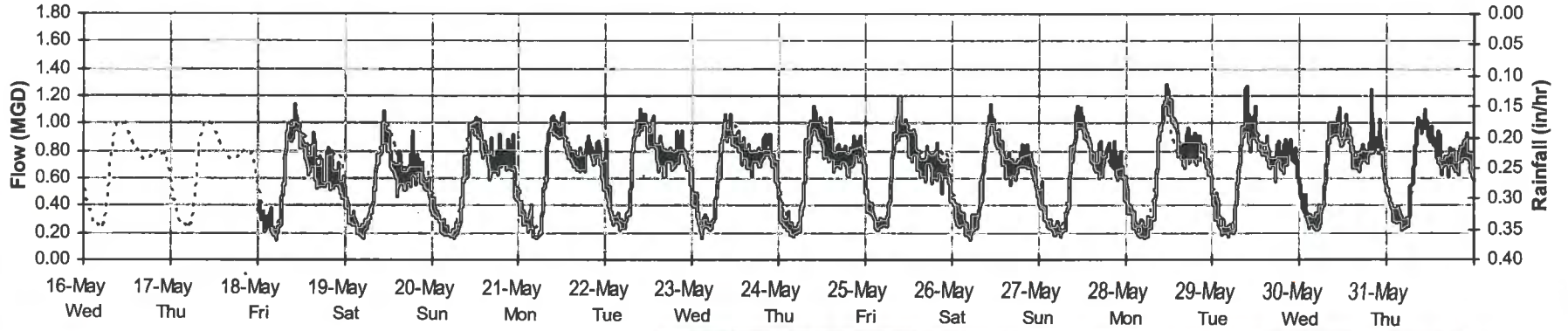
Plan view photo:

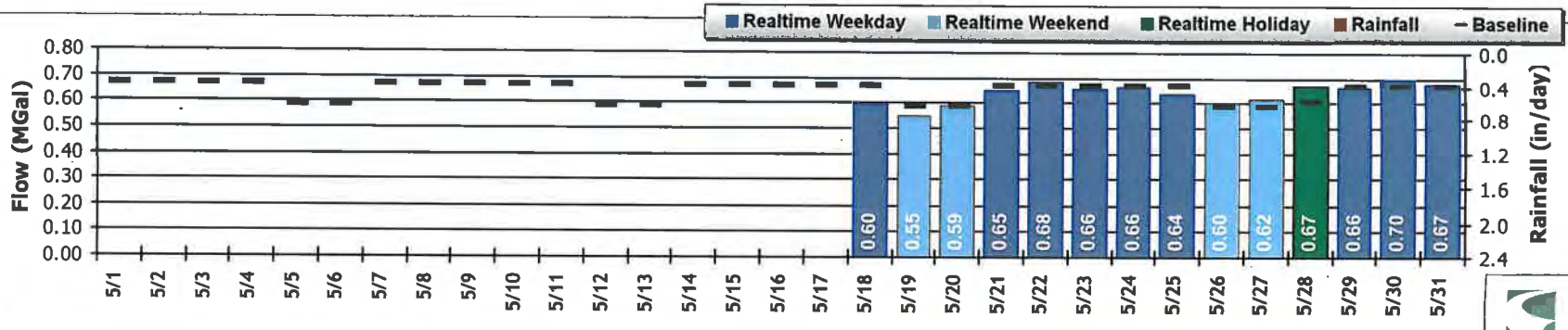
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 11

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.64 MGD Peak Flow: 1.29 MGD Min Flow: 0.14 MGD







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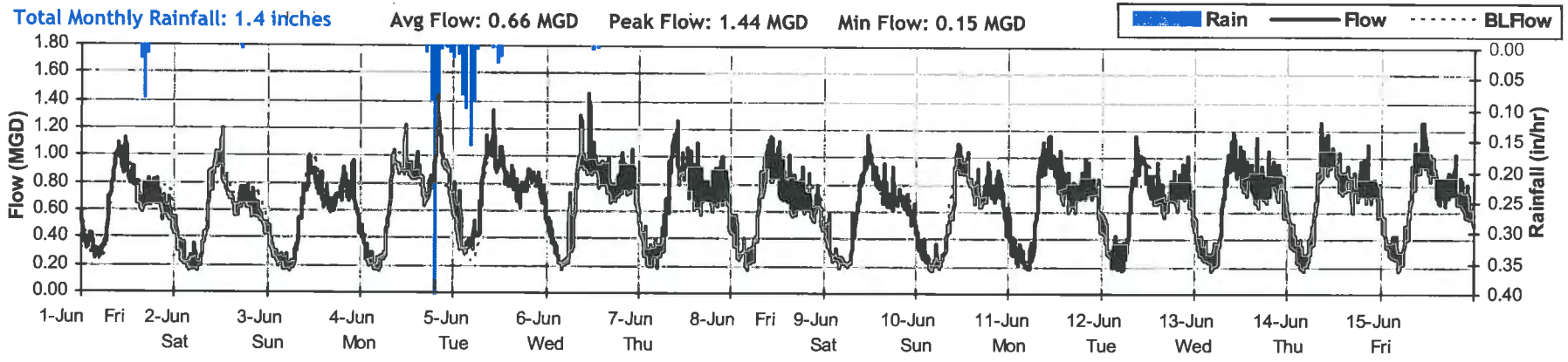
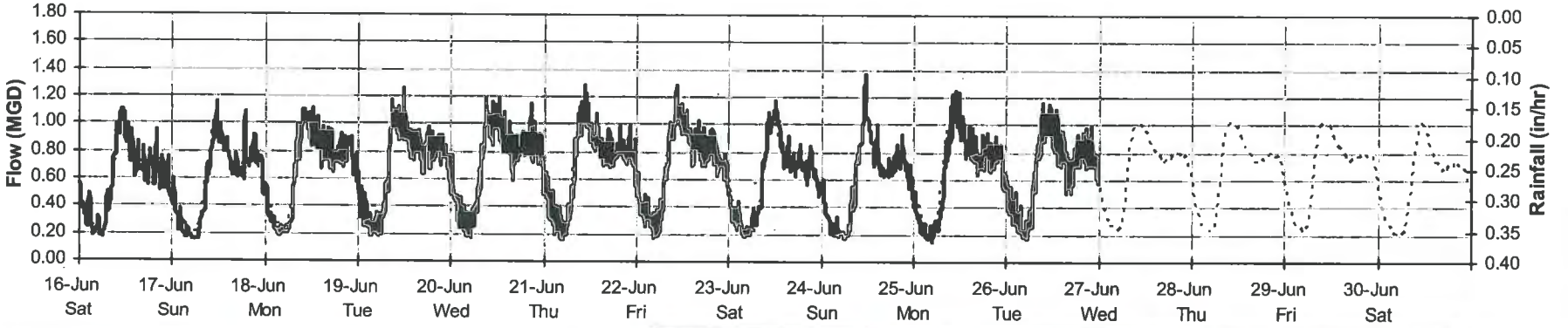
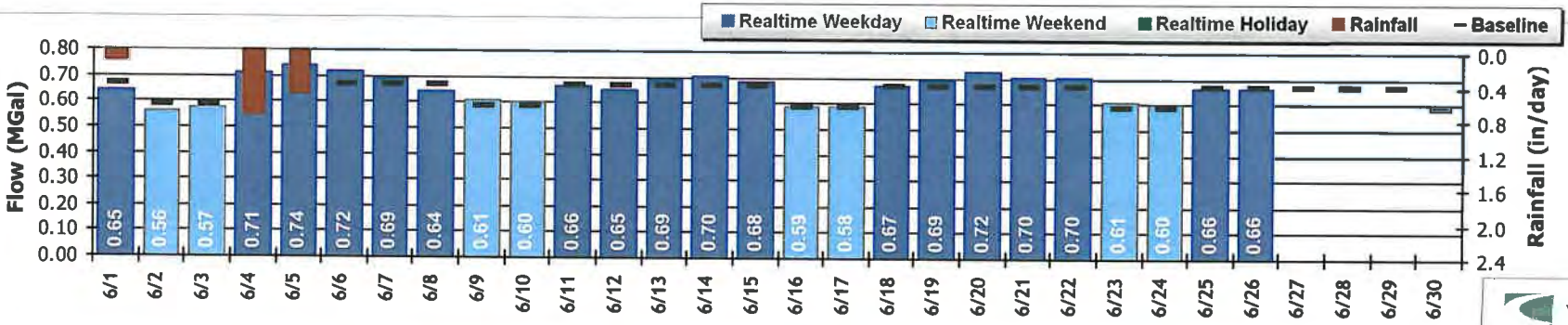
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 11

Total Monthly Rainfall: 1.4 inches Avg Flow: 0.66 MGD Peak Flow: 1.44 MGD Min Flow: 0.15 MGD







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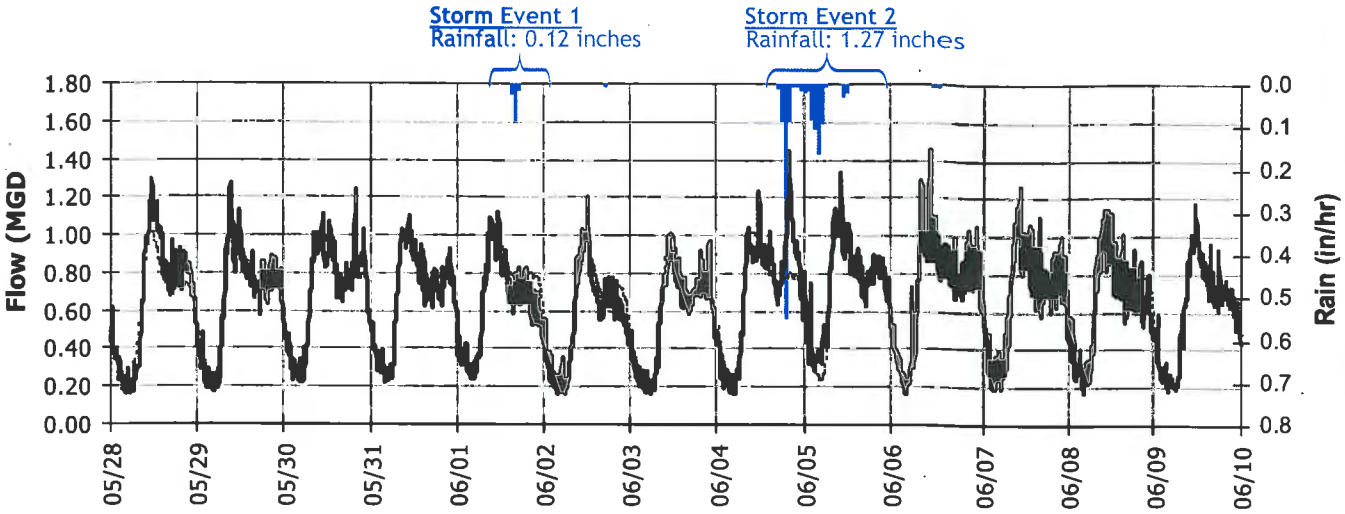
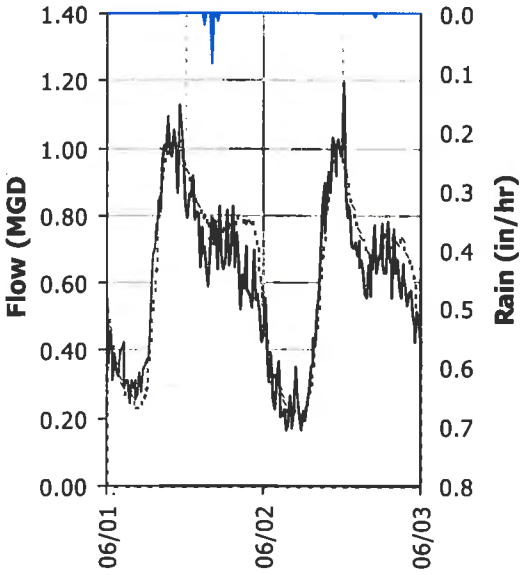
I/I Summary

Monitoring Site:
Site 11

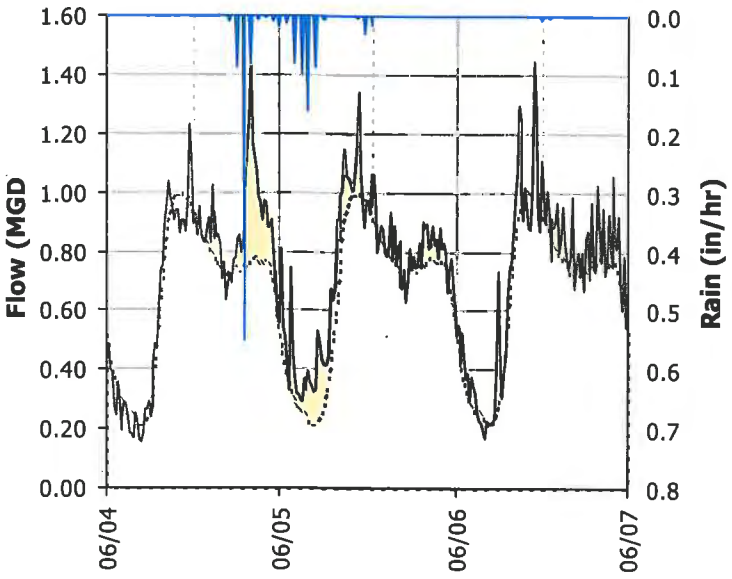
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.12	*inches*
Peak Flow:	0.71	*MGD*
Peak I/I Rate:	-0.09	*MGD*
PF:	1.09	
Pk I/I:ADWF:	-0.14	
Peak Level:	5.97	*inches*
d/D Ratio:	0.28	
Total I/I:	-1,000	*gallons*
RE1 R-Value:	0.0%	

Storm Event #2 I/I Analysis

Rainfall:	1.27	*inches*
Peak Flow:	1.44	*MGD*
Peak I/I Rate:	0.65	*MGD*
PF:	2.23	
Pk I/I:ADWF:	1.00	
Peak Level:	8.86	*inches*
d/D Ratio:	0.42	
Total I/I:	124,000	*gallons*
RE2 R-Value:	0.1%	

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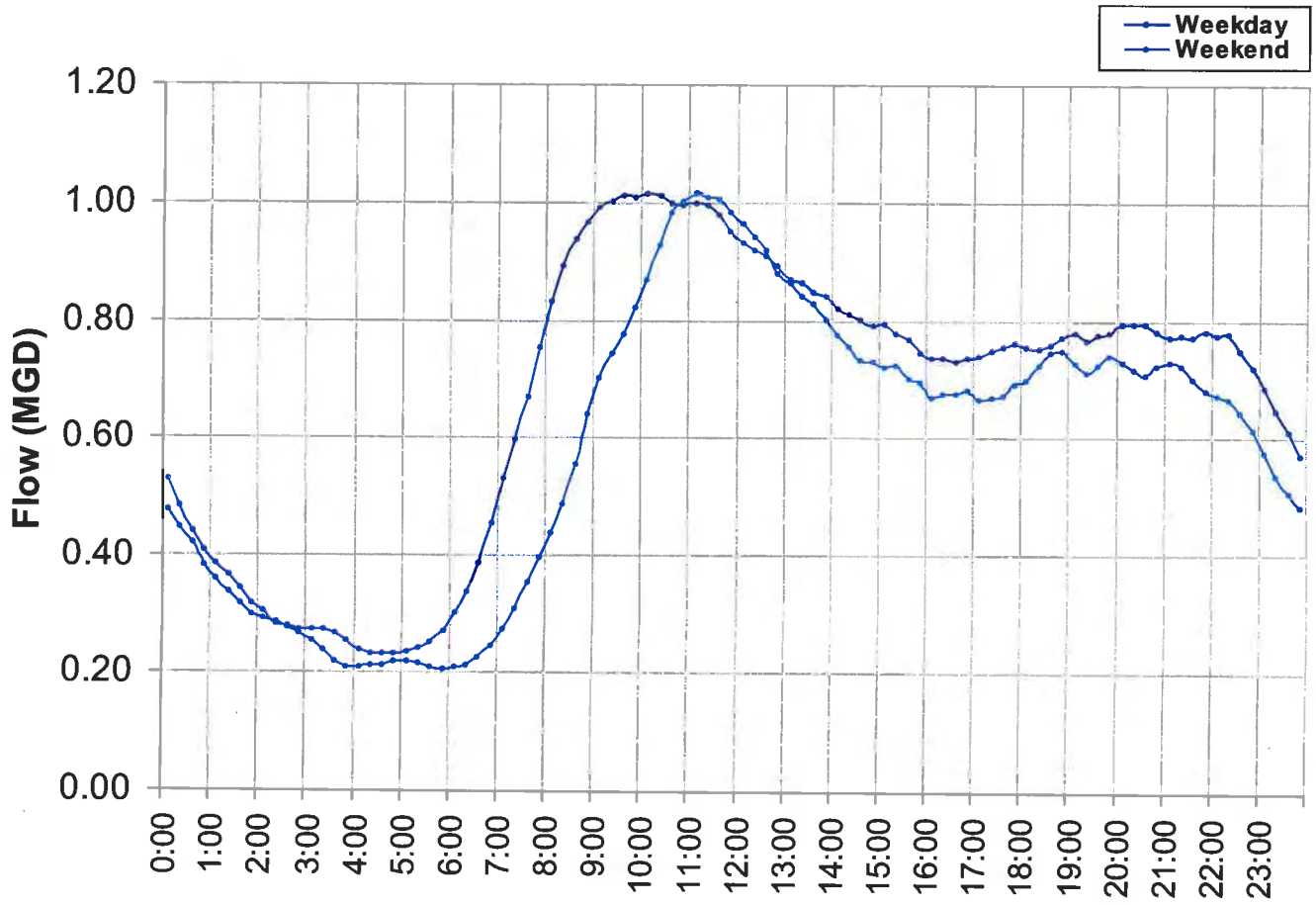
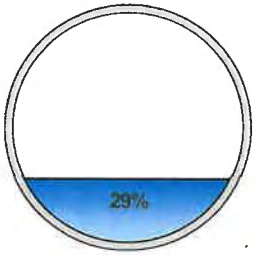
Average Dry Weather Flow

Monitoring Site:
Site 11



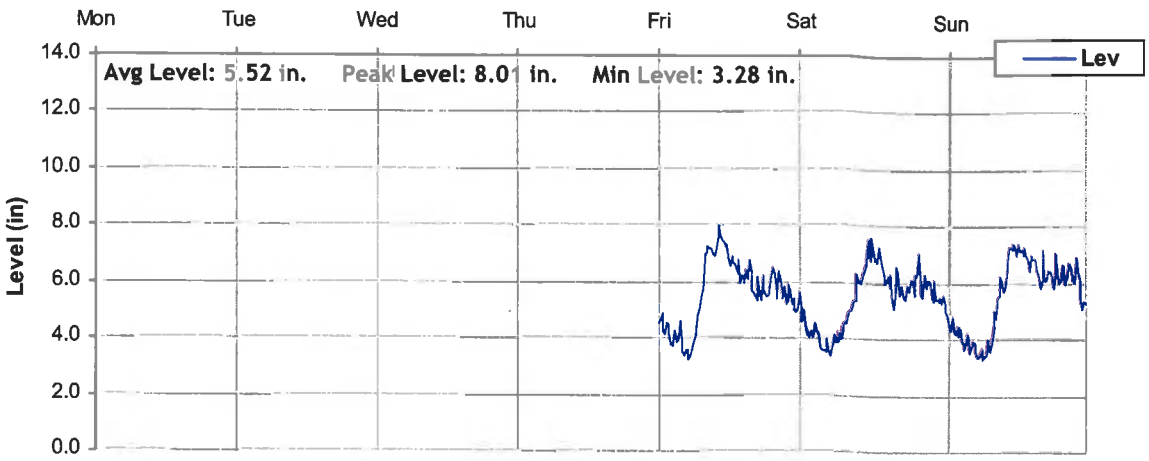
Average Dry Weather Flow:
0.65 *MGD*

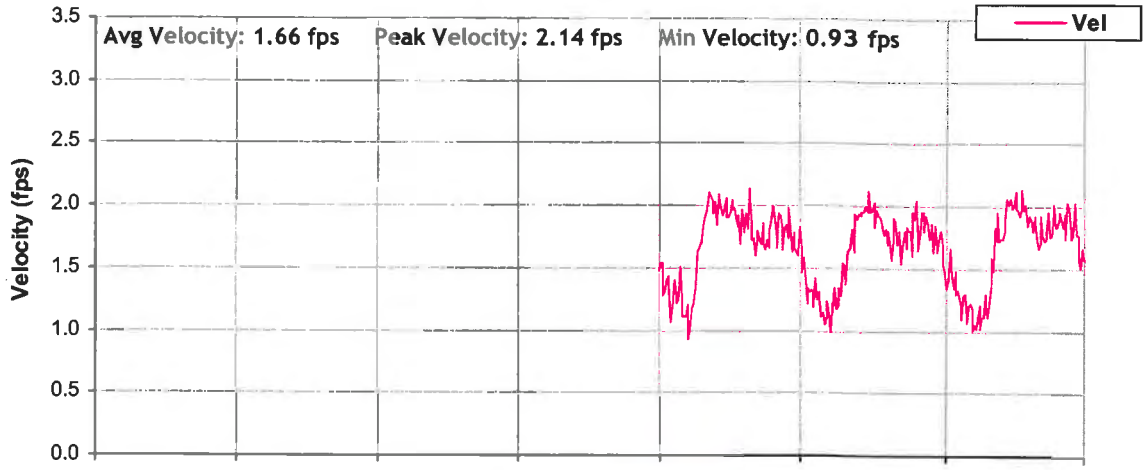


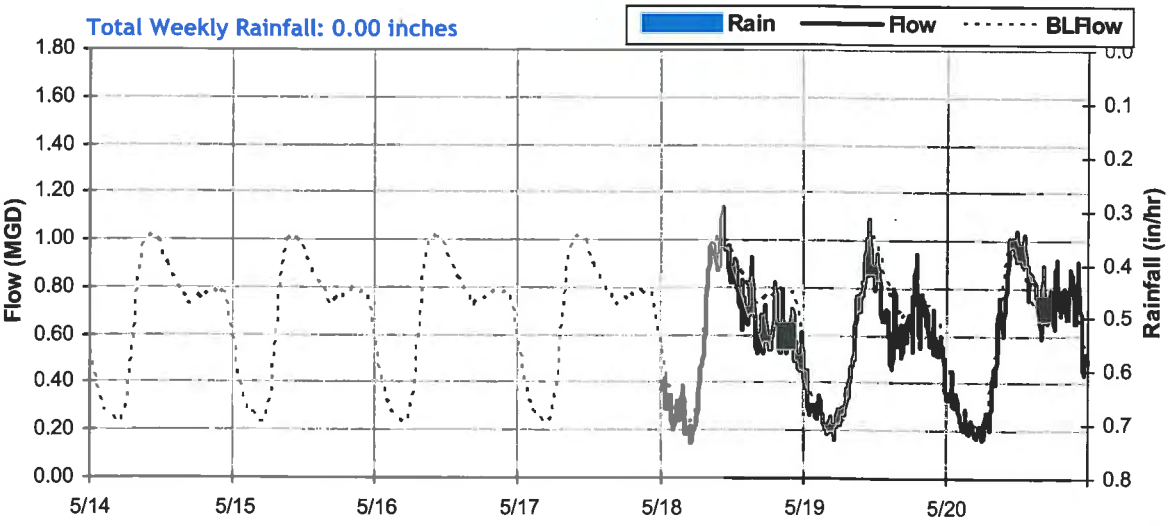
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 11





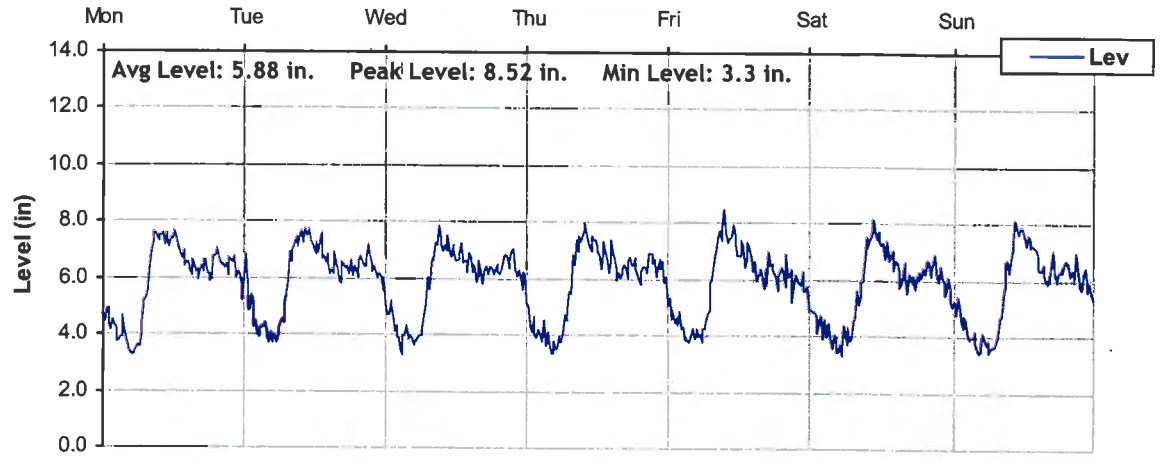


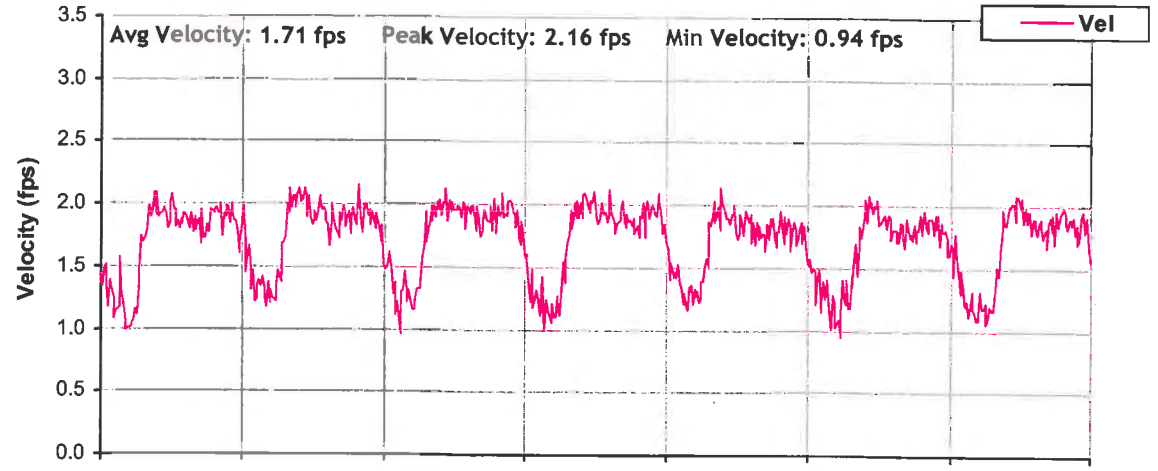
Avg Flow: 0.58 MGD Peak Flow: 1.14 MGD Min Flow: 0.14 MGD

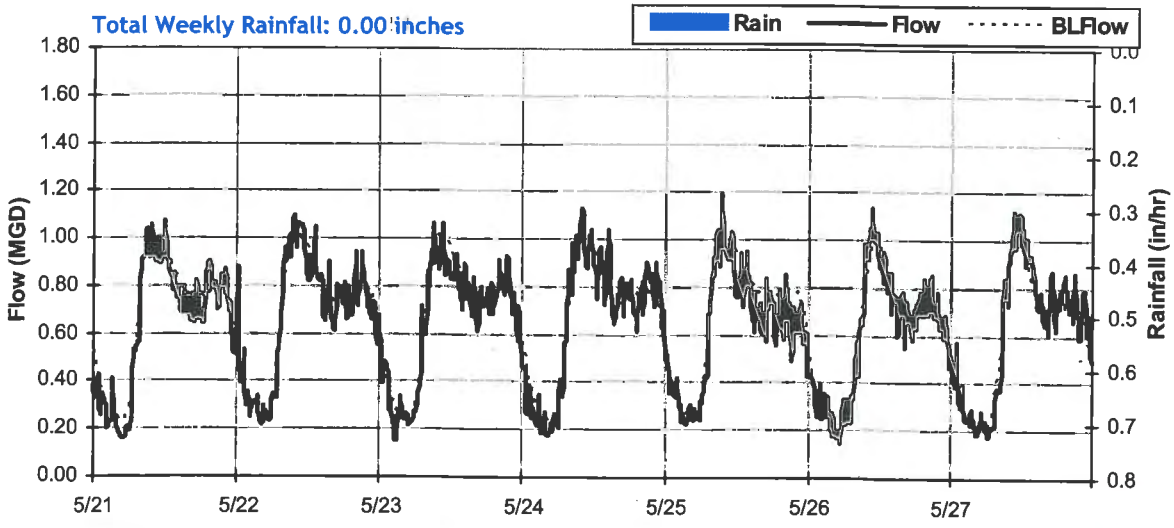
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 11





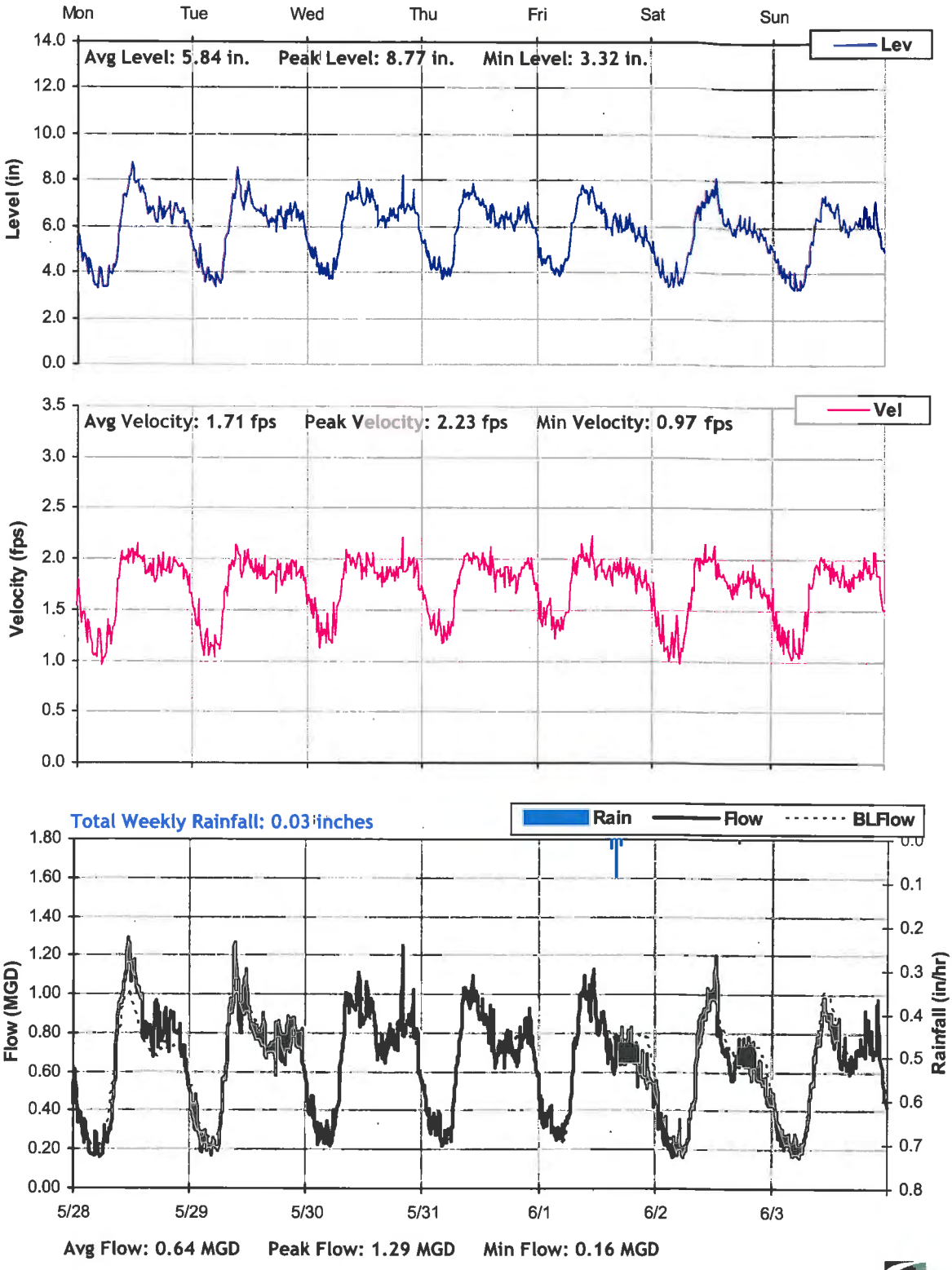


Avg Flow: 0.64 MGD Peak Flow: 1.2 MGD Min Flow: 0.15 MGD

V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

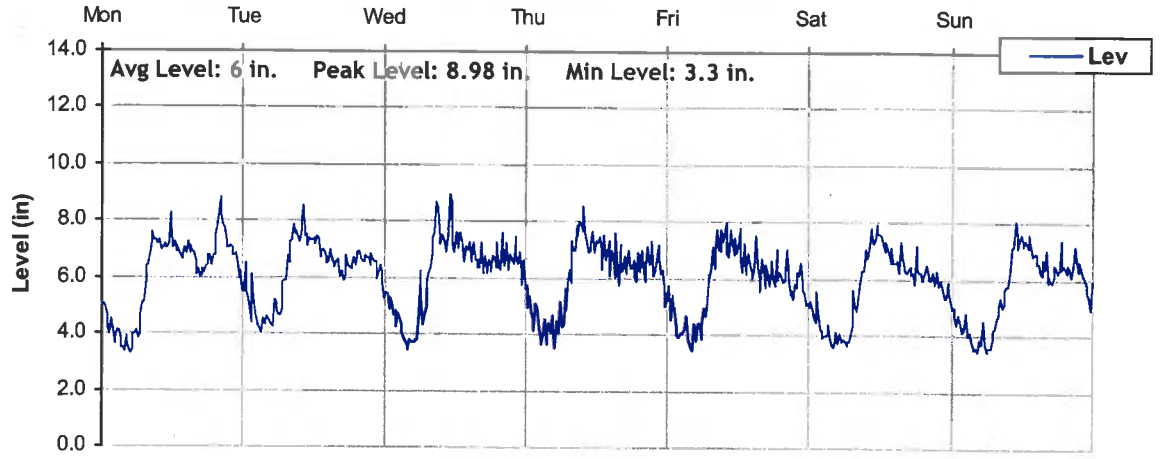
Monitoring Site:
Site 11

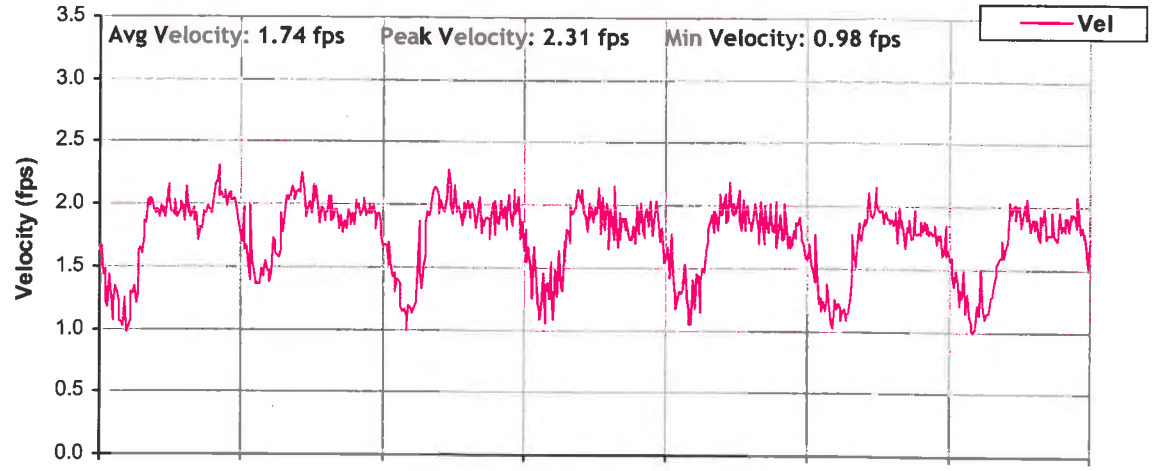


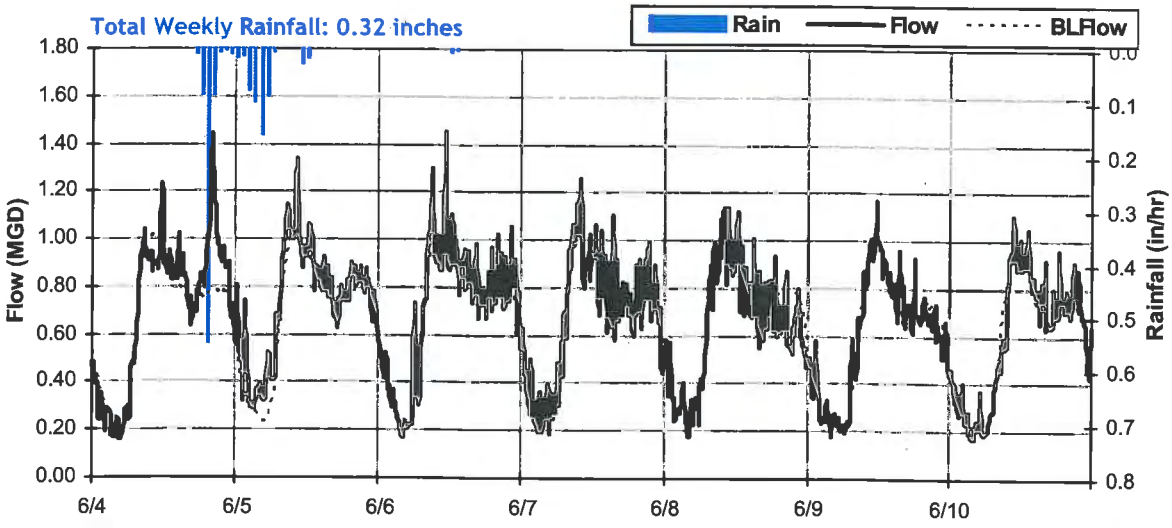
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 11





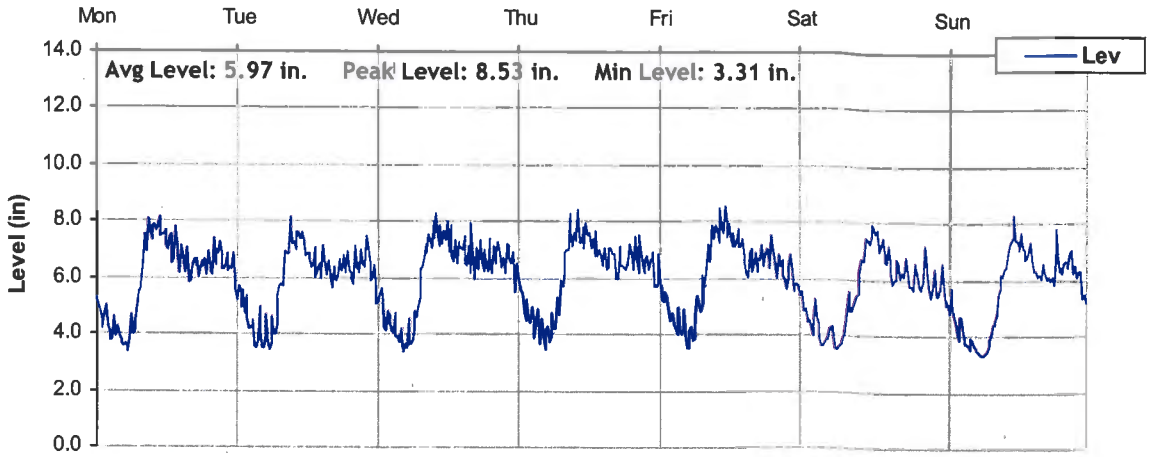


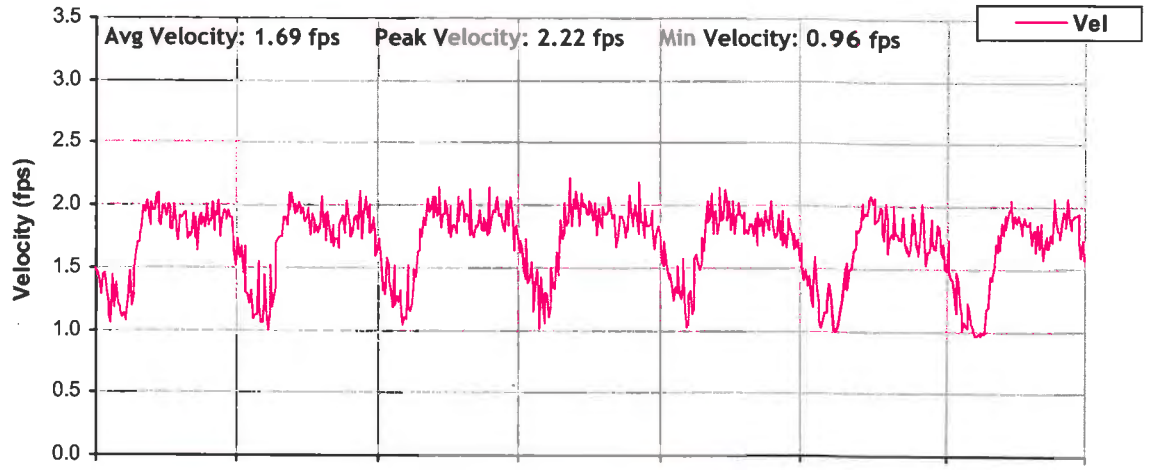
Avg Flow: 0.67 MGD Peak Flow: 1.44 MGD Min Flow: 0.16 MGD

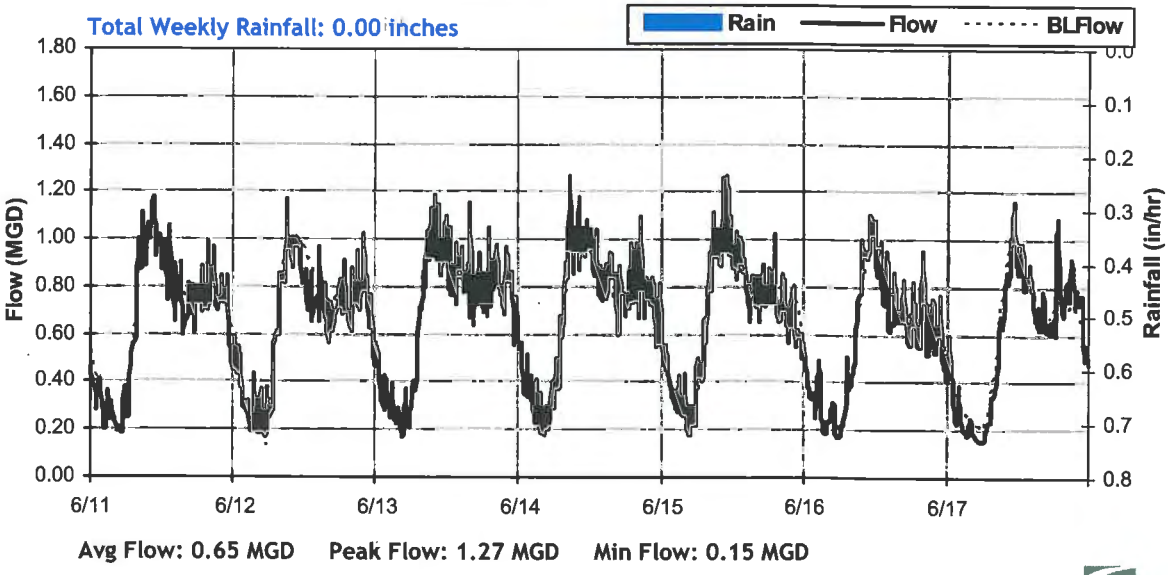
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 11





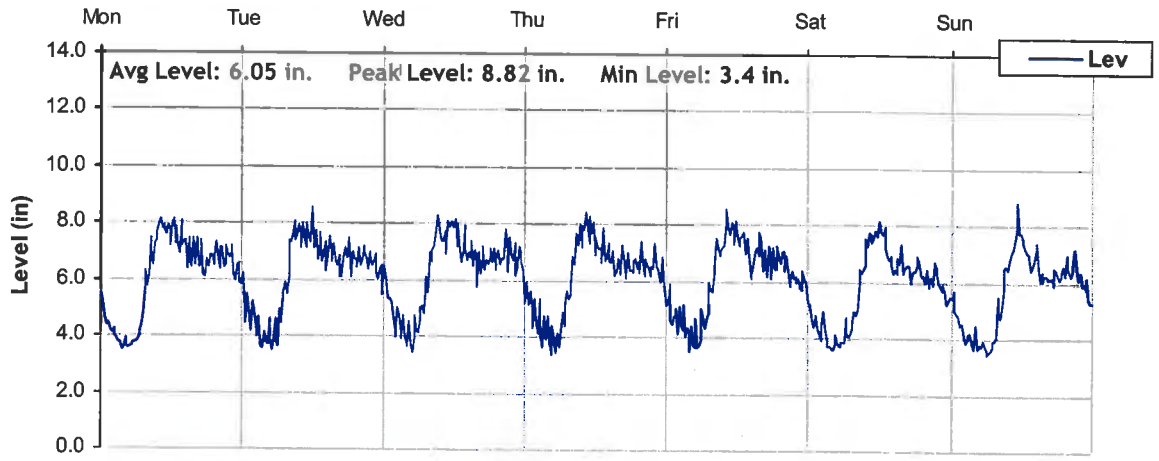


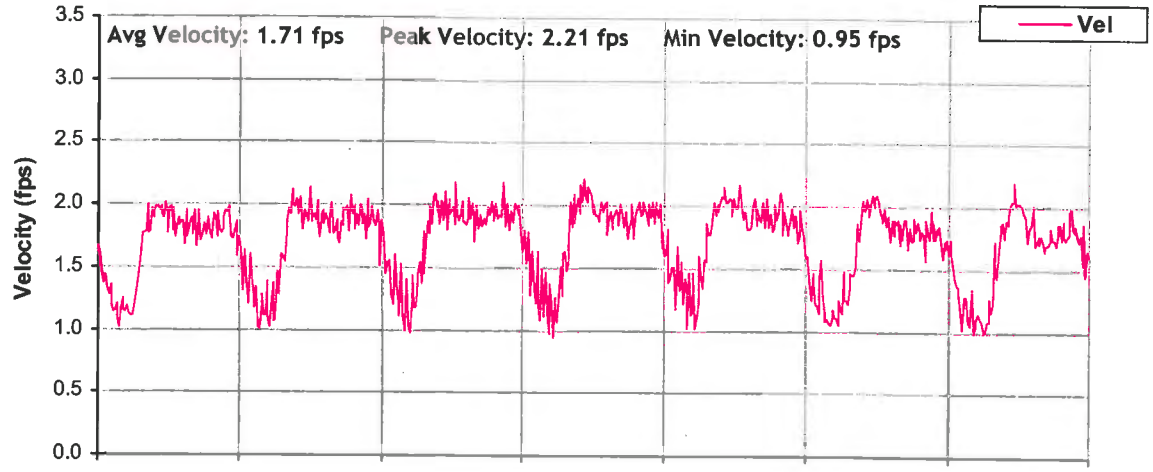
Avg Flow: 0.65 MGD Peak Flow: 1.27 MGD Min Flow: 0.15 MGD

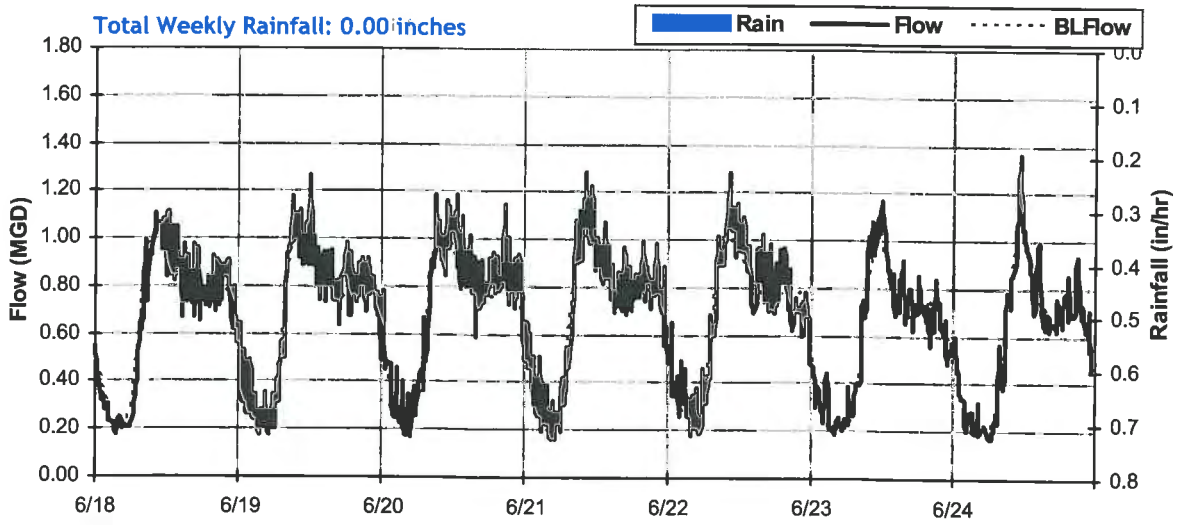
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 11





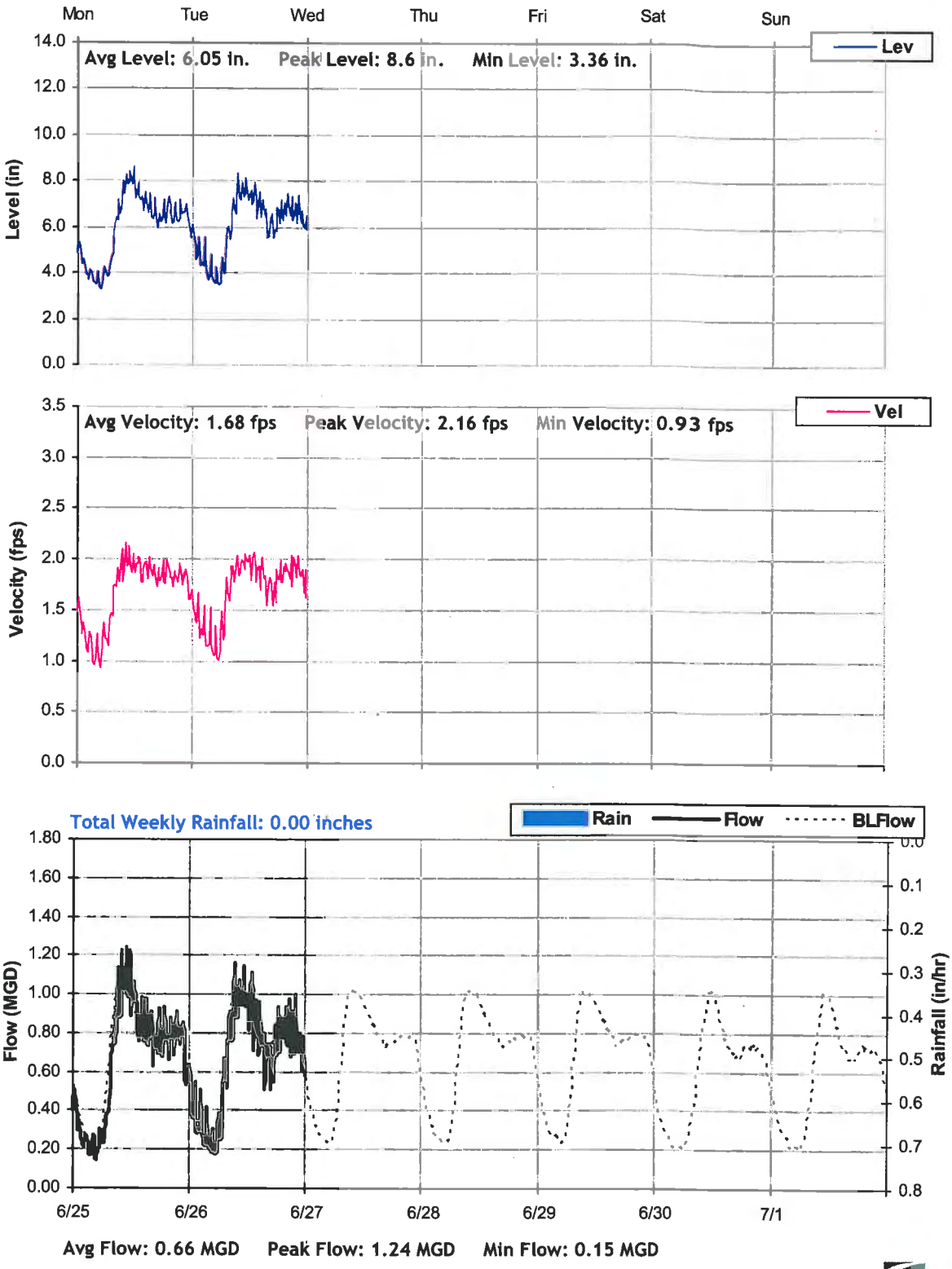


Avg Flow: 0.67 MGD Peak Flow: 1.37 MGD Min Flow: 0.16 MGD

V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 11



BEND OREGON	**Site Information Report**	**Monitoring Site:** Site 12

Location:

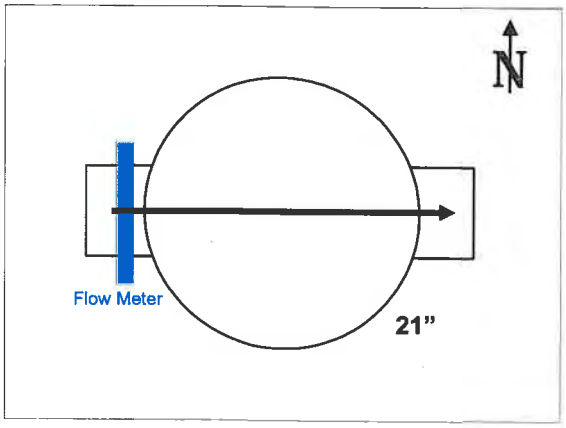
Diameter: 21 inches

Average Dry Weather Flow: 0.469 *MGD*

Peak Measured Flow: 1.477 *MGD*

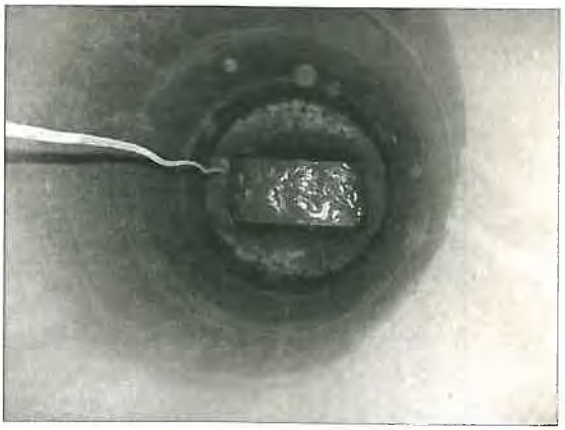
Sanitary sewer map:

Flow sketch:



Street-level photo:

Plan view photo:

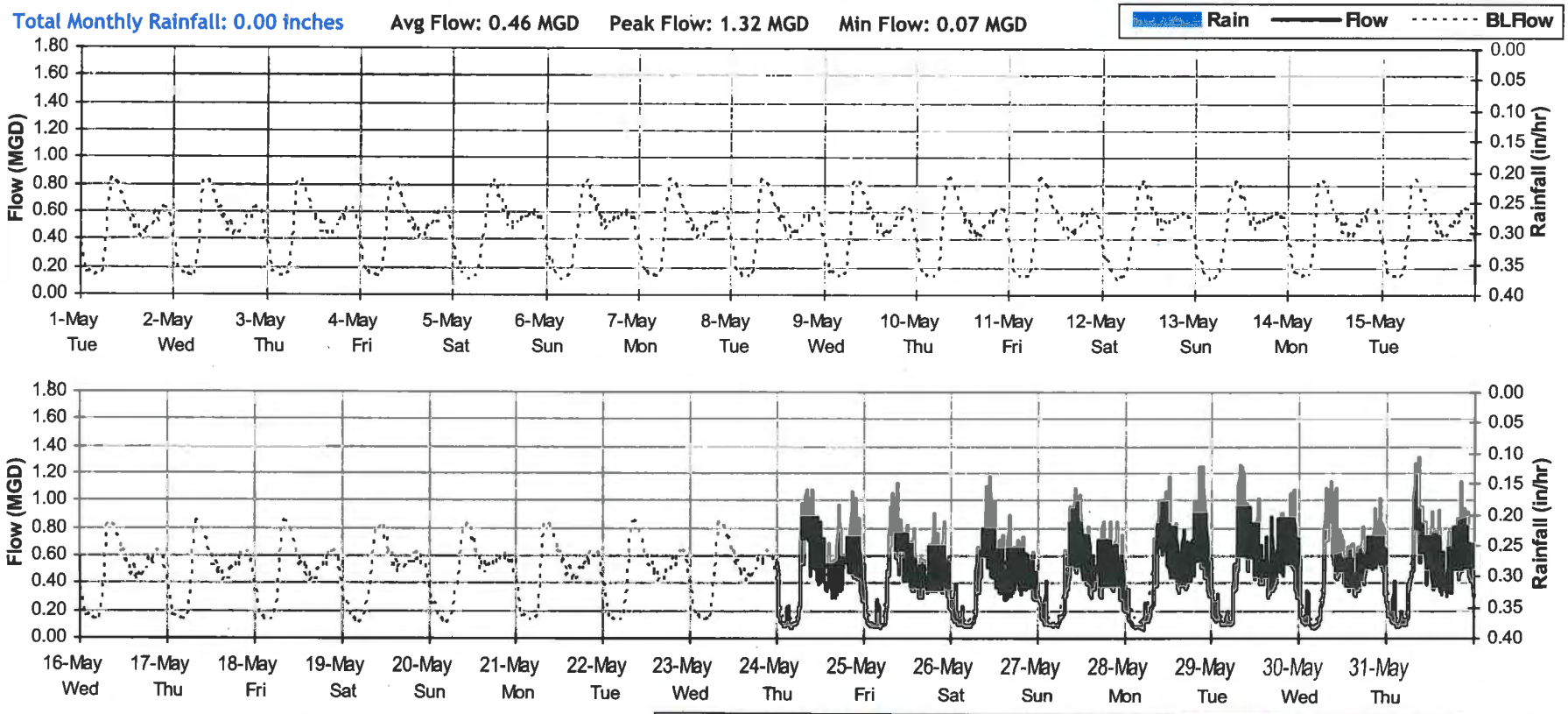


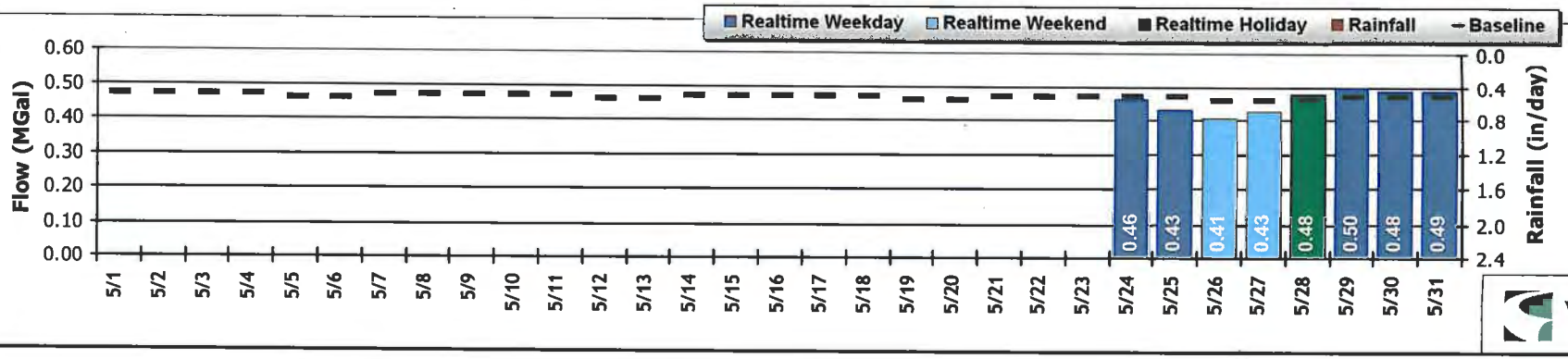
V&A

Monthly Flow Summary
May, 2007

Monitoring Site:
Site 12

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.46 MGD Peak Flow: 1.32 MGD Min Flow: 0.07 MGD



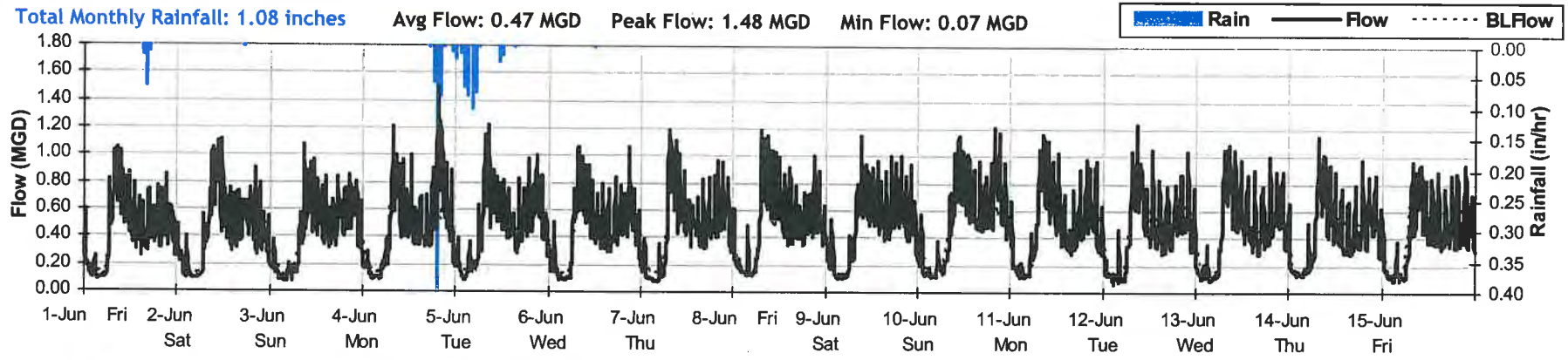


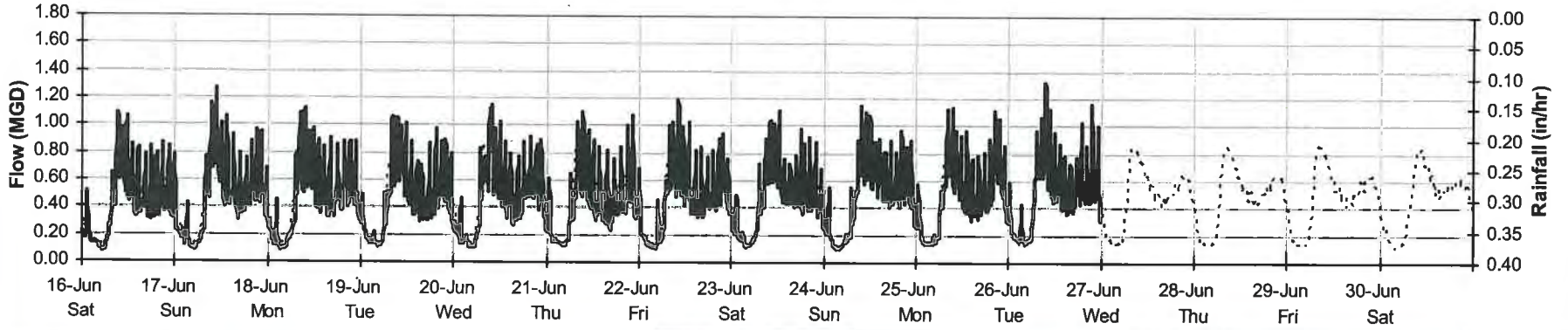
V&A

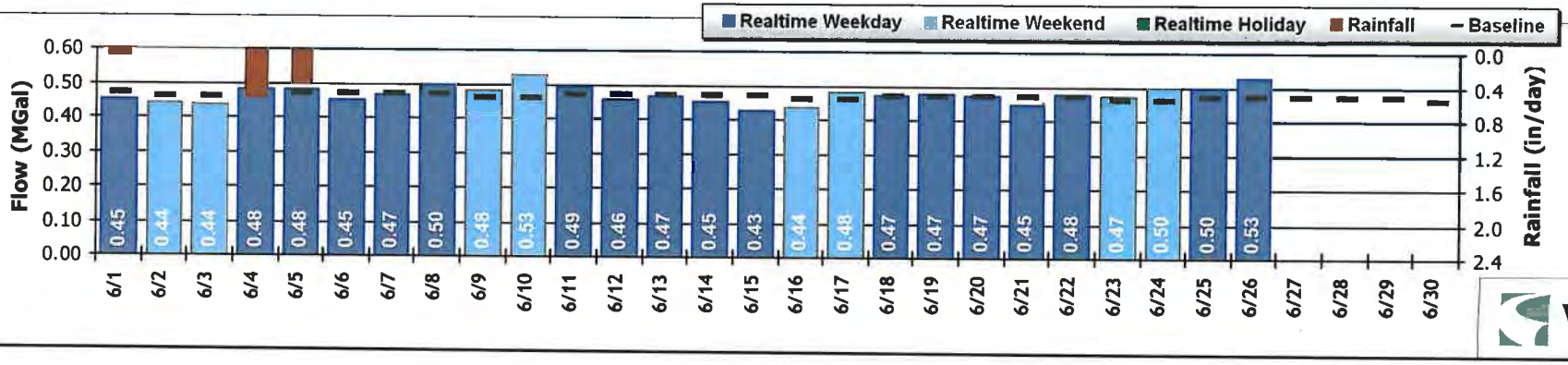
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 12

Total Monthly Rainfall: 1.08 inches Avg Flow: 0.47 MGD Peak Flow: 1.48 MGD Min Flow: 0.07 MGD





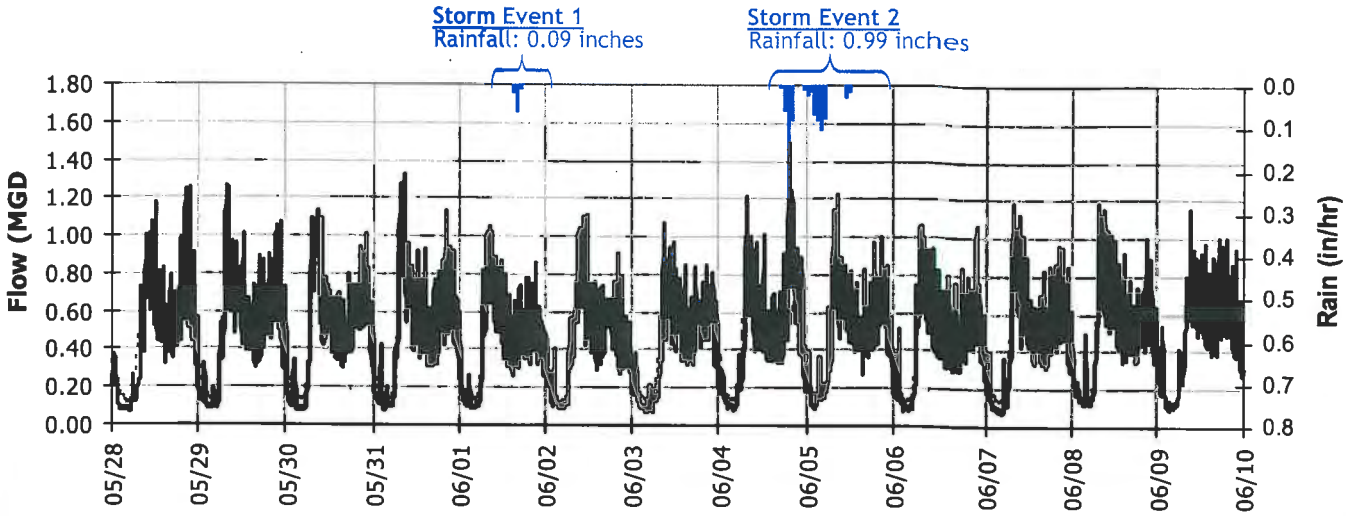


V&A

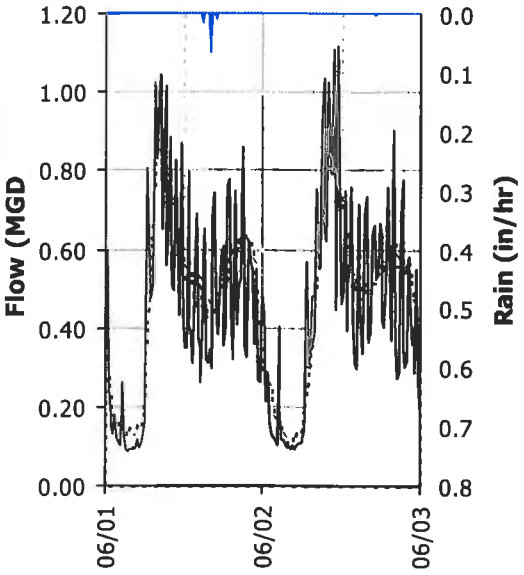
I/I Summary

Monitoring Site:
Site 12

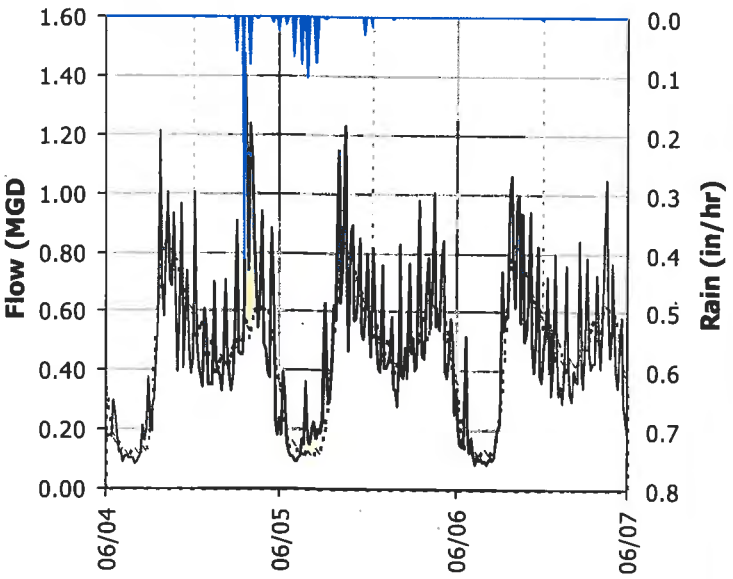
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.09	*inches*
Peak Flow:	0.40	*MGD*
Peak I/I Rate:	-0.01	*MGD*
PF:	0.85	
Pk I/I:ADWF:	-0.02	
Peak Level:	4.22	*inches*
d/D Ratio:	0.20	
Total I/I:	0	*gallons*
RE1 R-Value:	0.0%	

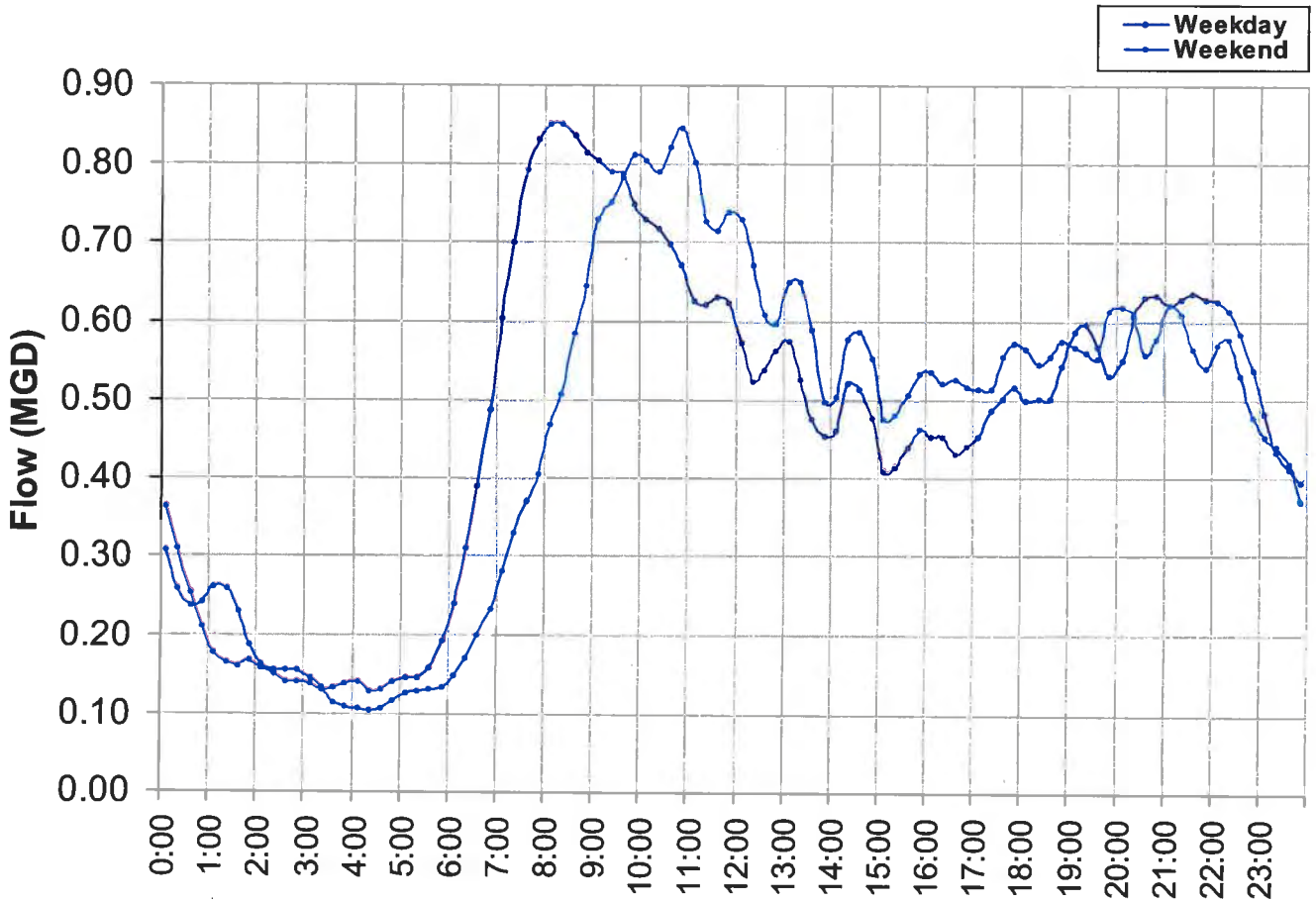
Storm Event #2 I/I Analysis

Rainfall:	0.99	*inches*
Peak Flow:	1.48	*MGD*
Peak I/I Rate:	0.88	*MGD*
PF:	3.15	
Pk I/I:ADWF:	1.88	
Peak Level:	8.30	*inches*
d/D Ratio:	0.40	
Total I/I:	50,000	*gallons*
RE2 R-Value:	0.1%	

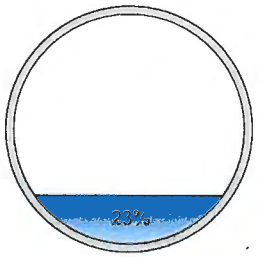
V&A

Average Dry Weather Flow

Monitoring Site:
Site 12



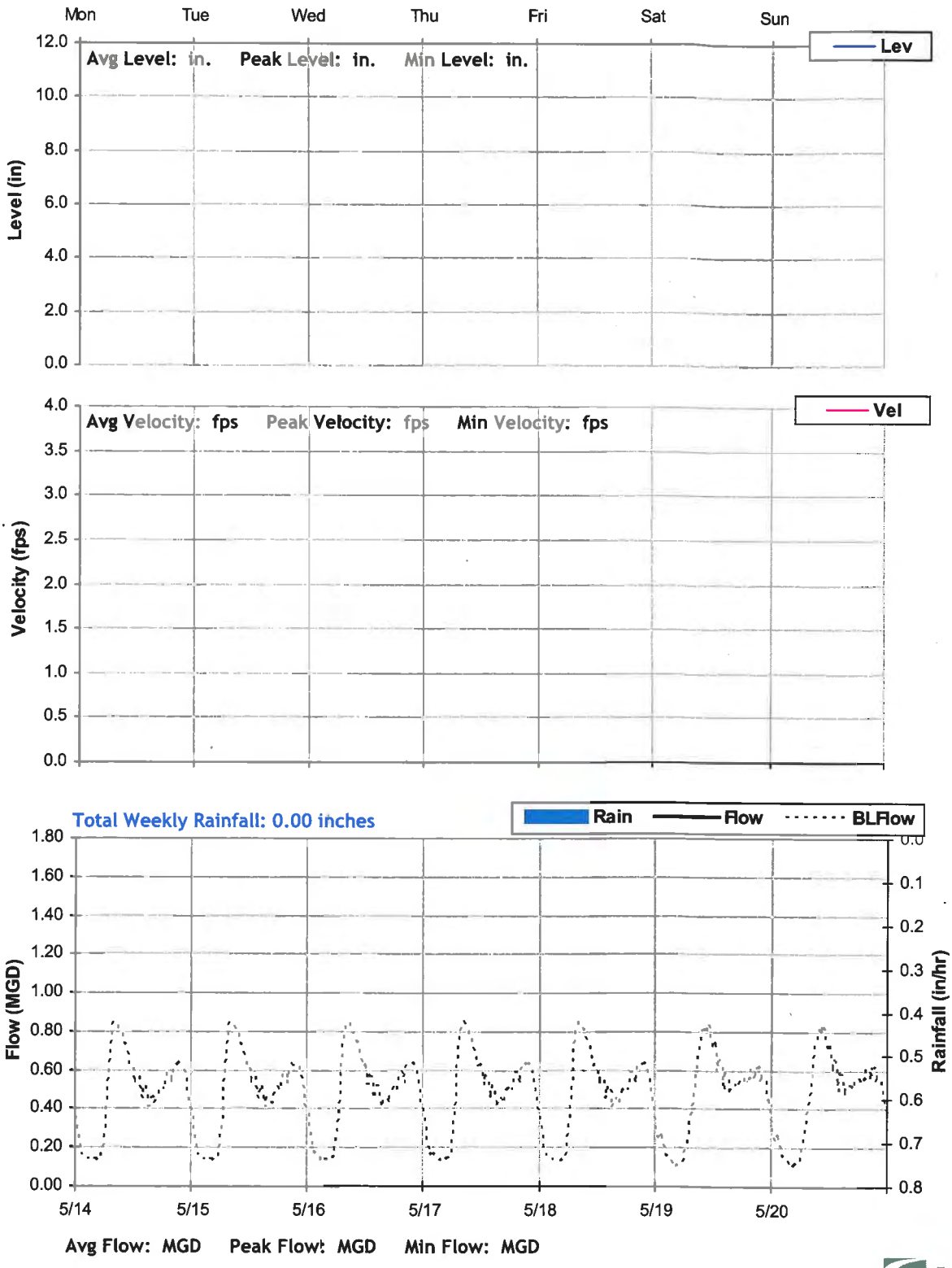
Average Dry Weather Flow:
0.47 *MGD*



V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

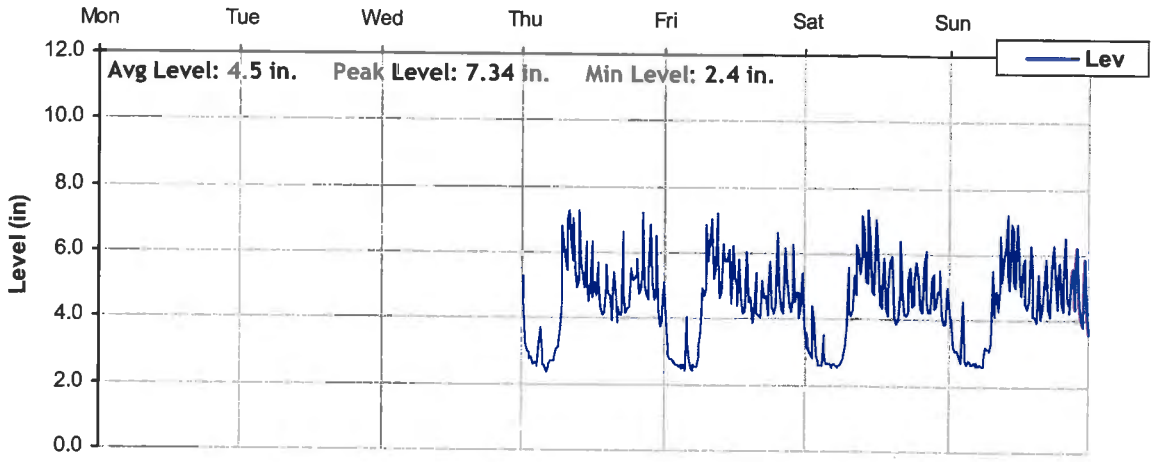
Monitoring Site:
Site 12

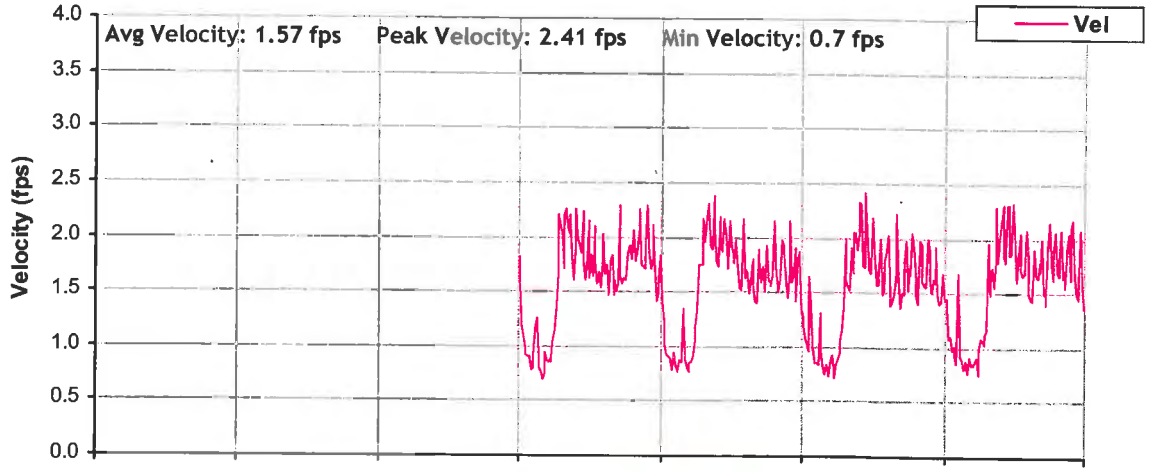


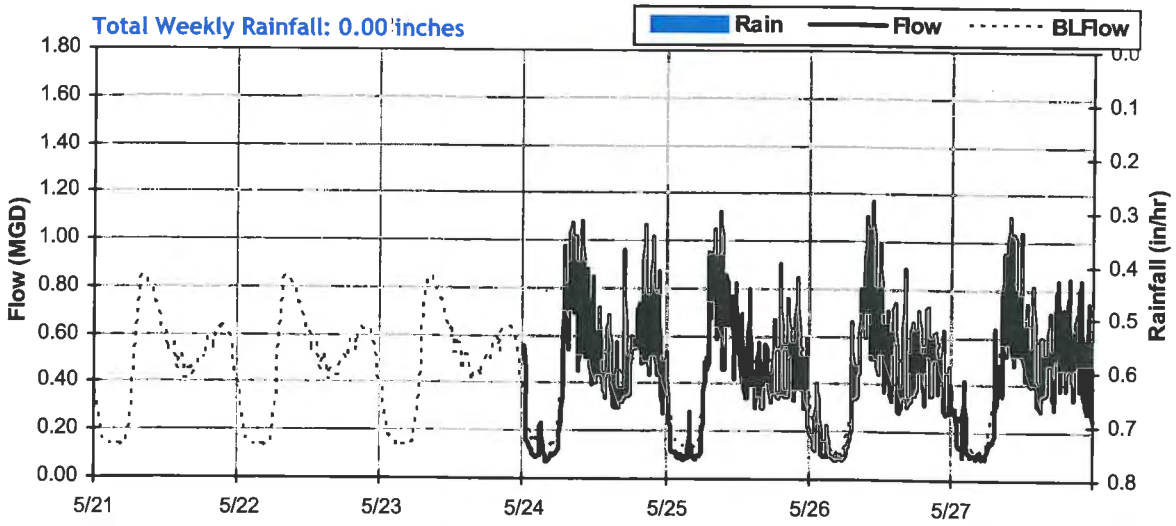
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 12





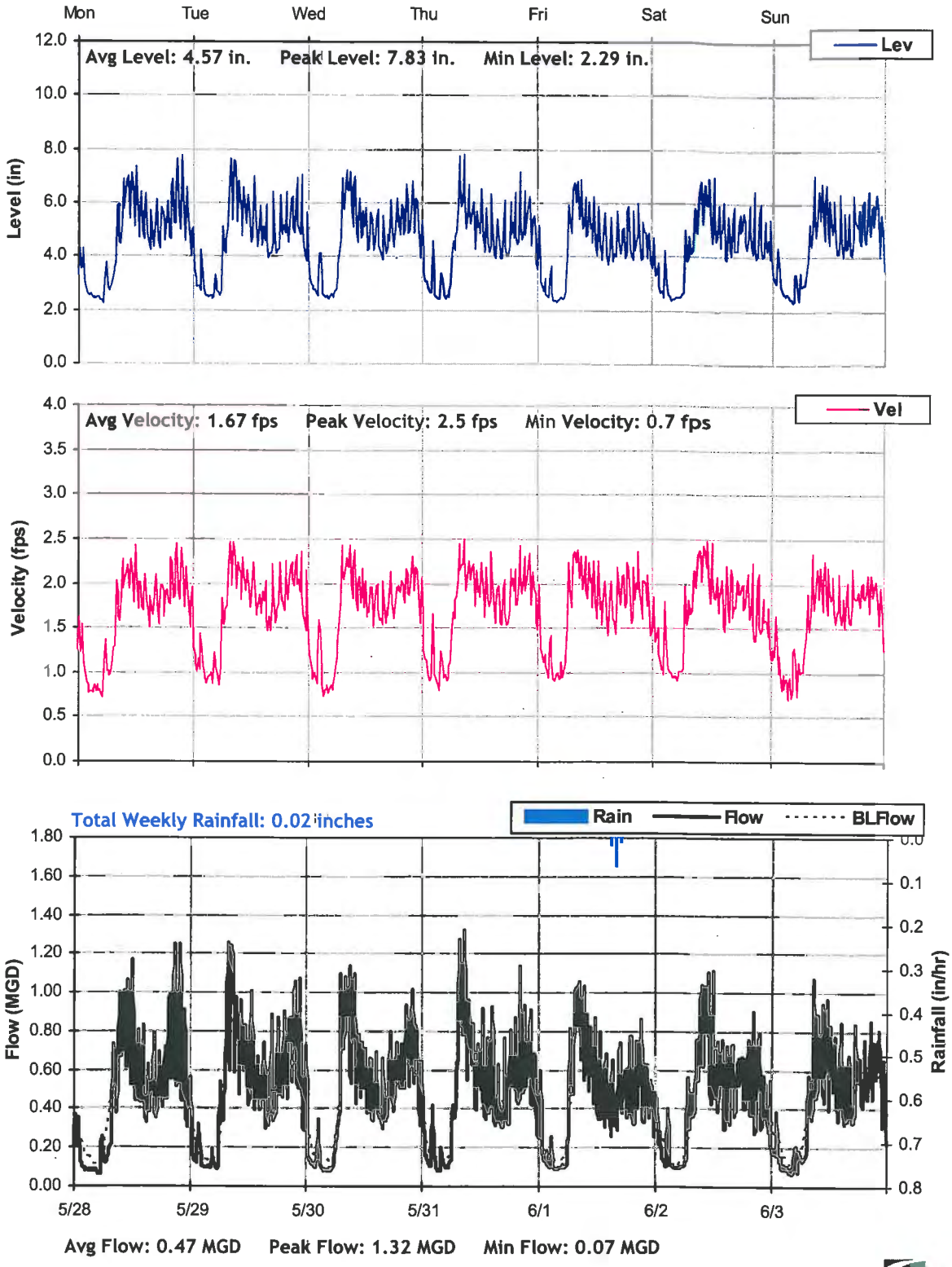


Avg Flow: 0.43 MGD Peak Flow: 1.16 MGD Min Flow: 0.07 MGD

V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

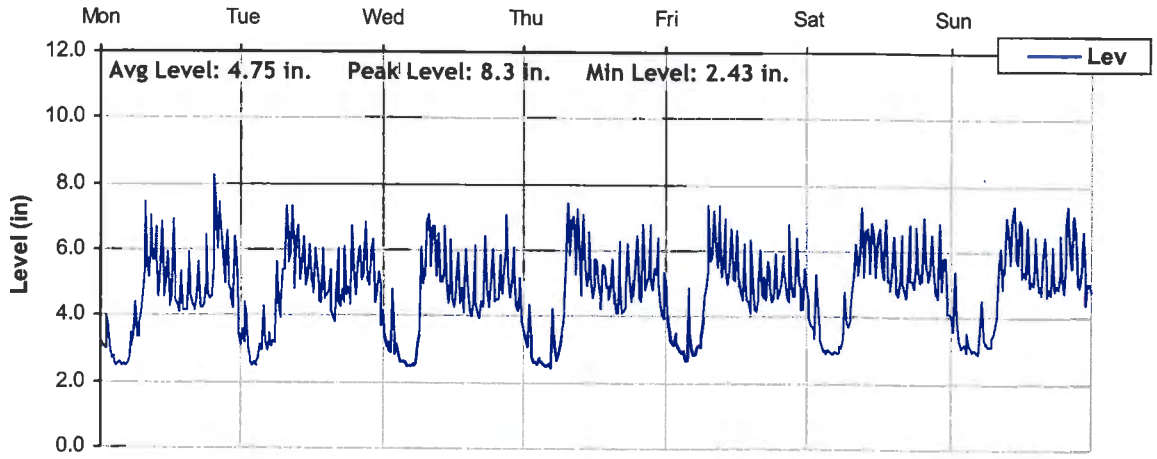
Monitoring Site:
Site 12

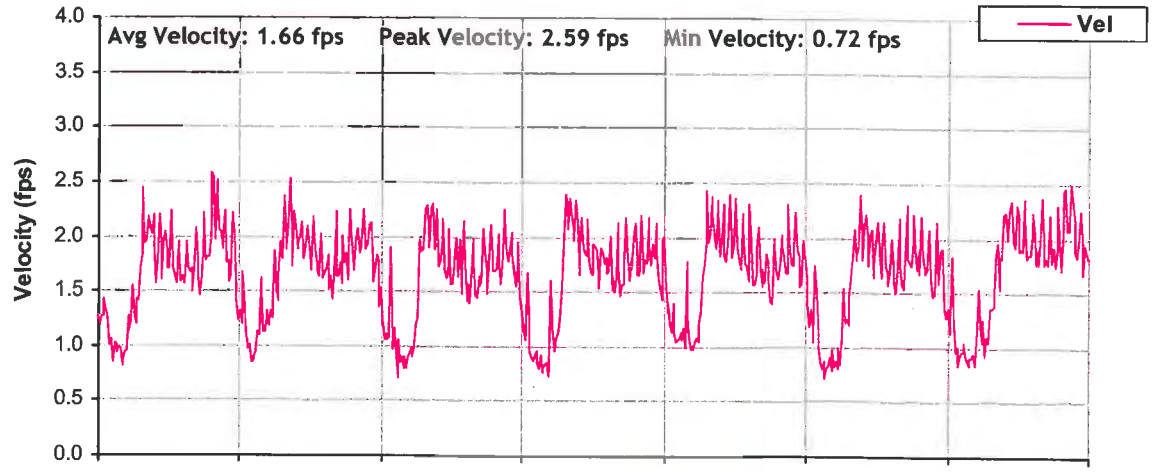


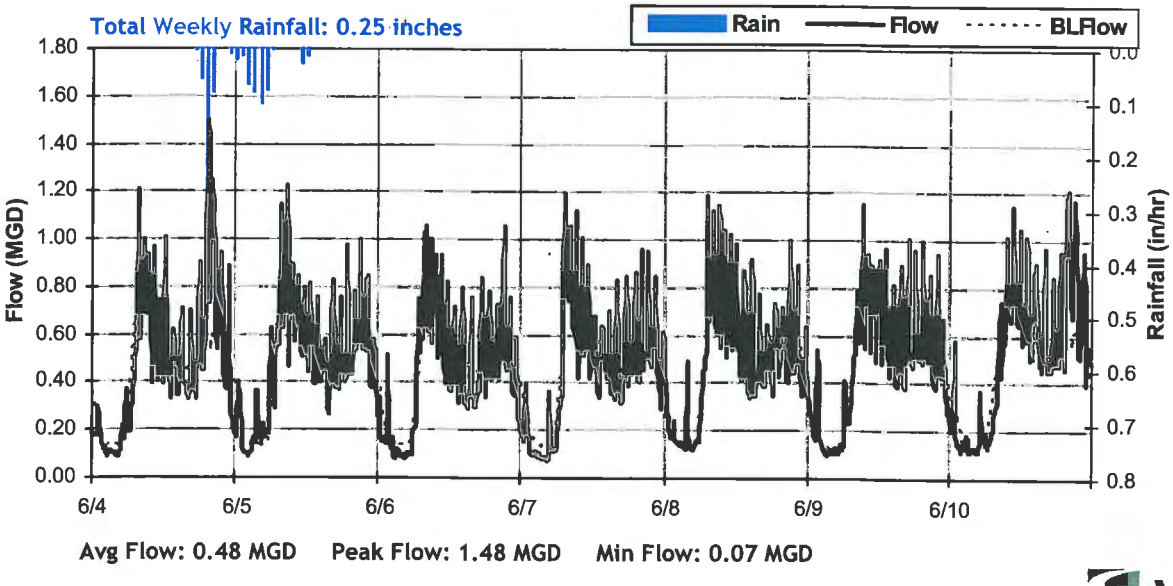
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 12





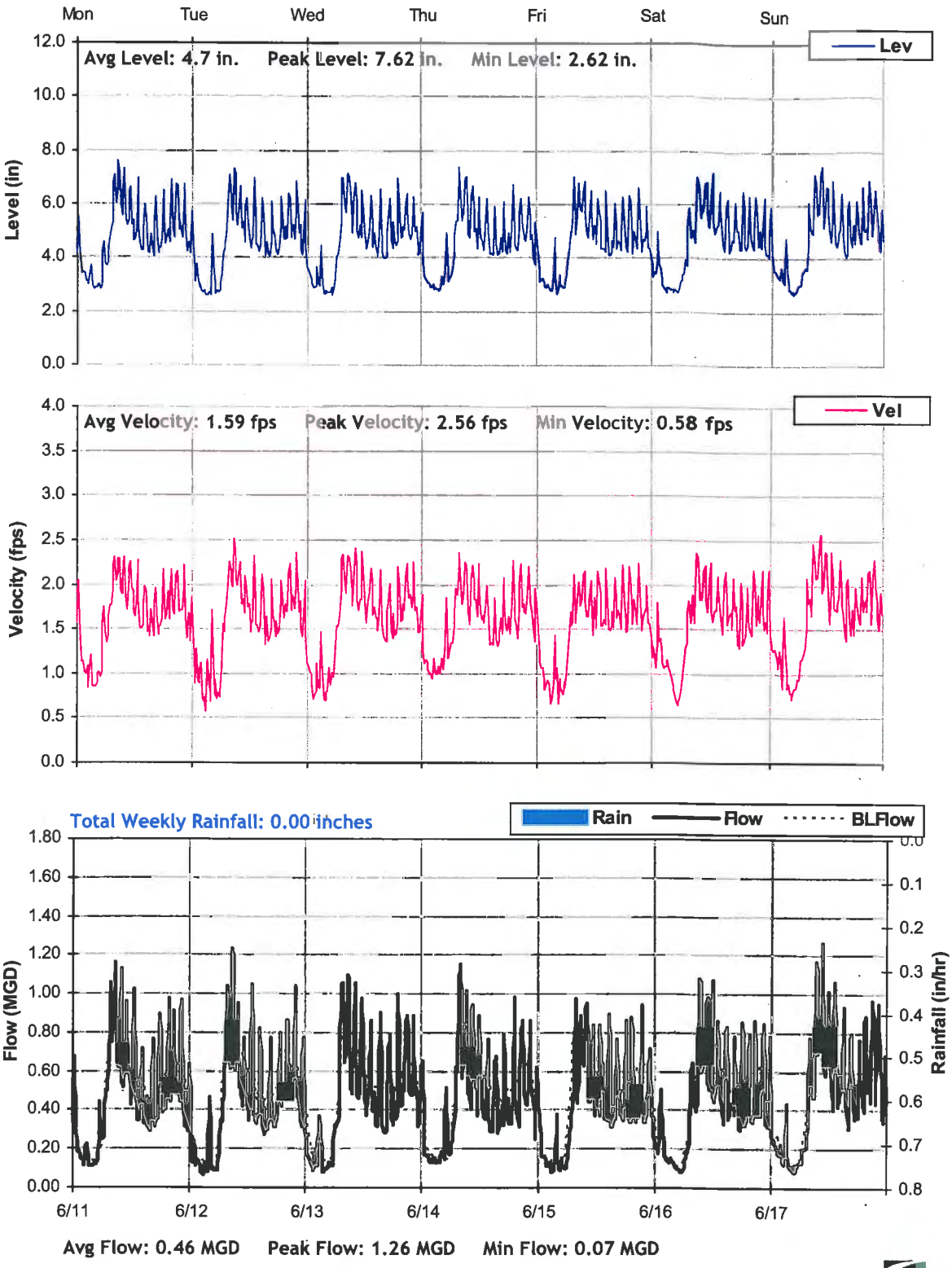


Avg Flow: 0.48 MGD Peak Flow: 1.48 MGD Min Flow: 0.07 MGD

V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

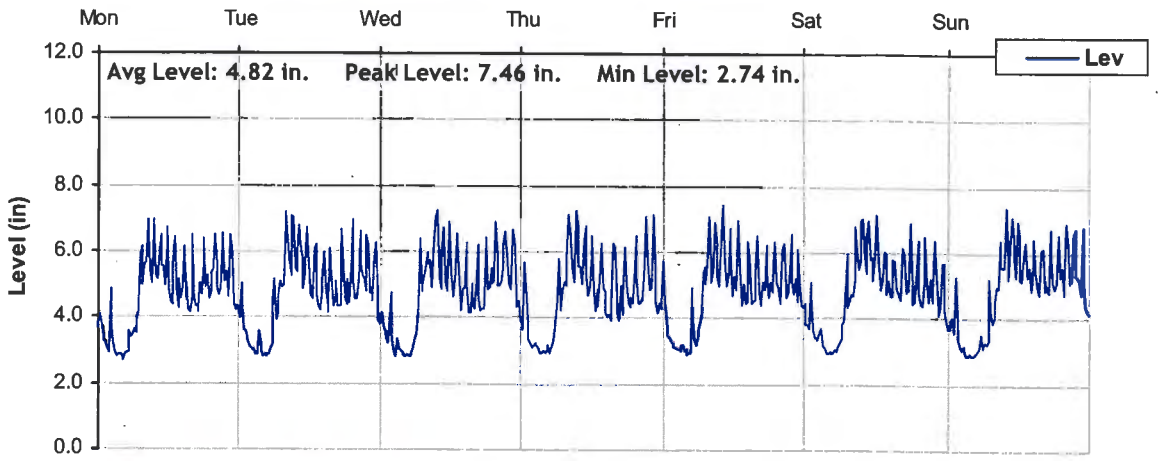
Monitoring Site:
Site 12

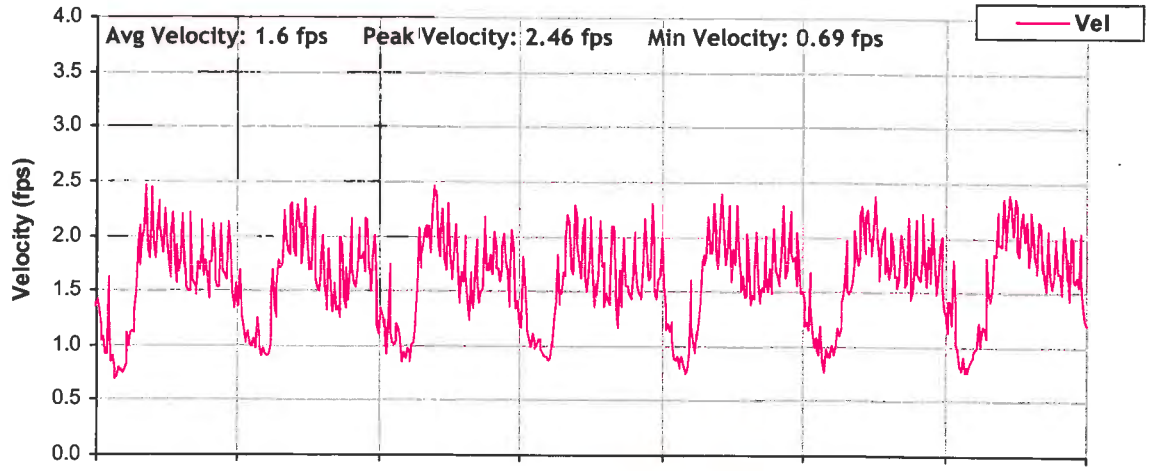


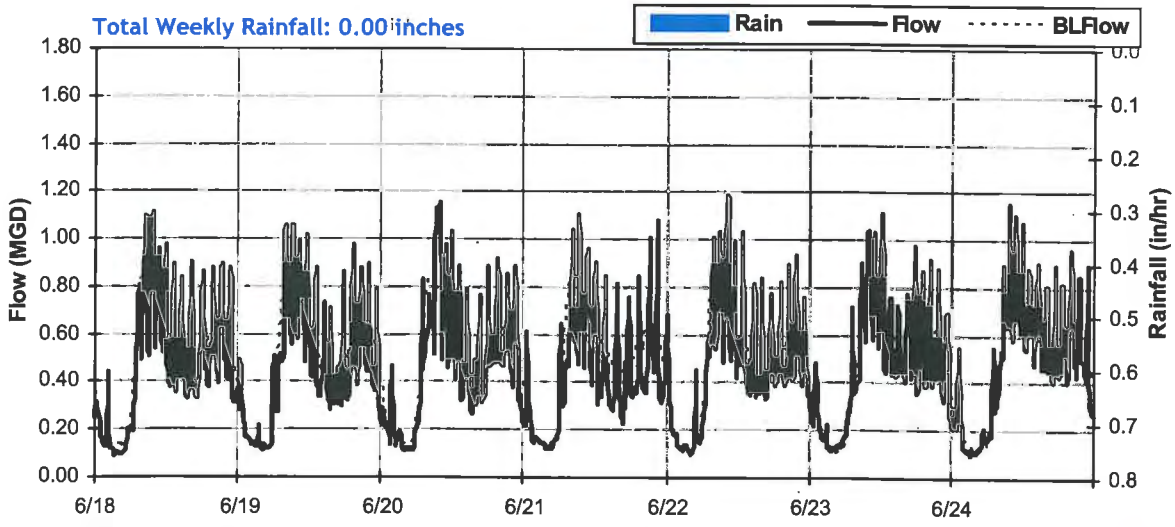
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 12





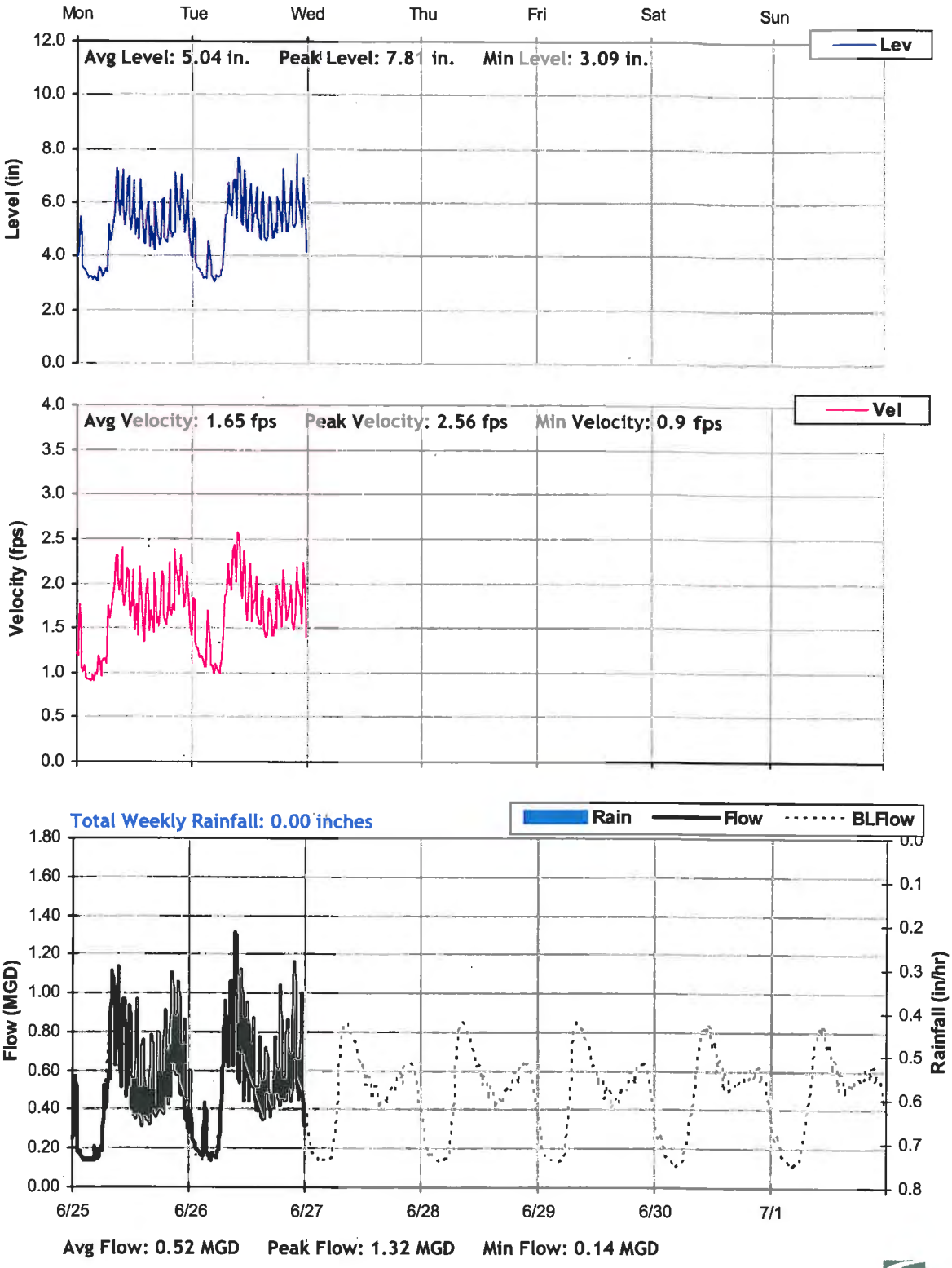


Avg Flow: 0.47 MGD Peak Flow: 1.19 MGD Min Flow: 0.09 MGD

V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 12



V&A

	Site Information Report	**Monitoring Site:** Site 13

Location:

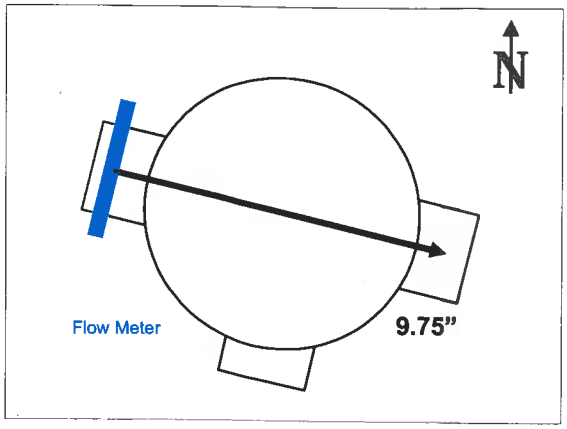
Diameter: 9.75 inches

Average Dry Weather Flow: 0.168 *MGD*

Peak Measured Flow: 0.882 *MGD*

Sanitary sewer map:

Flow sketch:



Street-level photo:

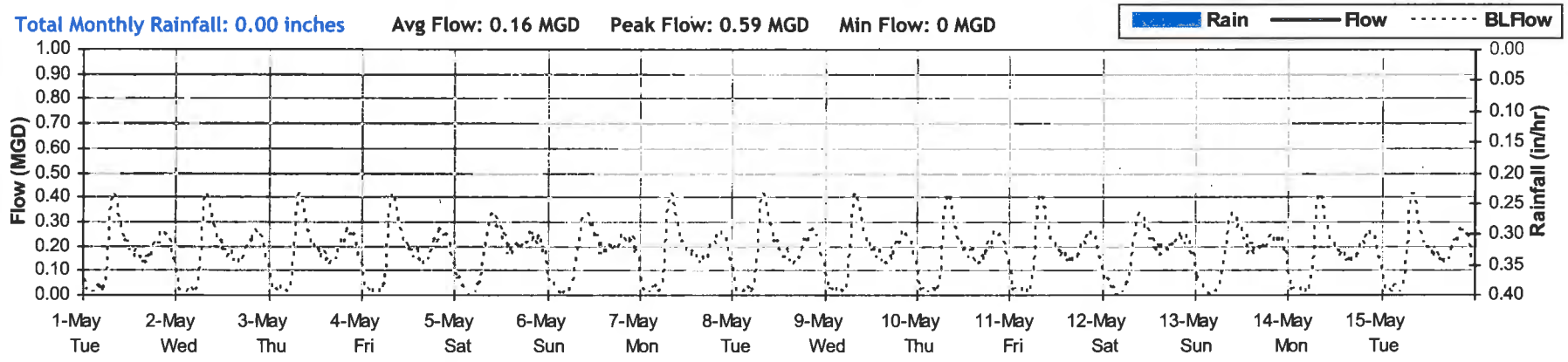
Plan view photo:

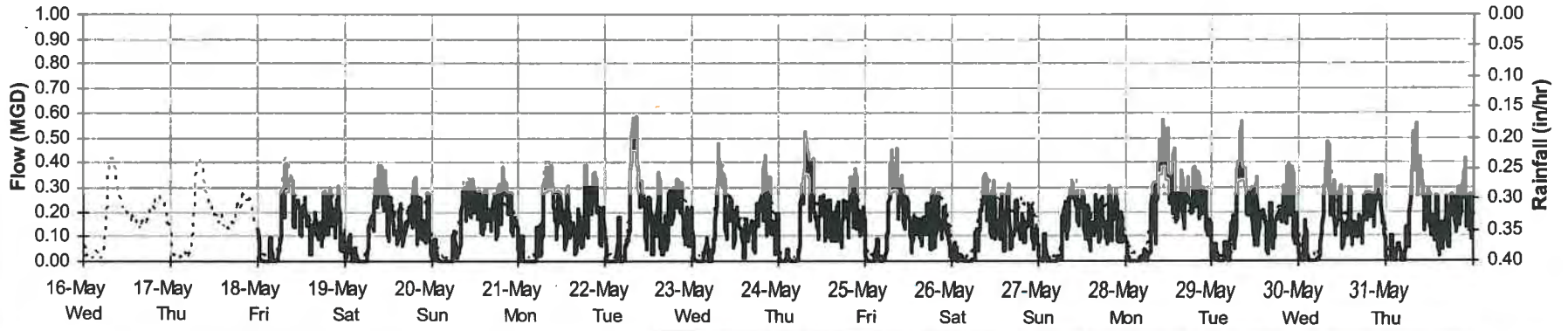
V&A

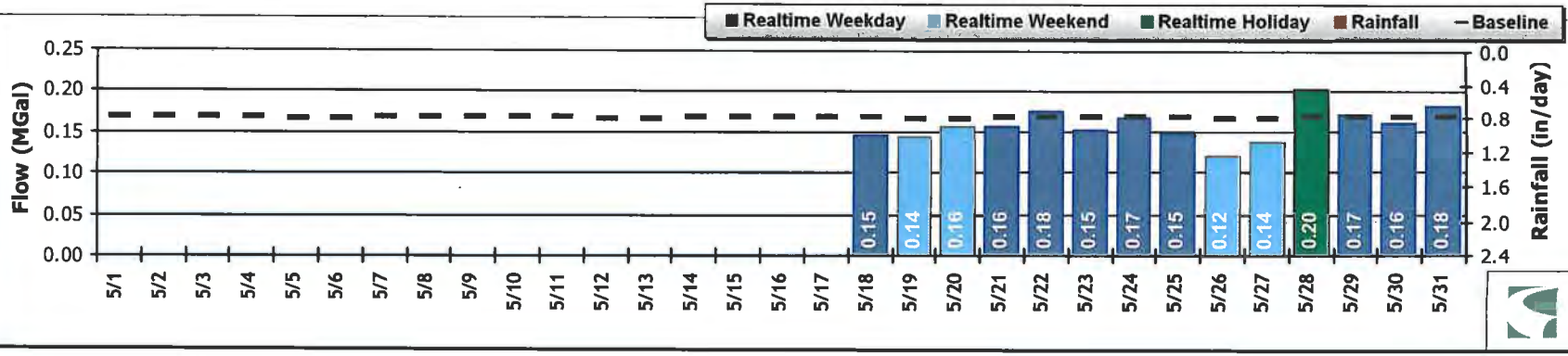
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 13

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.16 MGD Peak Flow: 0.59 MGD Min Flow: 0 MGD





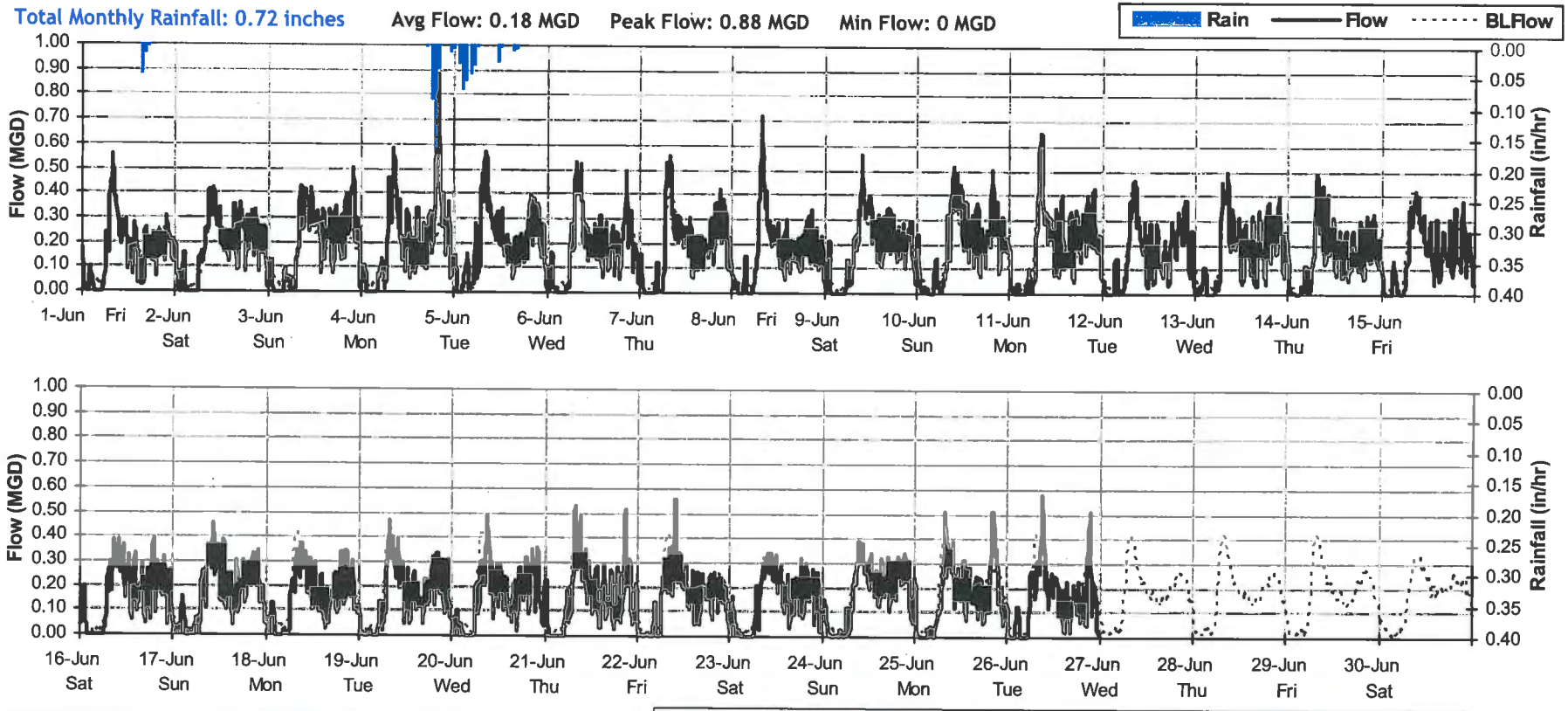


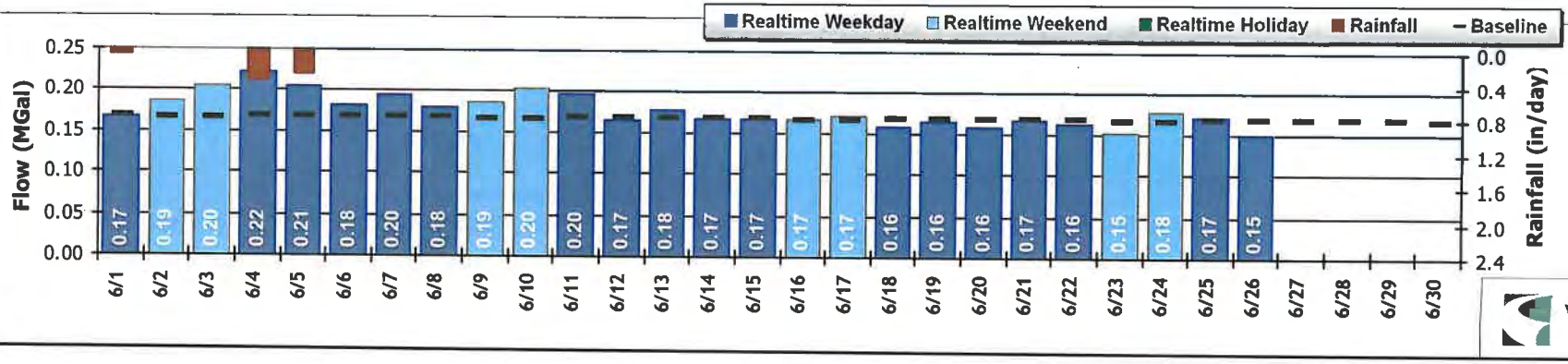
V&A

Monthly Flow Summary
June, 2007

Monitoring Site:
Site 13

Total Monthly Rainfall: 0.72 inches Avg Flow: 0.18 MGD Peak Flow: 0.88 MGD Min Flow: 0 MGD



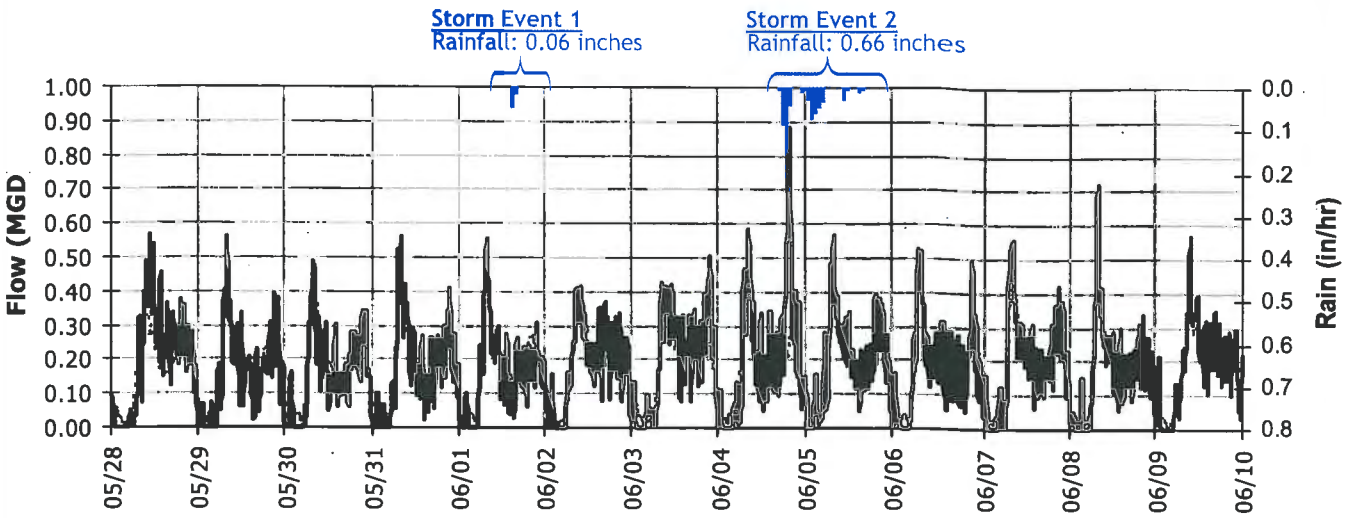


V&A

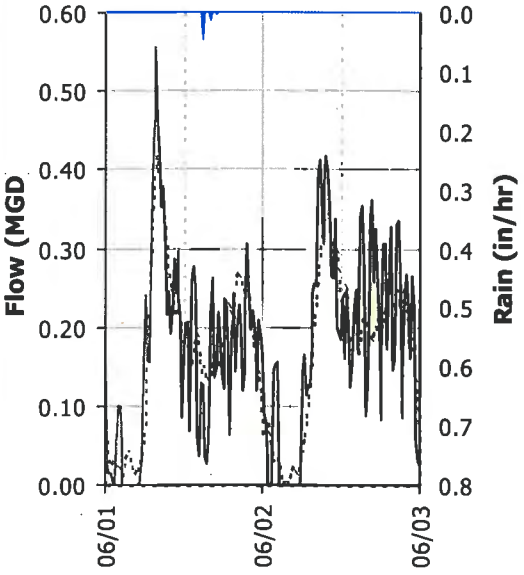
I/I Summary

Monitoring Site:
Site 13

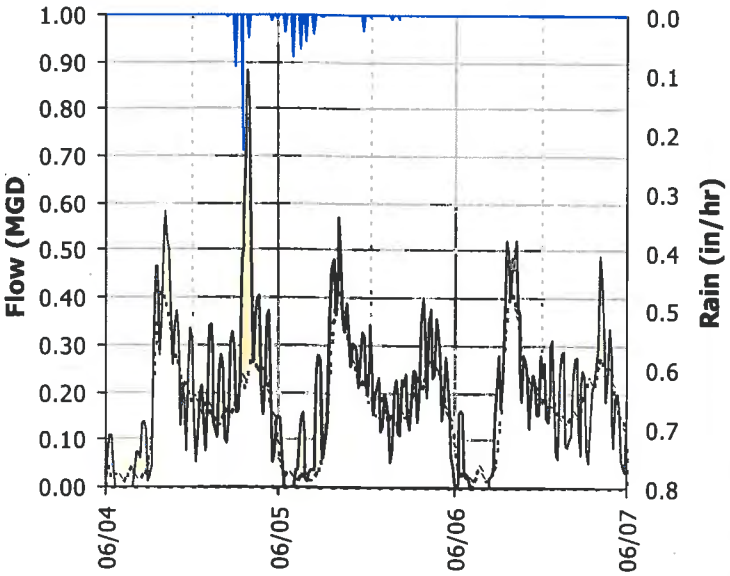
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.06	*inches*
Peak Flow:	0.13	*MGD*
Peak I/I Rate:	-0.02	*MGD*
PF:	0.75	
Pk I/I:ADWF:	-0.12	
Peak Level:	1.72	*inches*
d/D Ratio:	0.18	
Total I/I:	0	*gallons*
RE1 R-Value:	0.0%	

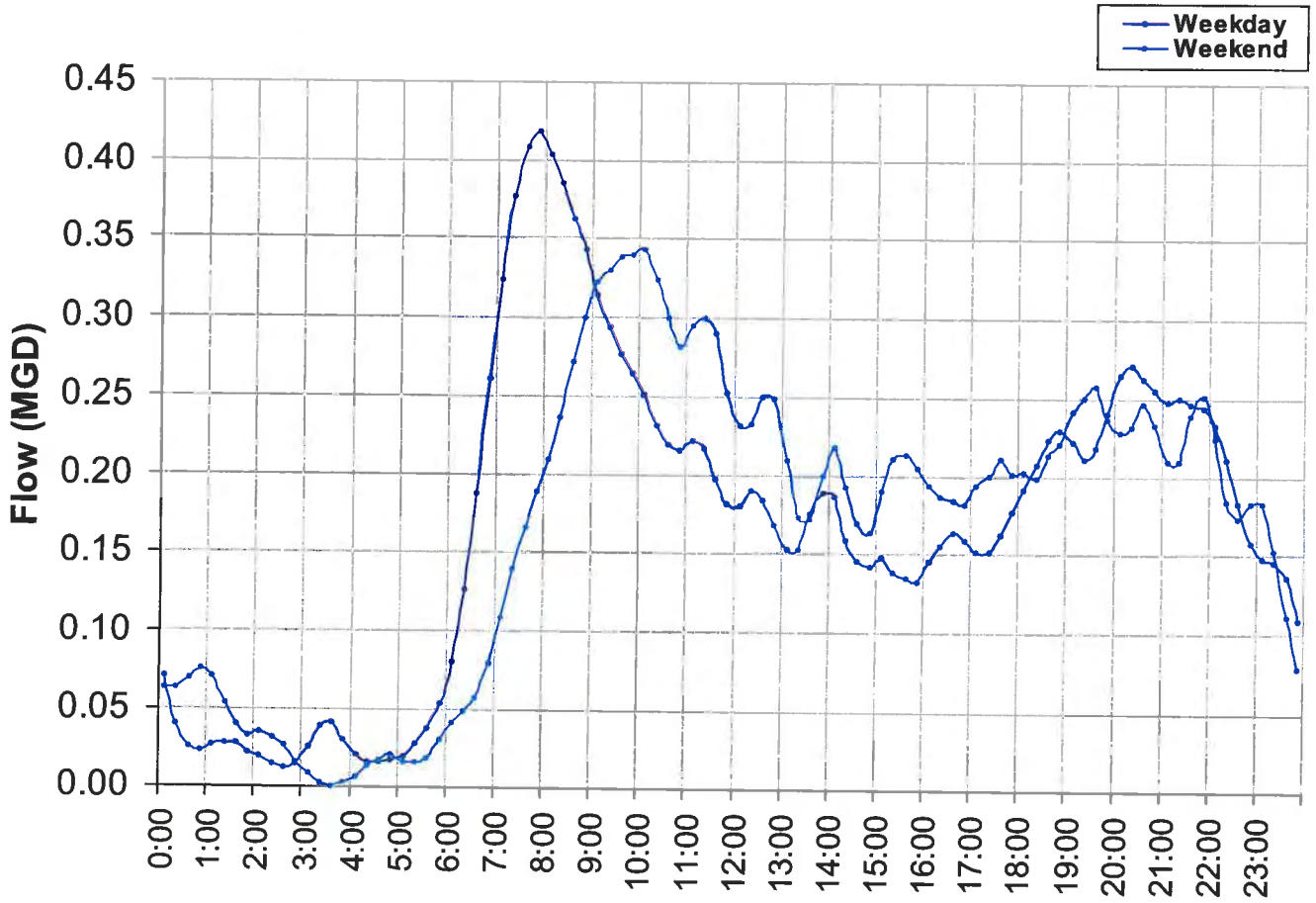
Storm Event #2 I/I Analysis

Rainfall:	0.66	*inches*
Peak Flow:	0.88	*MGD*
Peak I/I Rate:	0.64	*MGD*
PF:	5.24	
Pk I/I:ADWF:	3.81	
Peak Level:	6.31	*inches*
d/D Ratio:	0.65	
Total I/I:	60,000	*gallons*
RE2 R-Value:	0.2%	

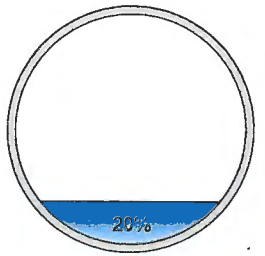
V&A

Average Dry Weather Flow

Monitoring Site:
Site 13



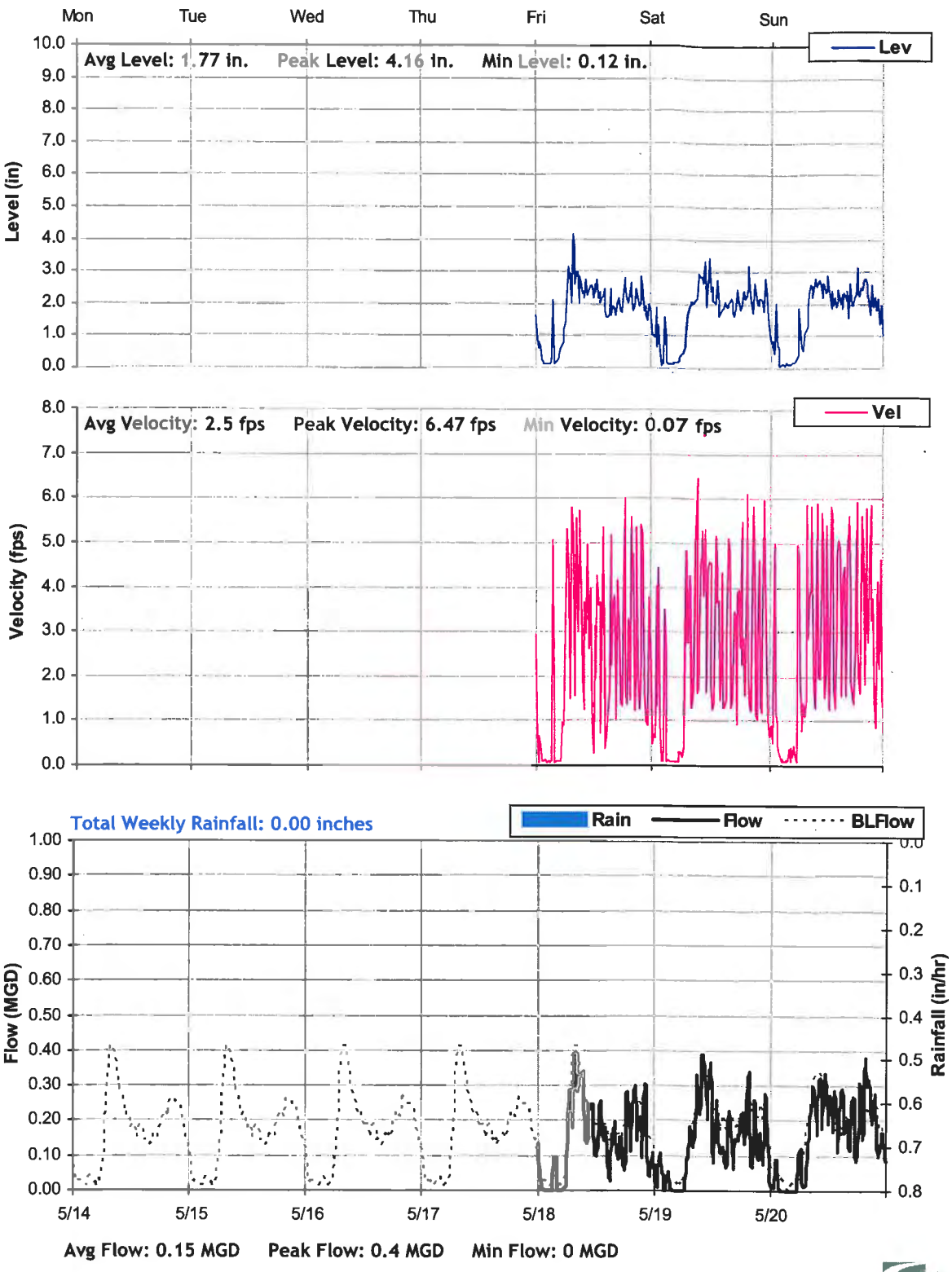
Average Dry Weather Flow:
0.17 *MGD*



V&A

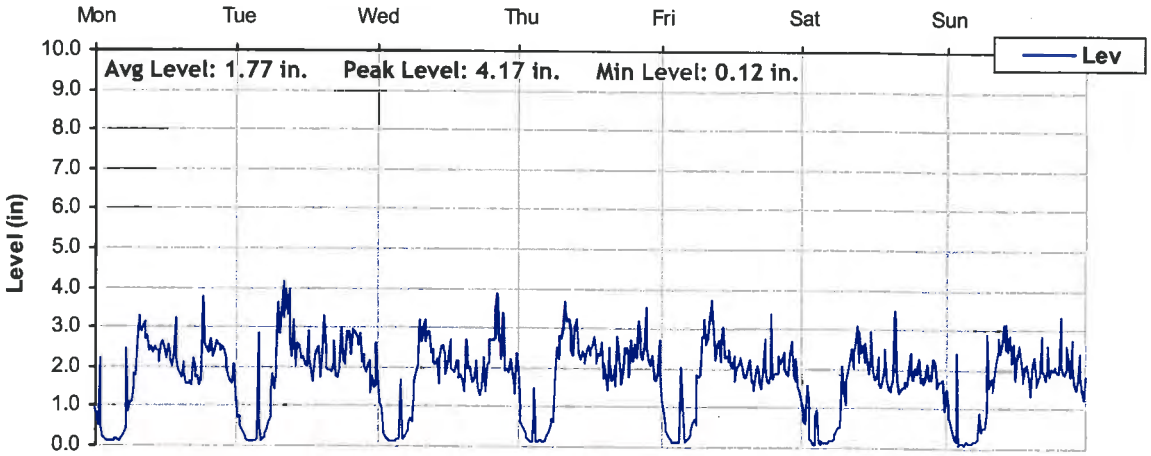
Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

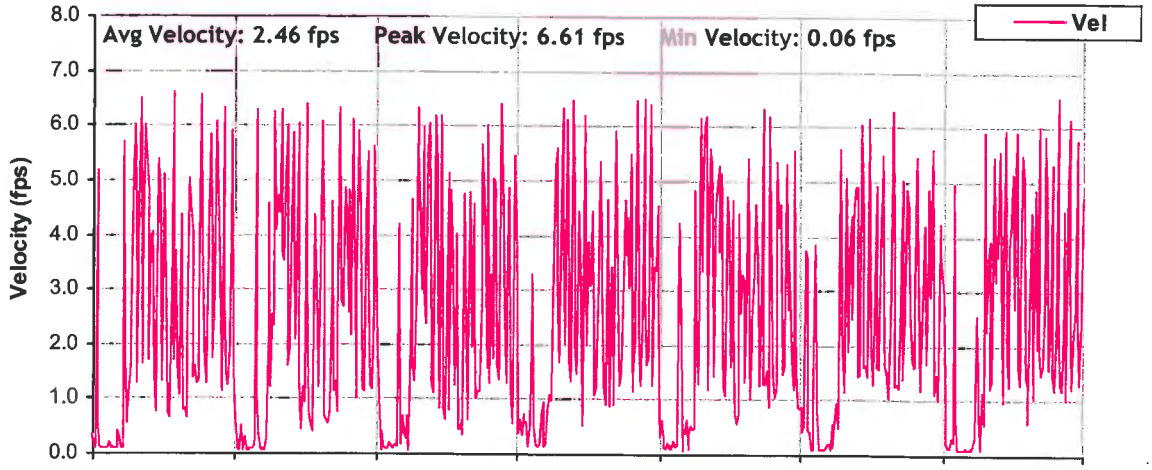
Monitoring Site:
Site 13

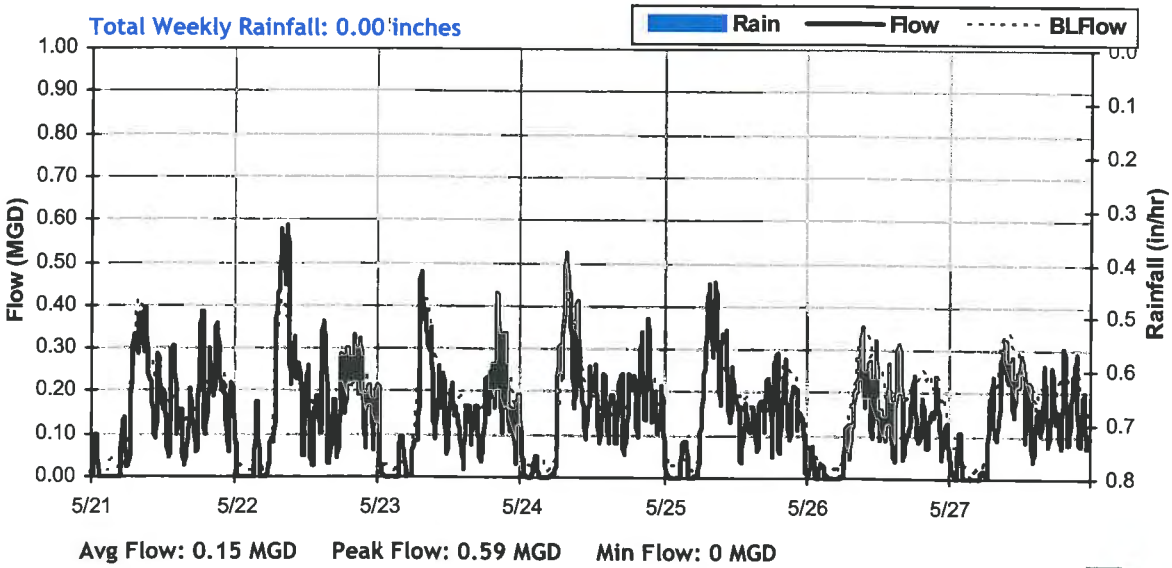


Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 13





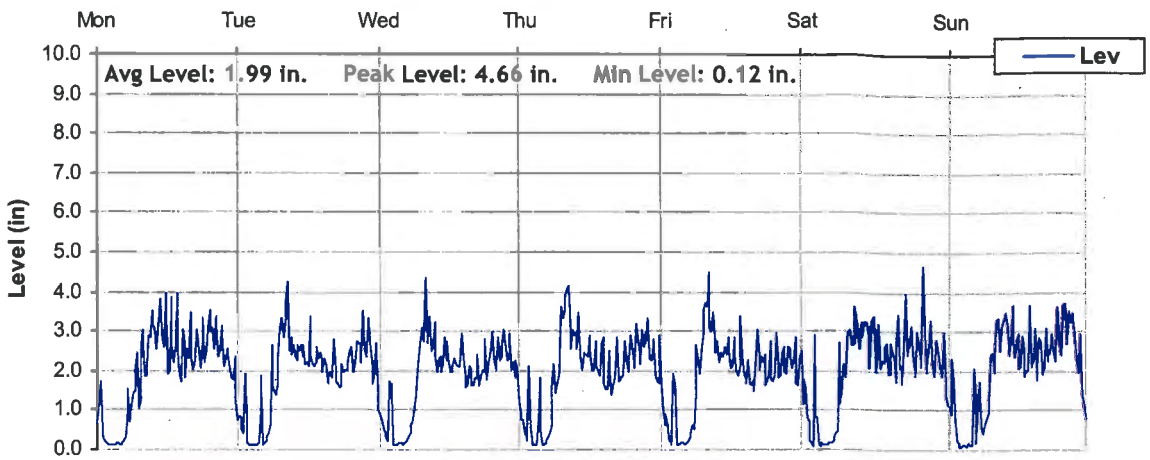


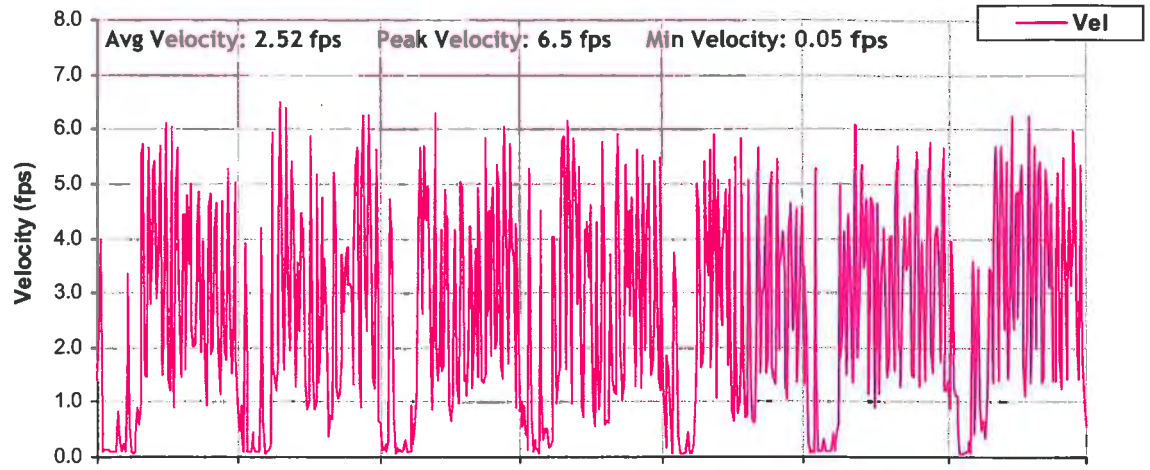
Avg Flow: 0.15 MGD Peak Flow: 0.59 MGD Min Flow: 0 MGD

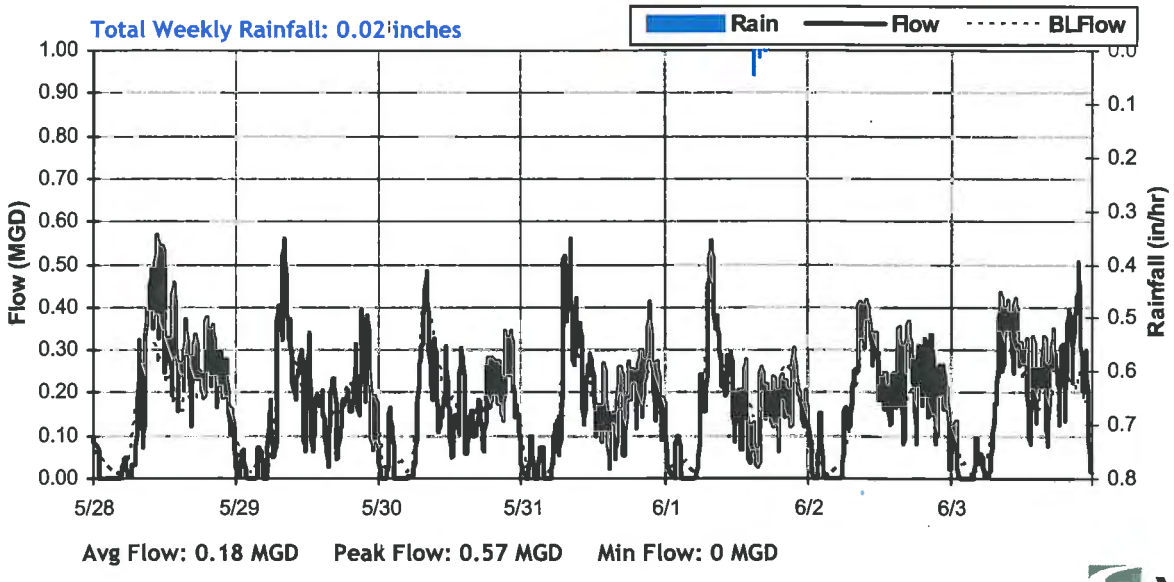
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 13





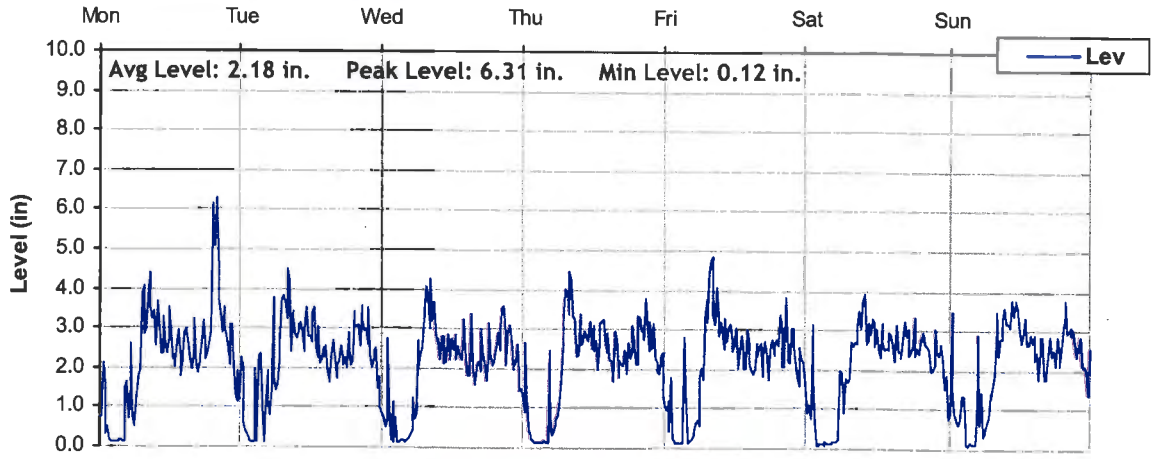


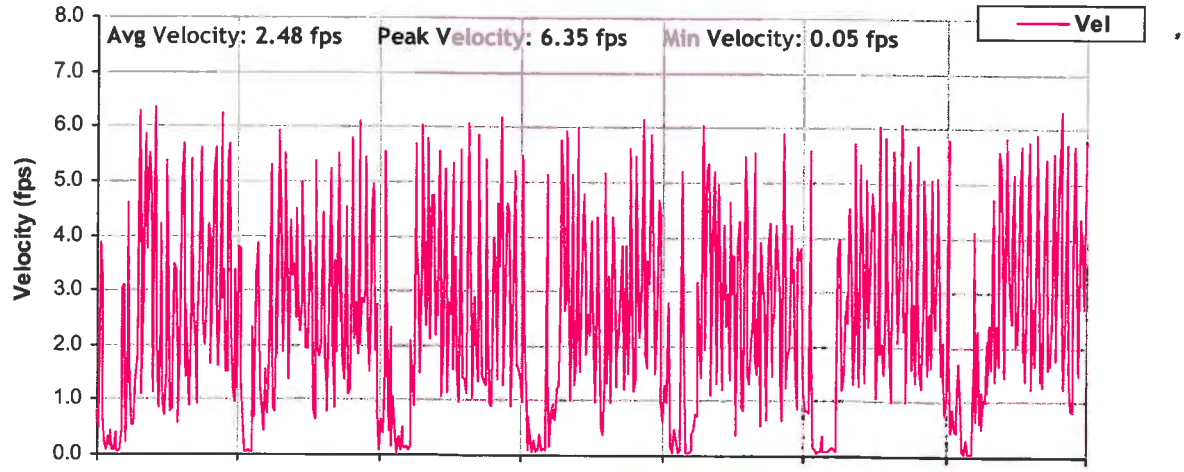
Avg Flow: 0.18 MGD Peak Flow: 0.57 MGD Min Flow: 0 MGD

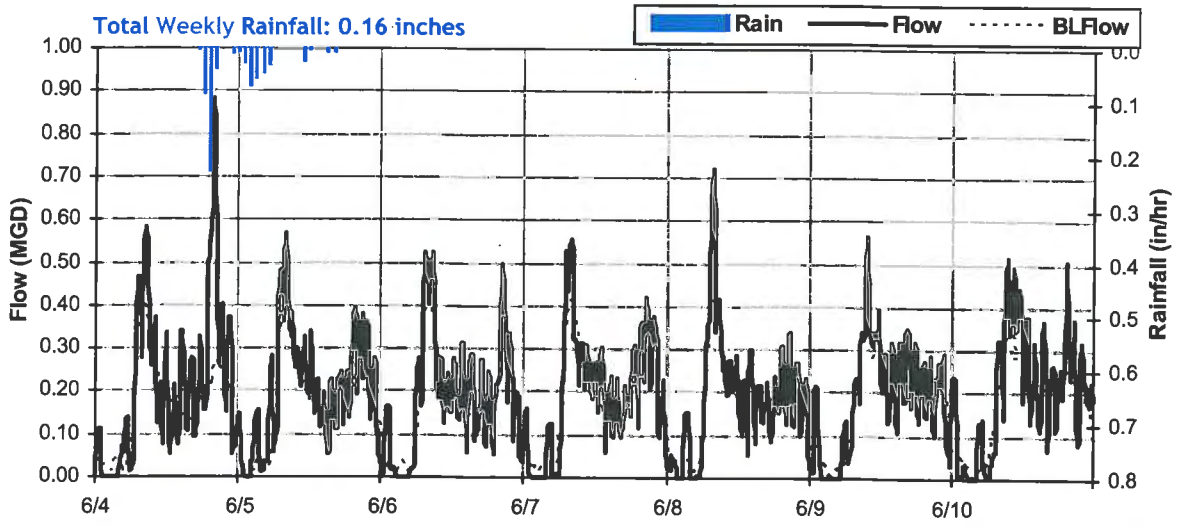
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 13





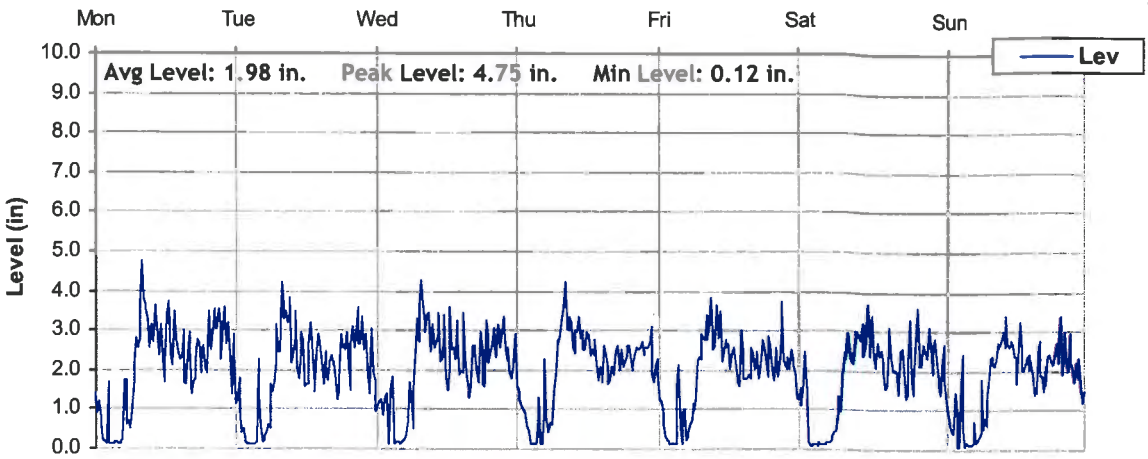


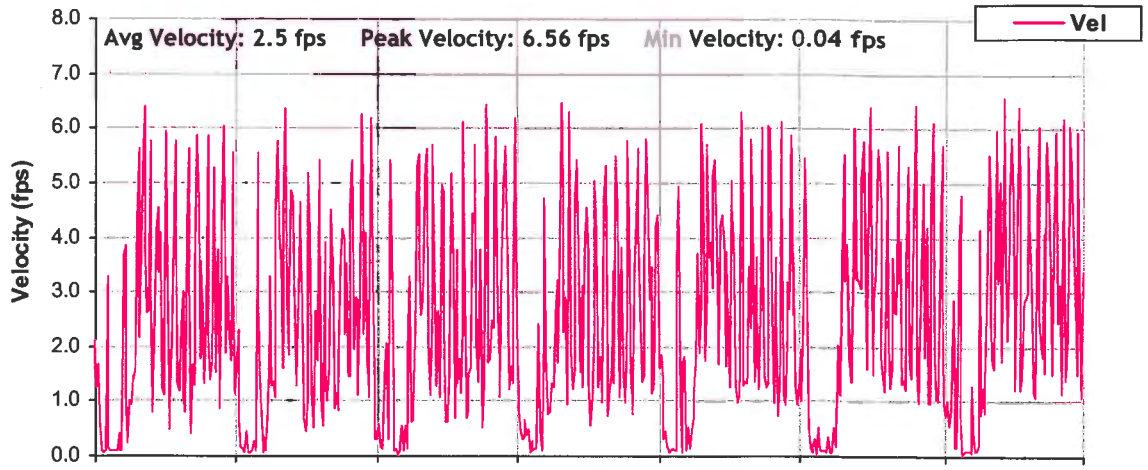
Avg Flow: 0.2 MGD Peak Flow: 0.88 MGD Min Flow: 0 MGD

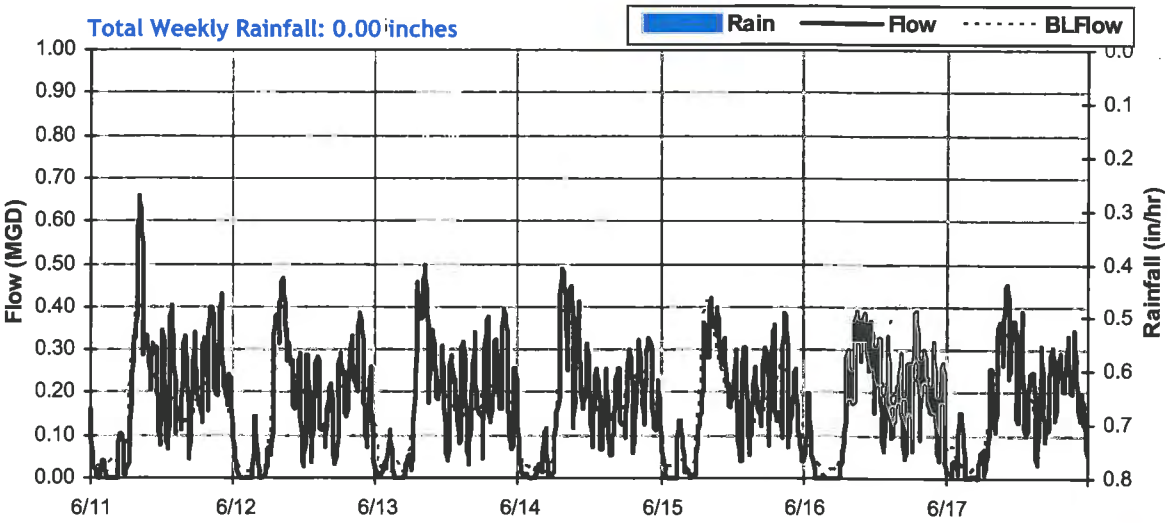
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 13





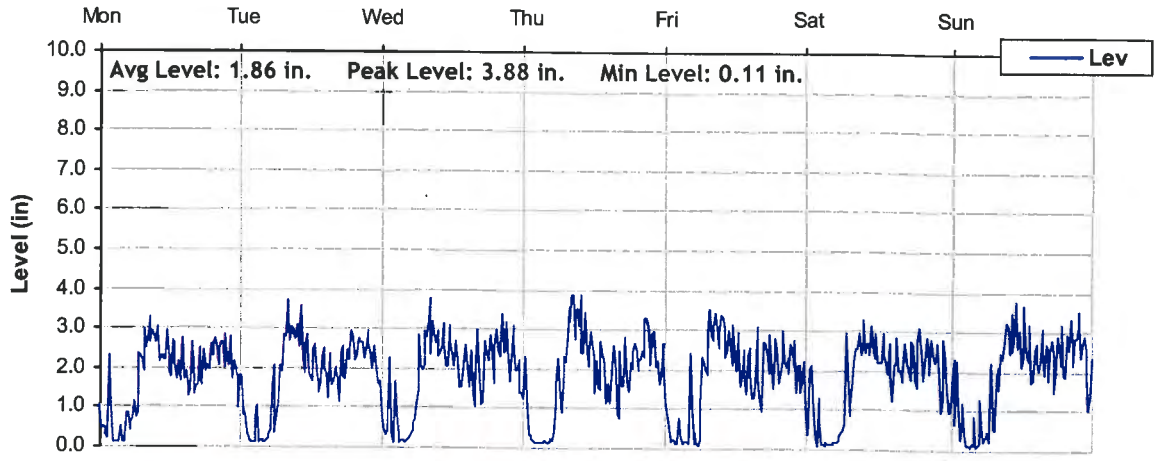


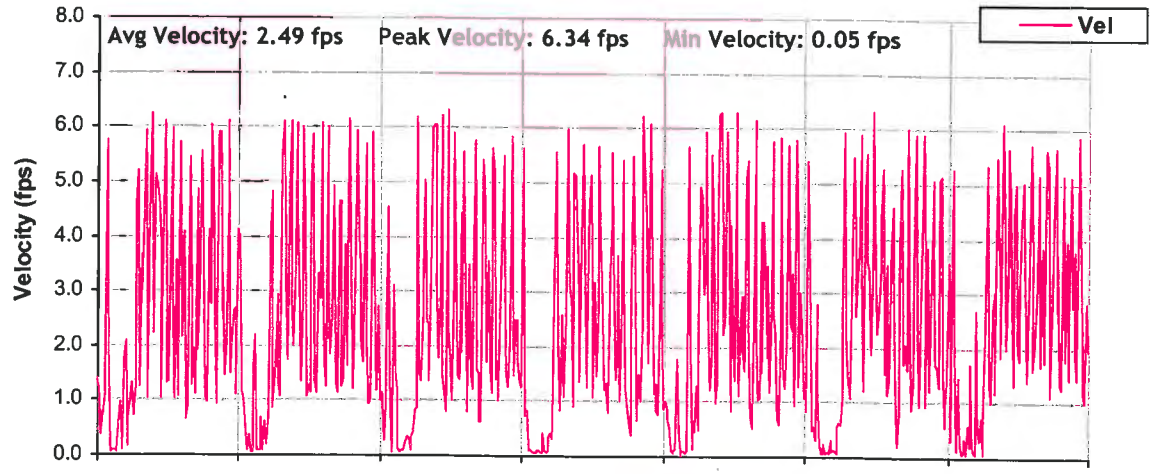
Avg Flow: 0.17 MGD Peak Flow: 0.66 MGD Min Flow: 0 MGD

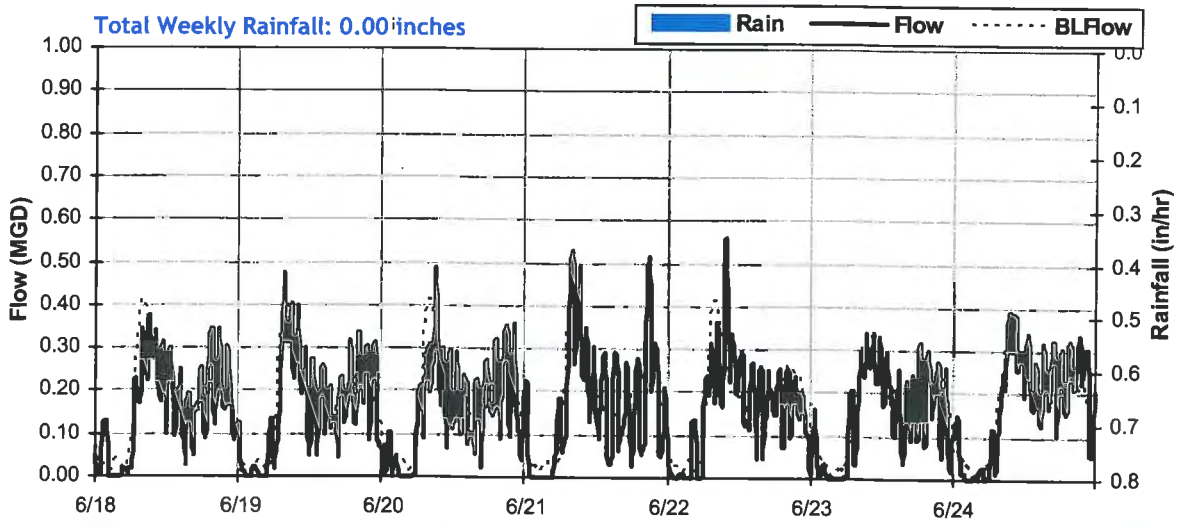
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 13





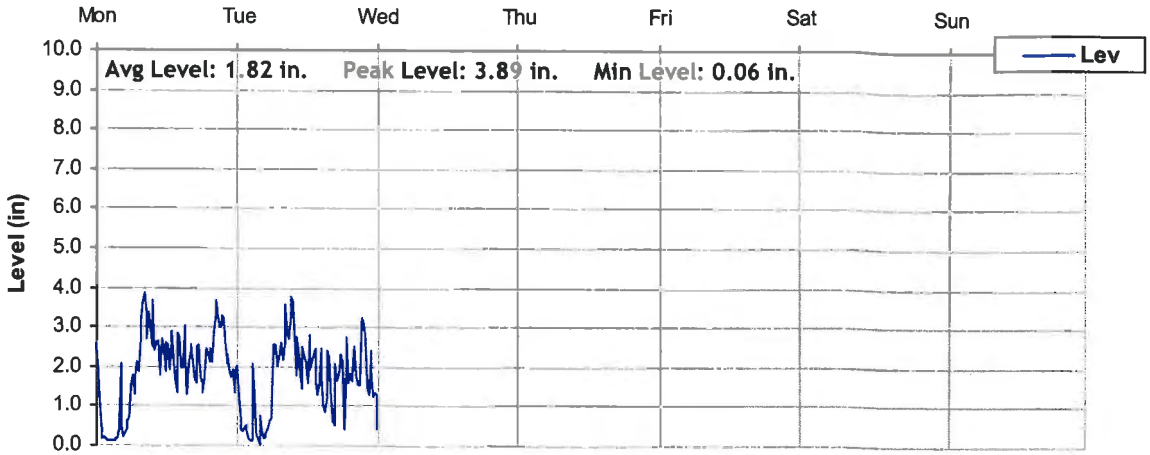


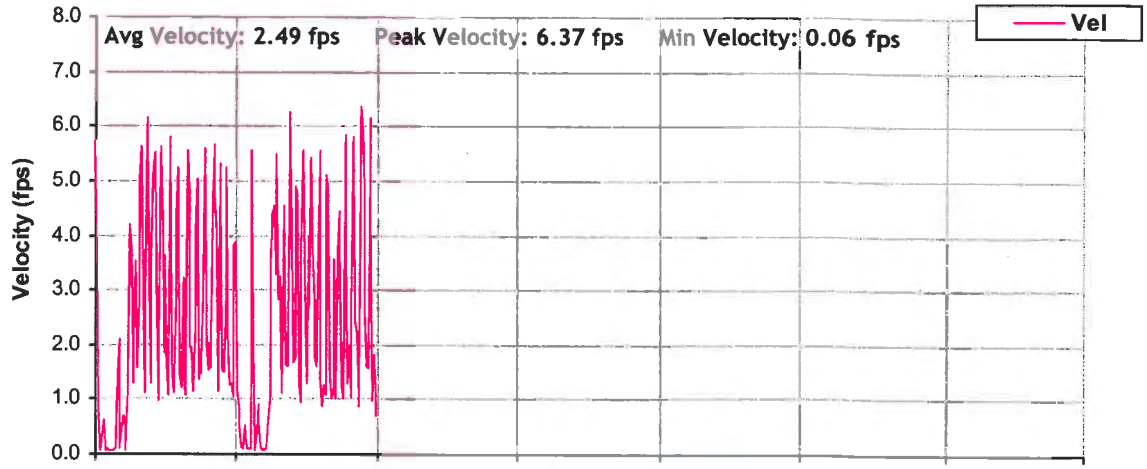
Avg Flow: 0.16 MGD Peak Flow: 0.56 MGD Min Flow: 0 MGD

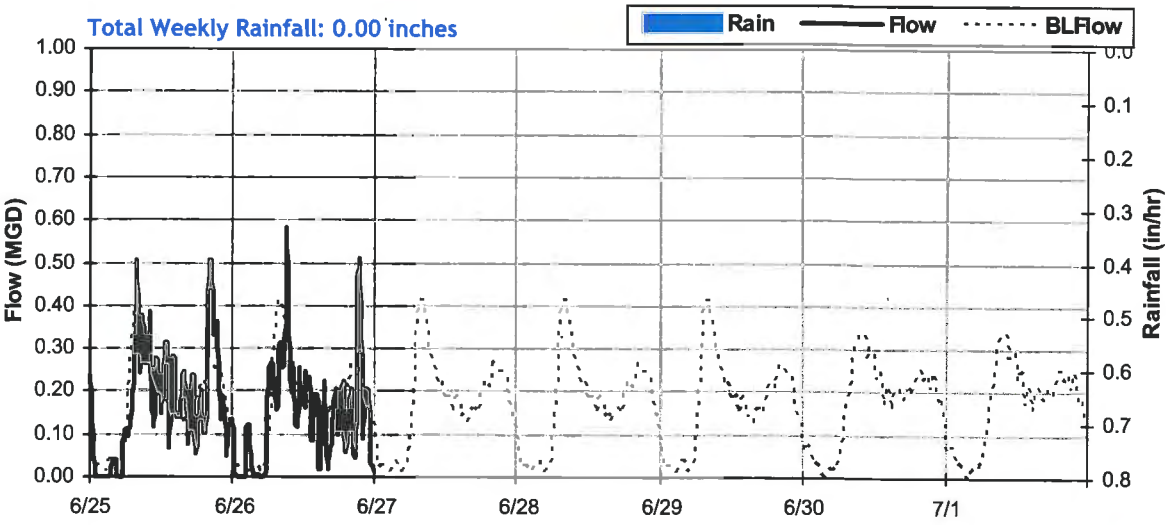
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 13







Avg Flow: 0.16 MGD Peak Flow: 0.58 MGD Min Flow: 0 MGD

V&A

Site Information Report

Monitoring Site: Site 14

Location:

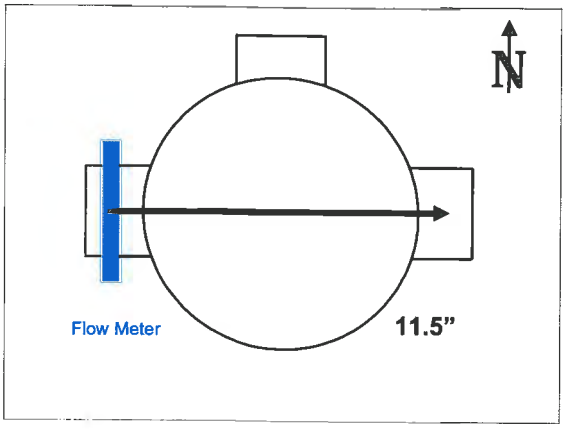
Diameter: 11.5 inches

Average Dry Weather Flow: 0.540 *MGD*

Peak Measured Flow: 1.282 *MGD*

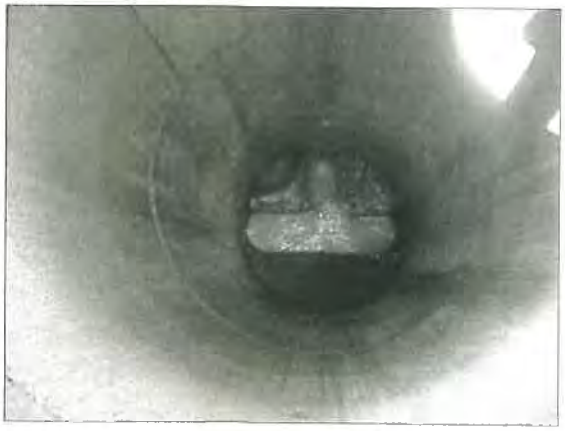
Sanitary sewer map:

Flow sketch:



Street-level photo:

Plan view photo:

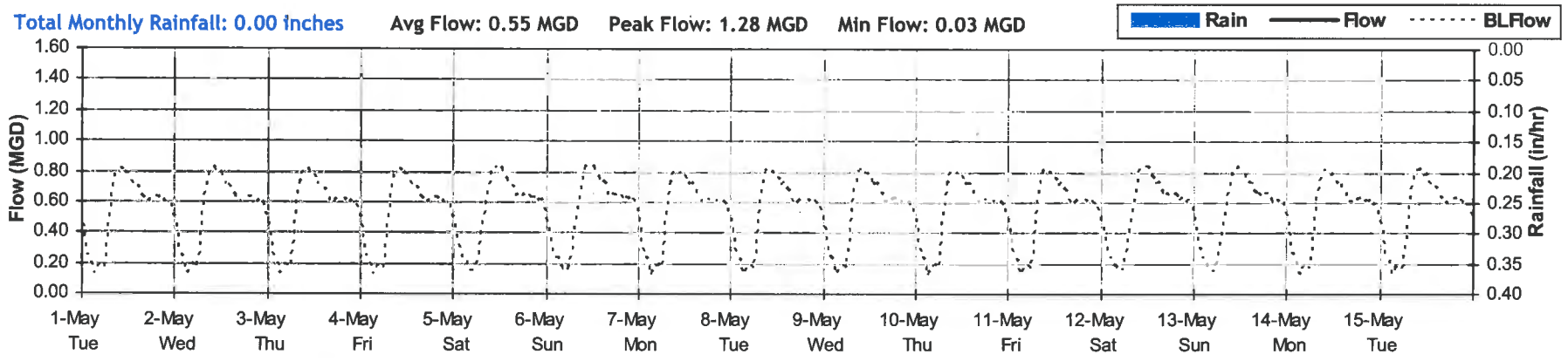


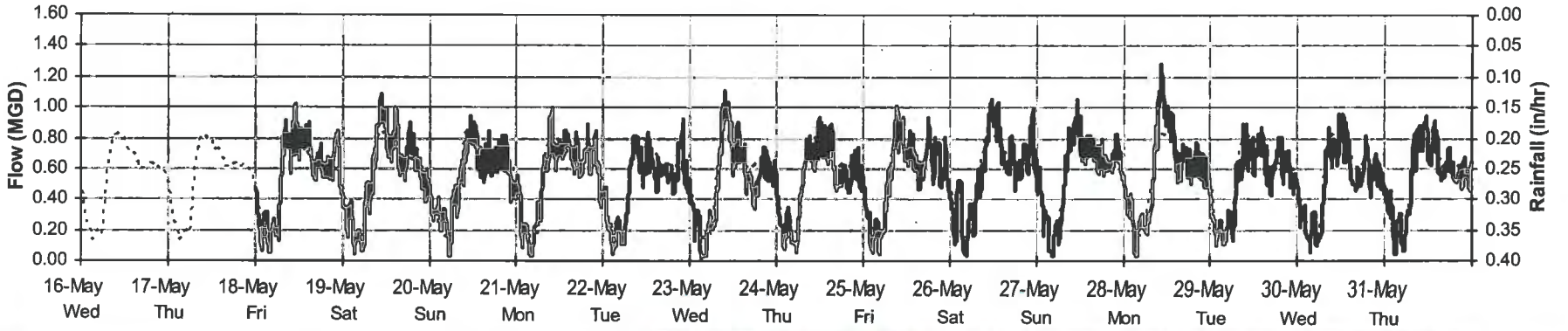
V&A

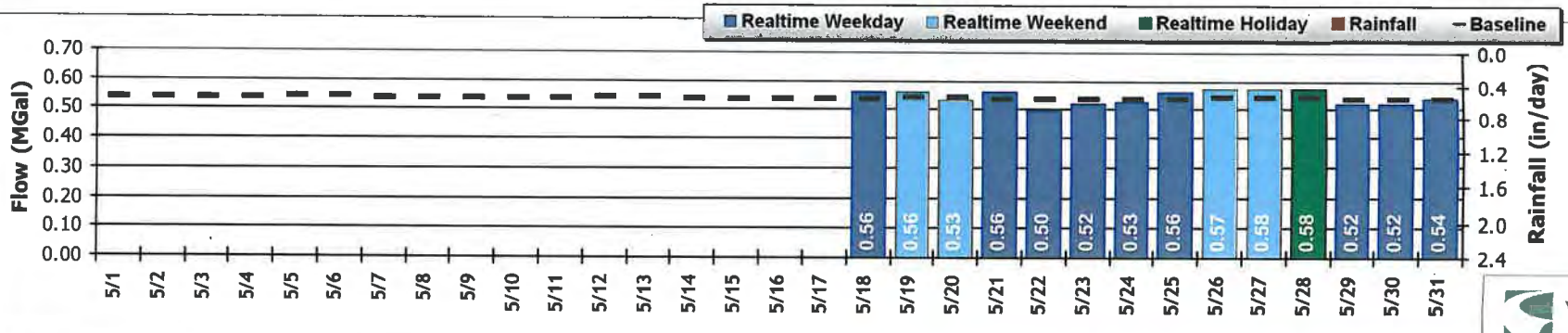
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 14

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.55 MGD Peak Flow: 1.28 MGD Min Flow: 0.03 MGD





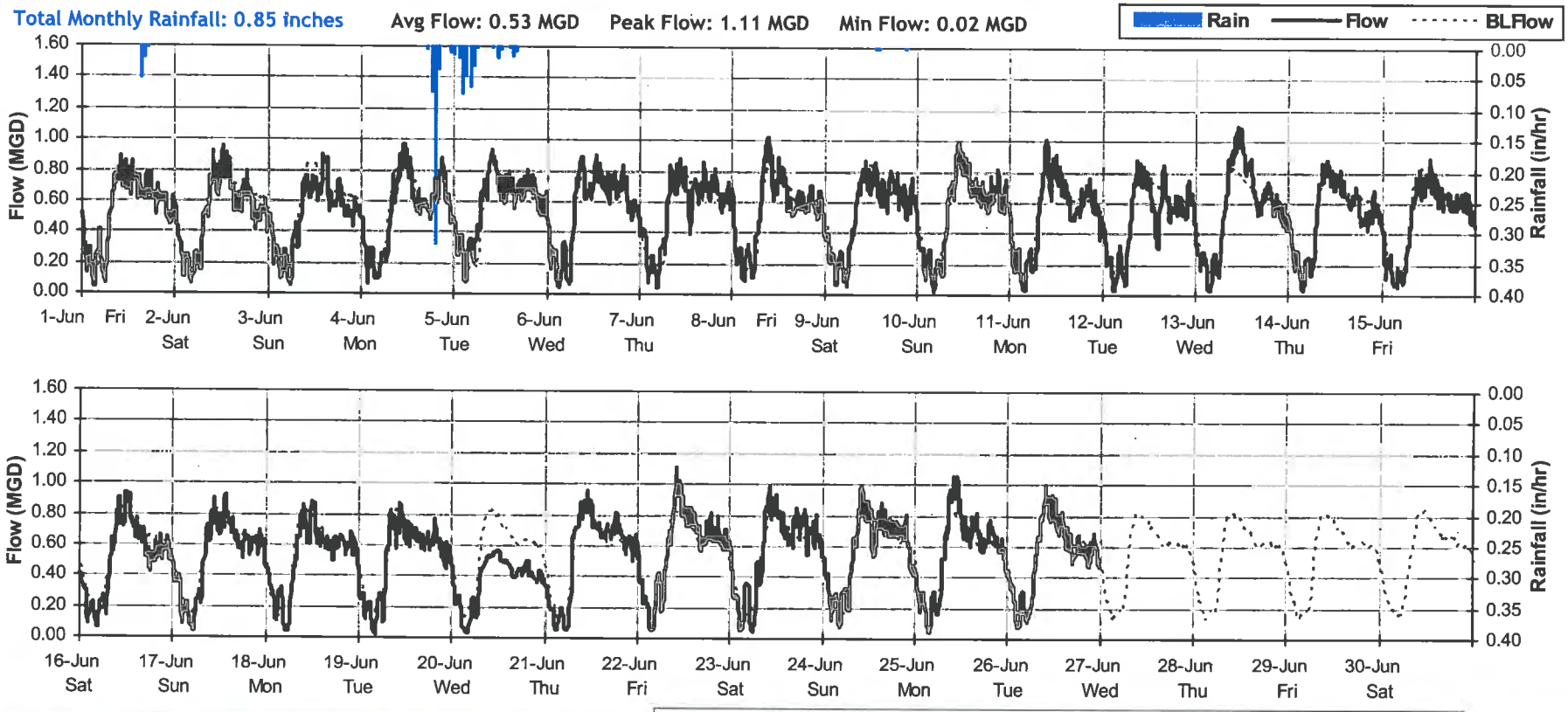


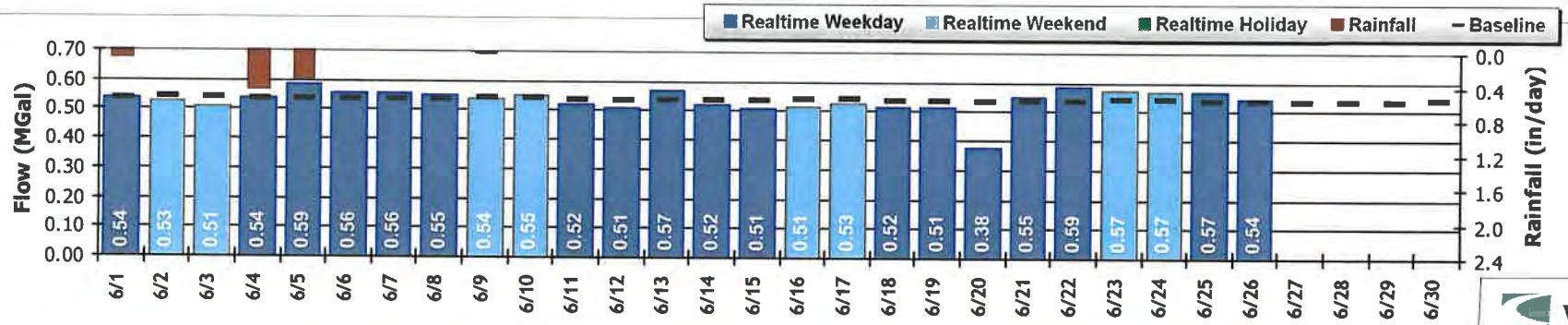
V&A

Monthly Flow Summary
June, 2007

Monitoring Site:
Site 14

Total Monthly Rainfall: 0.85 inches Avg Flow: 0.53 MGD Peak Flow: 1.11 MGD Min Flow: 0.02 MGD



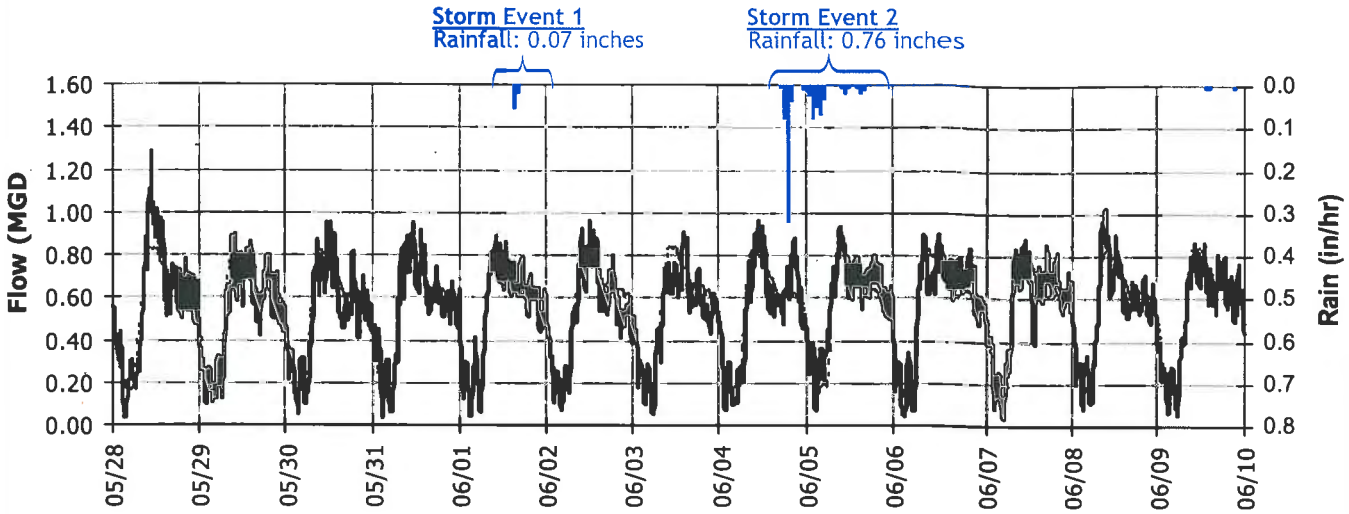


V&A

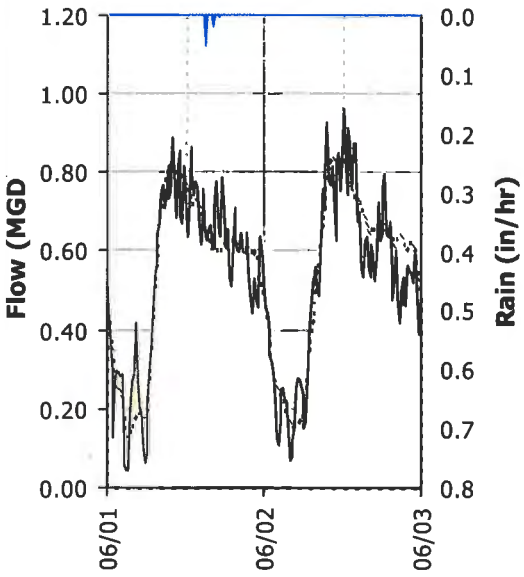
I/I Summary

Monitoring Site:
Site 14

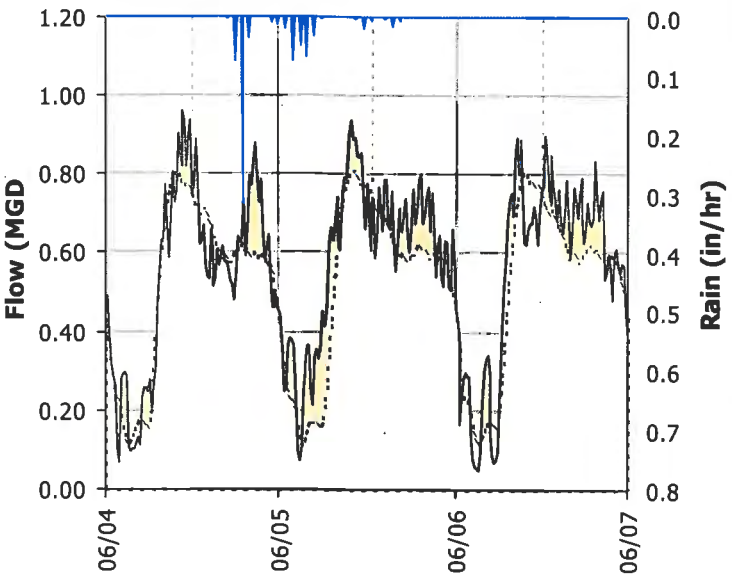
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.07	*inches*
Peak Flow:	0.96	*MGD*
Peak I/I Rate:	0.18	*MGD*
PF:	1.78	
Pk I/I:ADWF:	0.33	
Peak Level:	6.47	*inches*
d/D Ratio:	0.56	
Total I/I:	-1,000	*gallons*
RE1 R-Value:	0.0%	

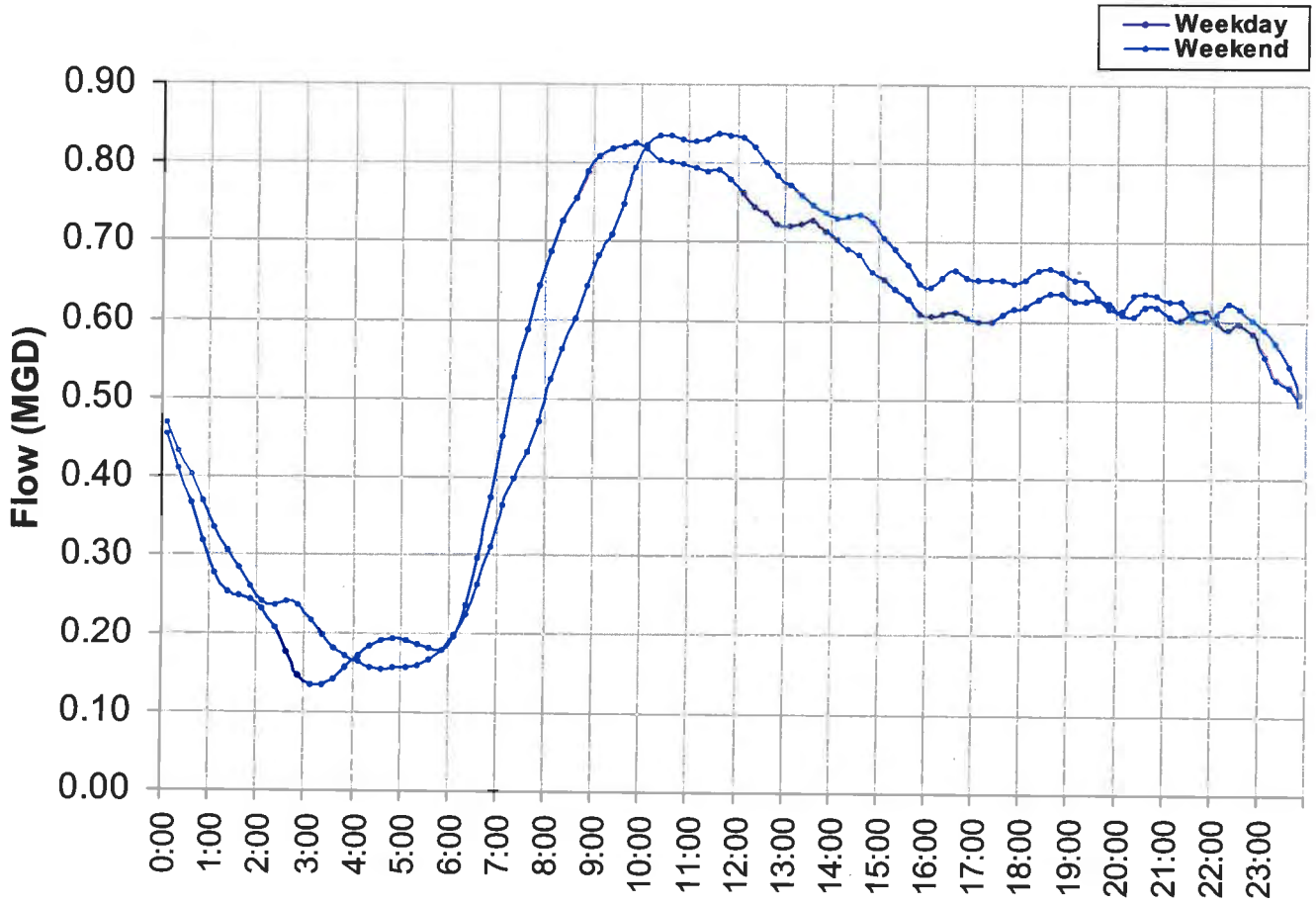
Storm Event #2 I/I Analysis

Rainfall:	0.76	*inches*
Peak Flow:	0.94	*MGD*
Peak I/I Rate:	0.26	*MGD*
PF:	1.74	
Pk I/I:ADWF:	0.48	
Peak Level:	6.45	*inches*
d/D Ratio:	0.56	
Total I/I:	62,000	*gallons*
RE2 R-Value:	0.1%	

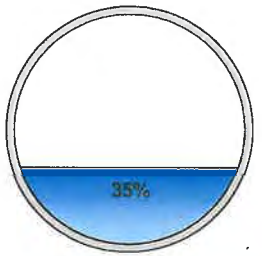
V&A

Average Dry Weather Flow

Monitoring Site:
Site 14



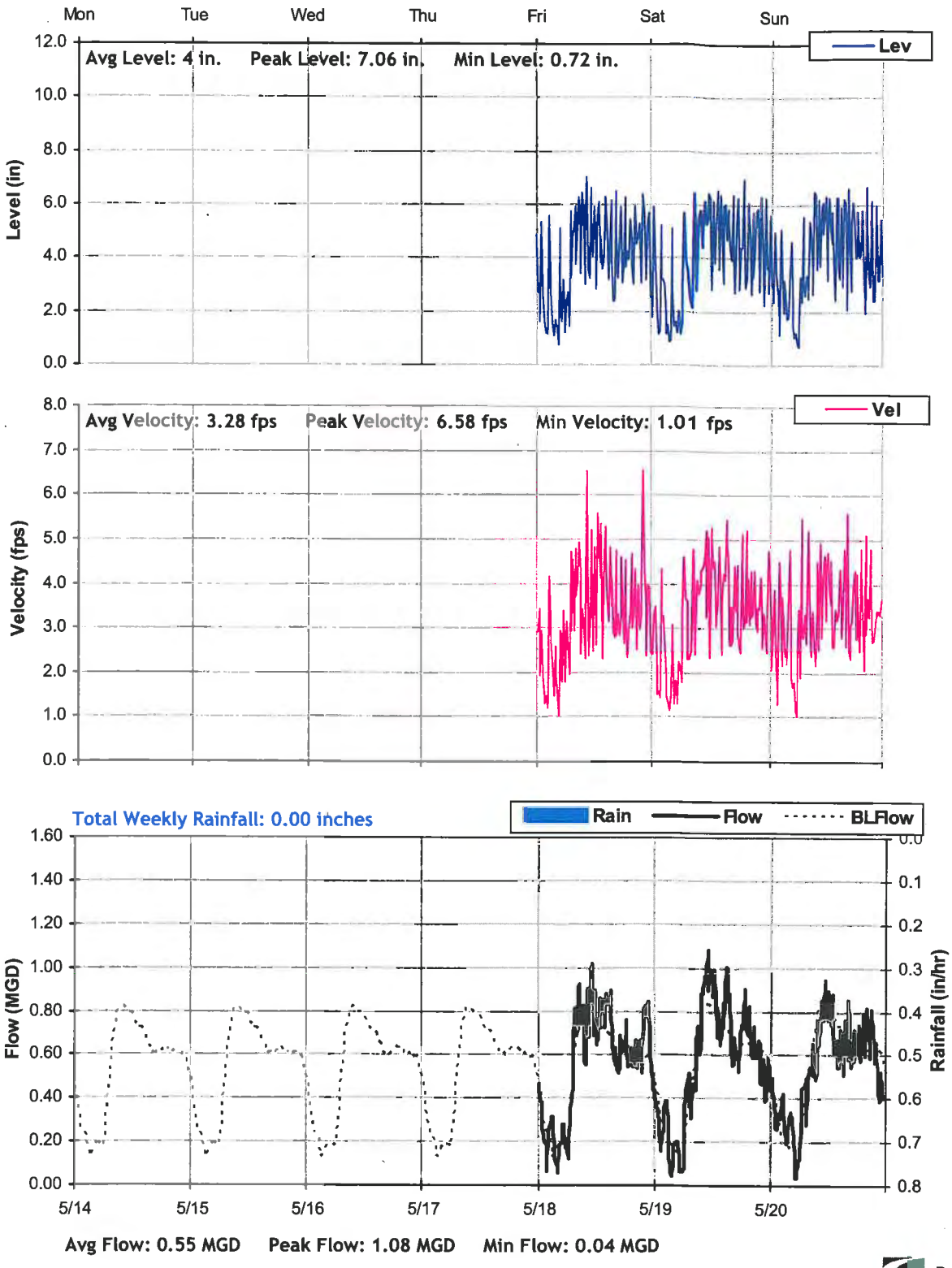
Average Dry Weather Flow:
0.54 *MGD*



V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

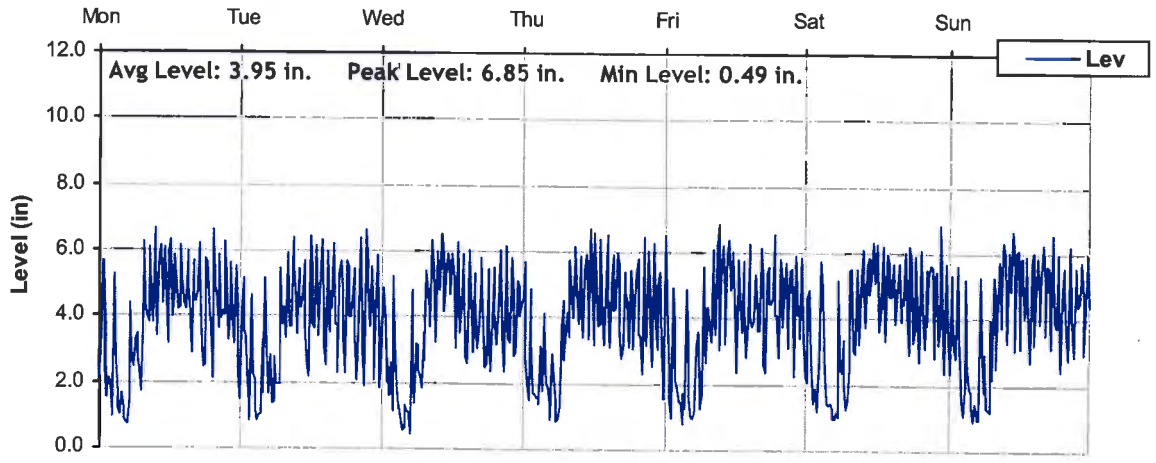
Monitoring Site:
Site 14

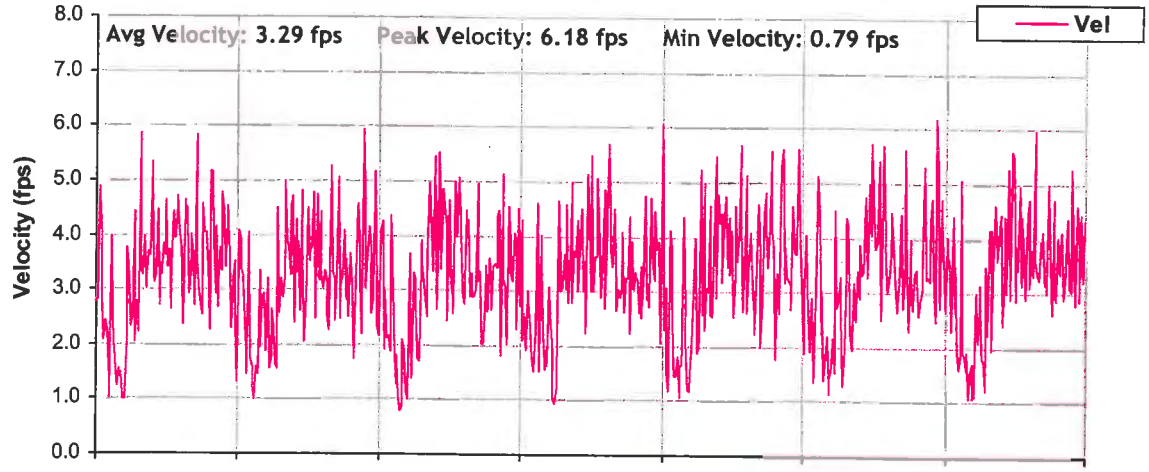


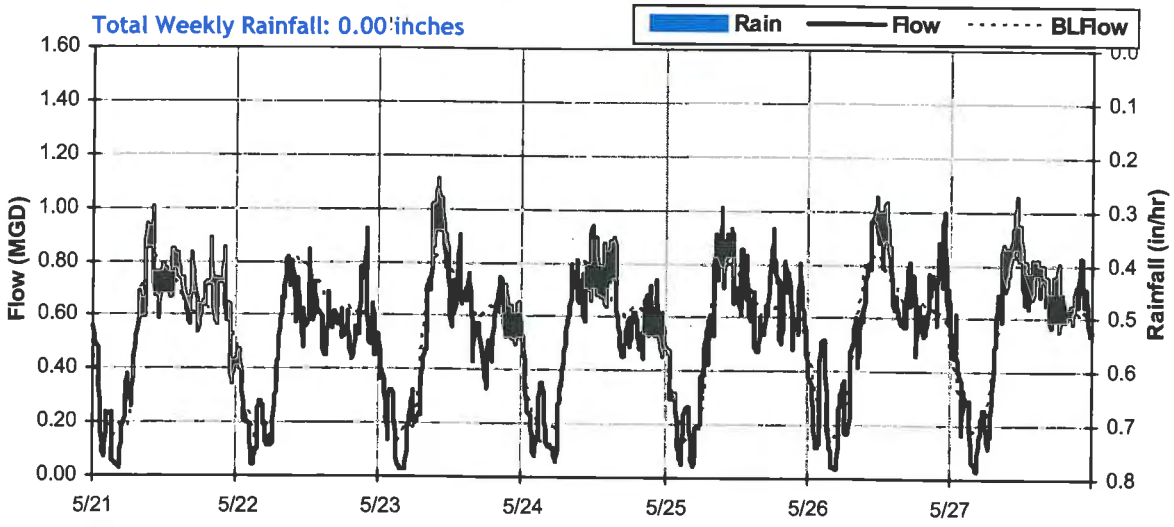
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 14





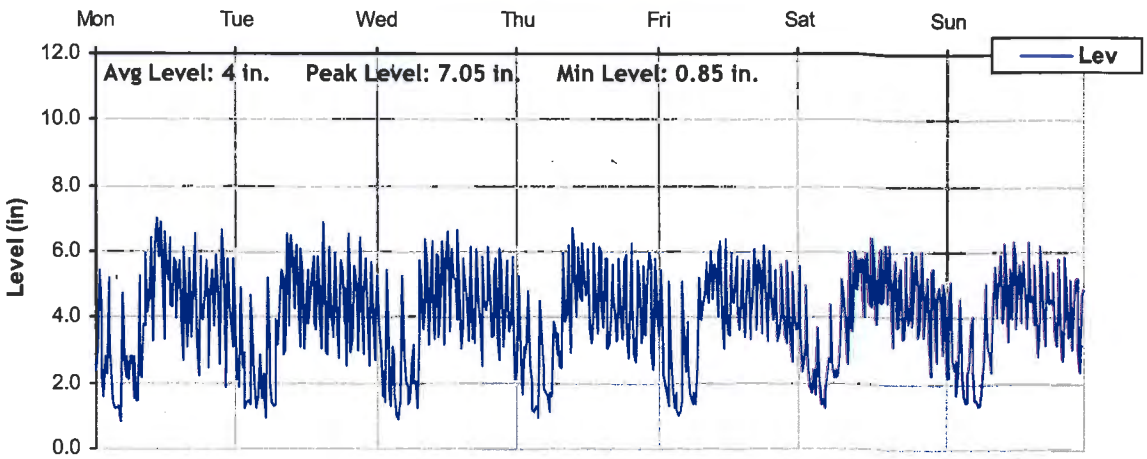


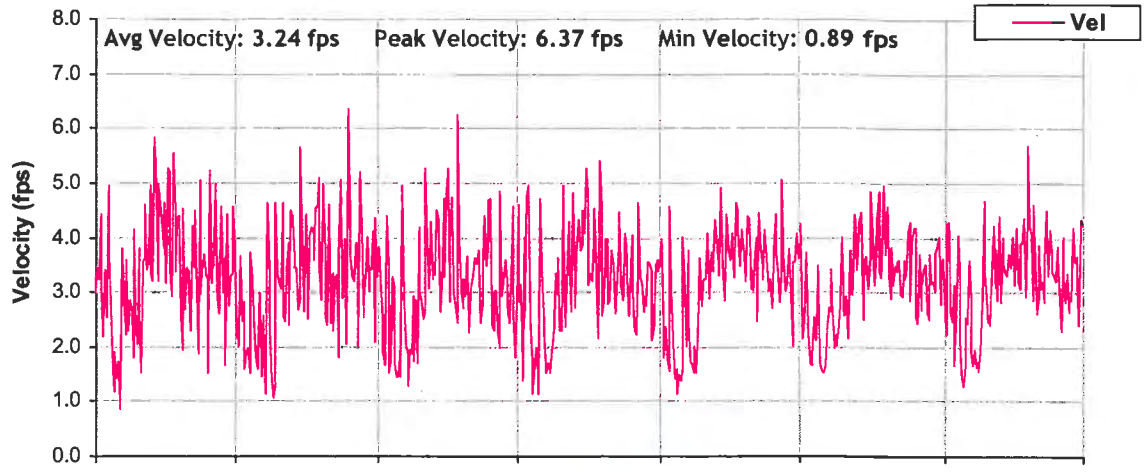
Avg Flow: 0.55 MGD Peak Flow: 1.11 MGD Min Flow: 0.03 MGD

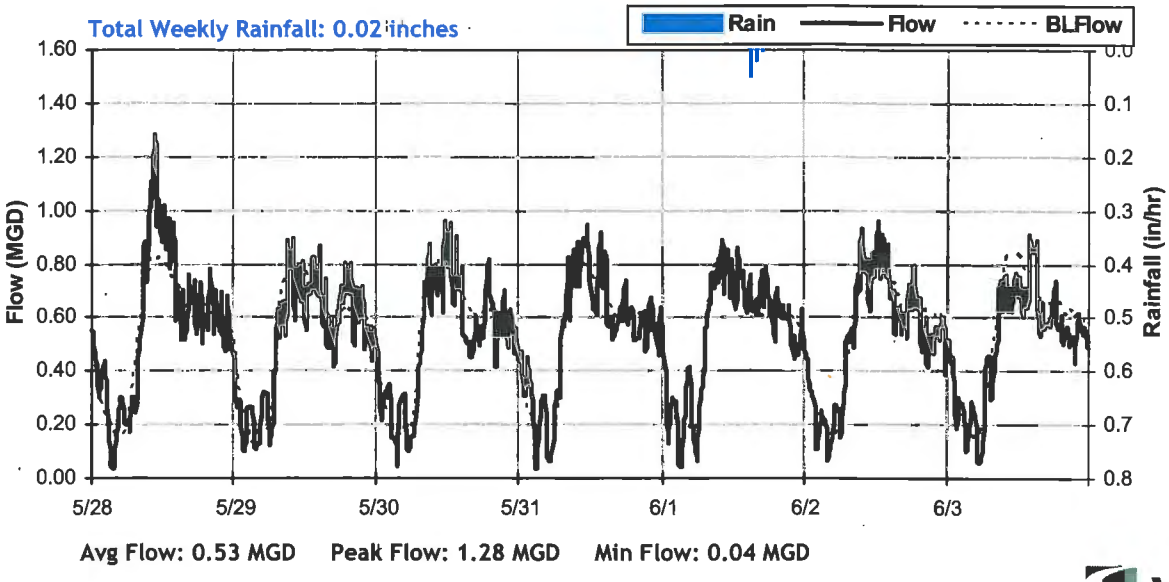
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 14





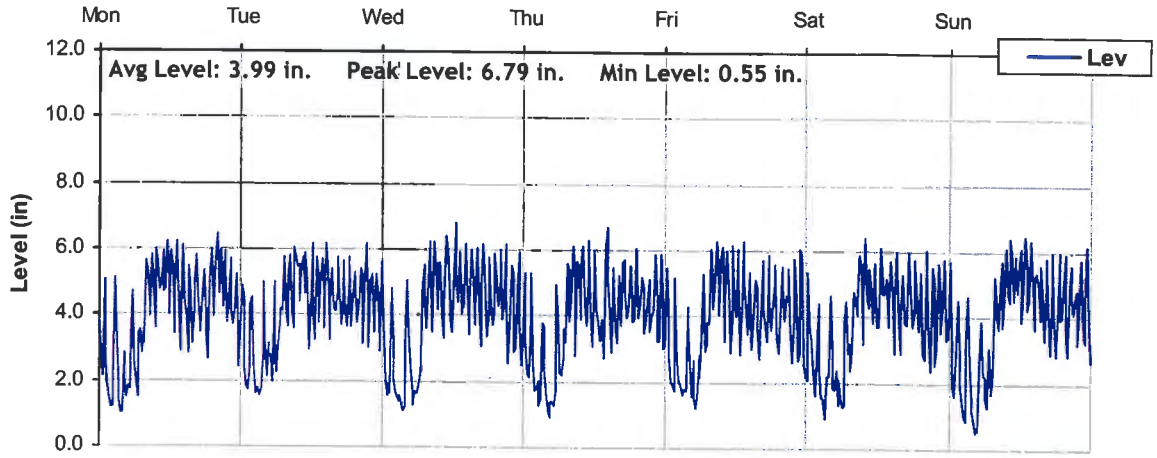


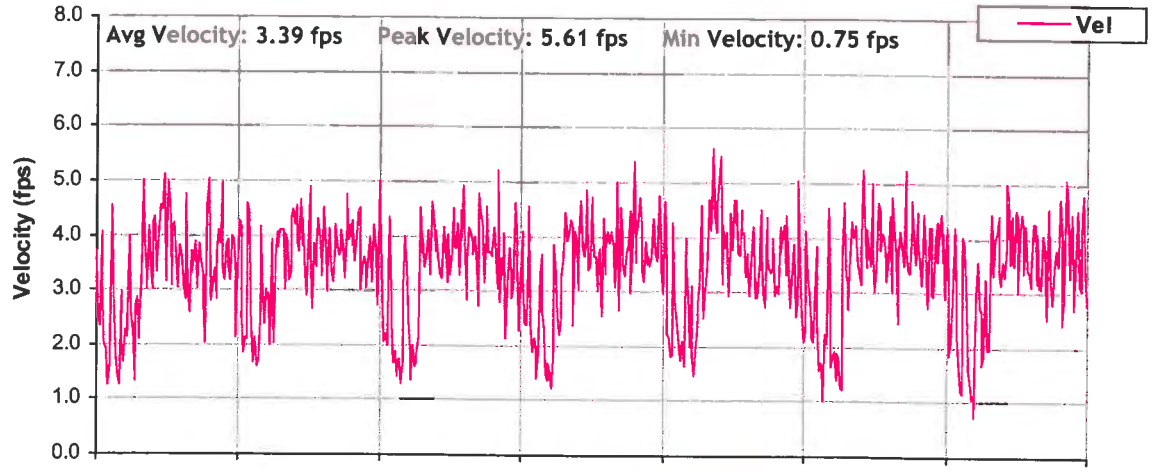
Avg Flow: 0.53 MGD Peak Flow: 1.28 MGD Min Flow: 0.04 MGD

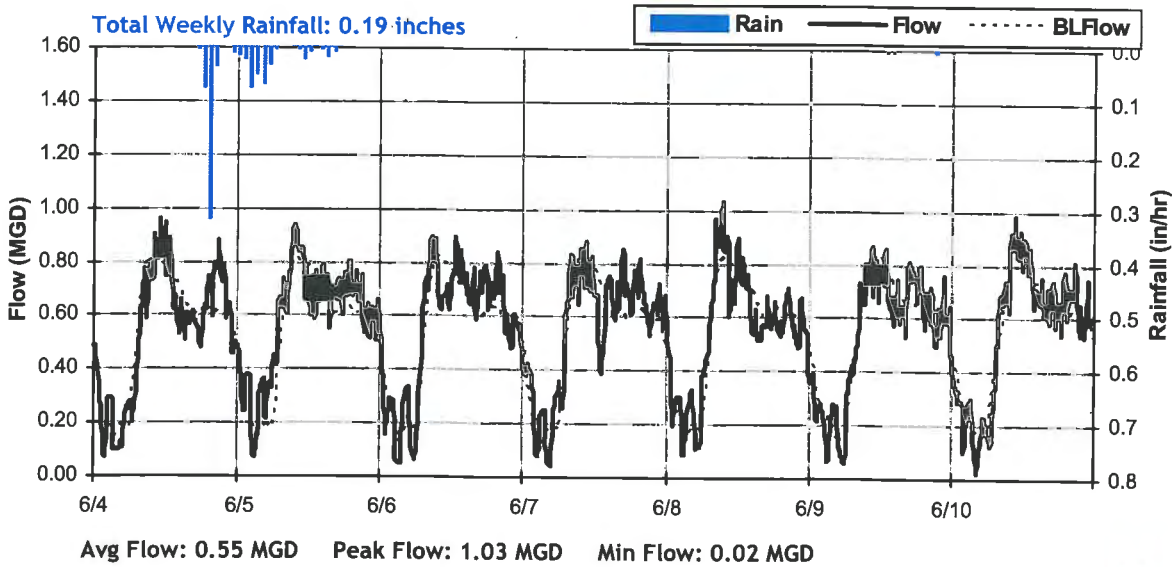
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 14





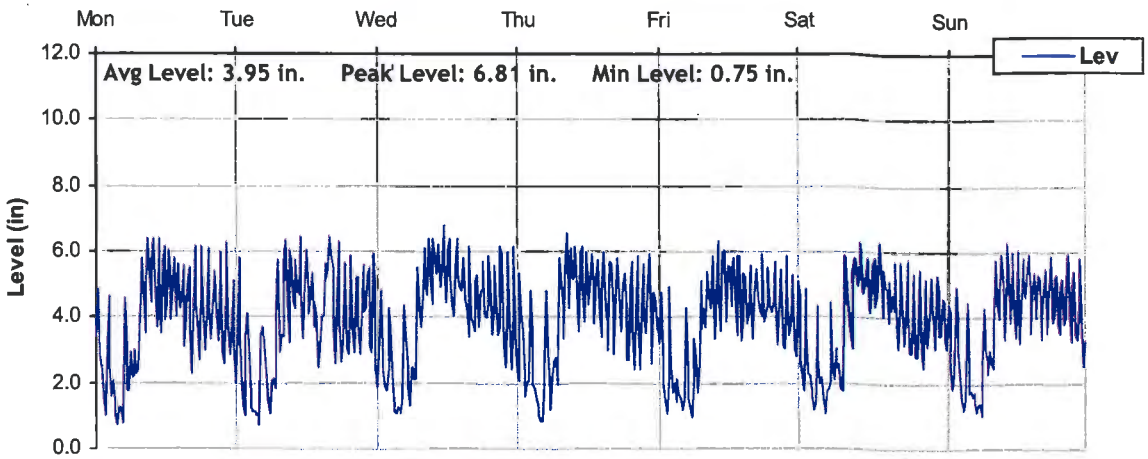


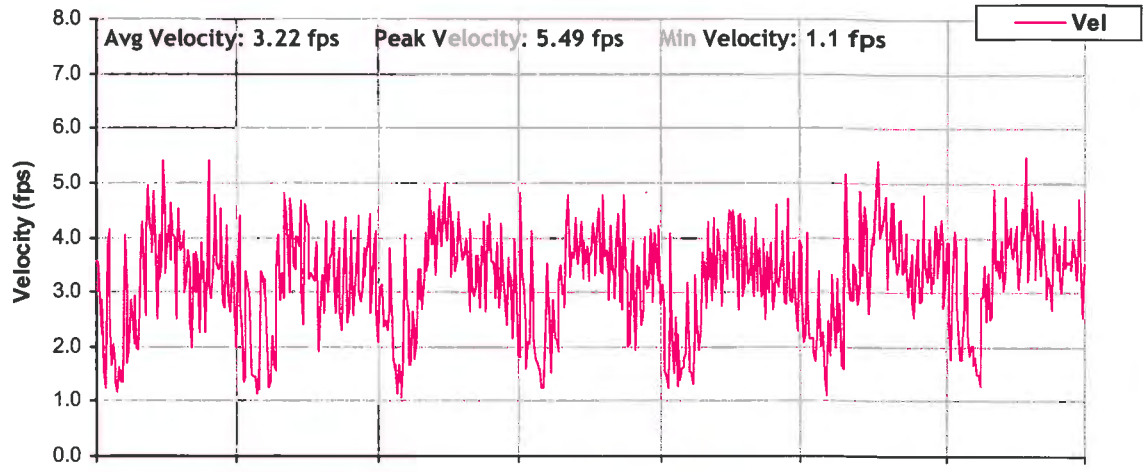
Avg Flow: 0.55 MGD Peak Flow: 1.03 MGD Min Flow: 0.02 MGD

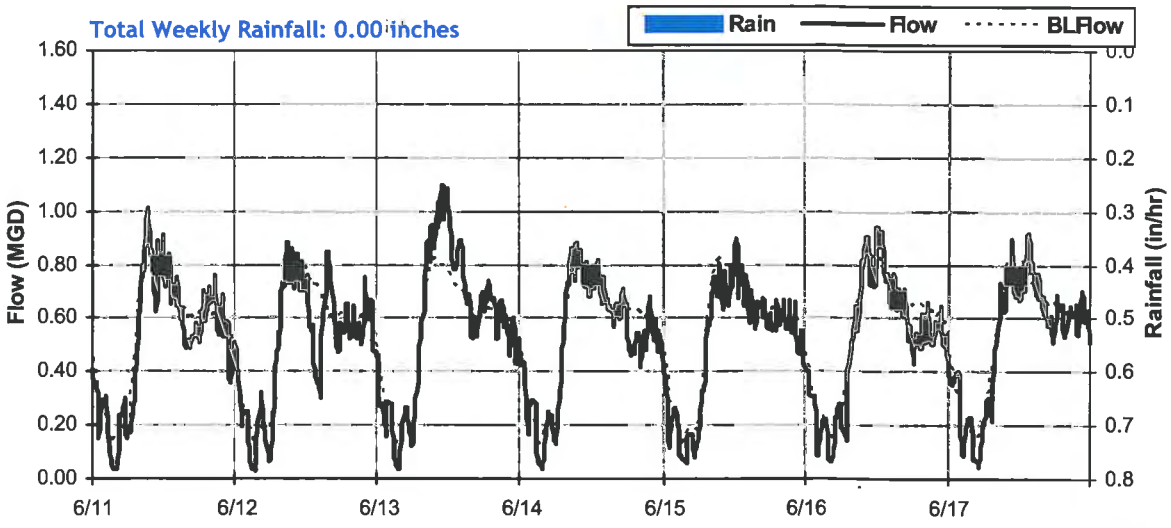
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 14





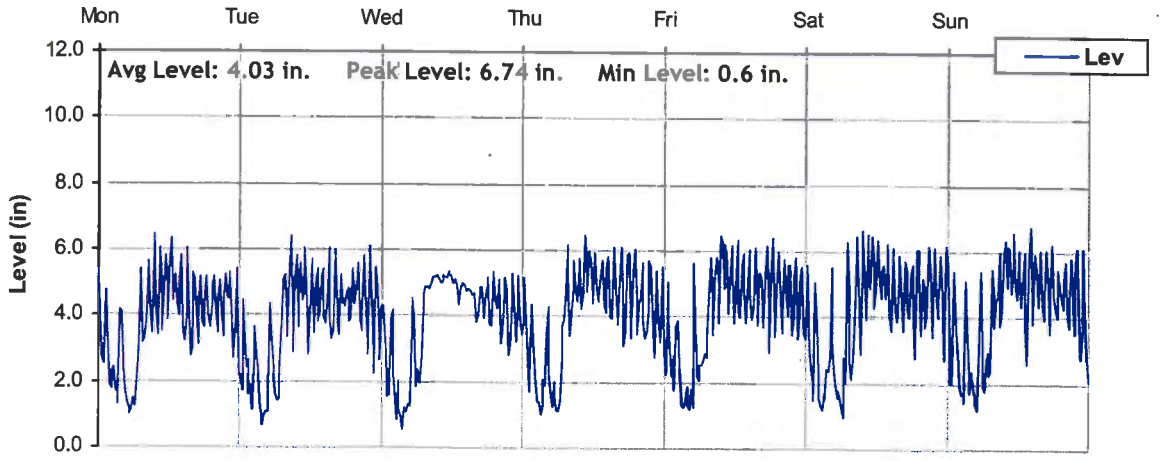


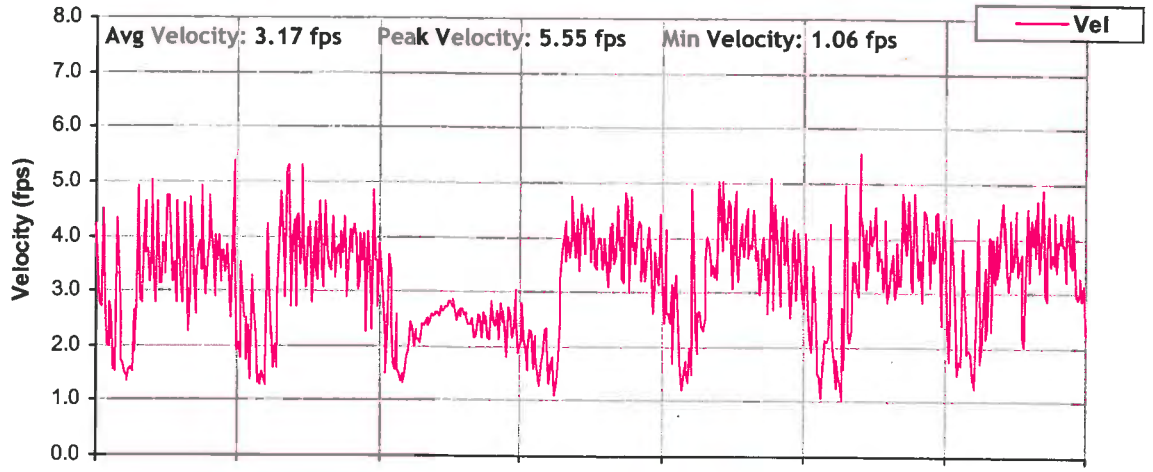
Avg Flow: 0.52 MGD Peak Flow: 1.1 MGD Min Flow: 0.03 MGD

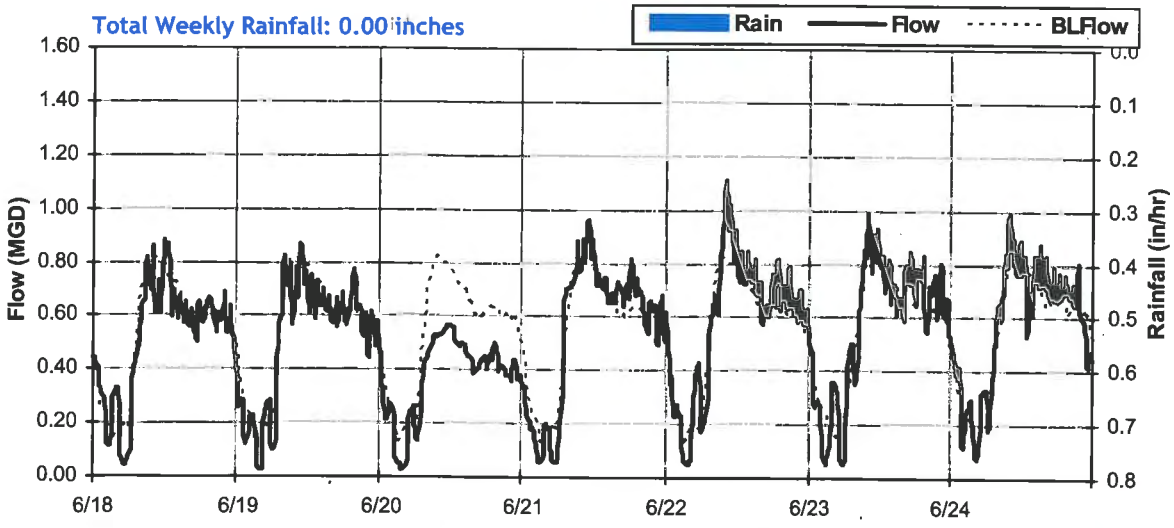
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 14





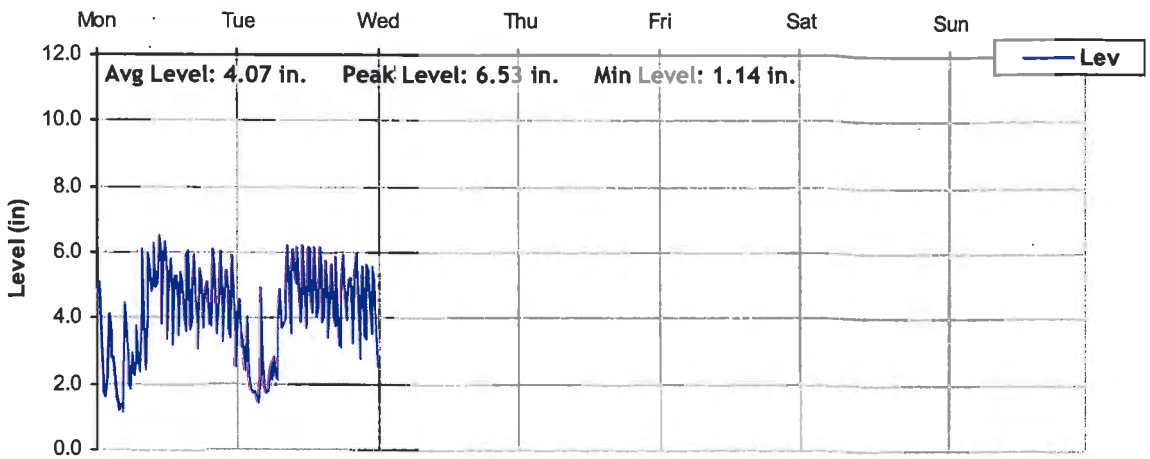


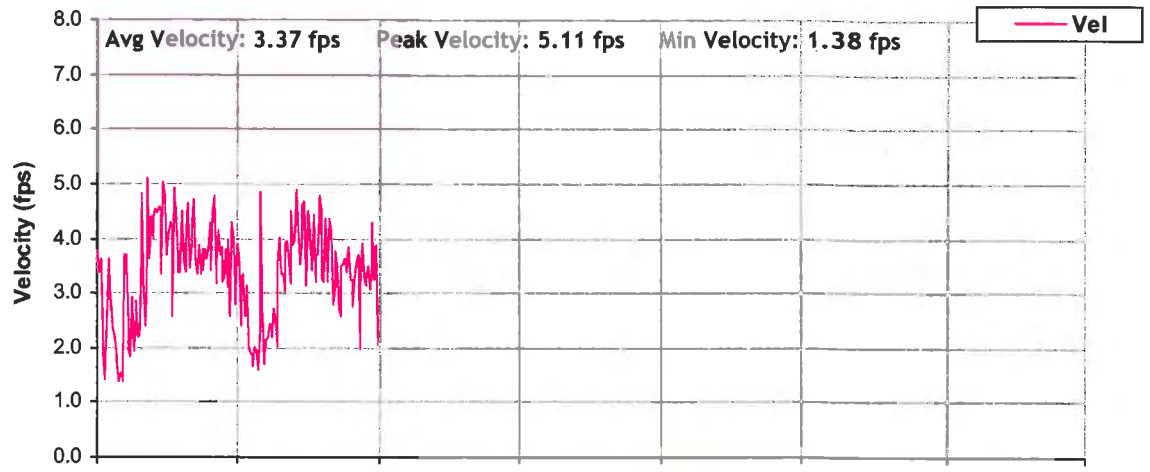
Avg Flow: 0.53 MGD Peak Flow: 1.11 MGD Min Flow: 0.03 MGD

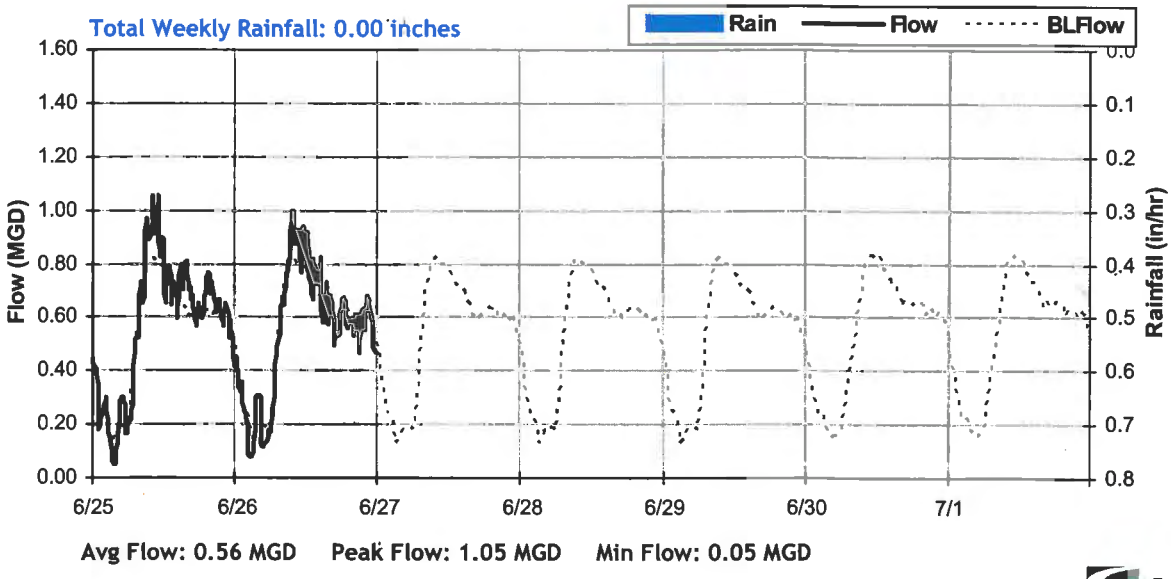
V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 14







Avg Flow: 0.56 MGD Peak Flow: 1.05 MGD Min Flow: 0.05 MGD

V&A

Site Information Report

Monitoring Site: Site 15

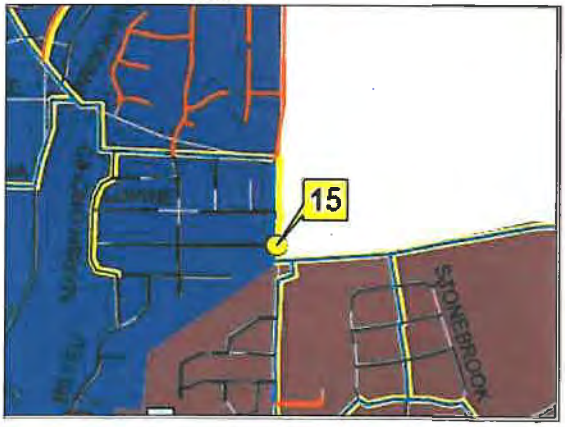
Location:

Diameter: 20.375 inches

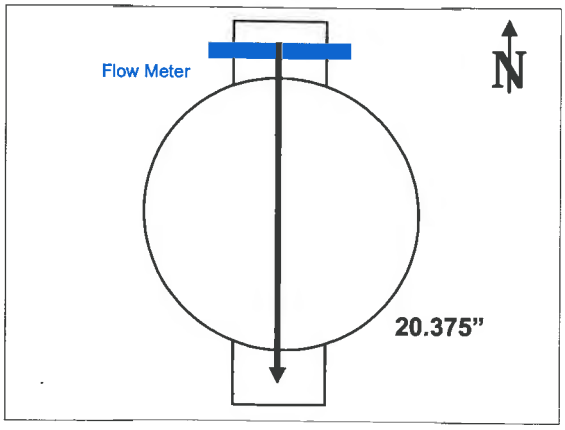
Average Dry Weather Flow: 0.730 *MGD*

Peak Measured Flow: 1.823 *MGD*

Sanitary sewer map:



Flow sketch:



Street-level photo:

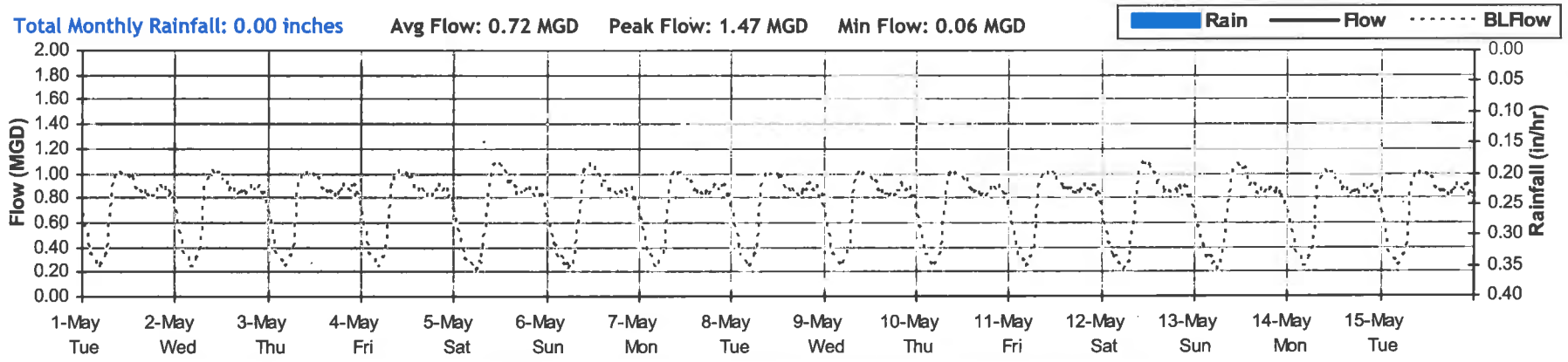
Plan view photo:

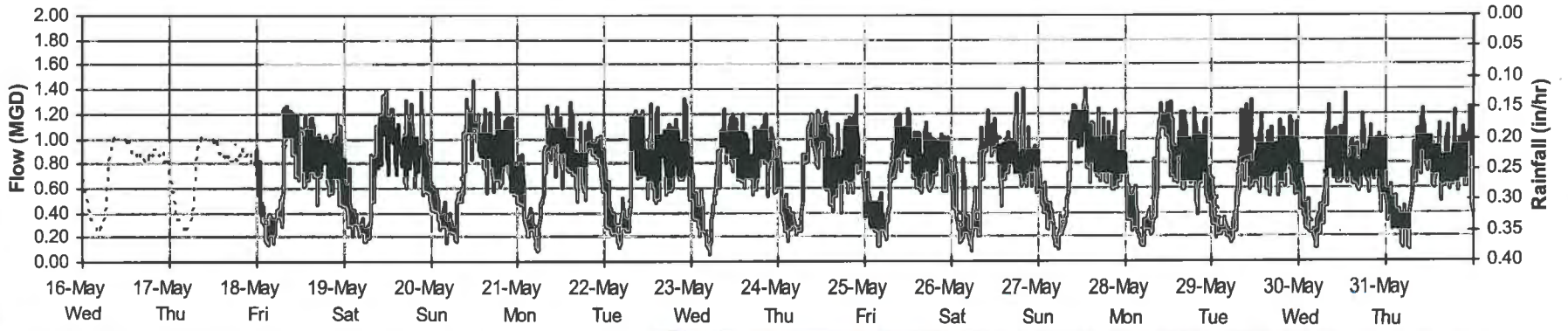
V&A

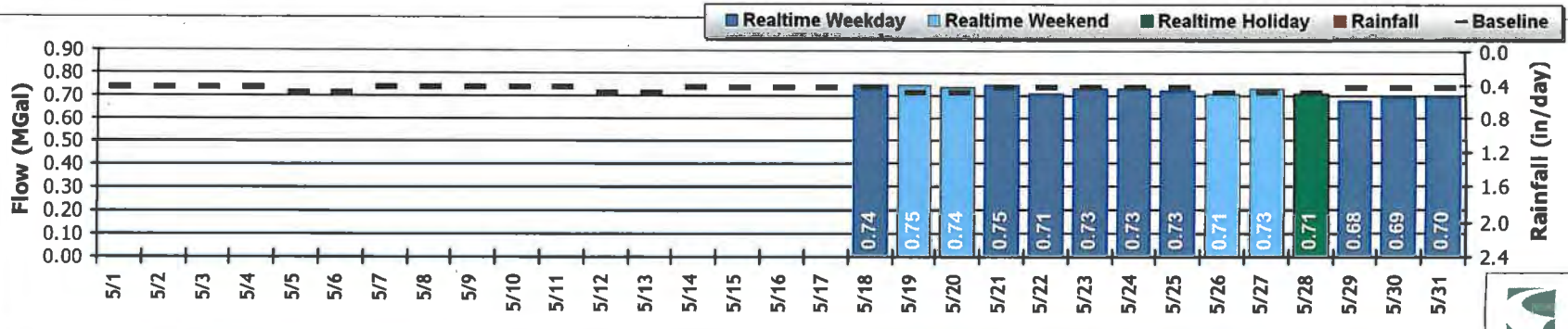
Monthly Flow Summary
May, 2007

Monitoring Site:
Site 15

Total Monthly Rainfall: 0.00 inches Avg Flow: 0.72 MGD Peak Flow: 1.47 MGD Min Flow: 0.06 MGD







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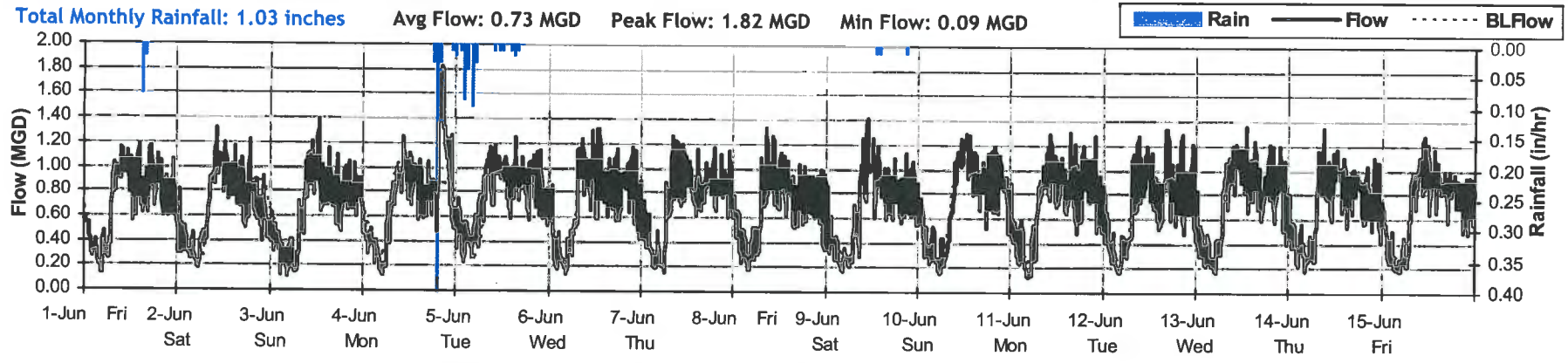
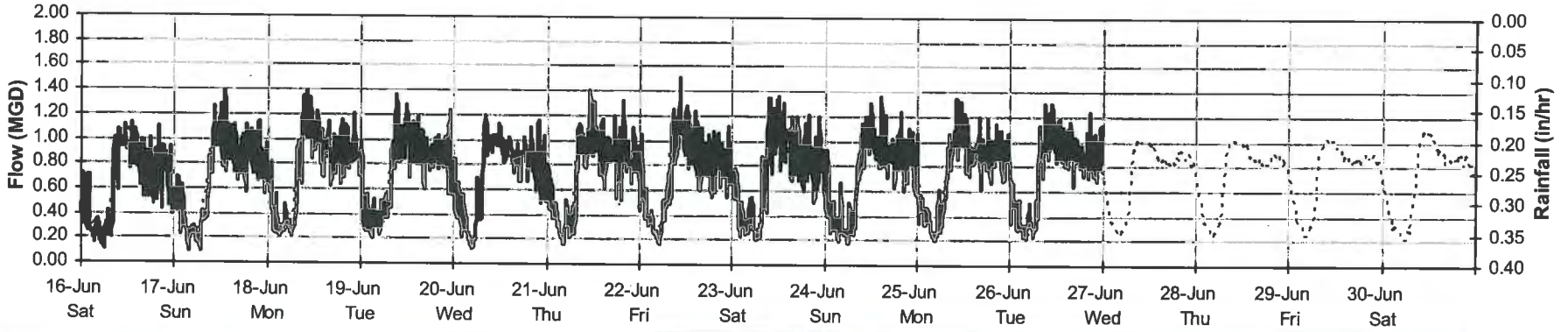
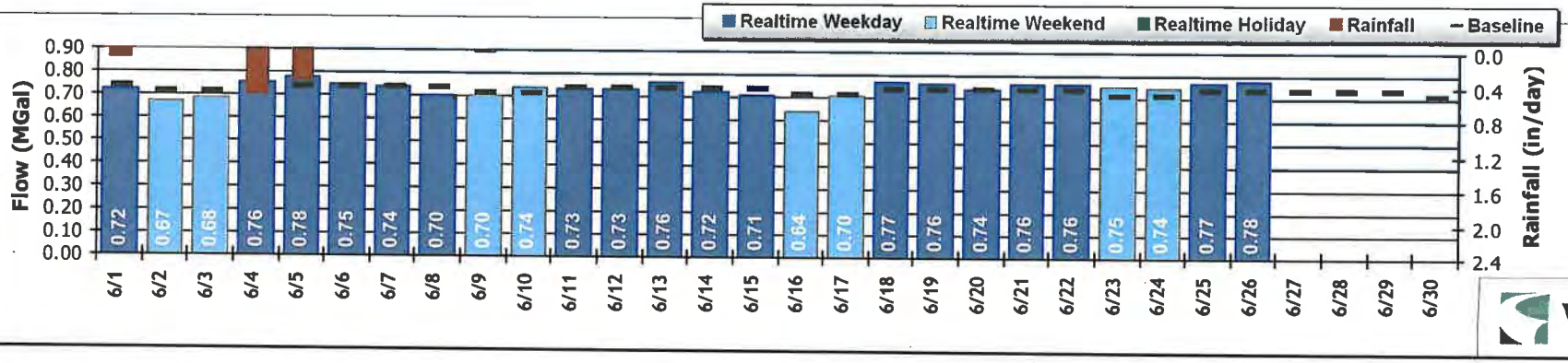
Monthly Flow Summary
June, 2007

Monitoring Site:
Site 15

Total Monthly Rainfall: 1.03 inches Avg Flow: 0.73 MGD Peak Flow: 1.82 MGD Min Flow: 0.09 MGD







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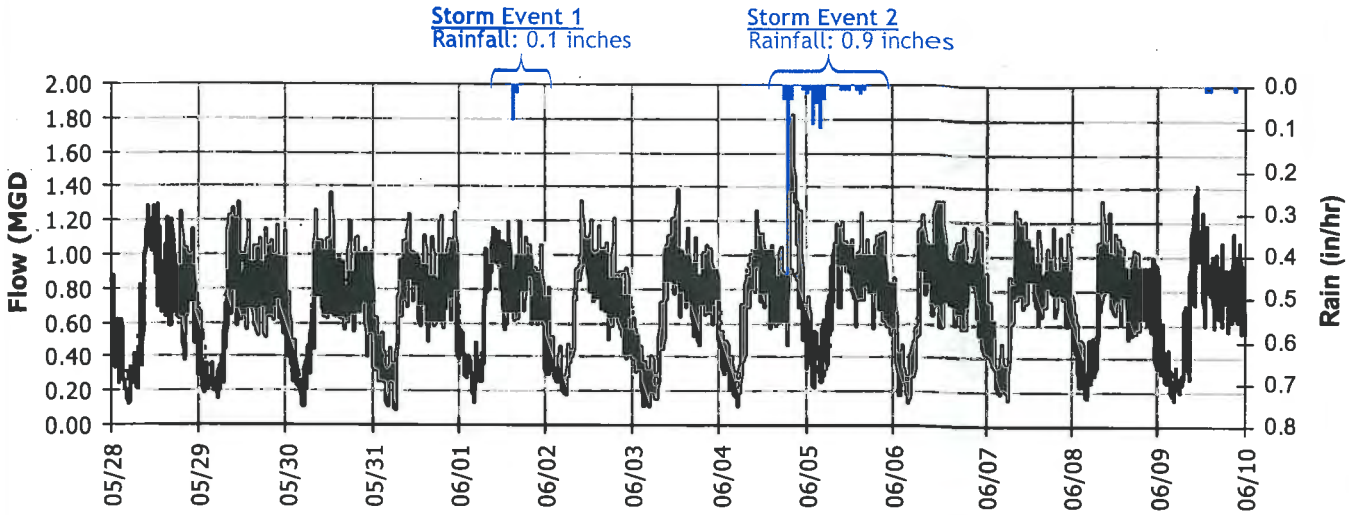
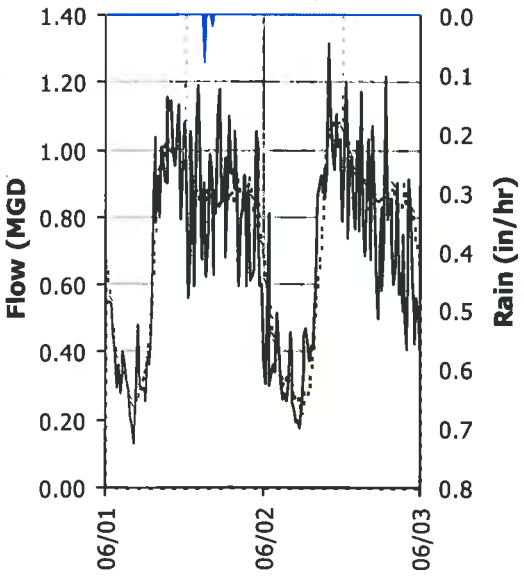
I/I Summary

Monitoring Site:
Site 15

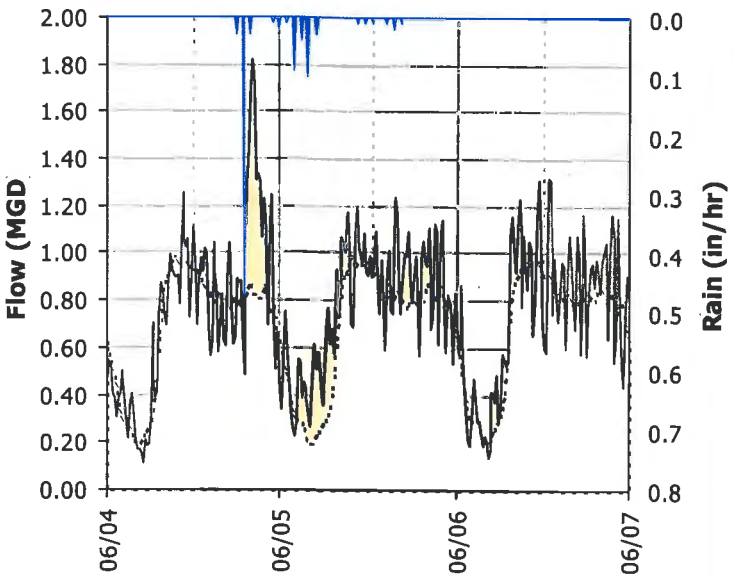
Baseline, Realtime, and I/I Flows over Monitoring Period:



Storm Event #1 Detail I/I Graph



Storm Event #2 Detail I/I Graph



Storm Event #1 I/I Analysis

Rainfall:	0.10	*inches*
Peak Flow:	0.90	*MGD*
Peak I/I Rate:	0.06	*MGD*
PF:	1.23	
Pk I/I:ADWF:	0.08	
Peak Level:	15.22	*inches*
d/D Ratio:	0.75	
Total I/I:	1,000	*gallons*
RE1 R-Value:	0.0%	

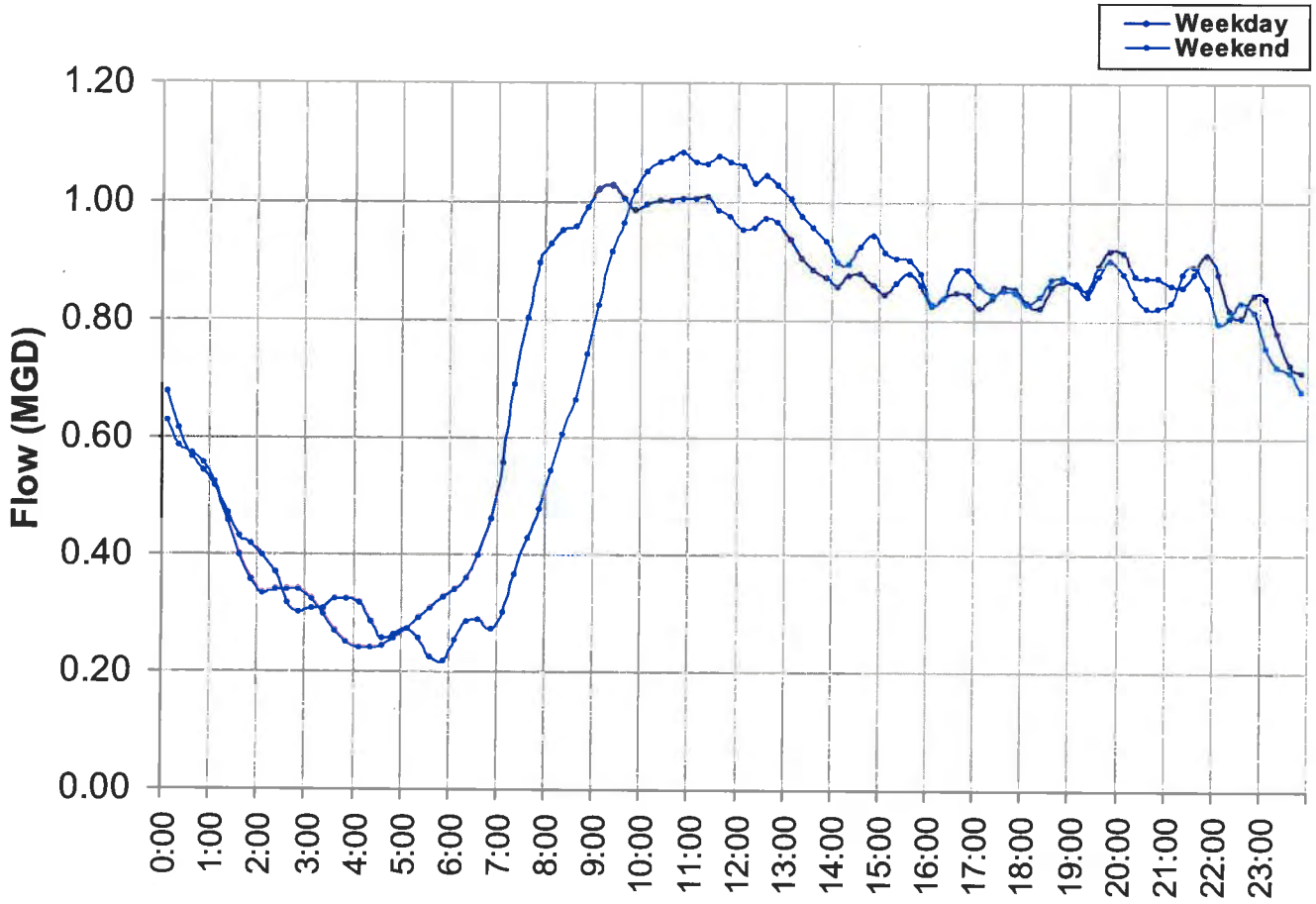
Storm Event #2 I/I Analysis

Rainfall:	0.90	*inches*
Peak Flow:	1.82	*MGD*
Peak I/I Rate:	0.95	*MGD*
PF:	2.50	
Pk I/I:ADWF:	1.30	
Peak Level:	21.97	*inches*
d/D Ratio:	1.08	
Total I/I:	165,000	*gallons*
RE2 R-Value:	0.2%	

V&A

Average Dry Weather Flow

Monitoring Site:
Site 15

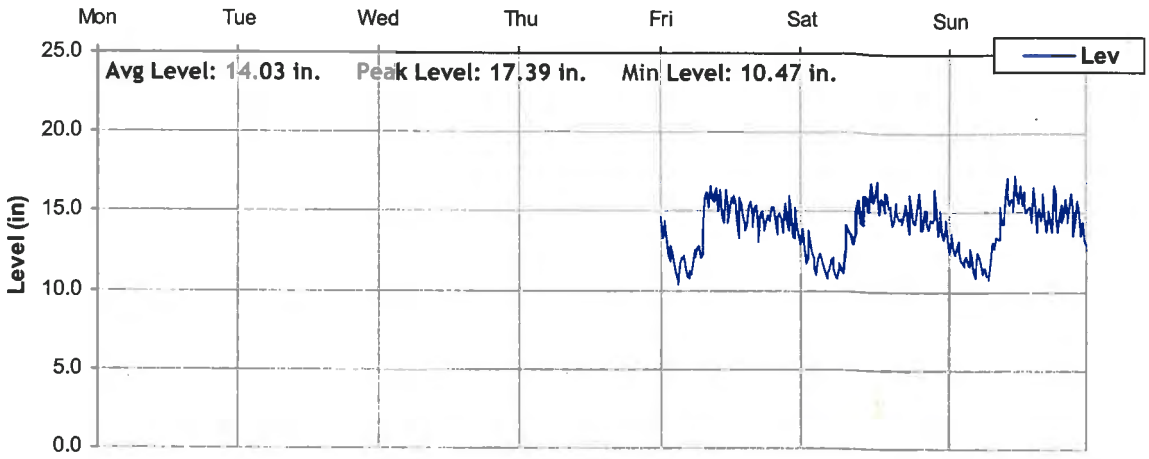


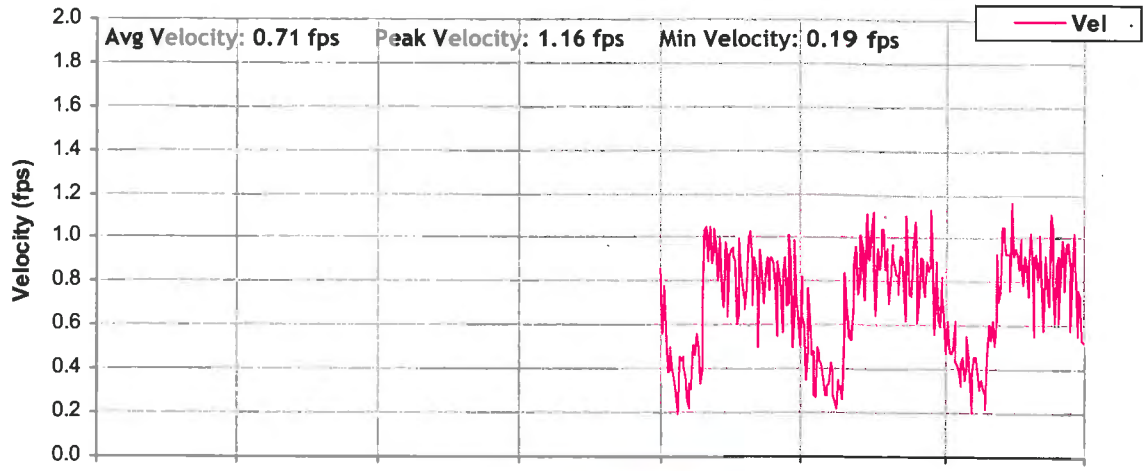
Average Dry Weather Flow:
0.73 *MGD*

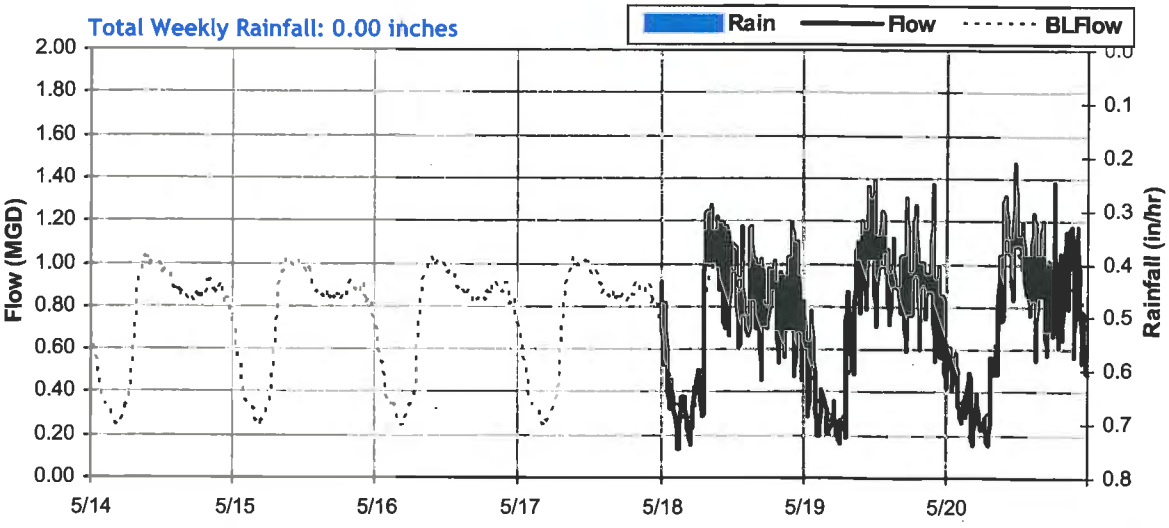
V&A

Level, Velocity and Flow
From 5/14/2007 to 5/21/2007

Monitoring Site:
Site 15





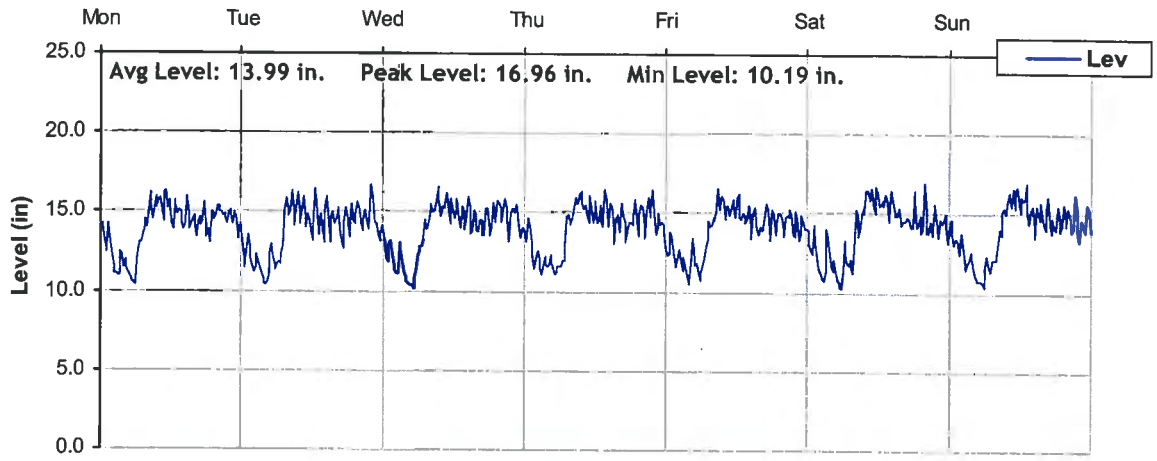


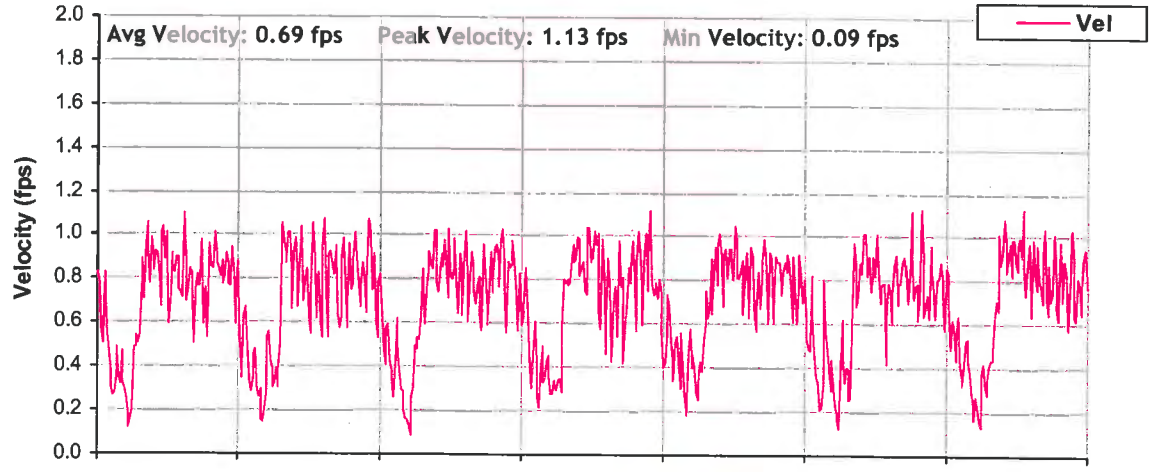
Avg Flow: 0.74 MGD Peak Flow: 1.47 MGD Min Flow: 0.13 MGD

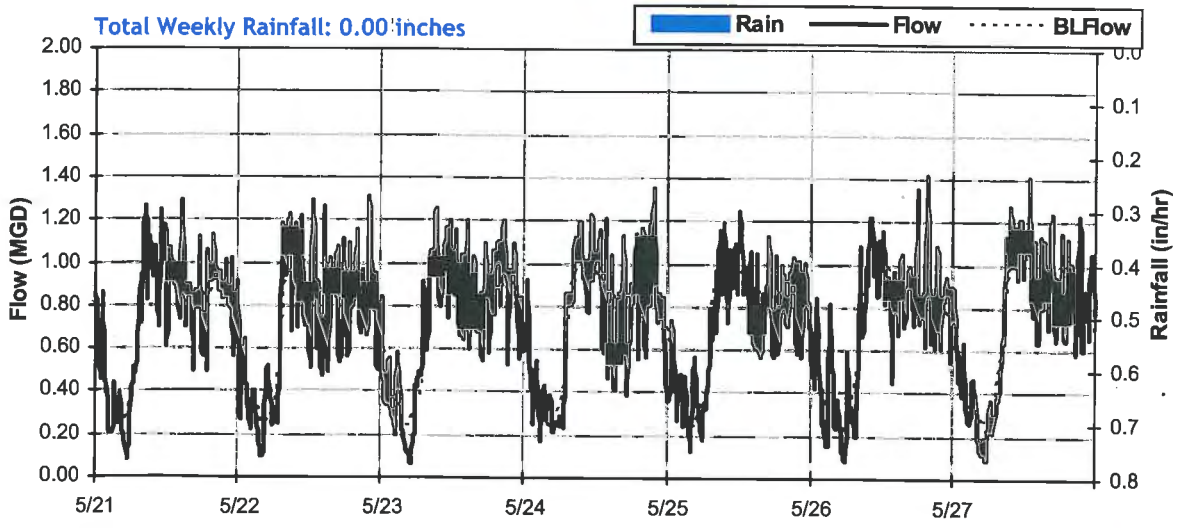
V&A

Level, Velocity and Flow
From 5/21/2007 to 5/28/2007

Monitoring Site:
Site 15





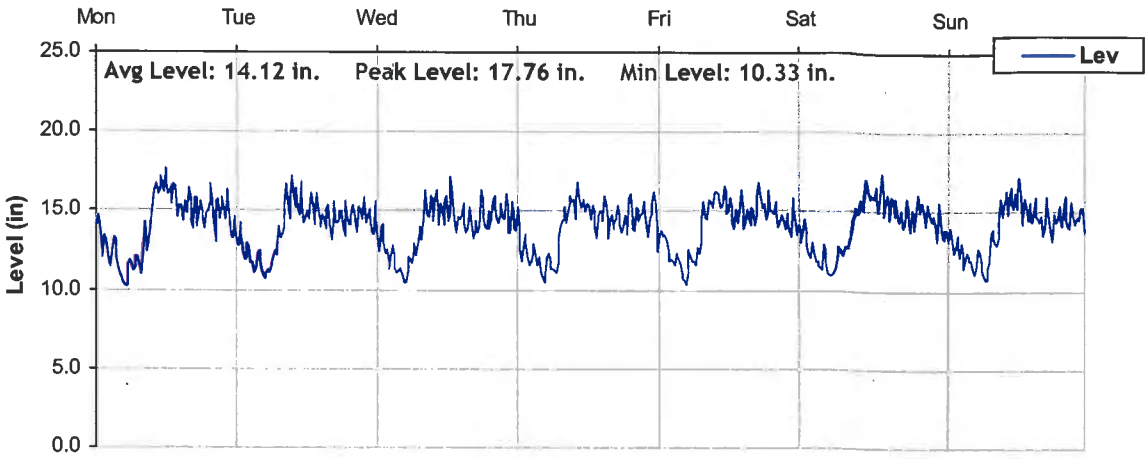


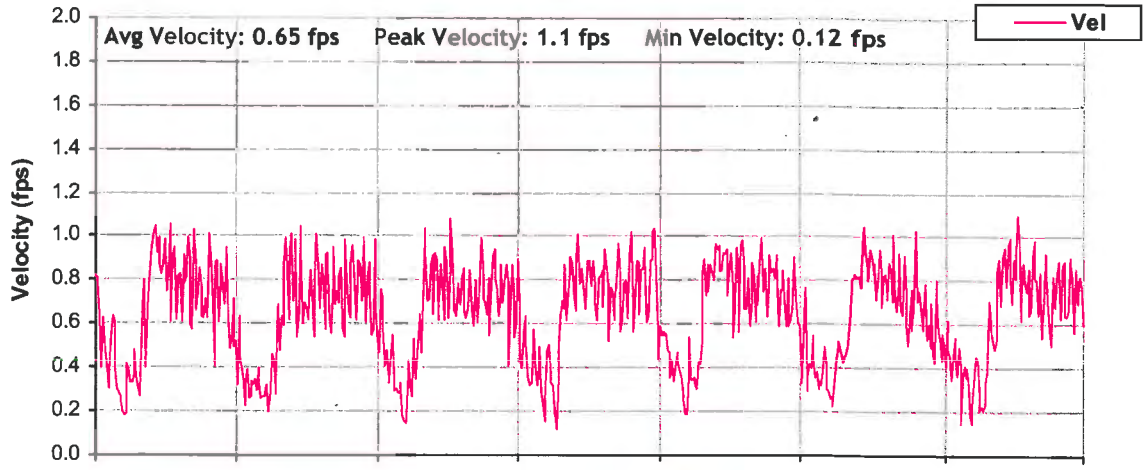
Avg Flow: 0.73 MGD Peak Flow: 1.41 MGD Min Flow: 0.06 MGD

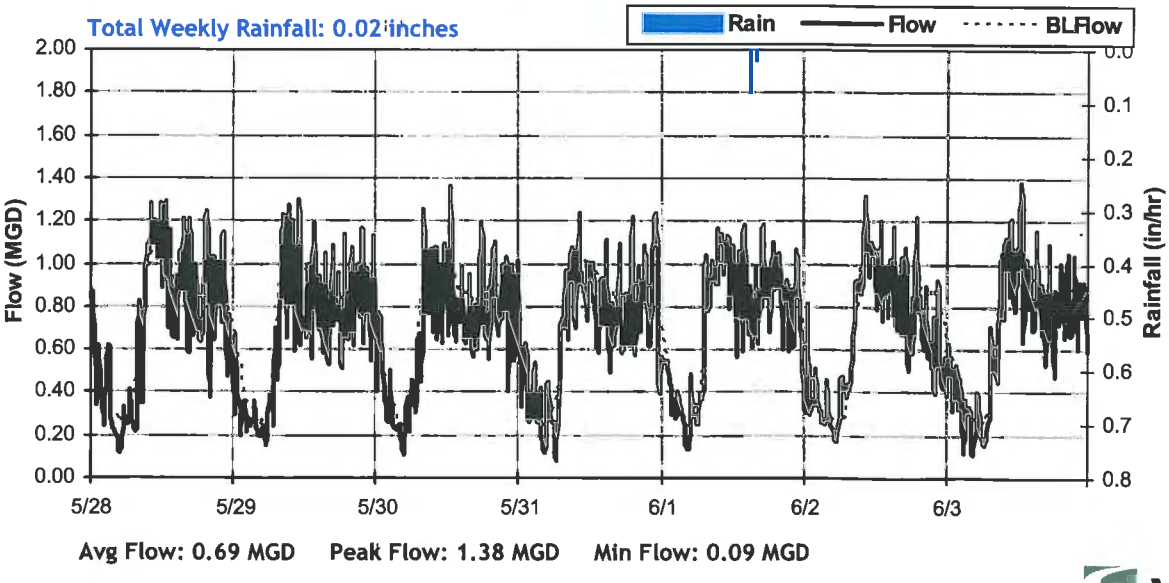
V&A

Level, Velocity and Flow
From 5/28/2007 to 6/4/2007

Monitoring Site:
Site 15





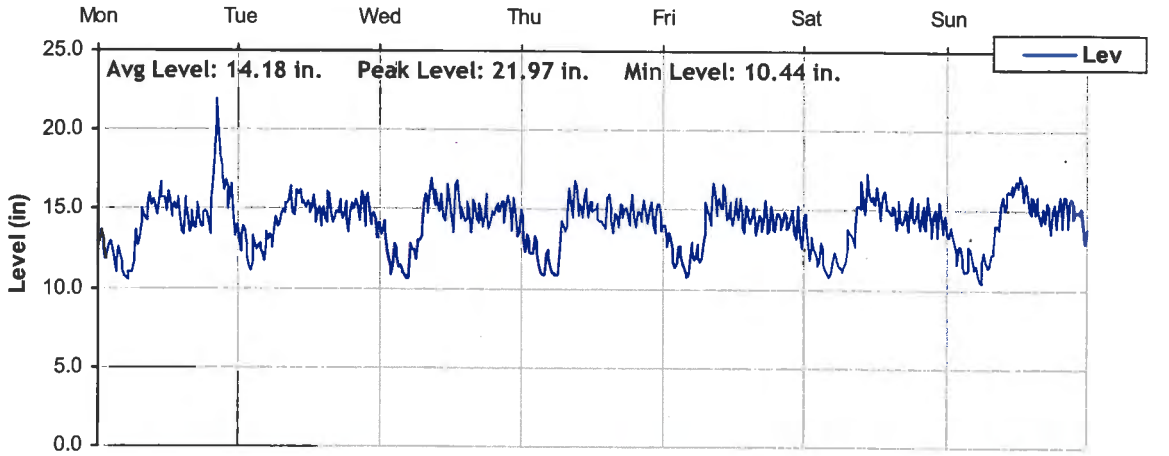


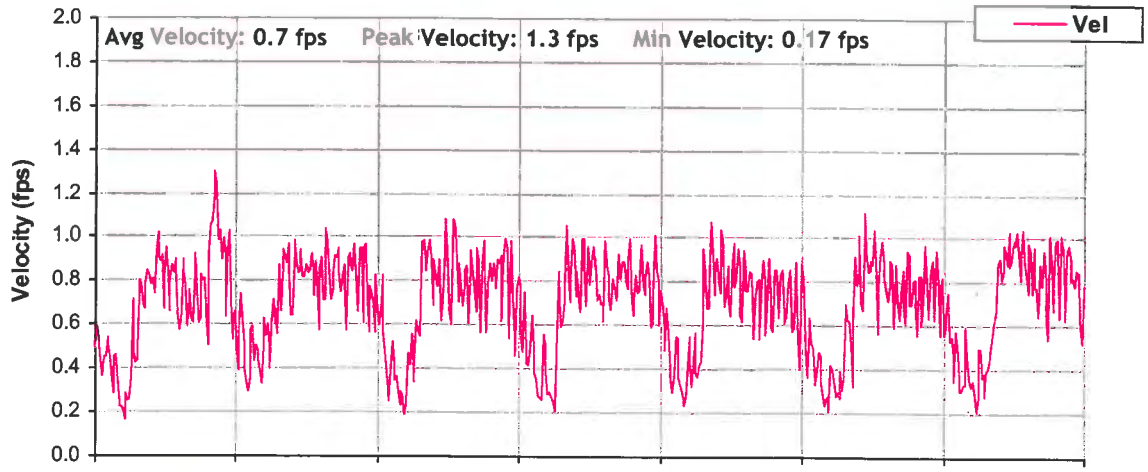
Avg Flow: 0.69 MGD Peak Flow: 1.38 MGD Min Flow: 0.09 MGD

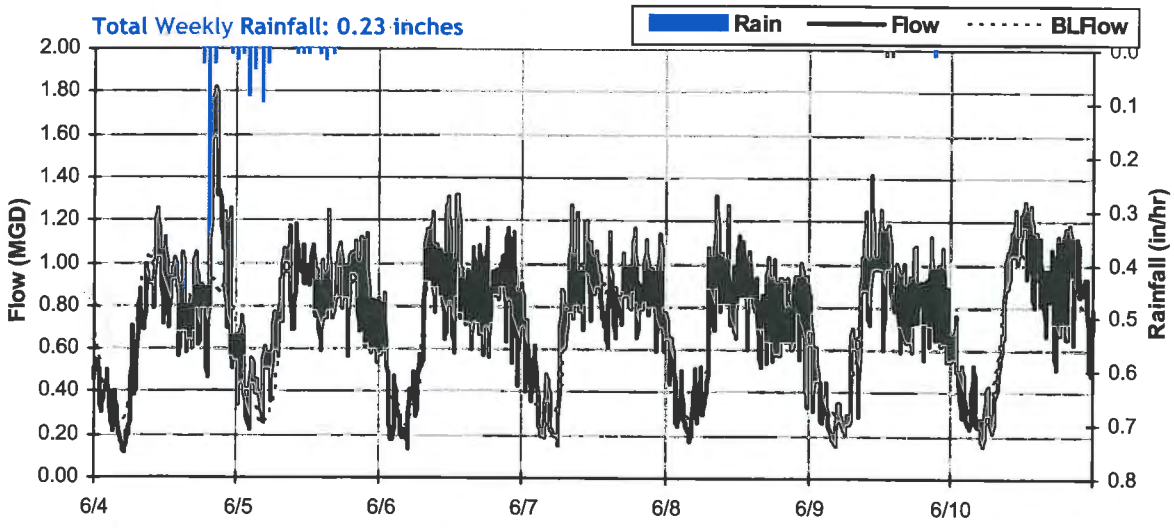
V&A

Level, Velocity and Flow
From 6/4/2007 to 6/11/2007

Monitoring Site:
Site 15





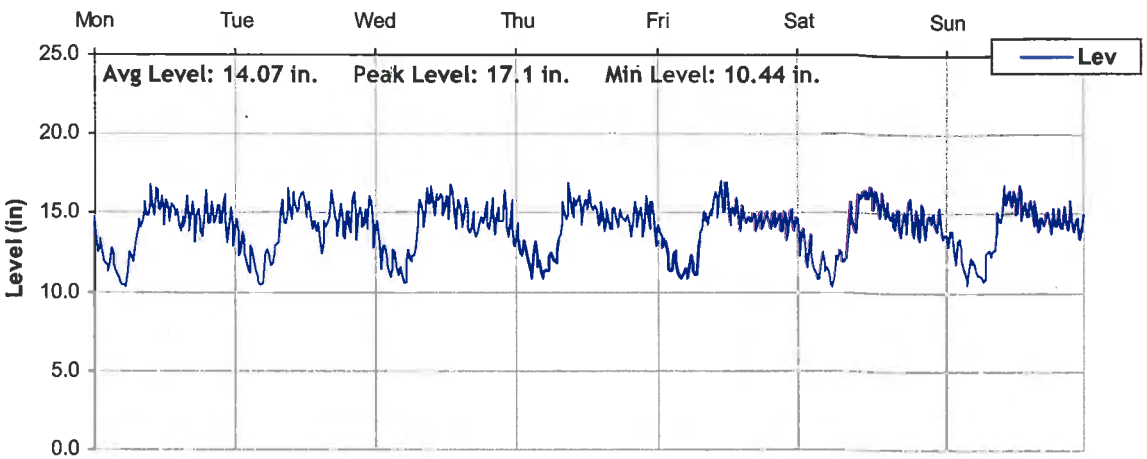


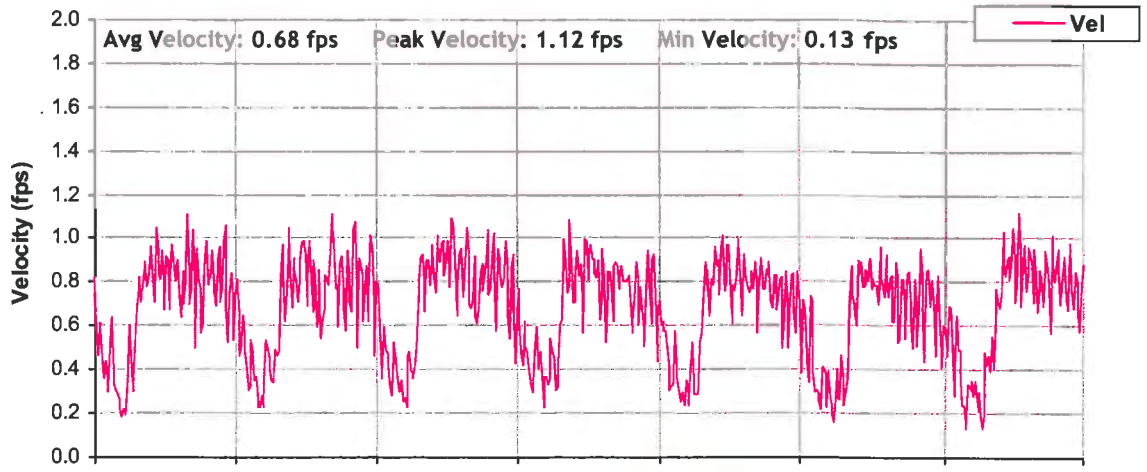
Avg Flow: 0.74 MGD Peak Flow: 1.82 MGD Min Flow: 0.12 MGD

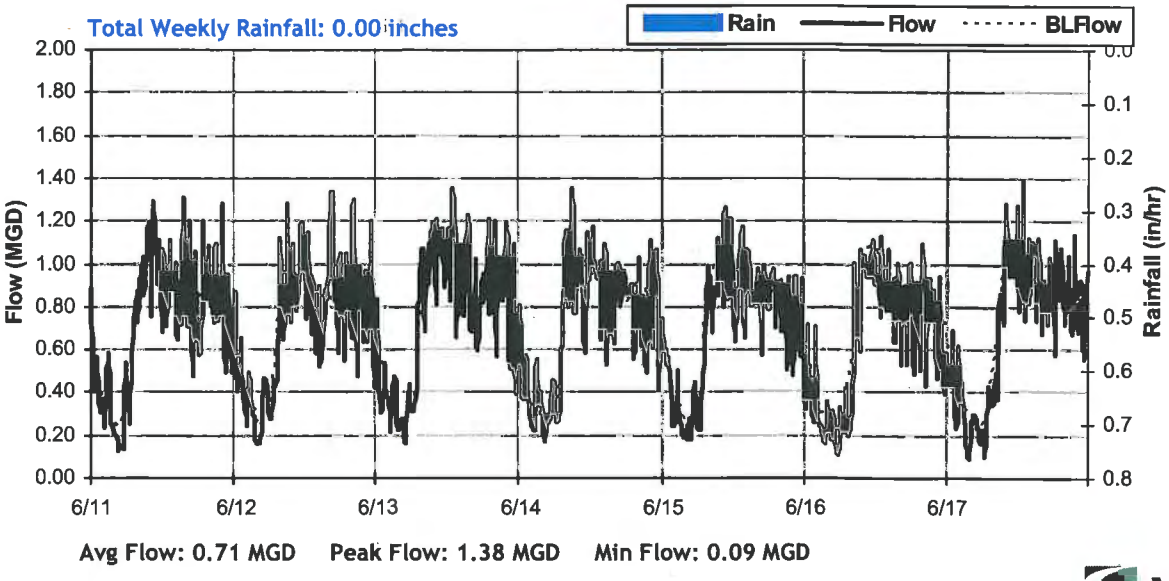
V&A

Level, Velocity and Flow
From 6/11/2007 to 6/18/2007

Monitoring Site:
Site 15





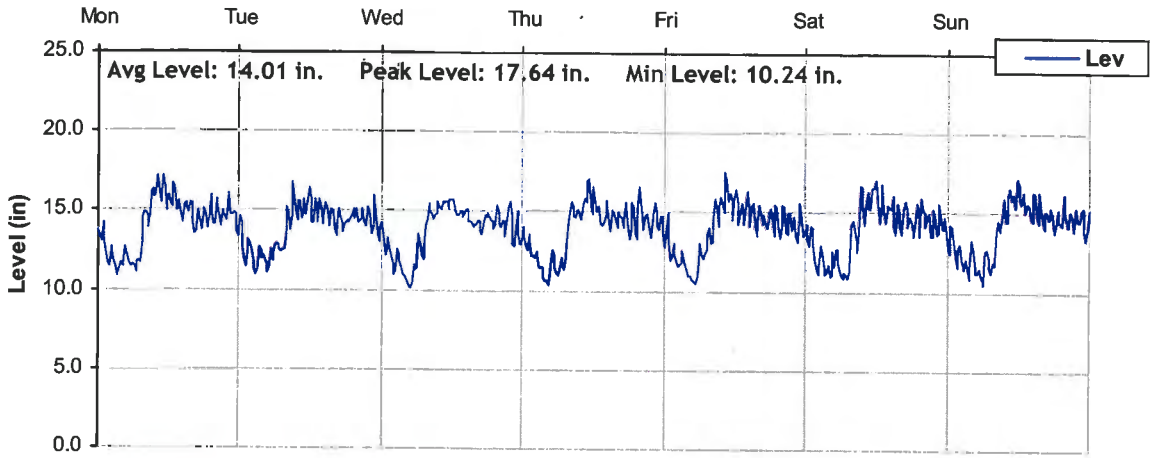


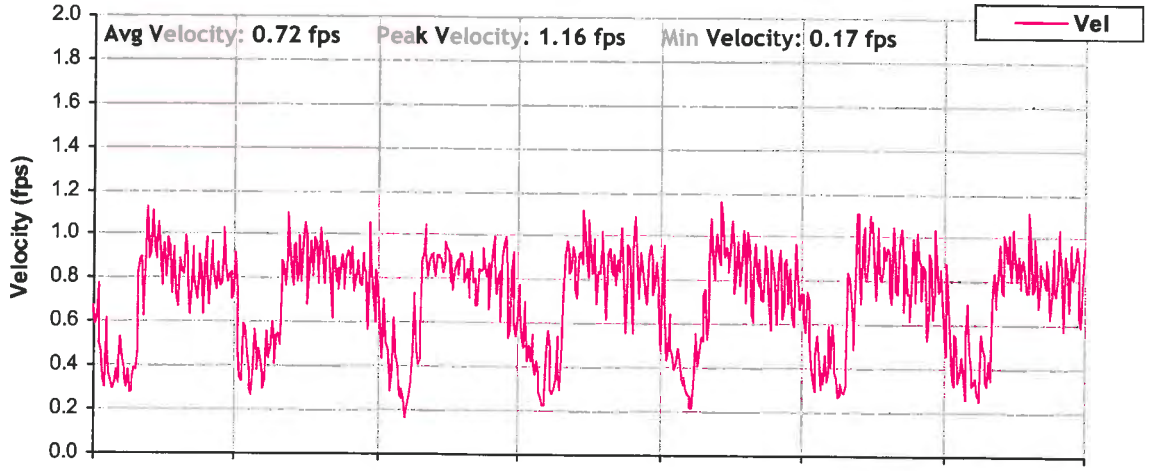
Avg Flow: 0.71 MGD Peak Flow: 1.38 MGD Min Flow: 0.09 MGD

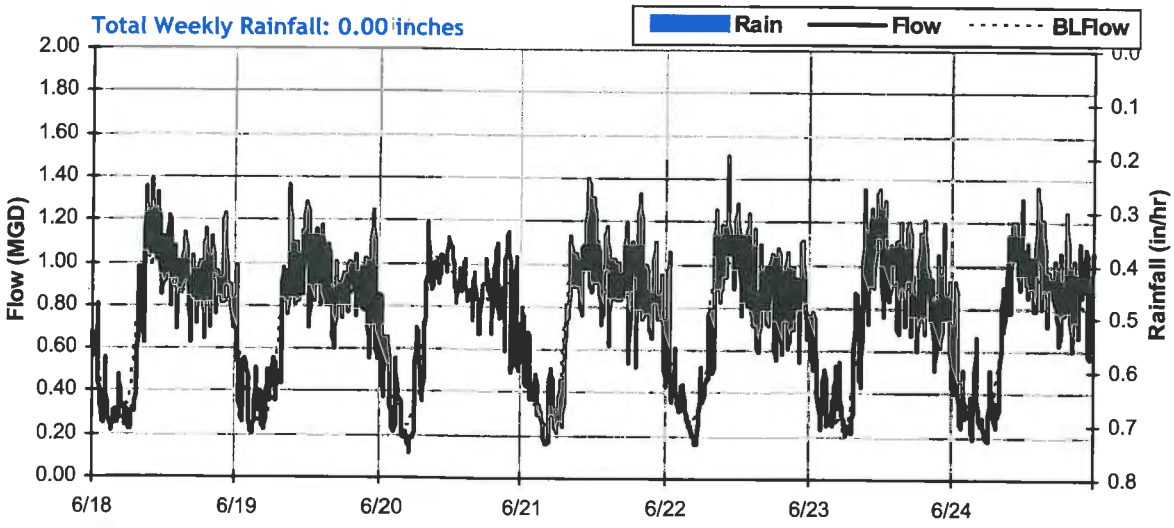
V&A

Level, Velocity and Flow
From 6/18/2007 to 6/25/2007

Monitoring Site:
Site 15





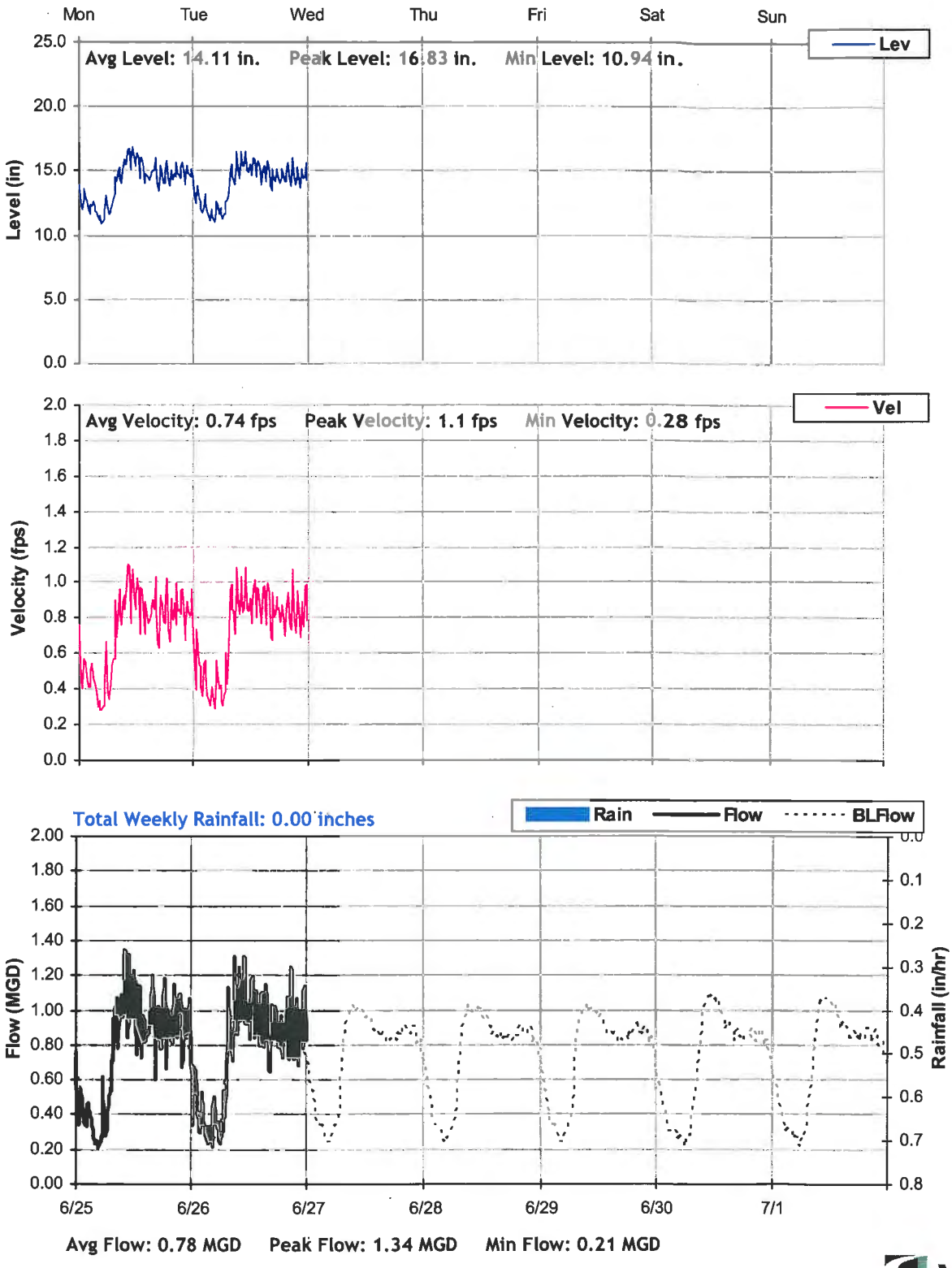


Avg Flow: 0.75 MGD Peak Flow: 1.49 MGD Min Flow: 0.12 MGD

V&A

Level, Velocity and Flow
From 6/25/2007 to 7/2/2007

Monitoring Site:
Site 15



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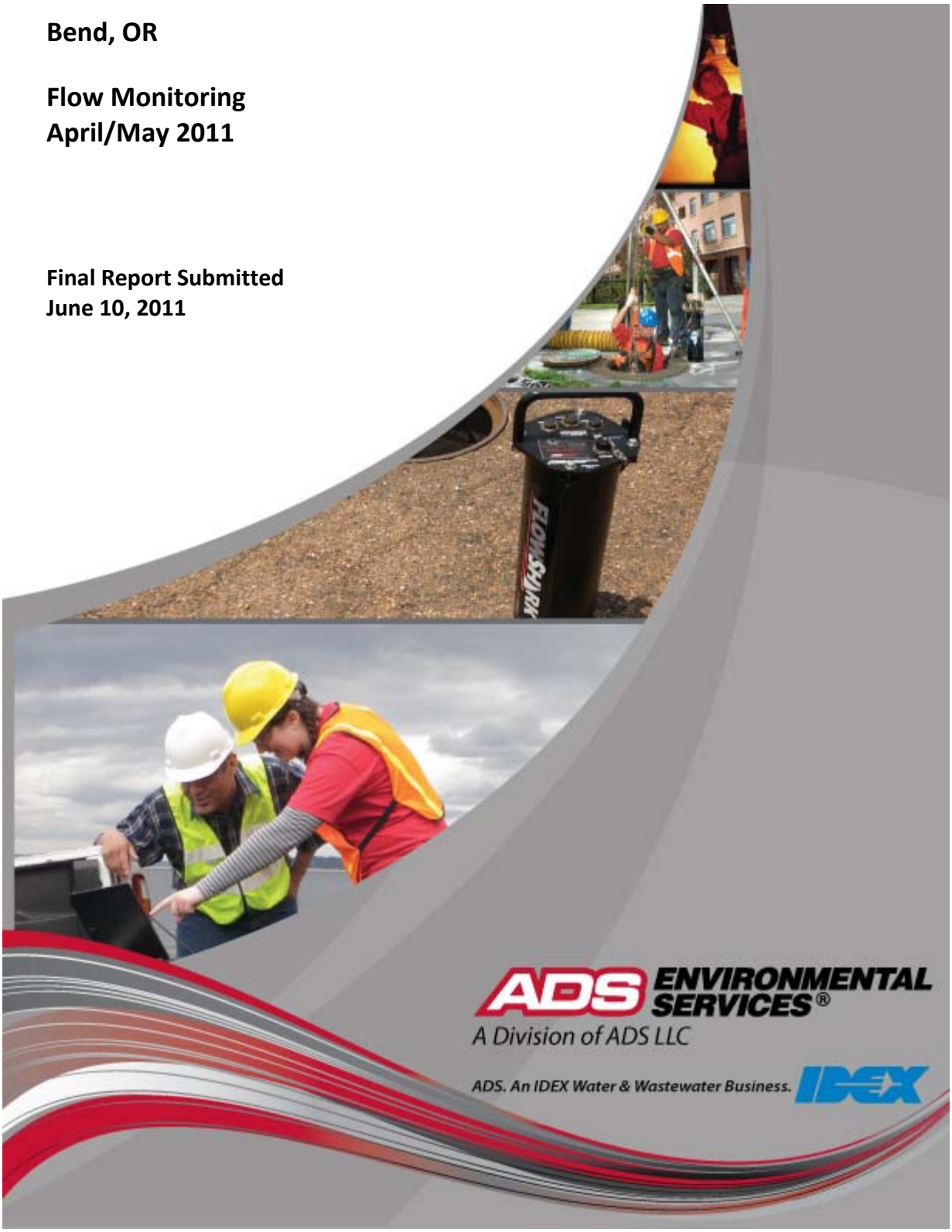
Bend, OR

Flow Monitoring
April/May 2011

Final Report Submitted
June 10, 2011



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June 10, 2011

Ken Vaughan
City of Bend - Public Works
Utility Services Division
62975 Boyd Acres Road
Bend, OR 97701
P (541) 330-4026
kvaughan@ci.bend.or.us

Re: Results and Analysis of Flow Monitoring Data – Final Report

Dear Mr. Vaughan,

Thank you for the opportunity to complete this flow monitoring work effort for the City of Bend, OR. Please find attached the electronic report of results and conclusions based on the flow monitoring study conducted April 9 - May 8, 2011.

Ken, we certainly look forward to other opportunities to work with the City on wastewater and water projects as they arise. If you have any questions regarding the content of this report, please do not hesitate to call me at (206) 255 6904.

Sincerely,

Gillian Woodward P.E. (WA)
Senior Project Engineer Pacific Northwest
gwoodward@idexcorp.com

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Site Commentary

Site Information

Bend_000178	
Measured Pipe Height (in)	41.88
Nominal Pipe Height (in)	42
Silt Level (in)	0.00

Overview

Monitoring point Bend_000178 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 . From Friday April 22, 2011 to Monday April 25, 2011 the raw velocity data was of poor quality that was likely caused by temporary debris obstructing the sensor. This data was flagged as invalid.

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	11.73	3.82	5.730
Minimum	5.96	2.11	1.197
Maximum	16.40	4.58	10.096
Time of Minimum	4/10/2011 7:20 AM	4/27/2011 6:55 AM	5/1/2011 6:40 AM
Time of Maximum	5/7/2011 12:15 PM	5/6/2011 9:50 AM	5/7/2011 12:10 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	89.48
Quantity	89.48

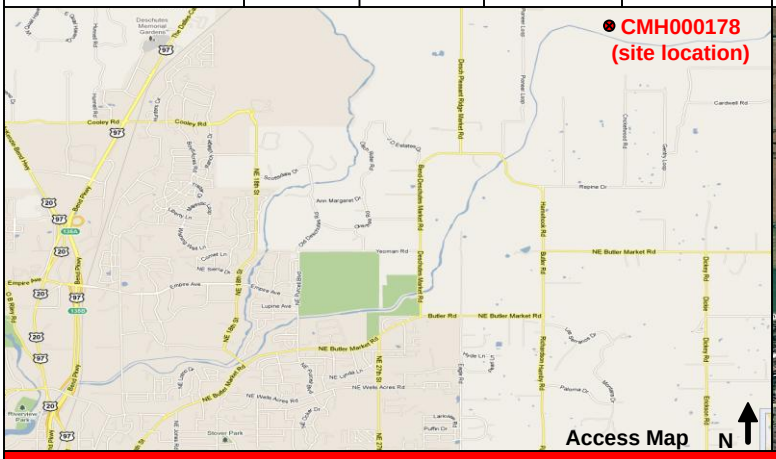
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_000178	**Monitor Series:**	5000 AG
Address/Location:	Along North Canal		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21722
Manhole #	CMH000178
Coordinates:	44° 7'9.93"N 121°14'8.13"W
Pipe Height:	41.88"
Pipe Width:	41.63"
IP Address:	166.219.169.175



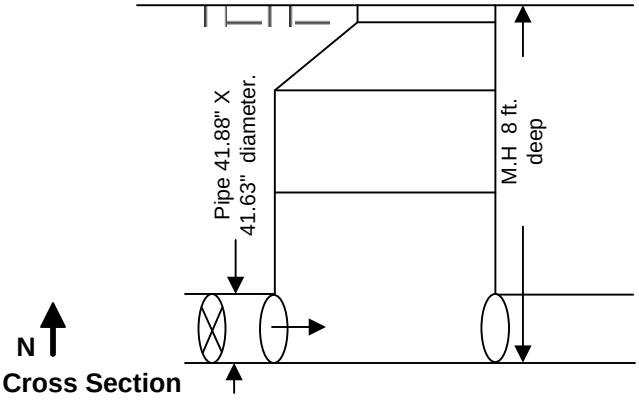
Investigation Information:

Date/Time of Investigation:	3/29/11 @ 15:39
Site Hydraulics:	Small waves and fast flow
Upstream Input: (L/S, P/S)	No Influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	11.88" +/- 0.25"
Range (Air DOF):	29.88" +/- 0.25"
Peak Velocity:	4.71 fps
Silt:	0 Inches

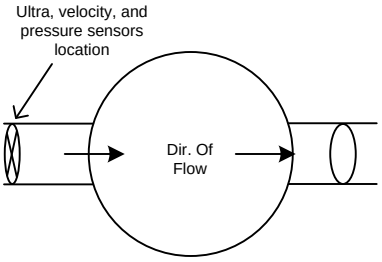
Manhole Information:

Manhole Depth:	8' - 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [ ]	Commercial [ ]	Industrial [ ]	Trunk [X]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:



Cross Section



Planar N

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk	[ ]	[X]	[ ]	
Sensors Devices:	Ultra, Velocity, Pressure	Lift / Pump Station	[ ]	[X]	[ ]	
Surcharge Height:	None observed	WWTP	[ ]	[X]	[ ]	
Rain Gauge Zone:	Bend_JRRG	Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_000178	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

No site specific hazards found at this site.

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/29/11	Date: 3/29/11

Bend_000178

Site set up

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Photo taken
3.29.11 @ 17:16

Bend_000178

Site set up

ADS ENVIRONMENTAL SERVICES®

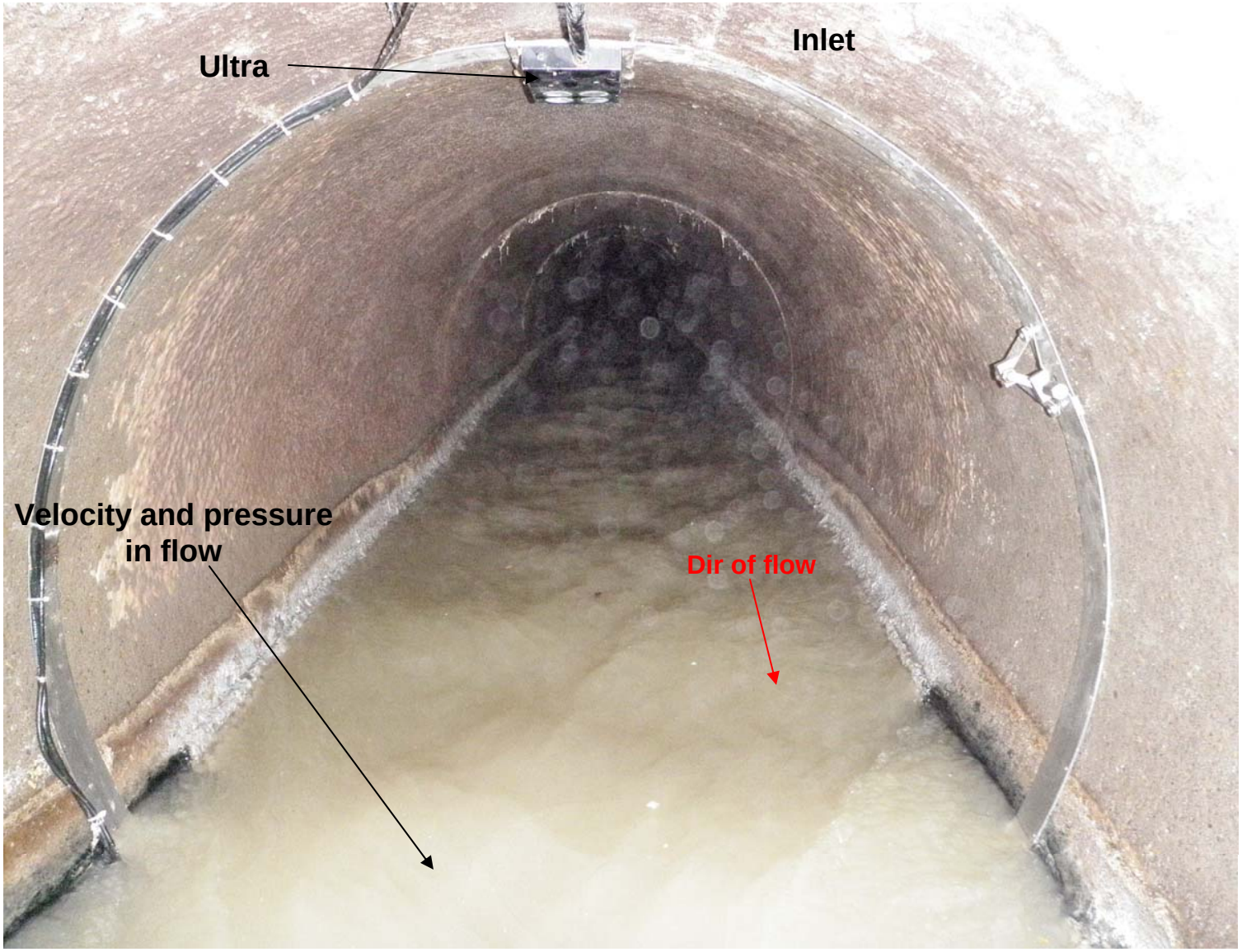
View down manhole facing north

Photo taken
3.29.11 @ 17:06

Bend_000178

Site set up

ADS ENVIRONMENTAL SERVICES®

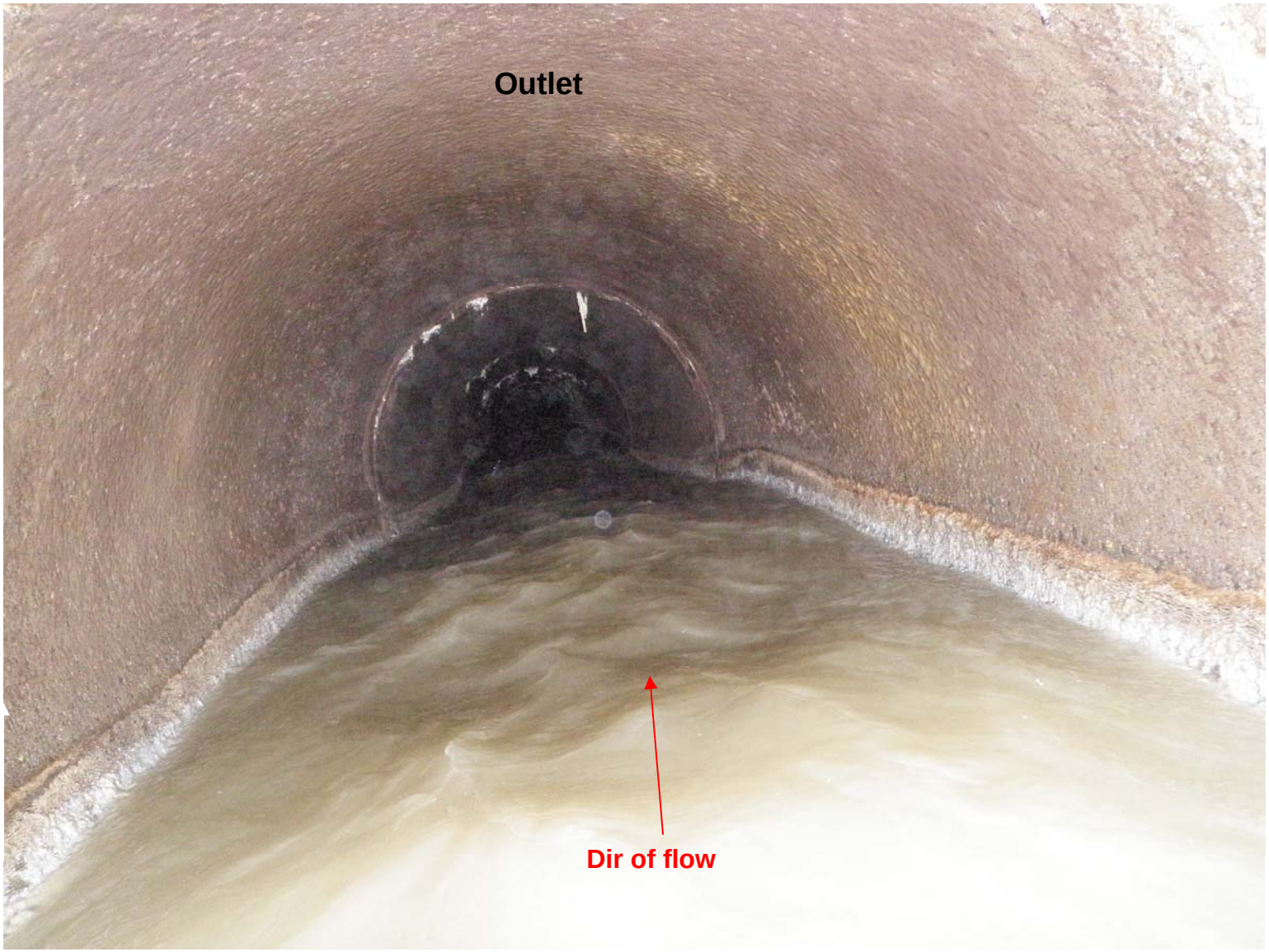


View of sensor placement and site hydraulics

Photo taken 3.29.11 @ 16:13

Bend_000178

Site set up



View of outlet and hydraulics

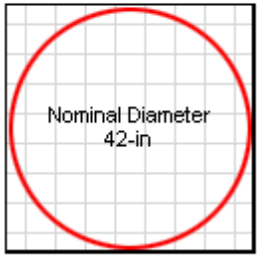
Photo taken
3.29.11 @ 15:54

SCATTERGRAPH REPORT

Bend_000178

Flow Monitor

Bend_000178

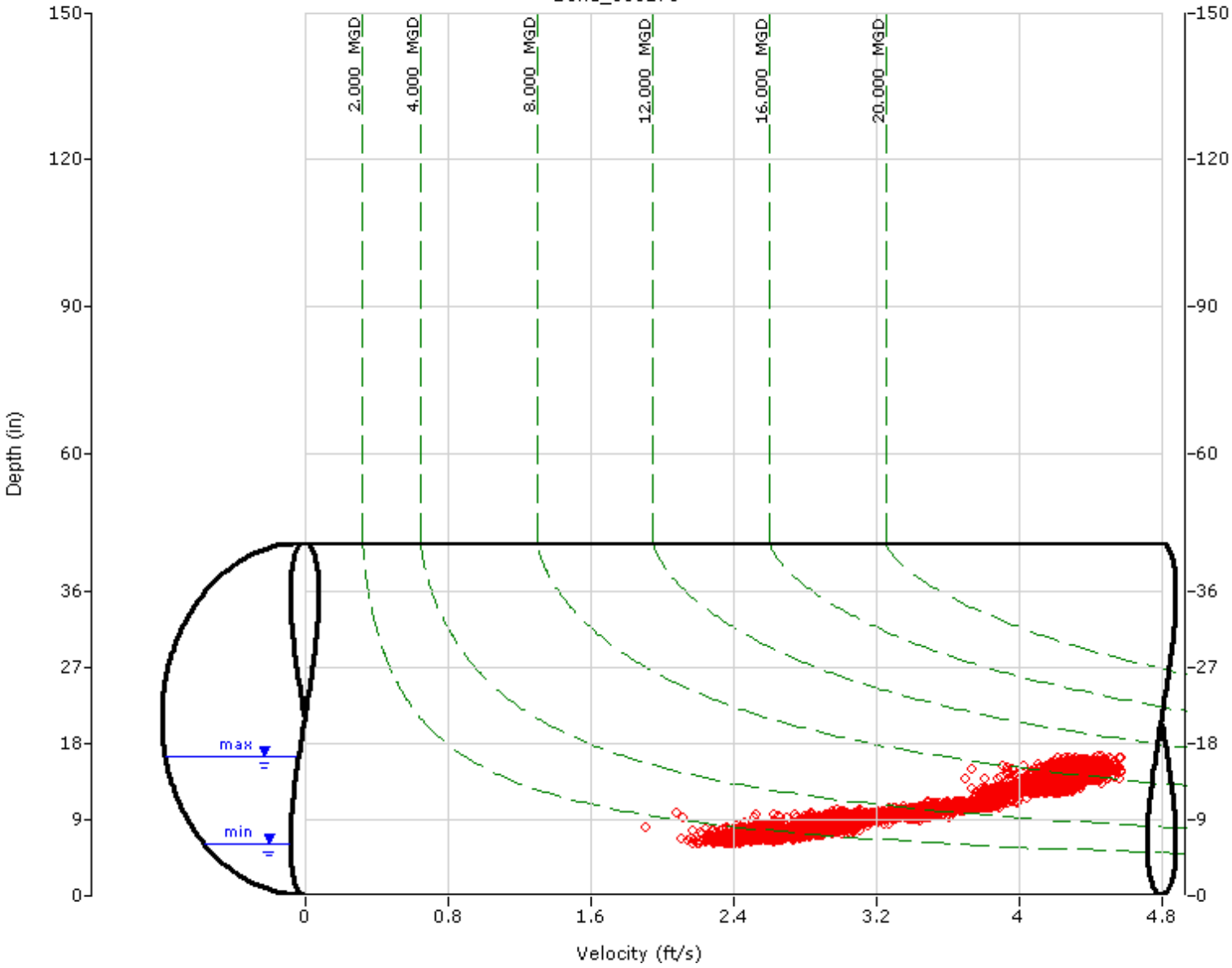


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_000178

Flow Monitor

Bend_000178

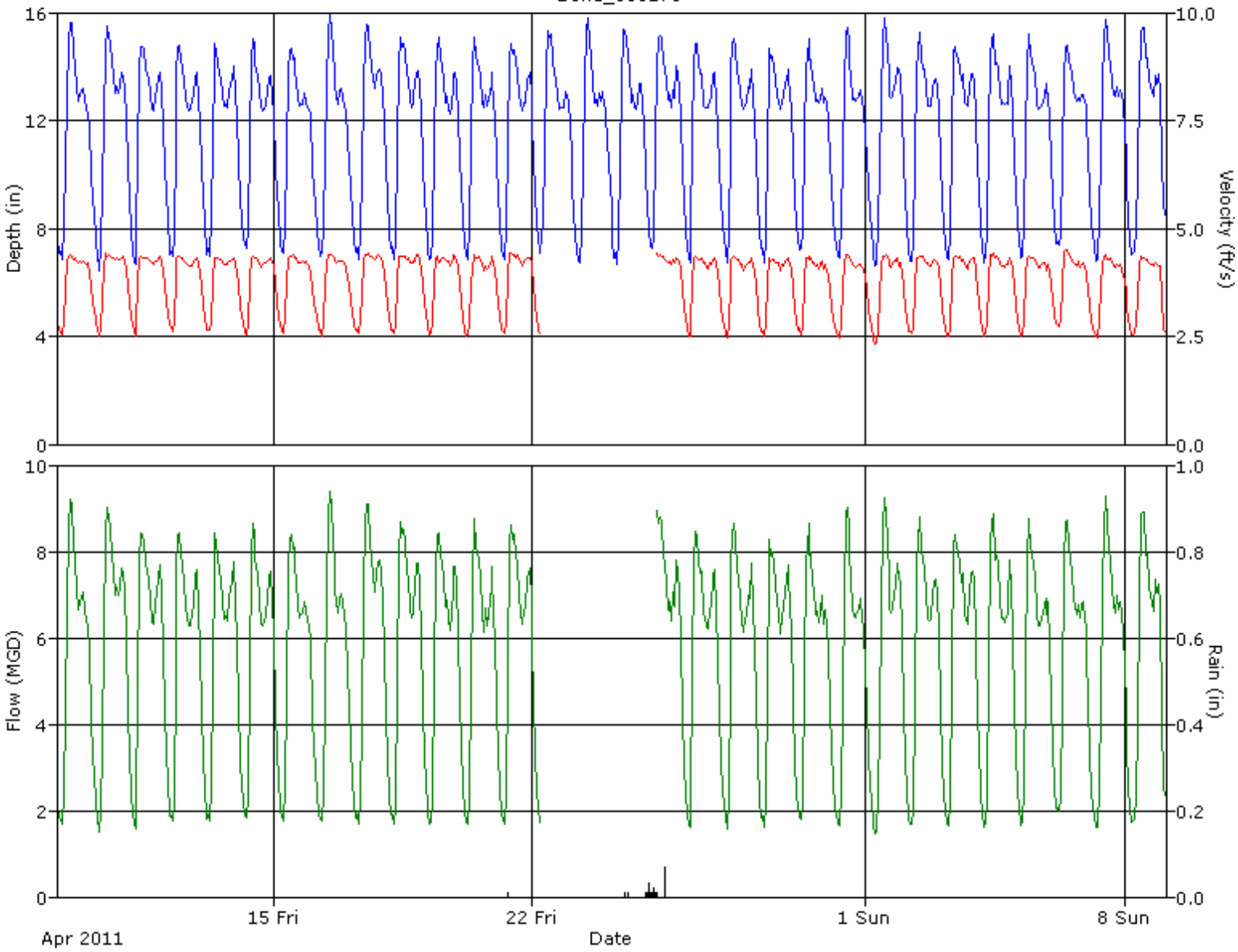
Nominal Diameter
42-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_000311	
Measured Pipe Height (in)	35.755
Nominal Pipe Height (in)	36
Silt Level (in)	0.00

Overview

Monitoring point Bend_000311 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	10.85	4.02	4.862
Minimum	5.04	2.32	0.955
Maximum	15.48	4.87	8.569
Time of Minimum	5/1/2011 5:25 AM	4/9/2011 5:55 AM	5/1/2011 5:20 AM
Time of Maximum	4/27/2011 10:05 AM	5/4/2011 9:45 AM	4/23/2011 11:35 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_000311

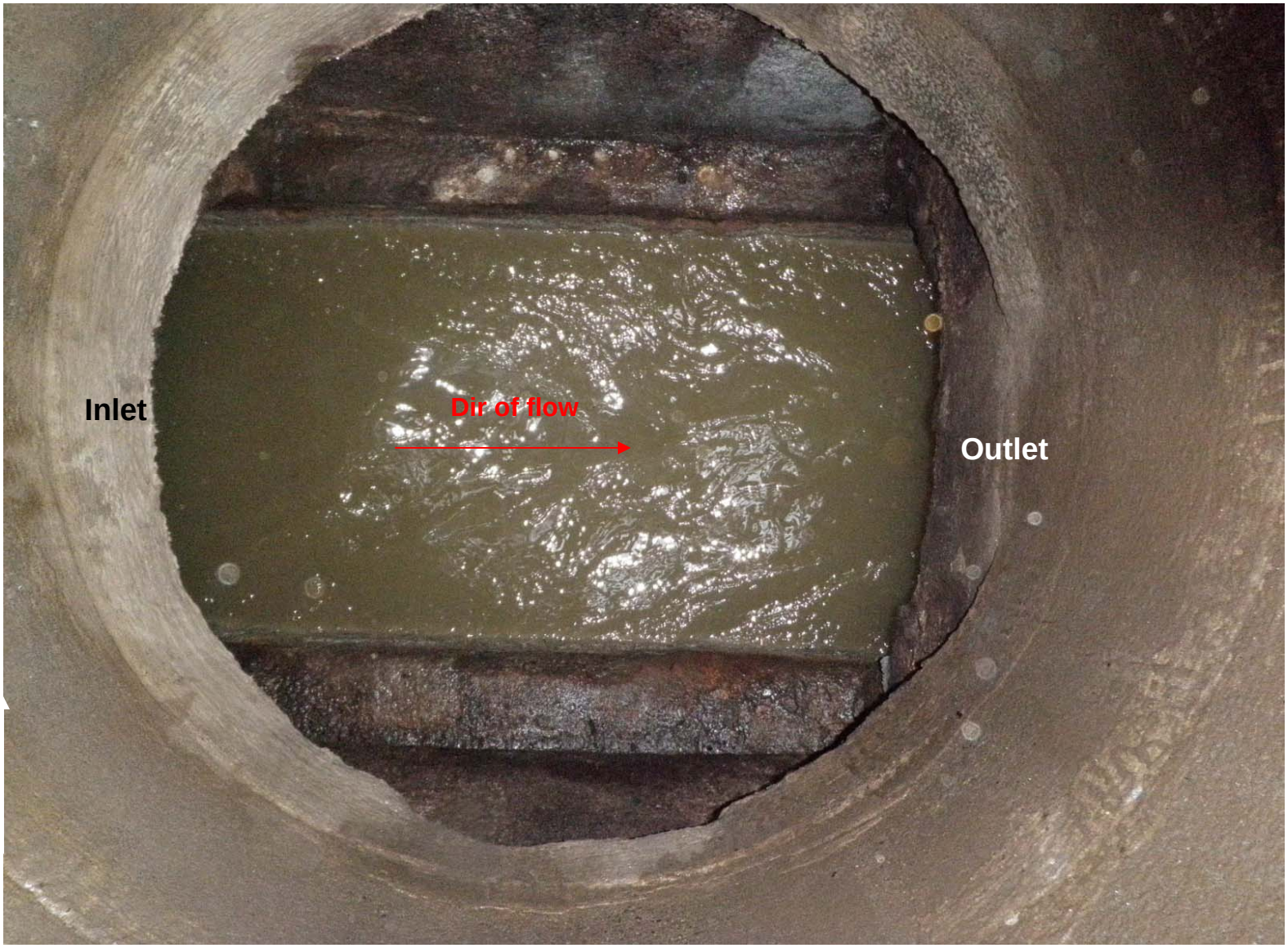
Site location

Site access looking north

Bend_000311

Site set up

ADS ENVIRONMENTAL SERVICES®

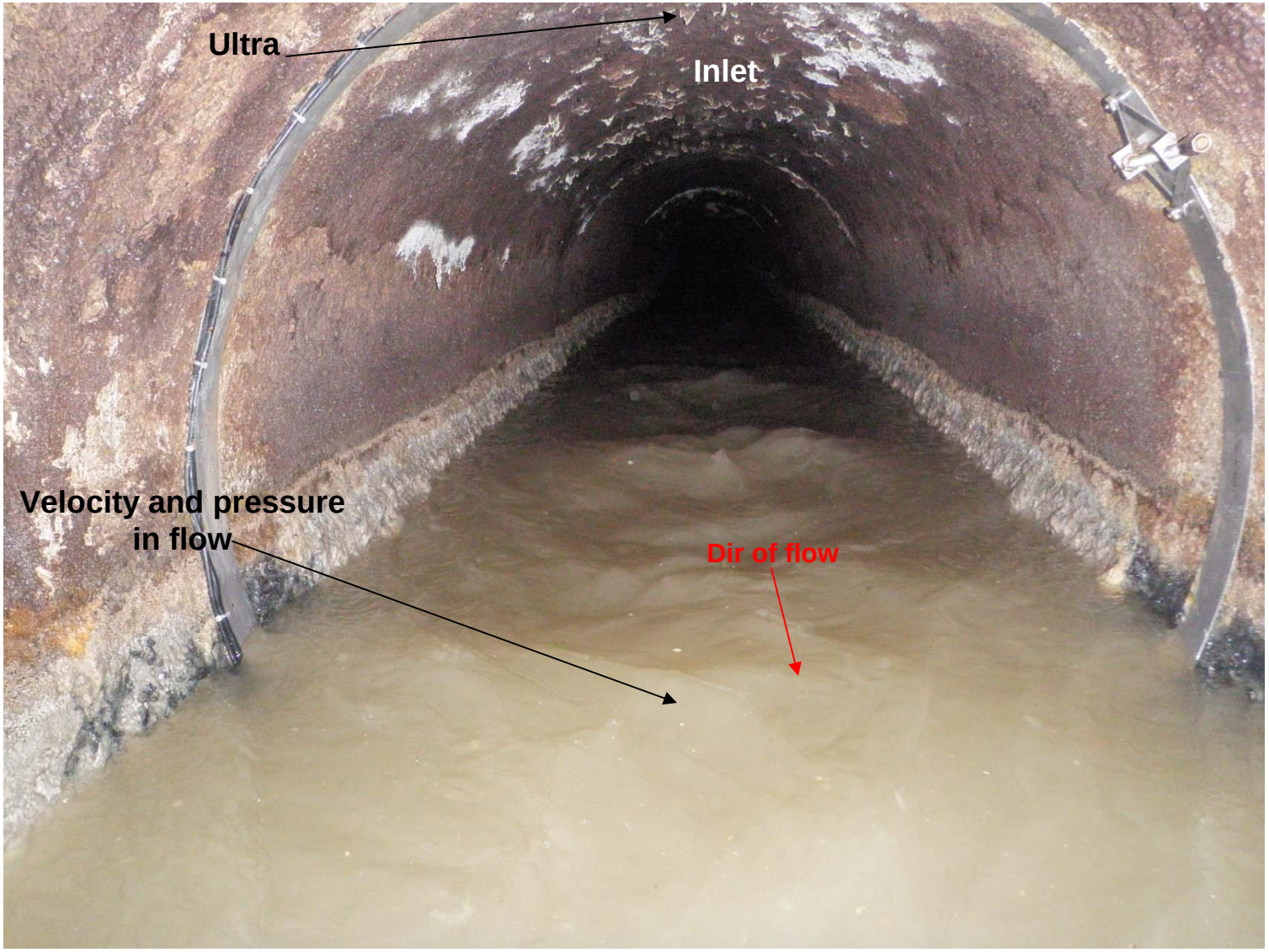


View down manhole facing north

Bend_000311

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_000311

Site outlet

View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW
Site Name:	Bend_000311	**Monitor Series:**	5000 AG		
Address/Location:	South of NE Madison Ave. on NE Butler Market Rd.				
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]		

Monitor S/N:	21730
Manhole #	CMH000311
Coordinates:	44°05'00.06" N, 121°16'32.85" W
Pipe Height:	35.755"
Pipe Width:	35.755"
IP Address:	166.219.169.172

Investigation Information:

Date/Time of Investigation:	4/07/11 @ 13:10
Site Hydraulics:	Small waves
Upstream Input: (L/S, P/S)	No influences
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	11.50" +/- .38"
Range (Air DOF):	32.88" +/- .38"
Peak Velocity:	4.90 fps
Silt:	0 Inches

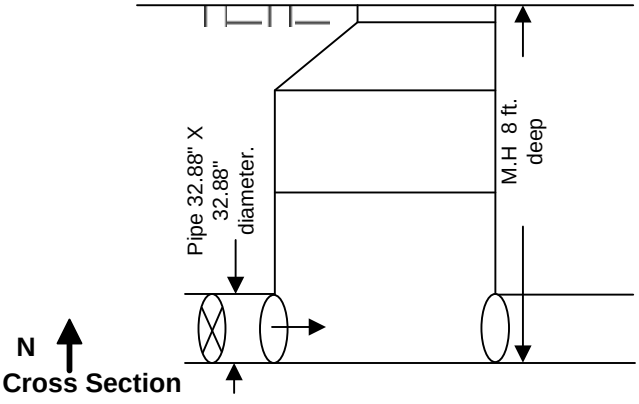
Manhole Information:

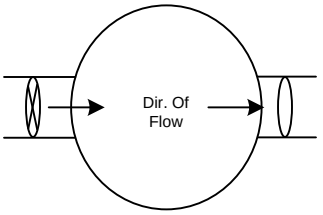
Manhole Depth:	8' – 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good

Mini System Character:	Residential [ ]	Commercial [ ]	Industrial [ ]	Trunk [X]

Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_000311	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	X
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	X
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site is located in a 45 mph speed limit zone, requiring an approved traffic control plan. (Traffic Control Plan attached)
Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
X	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

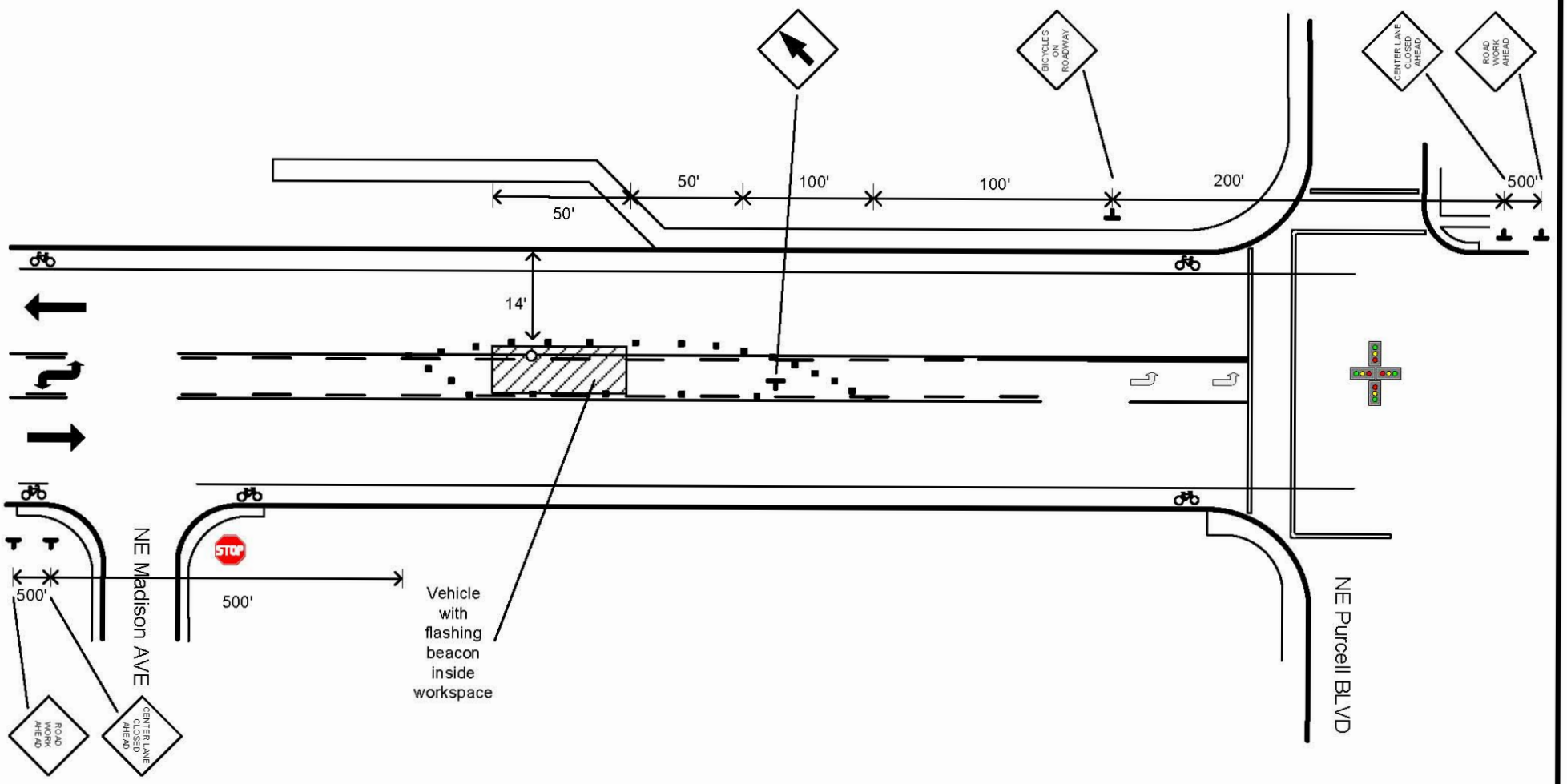
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/7/11	Date: 4/7/11

ADS ENVIRONMENTAL SERVICES®	Site Name:	Address:		Drawn: 03/31/11	Rev.	Pg.	Bend, OR
4455 South 134th Place Tukwila, WA 98168	Bend_000311 MH #: CMH000311	1950 NE Butler Market RD Bend, OR	N	Submitted: 04/05/11	0	1 of 1	Temporary Flow Monitoring
				Approved:	Not to Scale		



Posted Speed Limit

SPEED LIMIT 45

Site Access
4/05/11 – 5/13/11
10:00am-3:00pm

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

SCATTERGRAPH REPORT

Bend_000311

Flow Monitor

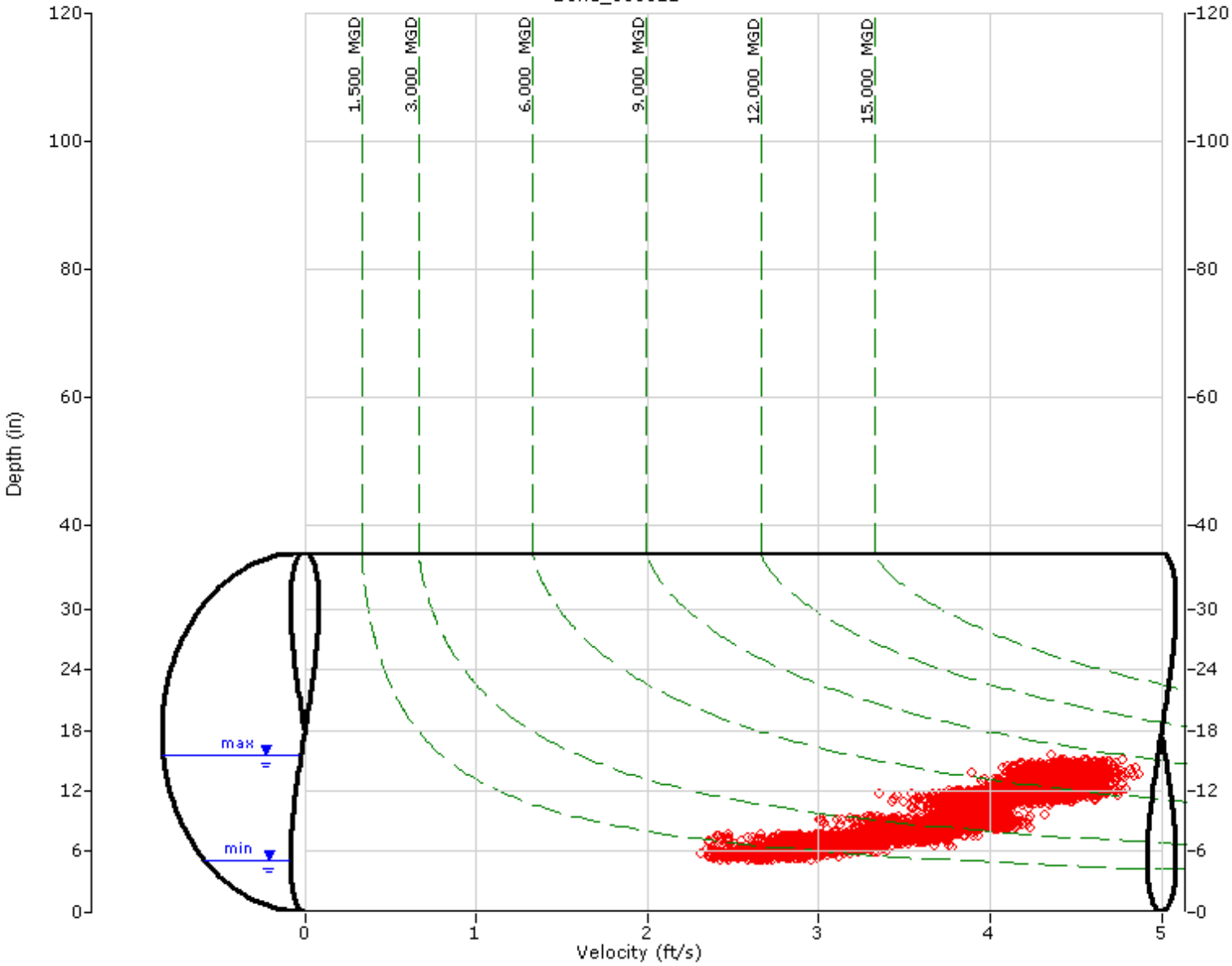
Bend_000311

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_000311

Flow Monitor

Bend_000311

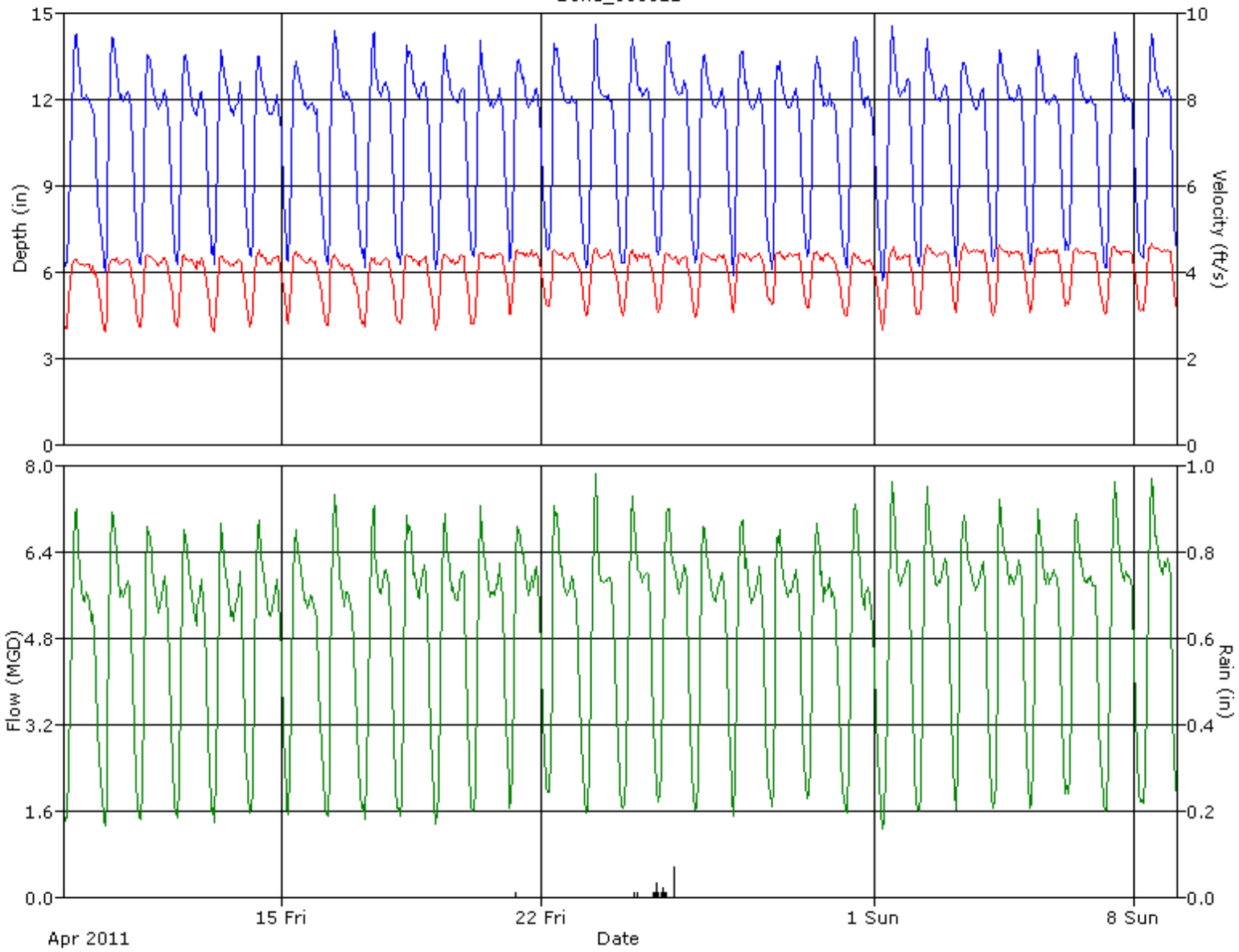
Nominal Diameter
36-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_000317	
Measured Pipe Height (in)	27.13
Nominal Pipe Height (in)	27
Silt Level (in)	0.00

Overview

Monitoring point Bend_000317 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted. Upon review of the final flow balance with the upstream locations it was recognized that the velocity data was subtly deteriorated in quality over the study period. For this reason a depth versus velocity best fit curve was created from the April 9 - April 16, 2011 data set and used to reconstitute velocities outside a 0.5ft/s tolerance for the remainder of the period. 50% of the velocity data was reconstituted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	7.23	5.37	3.255
Minimum	3.02	1.23	0.218
Maximum	10.84	7.34	5.985
Time of Minimum	4/21/2011 5:15 AM	5/7/2011 5:20 AM	5/7/2011 5:20 AM
Time of Maximum	5/4/2011 10:50 AM	5/4/2011 12:10 PM	4/27/2011 10:00 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_000317

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking west

Bend_000317

Site set up

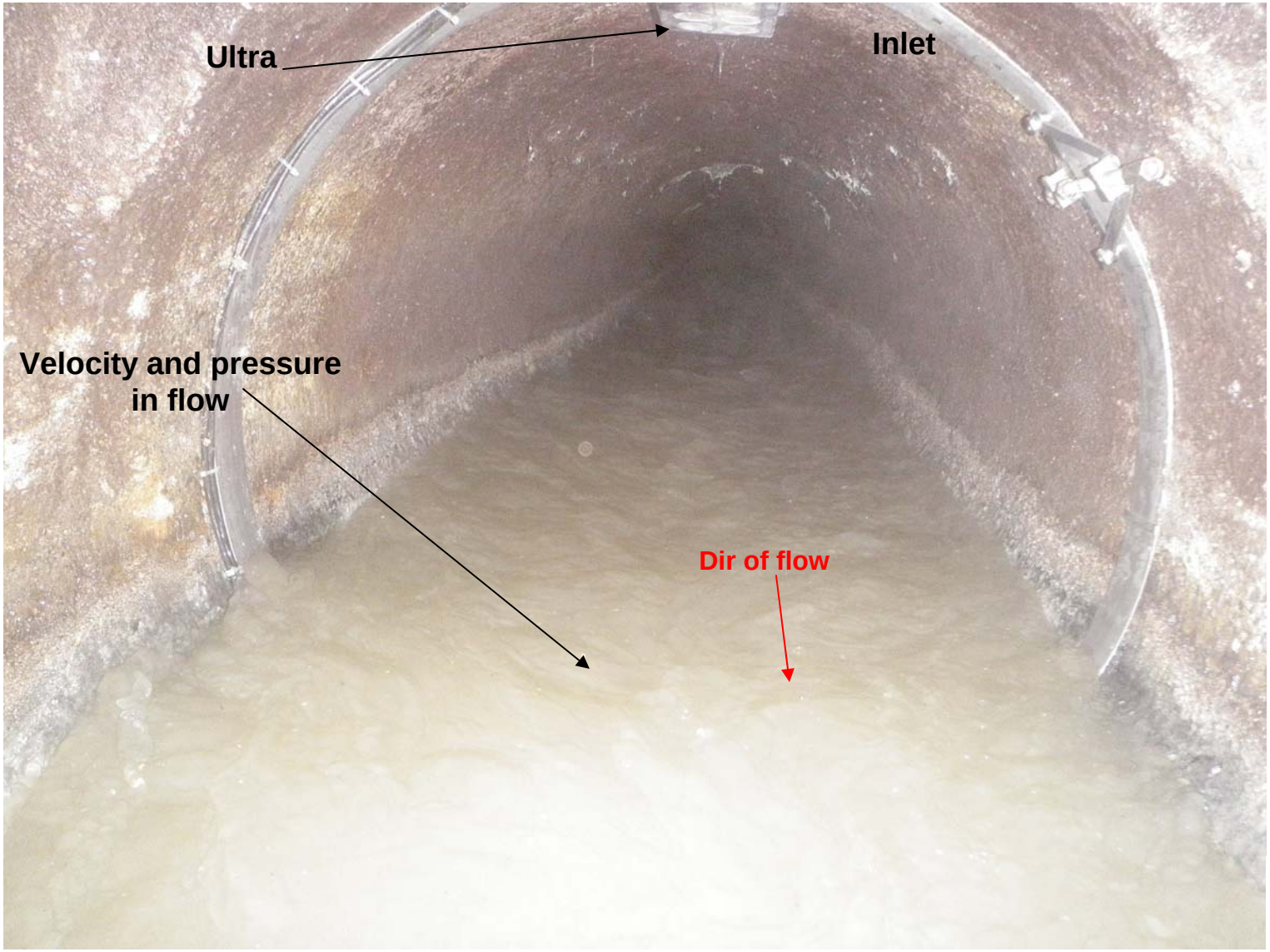
ADS ENVIRONMENTAL SERVICES®

View down manhole facing northwest

Bend_000317

Site set up

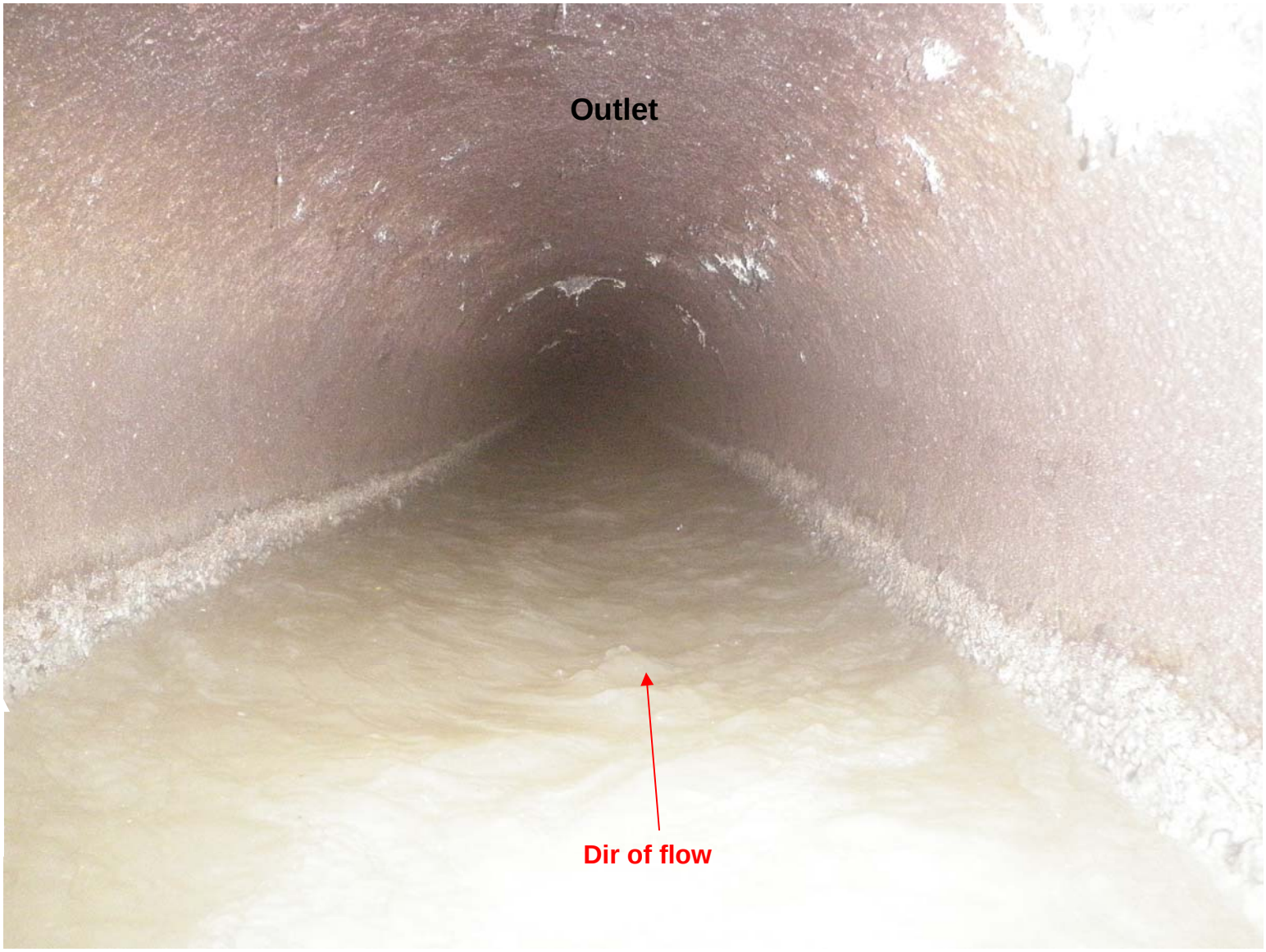
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_000317

Site outlet



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_000317	**Monitor Series:**	5000 AG
Address/Location:	1630 NE Butler Market Rd		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21514
Manhole #	CMH000317
Coordinates:	44° 4'52.99"N 121°16'51.75"W
Pipe Height:	27.13"
Pipe Width:	27.00"
IP Address:	166.219.51.88

Investigation Information:

Date/Time of Investigation:	4/7/11 @ 11:08
Site Hydraulics:	Small waves and fast flow
Upstream Input: (L/S, P/S)	No Influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	8.50" +/- 0.38"
Range (Air DOF):	18.63" +/- 0.25"
Peak Velocity:	8.05 fps
Silt:	0 Inches

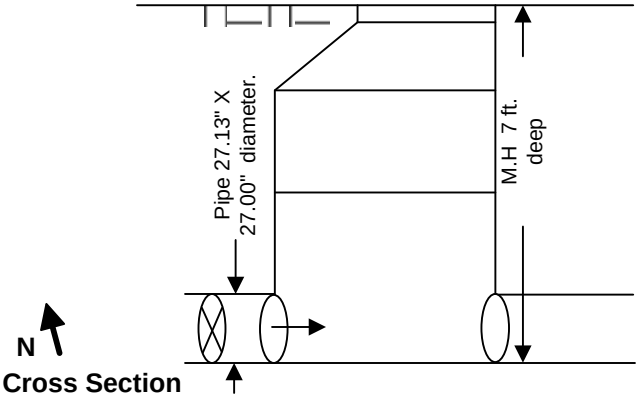
Manhole Information:

Manhole Depth:	7' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good

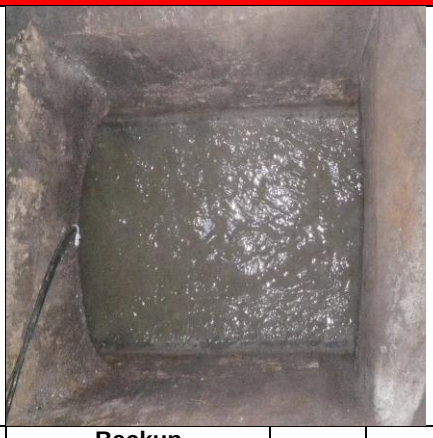
Mini System Character:	Residential	Commercial	Industrial	Trunk
	[ ]	[ ]	[ ]	[X]

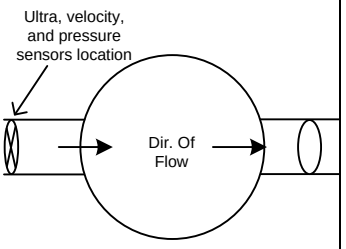
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:



Cross Section





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_000317	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

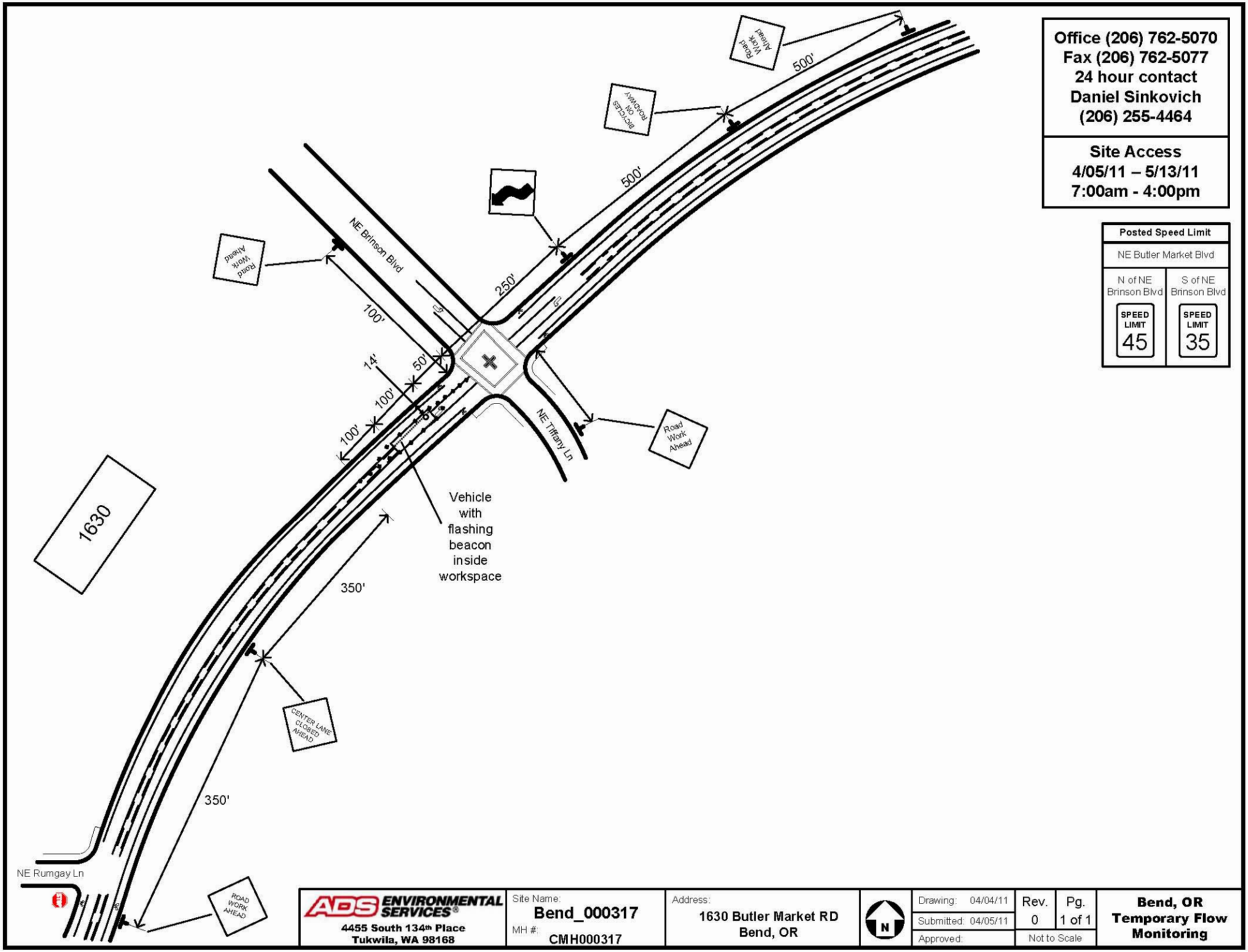
Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/7/11	Date: 4/7/11

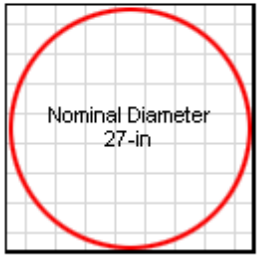

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464
Site Access
4/05/11 – 5/13/11
7:00am - 4:00pm
Posted Speed Limit
NE Butler Market Blvd
N of NE Brinson Blvd
SPEED LIMIT 45
S of NE Brinson Blvd
SPEED LIMIT 35
Road Work Ahead
BICYCLES ON ROADWAY
500'
500'
NE Brinson Blvd
Road Work Ahead
250'
100'
14'
50'
100'
100'
NE Tiffany Ln
Road Work Ahead
1630
Vehicle with flashing beacon inside workspace
350'
CENTER LANE CLOSED AHEAD
350'
NE Rumgay Ln
ROAD WORK AHEAD
ADS ENVIRONMENTAL SERVICES®
4455 South 134th Place
Tukwila, WA 98168
Site Name:
Bend_000317
MH #:
CMH000317
Address:
1630 Butler Market RD
Bend, OR
N
Drawing: 04/04/11
Submitted: 04/05/11
Approved:
Rev. 0
Pg. 1 of 1
Not to Scale
Bend, OR
Temporary Flow Monitoring

SCATTERGRAPH REPORT

Bend_000317

Flow Monitor

Bend_000317

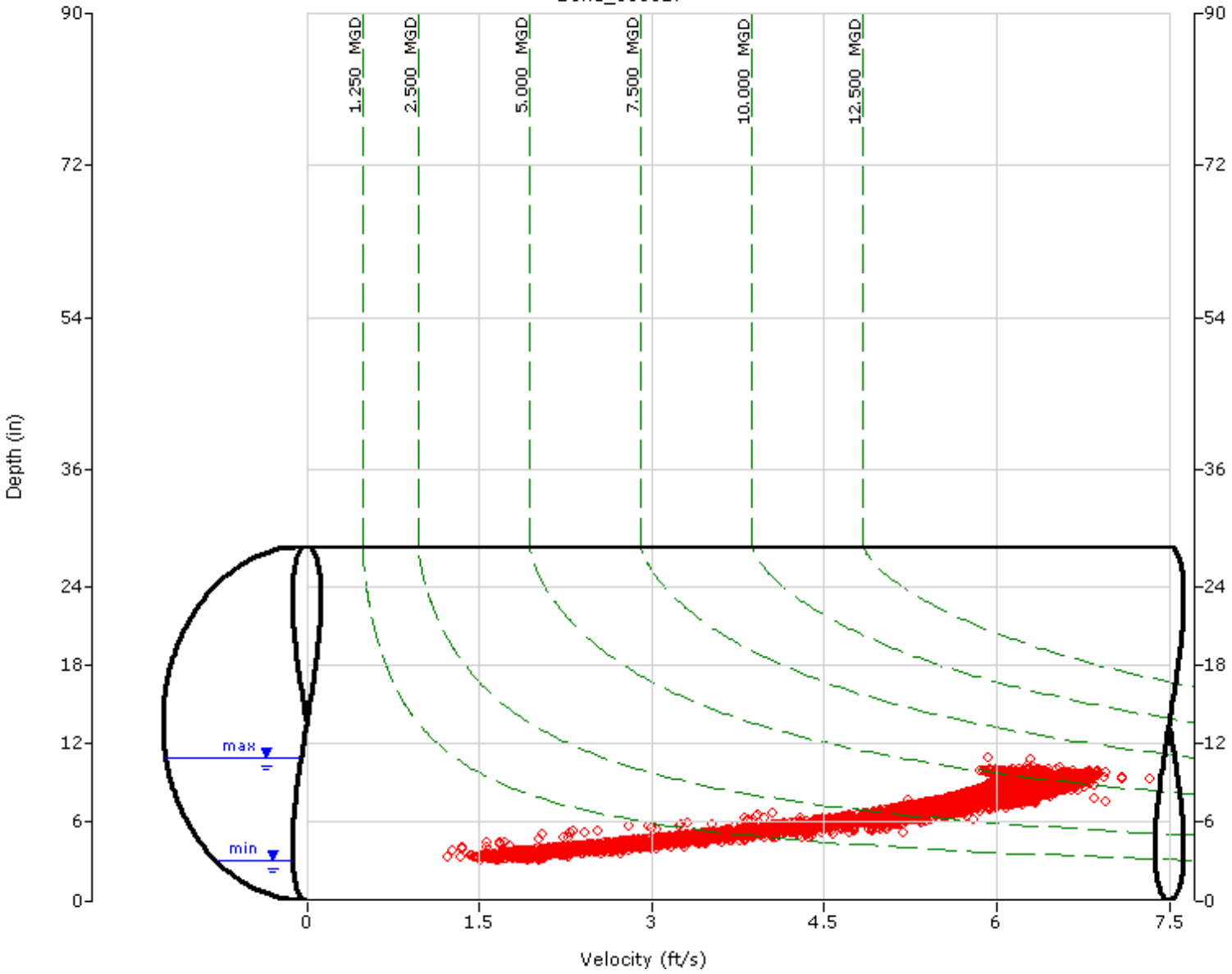


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_000317

Flow Monitor

Bend_000317

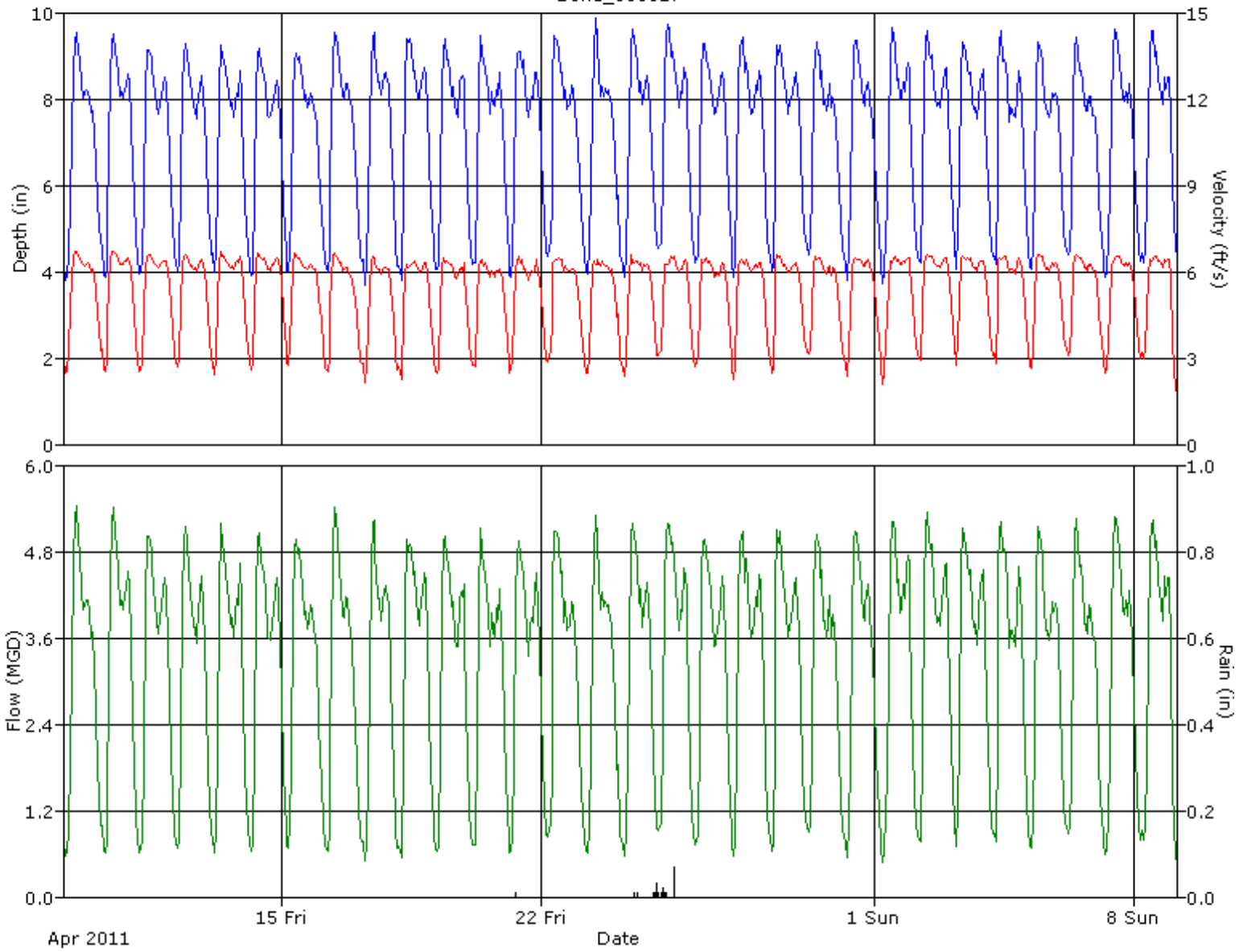
Nominal Diameter
27-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_001293	
Measured Pipe Height (in)	17.75
Nominal Pipe Height (in)	18
Silt Level (in)	0.00

Overview

Monitoring point Bend_001293 was located in the East of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	4.65	1.12	0.277
Minimum	2.41	0.16	0.018
Maximum	6.94	1.85	0.675
Time of Minimum	5/5/2011 4:45 AM	5/6/2011 7:00 AM	5/8/2011 6:35 AM
Time of Maximum	4/27/2011 9:35 AM	4/18/2011 12:00 PM	4/13/2011 12:55 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.79
Quantity	99.79

Bend_001293

Site location

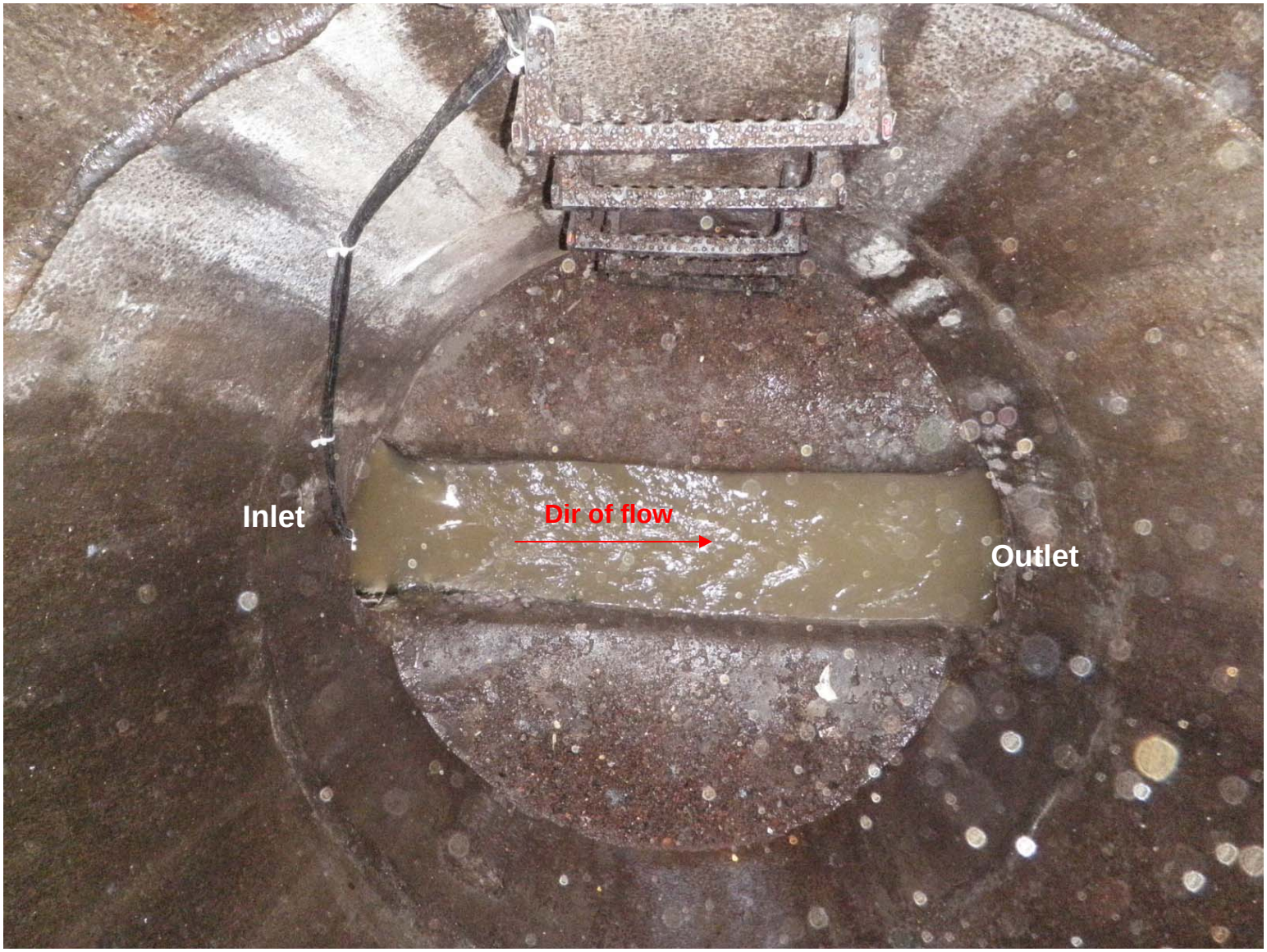
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_001293

Site set up

ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_001293

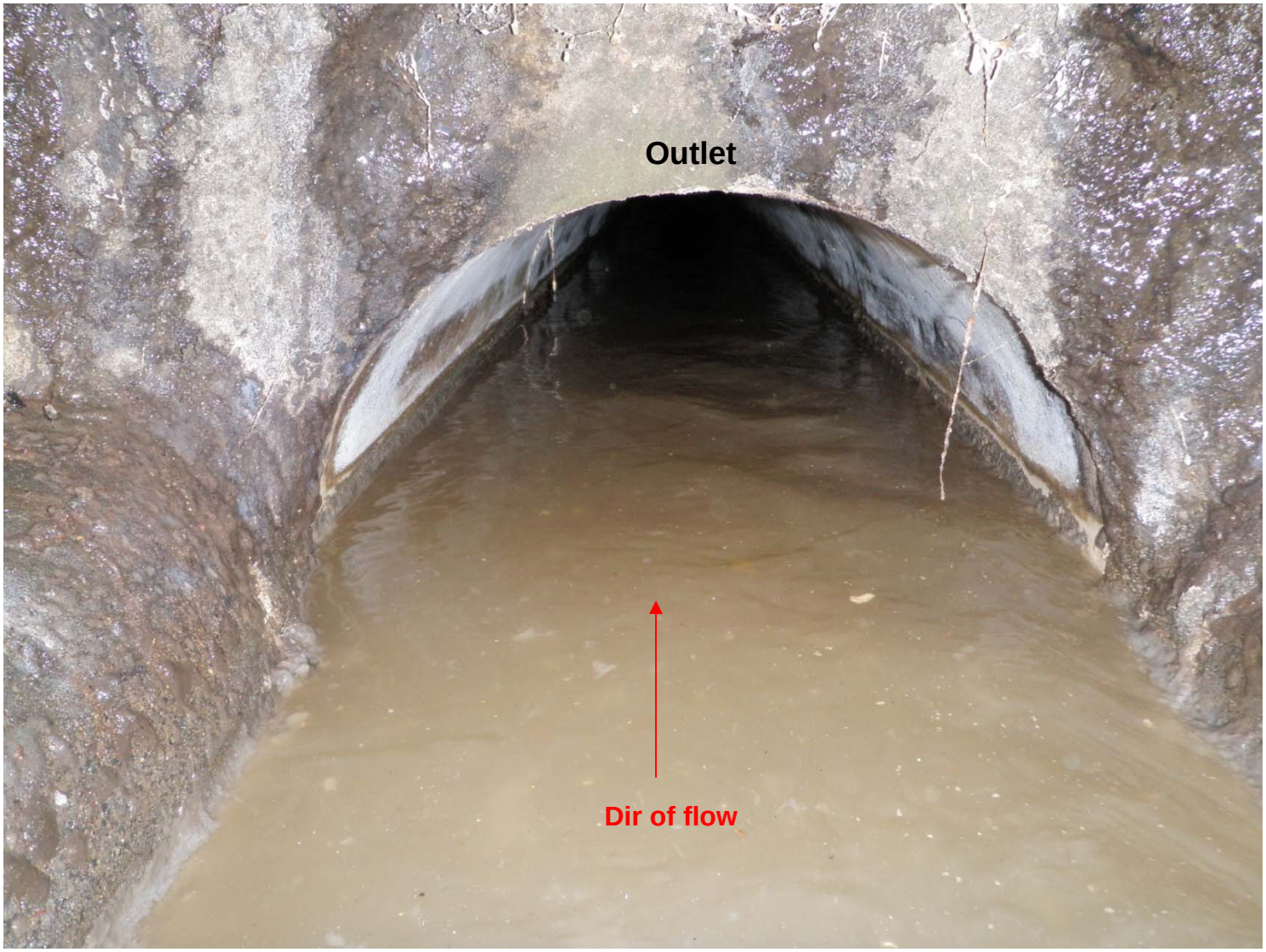
Site set up

ADS ENVIRONMENTAL SERVICES®

View of sensor placement and site hydraulics

Bend_001293

Site outlet

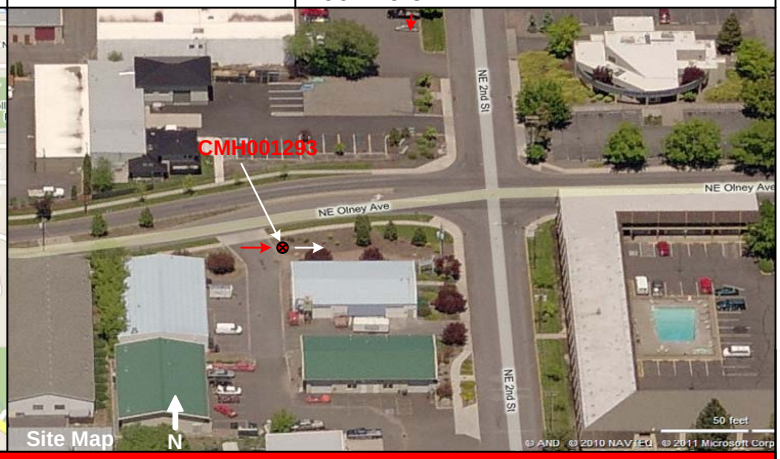


View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:** Bend, OR	**FM Initials:** SW
Site Name: Bend_001293	**Monitor Series:** 5000 AG	**Monitor S/N:**	20034
Address/Location:	147 NE Olney Ave.	**Manhole #**	CMH001293
		Coordinates:	44°03'53.17" N, 121°18'15.61" W
		Pipe Height:	17.75"
Access: Drive	**Type of System:** Sanitary [X] Storm [ ] Combined [ ]	**Pipe Width:**	17.63"
		IP Address:	166.219.51.171



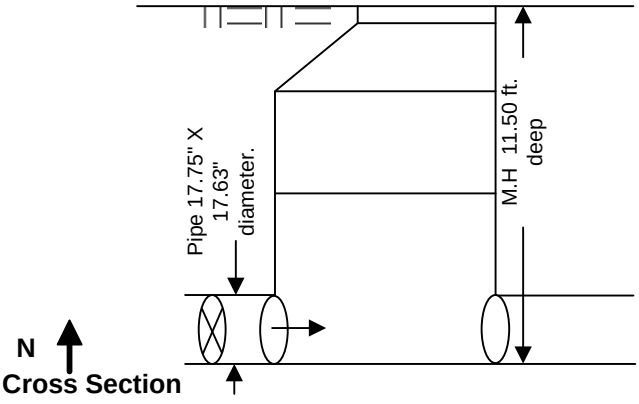
Investigation Information:

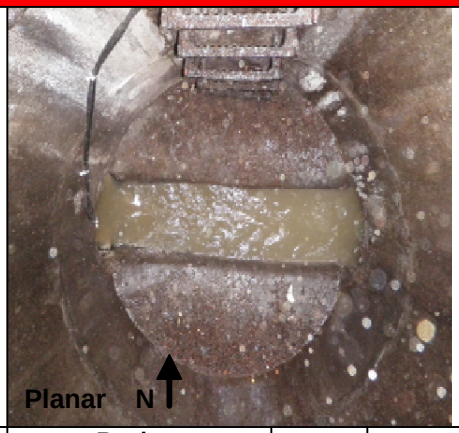
Date/Time of Investigation:	3/24/11 @ 14:16
Site Hydraulics:	Ripples
Upstream Input: (L/S, P/S)	No immediate influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	5.25" +/- .25"
Range (Air DOF):	12.50" +/- .38"
Peak Velocity:	3.00 fps
Silt:	0 Inches

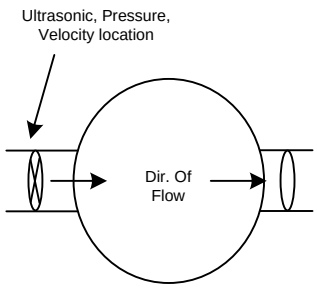
Manhole Information:

Manhole Depth:	11.50"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [X]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_001293	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☐
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

- ☒ This worksite does NOT require a traffic control Plan
- ☐ Standard Traffic Control Plan is to be used at this work site
- ☐ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/24/11	Date: 3/24/11

SCATTERGRAPH REPORT

Bend_001293

Flow Monitor

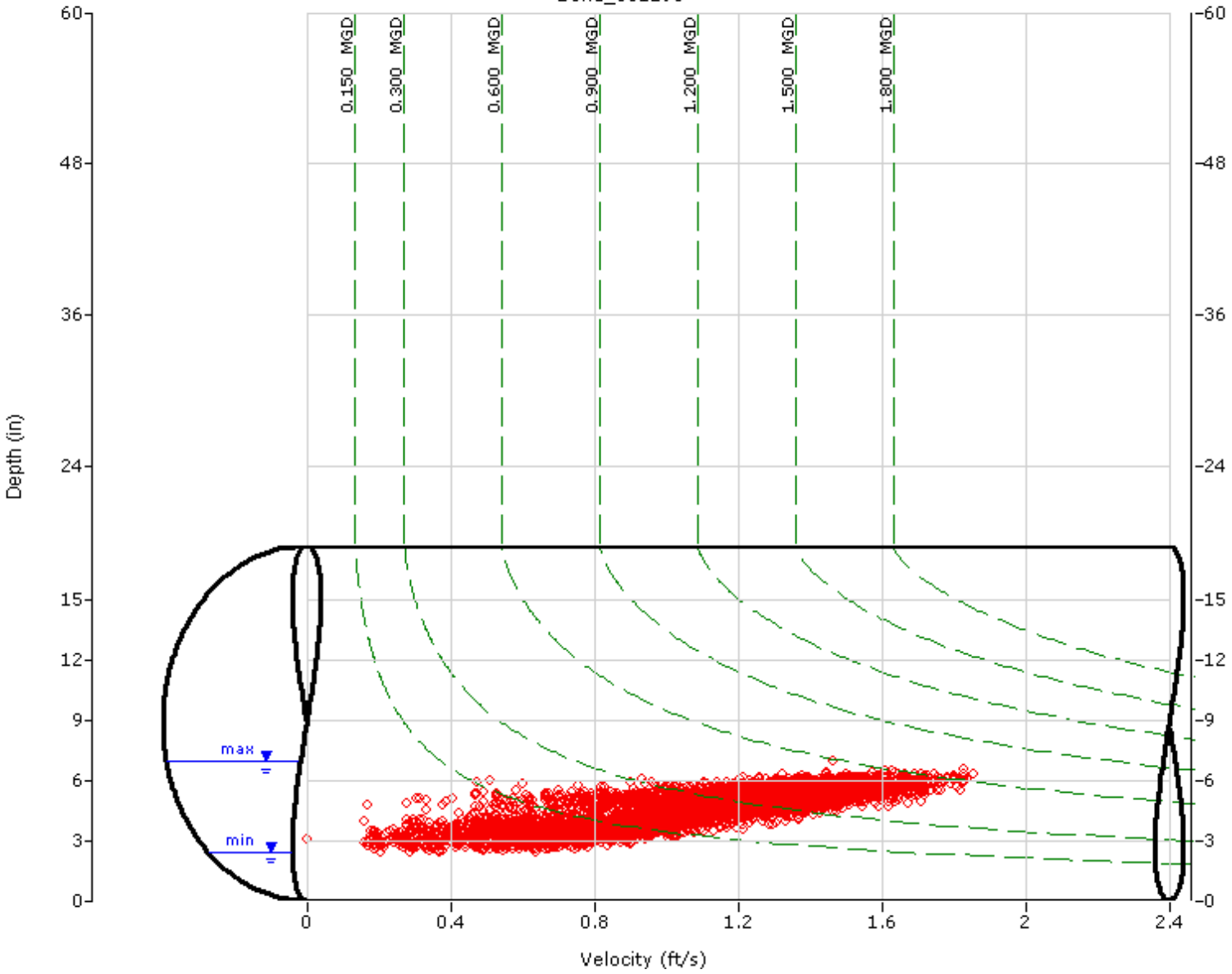
Bend_001293

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_001293

Flow Monitor

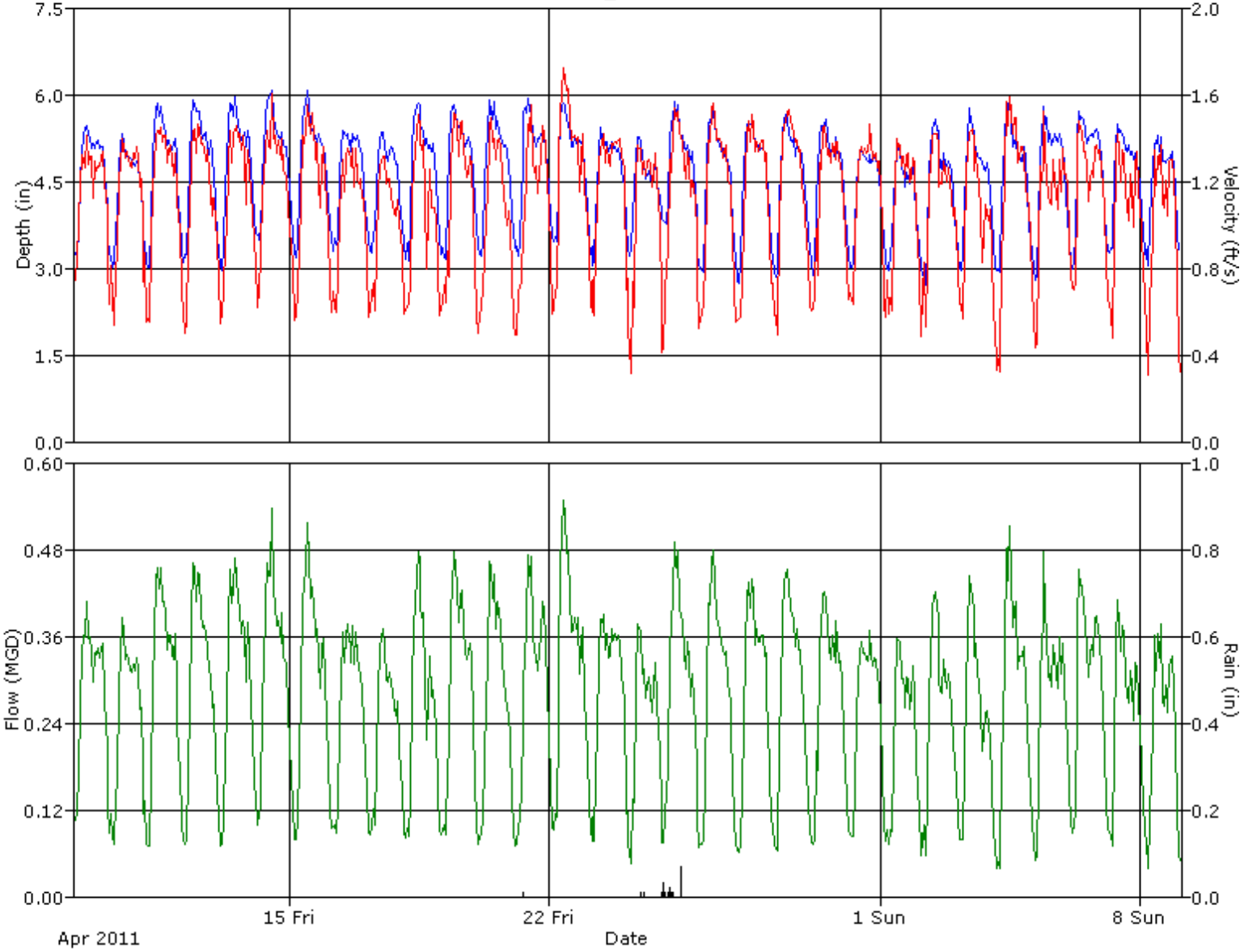
Bend_001293

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_001579	
Measured Pipe Height (in)	23.88
Nominal Pipe Height (in)	24
Silt Level (in)	0.00

Overview

Monitoring point Bend_001579 was located in the Southwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	5.81	2.60	1.064
Minimum	2.77	1.43	0.186
Maximum	8.68	3.60	2.379
Time of Minimum	4/18/2011 5:25 AM	4/18/2011 5:25 AM	4/18/2011 5:25 AM
Time of Maximum	4/10/2011 11:50 AM	4/10/2011 11:50 AM	4/10/2011 11:50 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_001579
Site location

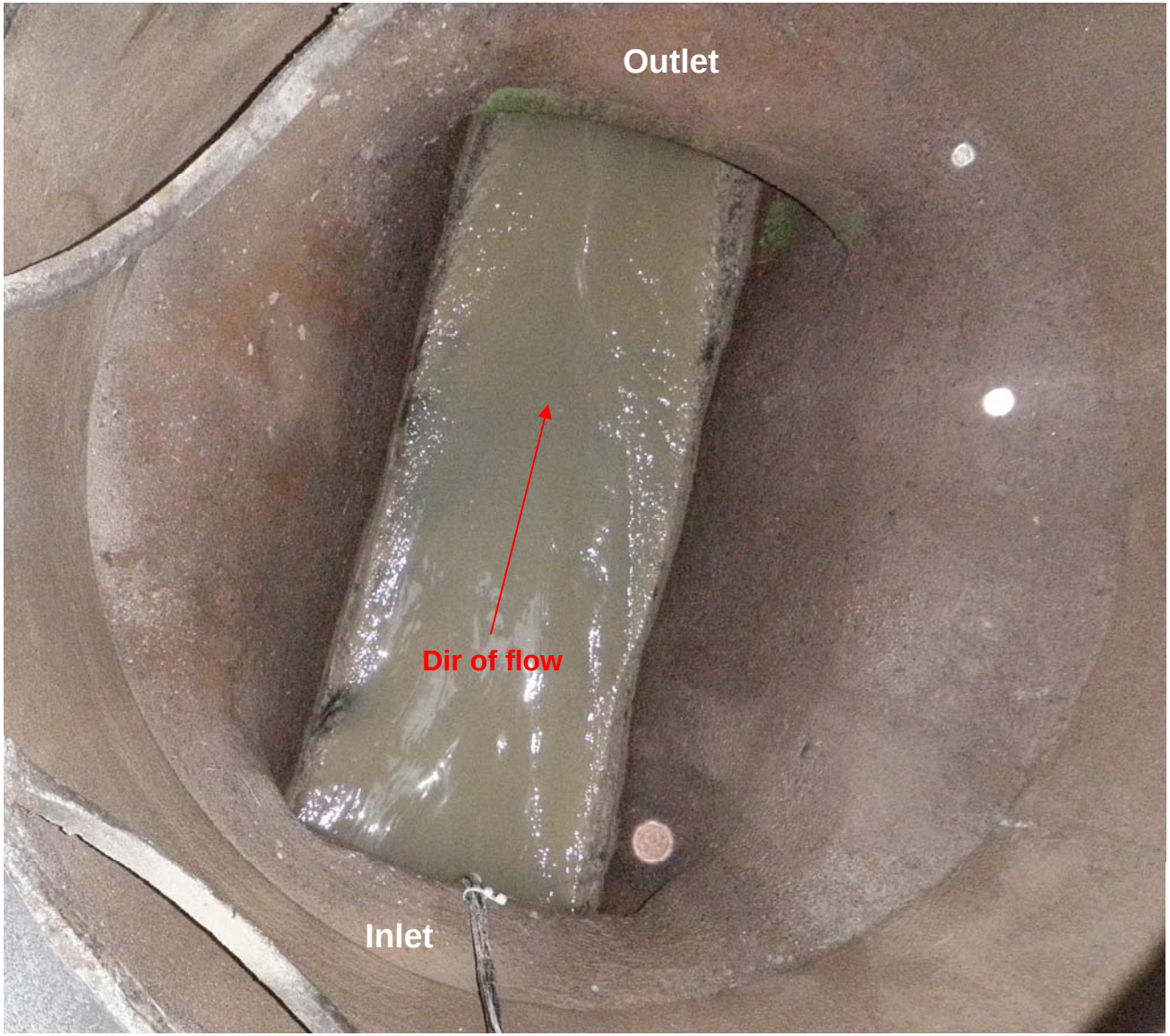
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_001579

Site set up

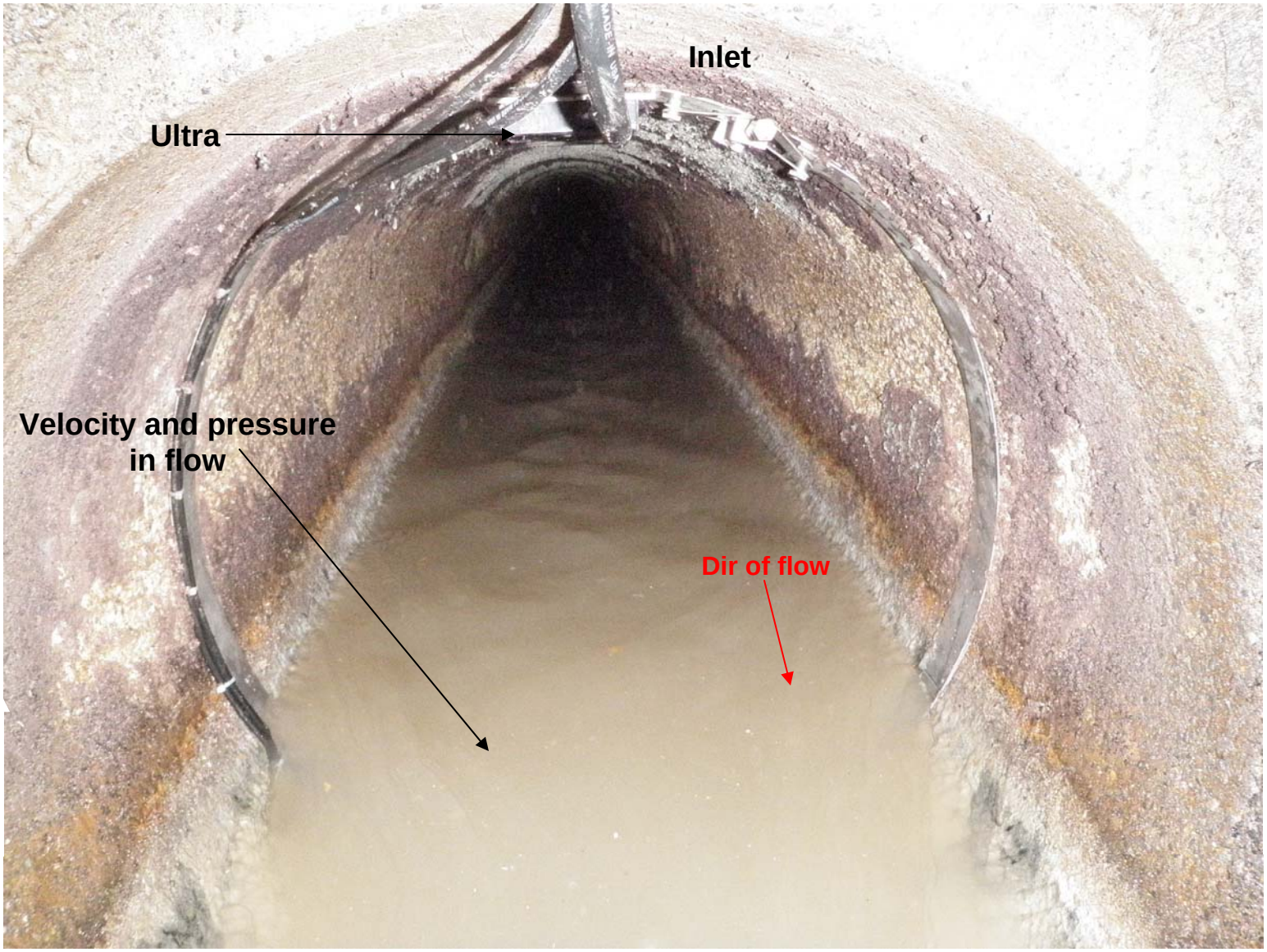
ADS ENVIRONMENTAL SERVICES®



View down manhole facing northeast

Bend_001579
Site set up

ADS ENVIRONMENTAL SERVICES®

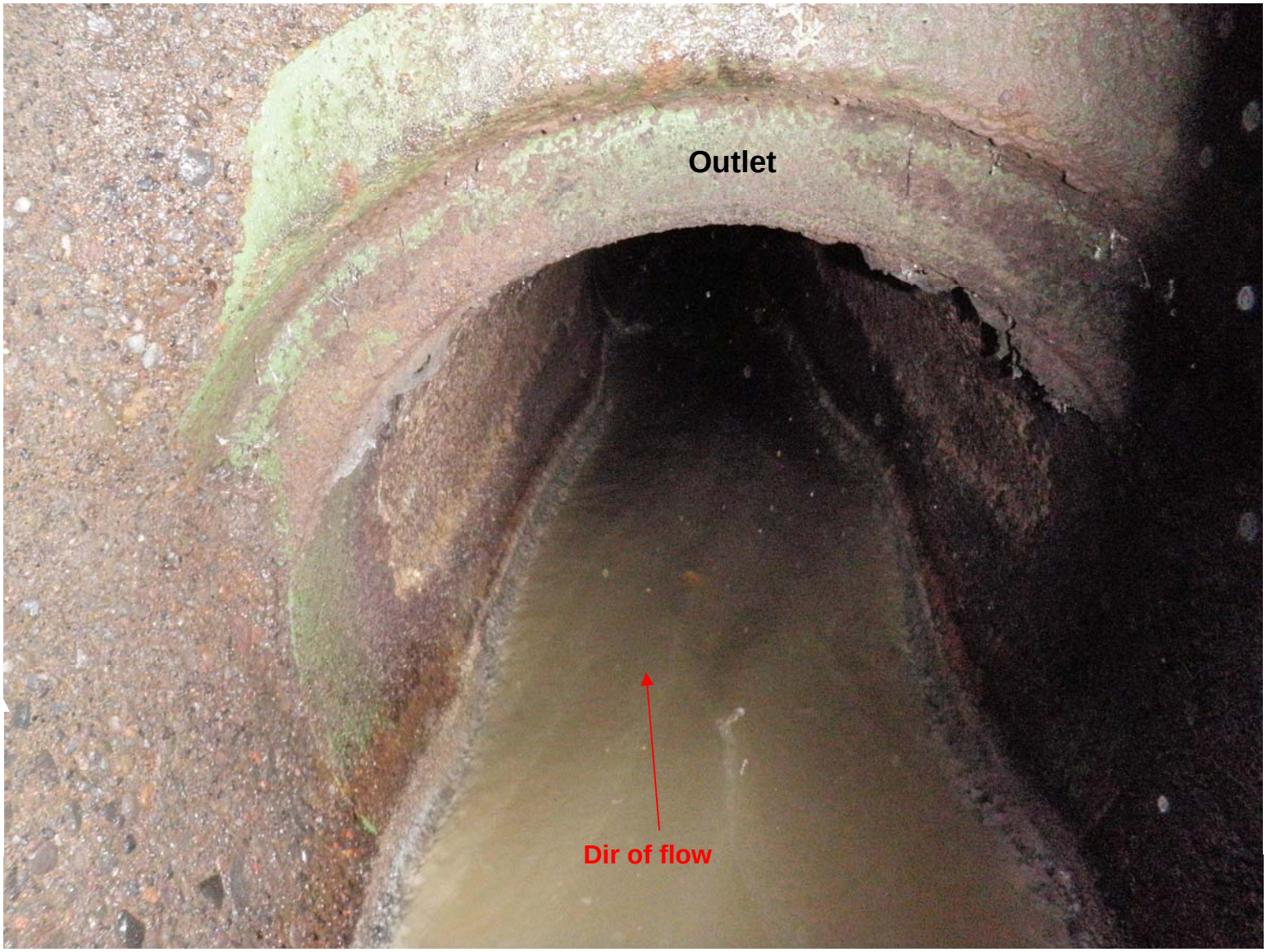


View of sensor placement and site hydraulics

Bend_001579

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

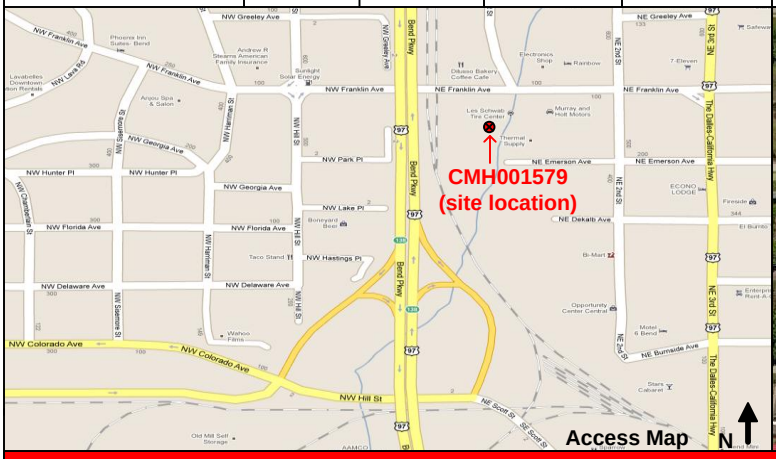
ADS Site Report

Quality Form

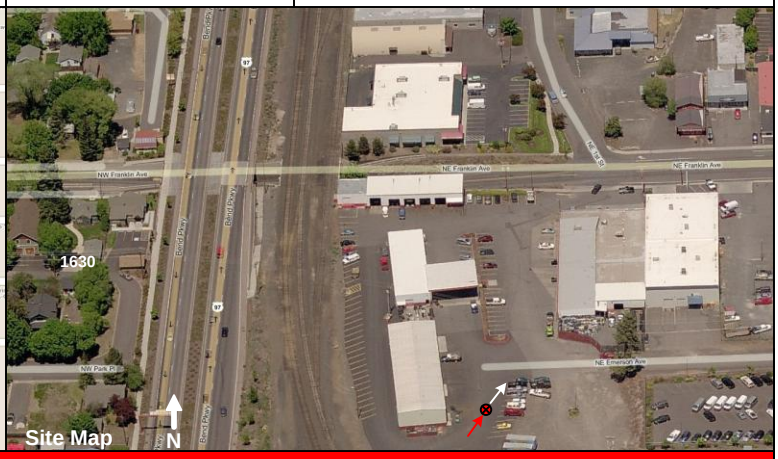
Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_001579	**Monitor Series:**	5000 AG
Address/Location:	105 NE Franklin Ave (Parking Lot of Les Schwab)		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21724
Manhole #	CMH001579
Coordinates:	44° 3'16.92"N 121°18'21.51"W
Pipe Height:	23.88"
Pipe Width:	23.88"
IP Address:	166.219.51.173



Access Map



Site Map

Investigation Information:

Date/Time of Investigation:	3/24/11 @ 17:05
Site Hydraulics:	Small waves and fast flow
Upstream Input: (L/S, P/S)	No Influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	5.88" +/- 0.25"
Range (Air DOF):	18.00" +/- 0.25"
Peak Velocity:	3.00 fps
Silt:	0 Inches

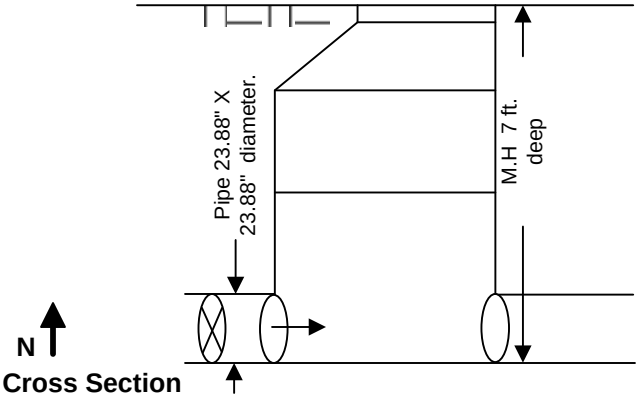
Manhole Information:

Manhole Depth:	7' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good

Mini System Character:	Residential	Commercial	Industrial	Trunk
	[ ]	[ ]	[ ]	[X]

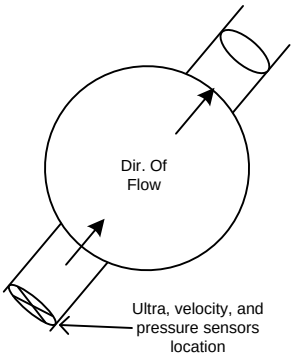
Telephone Information:	Doesn't apply		
Access Pole #:	Doesn't apply		
Distance From Manhole:	Doesn't apply	Feet	
Road Cut Length:	Doesn't apply	Feet	
Trench Length:	Doesn't apply	Feet	

Other Information:



Cross Section

Planar



Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_001579	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

No site specific safety requirements

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

- ☒ This worksite does NOT require a traffic control Plan
- ☐ Standard Traffic Control Plan is to be used at this work site
- ☐ This site requires a special Traffic Control Plan which is attached

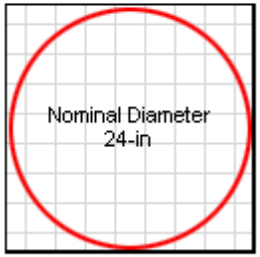
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/24/11	Date: 3/24/11

SCATTERGRAPH REPORT

Bend_001579

Flow Monitor

Bend_001579

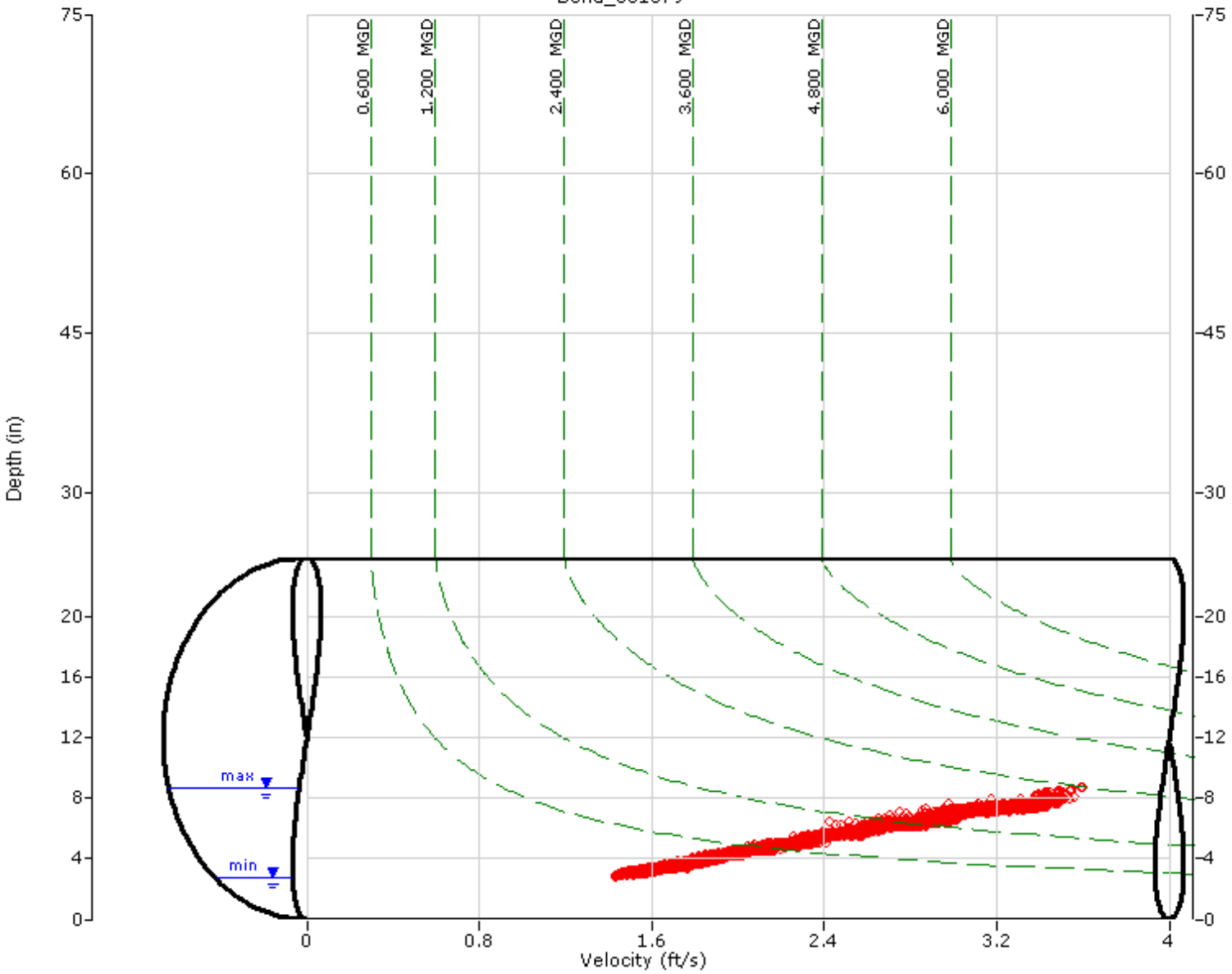


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



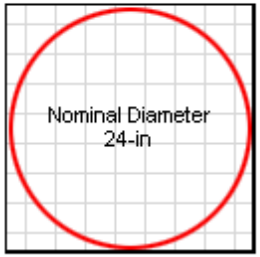
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_001579

Flow Monitor

Bend_001579

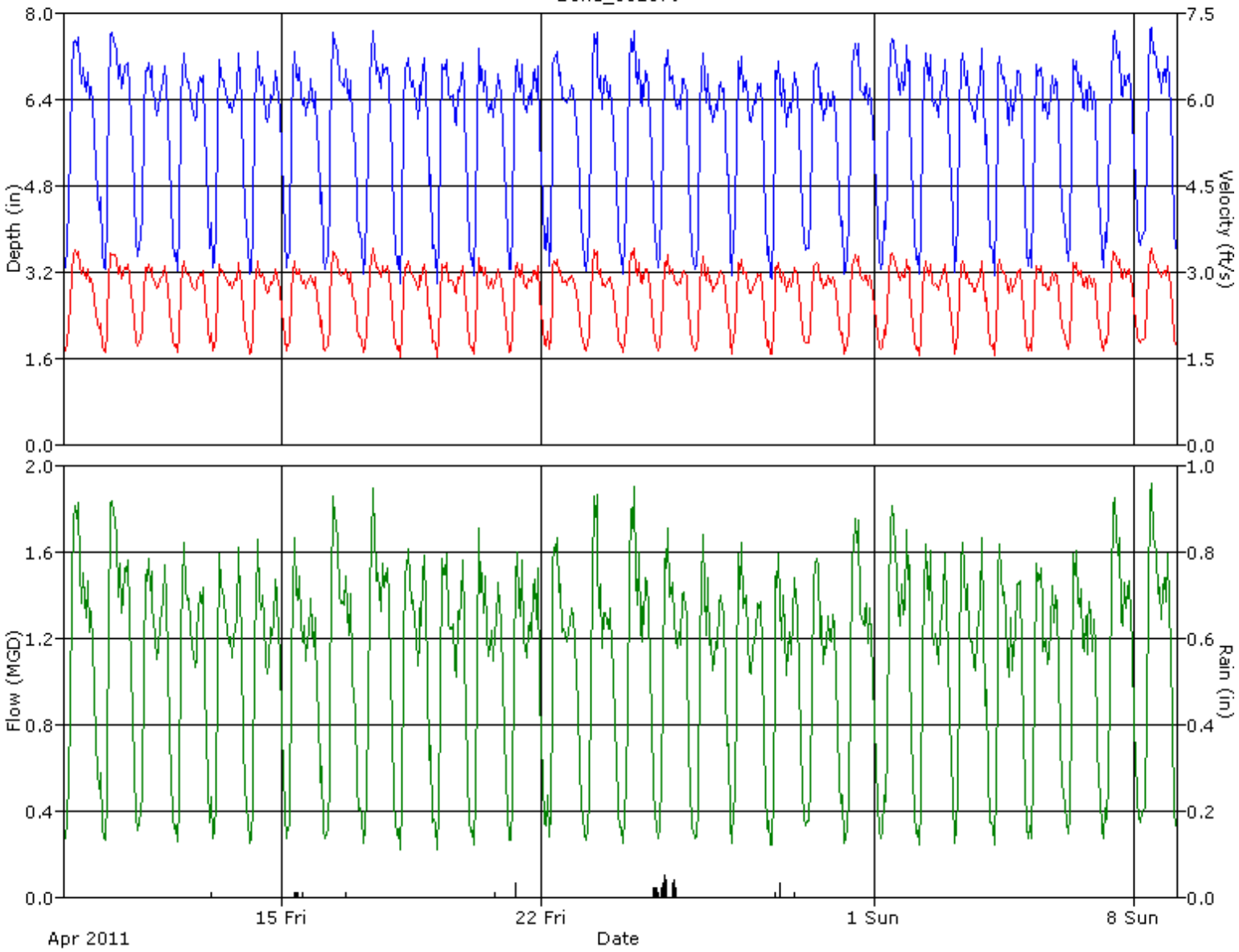


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_001732	
Measured Pipe Height (in)	14.25 - 14.525
Nominal Pipe Height (in)	15
Silt Level (in)	0.00

Overview

Monitoring point Bend_001732 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a industrial flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with a slight hydraulic shift, that is most likely due to shifting debris.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.74	0.92	0.055
Minimum	0.91	0.25	0.006
Maximum	3.56	1.97	0.275
Time of Minimum	5/8/2011 6:05 AM	4/27/2011 5:30 AM	5/8/2011 6:50 AM
Time of Maximum	4/18/2011 3:15 PM	4/18/2011 12:30 PM	4/21/2011 12:15 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_001732

Site location

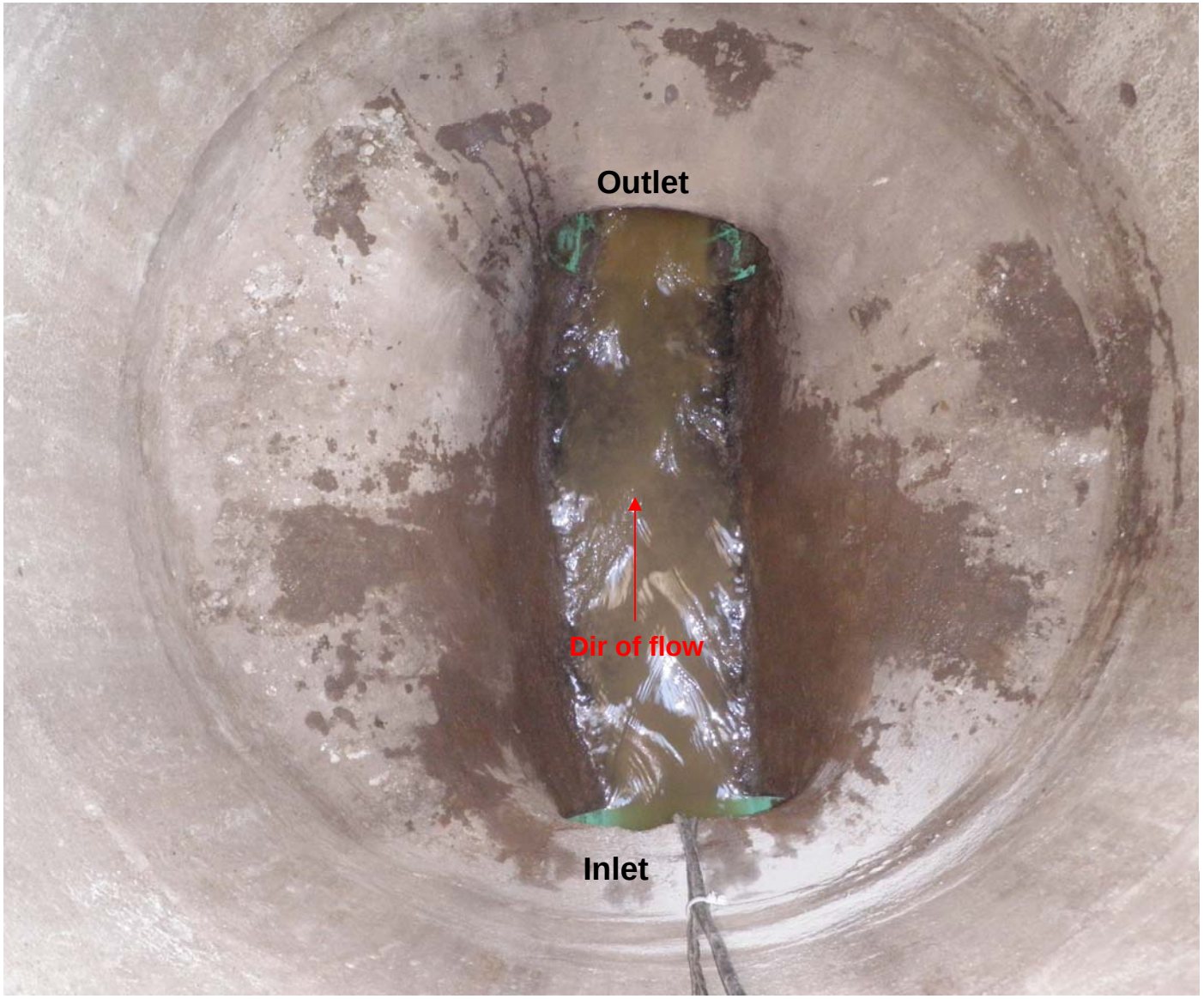
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_001732

Site set up

ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_001732

Site set up

ADS ENVIRONMENTAL SERVICES®

View of sensor placement and site hydraulics

Bend_001732

Site outlet

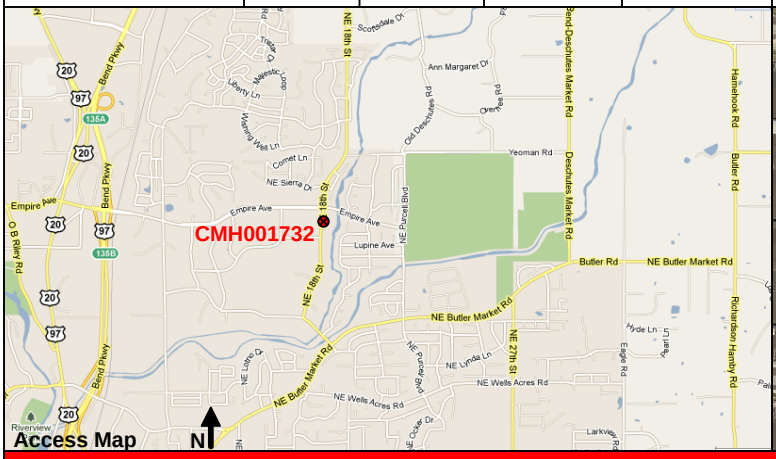
View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_001732	**Monitor Series:**	5000 AG
Address/Location:	63064 NE 18th St.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21696
Manhole #	CMH001732
Coordinates:	44°05'22.61" N, 121°16'52.27" W
Pipe Height:	14.525"
Pipe Width:	14.525"
IP Address:	166.219.169.180



Access Map

Site Map

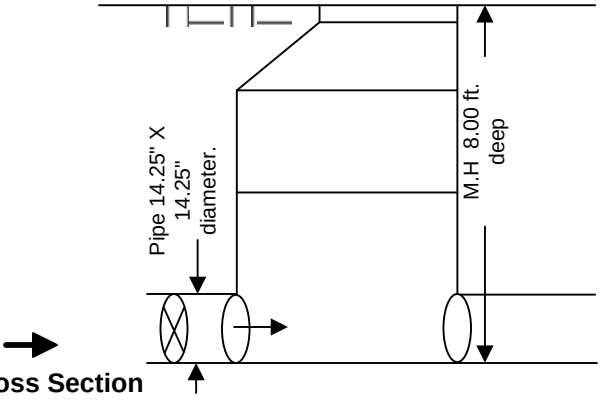
Investigation Information:

Date/Time of Investigation:	4/7/11 @ 9:20
Site Hydraulics:	Ripples
Upstream Input: (L/S, P/S)	No Influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	2.50" +/- .25"
Range (Air DOF):	11.75" +/- .25"
Peak Velocity:	1.64 fps
Silt:	0 Inches

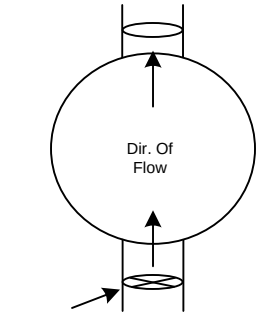
Manhole Information:

Manhole Depth:	8' - 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [ ]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:



Cross Section



Ultrasonic, Pressure, Velocity location

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk	[ ]	[X]	[ ]	
Sensors Devices:	Ultra, Velocity, Pressure	Lift / Pump Station	[ ]	[X]	[ ]	
Surcharge Height:	None Observed	WWTP	[ ]	[X]	[ ]	
Rain Gauge Zone:	JRRG	Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_001732	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

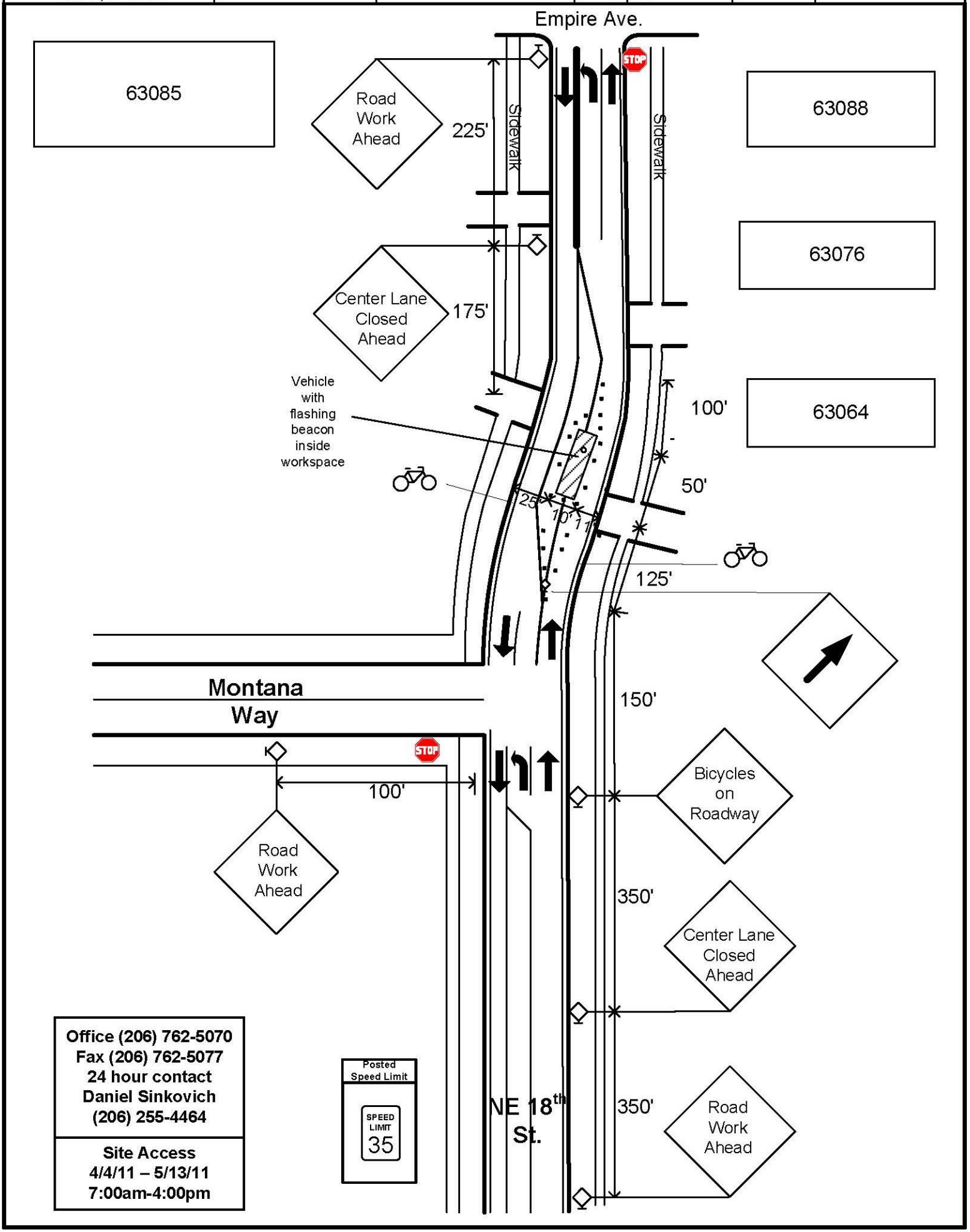
☐ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/7/11	Date: 4/7/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_001732 MH# CMH001732	Address: 163076 NE 18th St. Bend, OR	N	Drawn: 03/31/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring

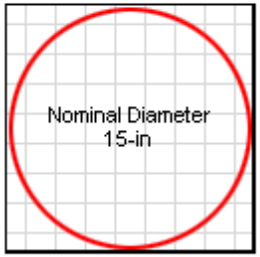


SCATTERGRAPH REPORT

Bend_001732

Flow Monitor

Bend_001732

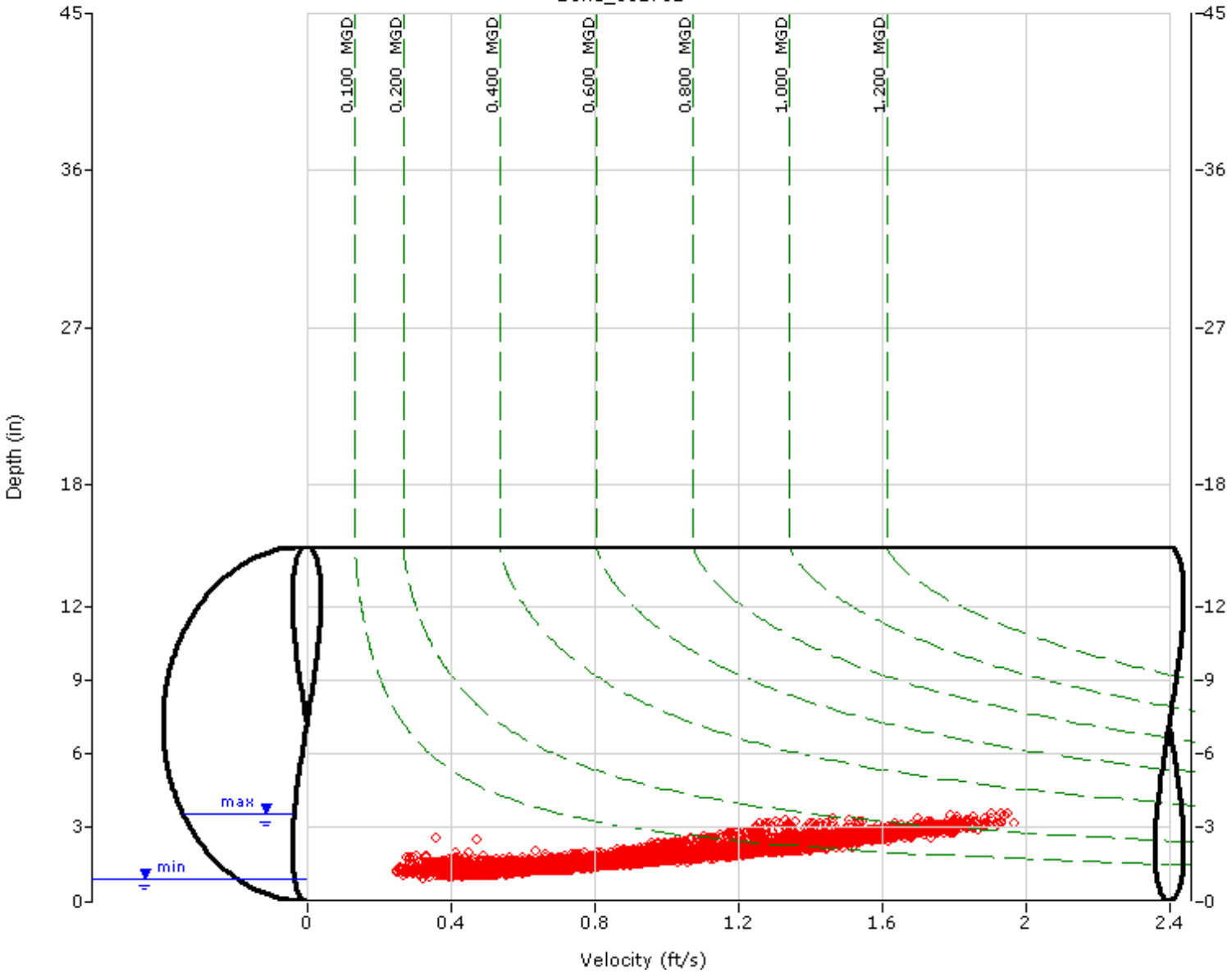


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



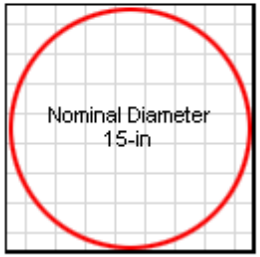
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_001732

Flow Monitor

Bend_001732

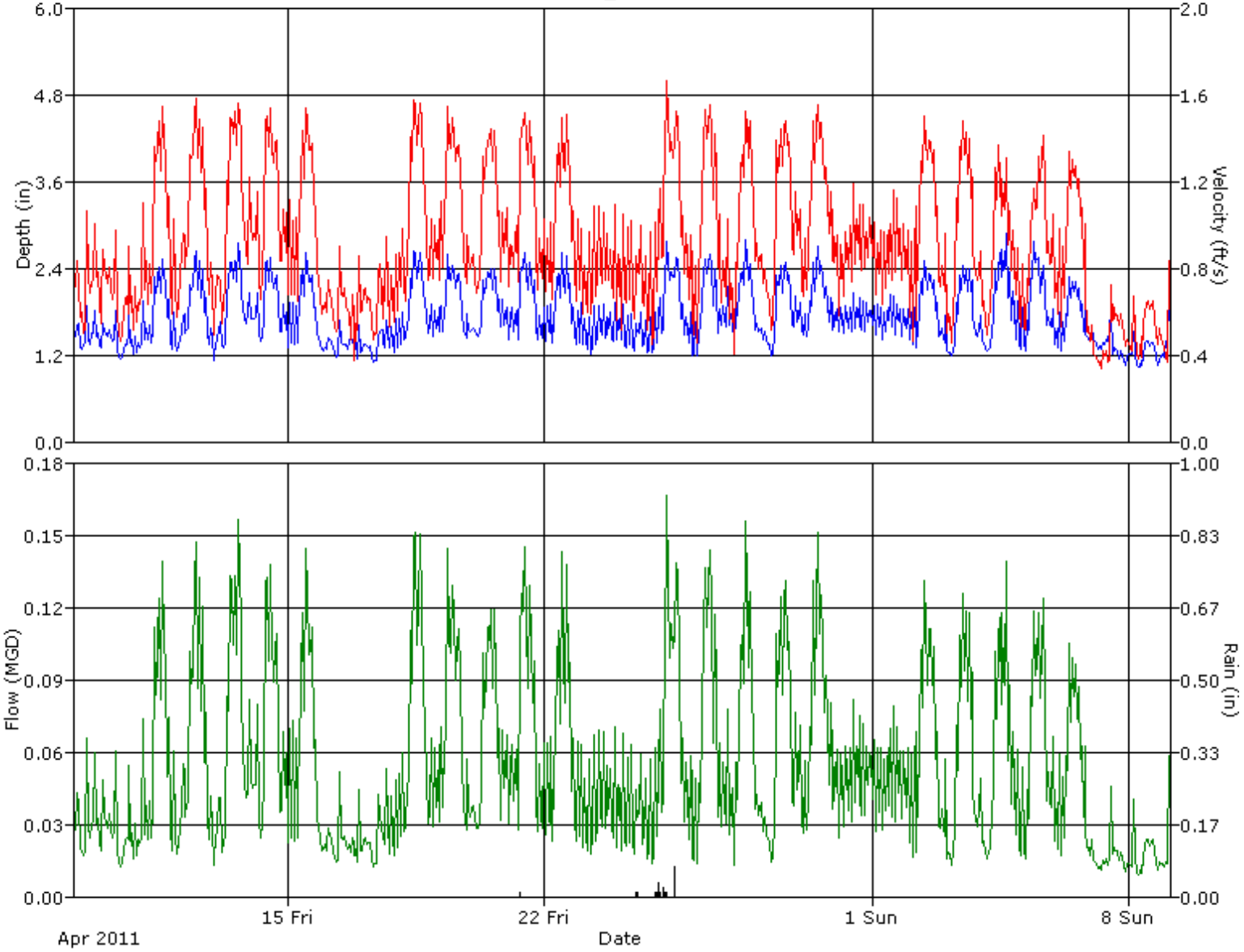


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_001962	
Measured Pipe Height (in)	20.5
Nominal Pipe Height (in)	21
Silt Level (in)	0.00

Overview

Monitoring point Bend_001962 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	5.84	1.65	0.637
Minimum	2.26	0.14	0.023
Maximum	9.94	2.45	1.727
Time of Minimum	4/30/2011 4:50 AM	4/13/2011 6:50 AM	4/13/2011 6:50 AM
Time of Maximum	4/27/2011 8:30 AM	4/14/2011 9:20 AM	4/27/2011 8:30 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_001962

Site location

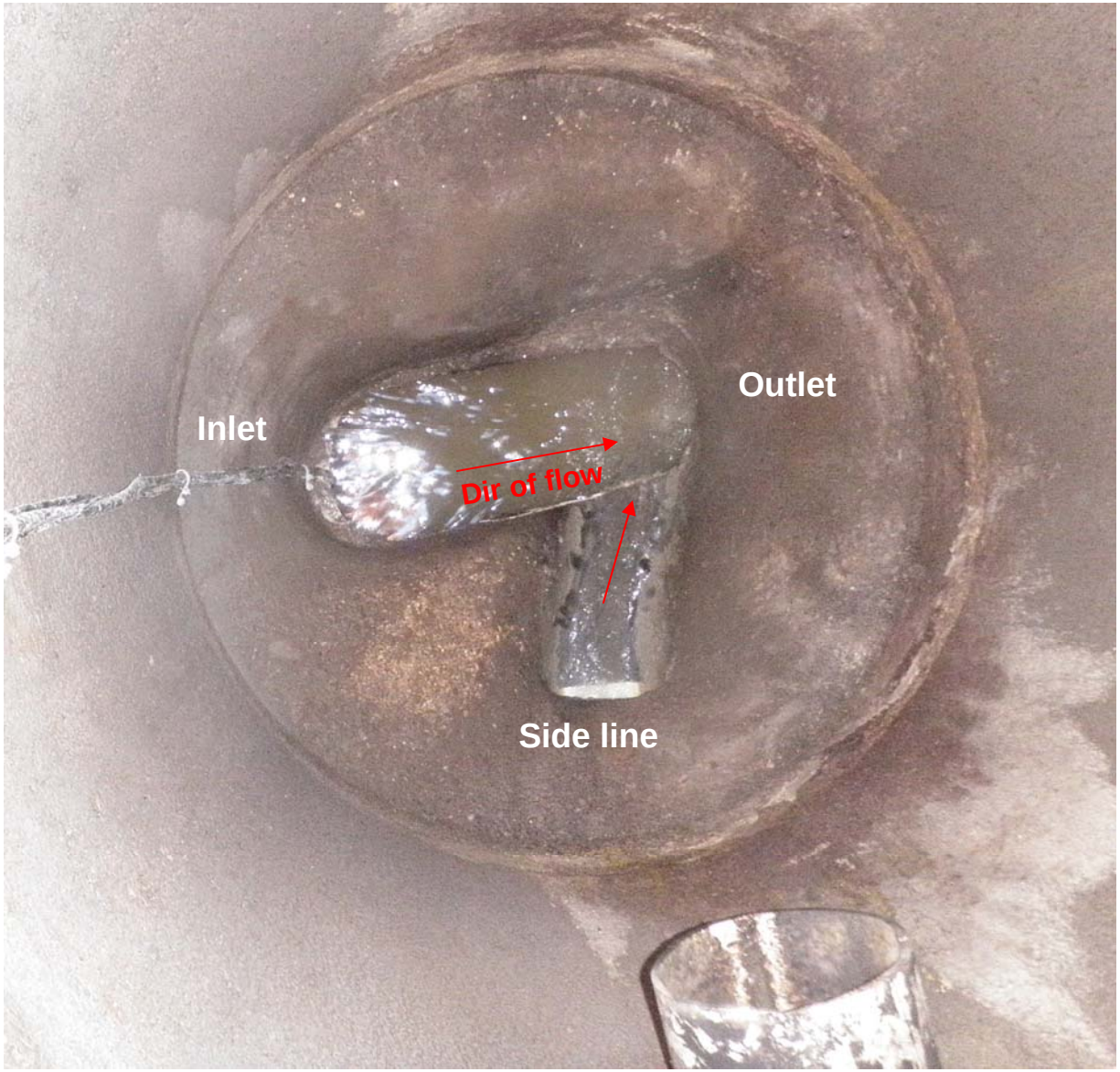
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_001962

Site set up

ADS ENVIRONMENTAL SERVICES®

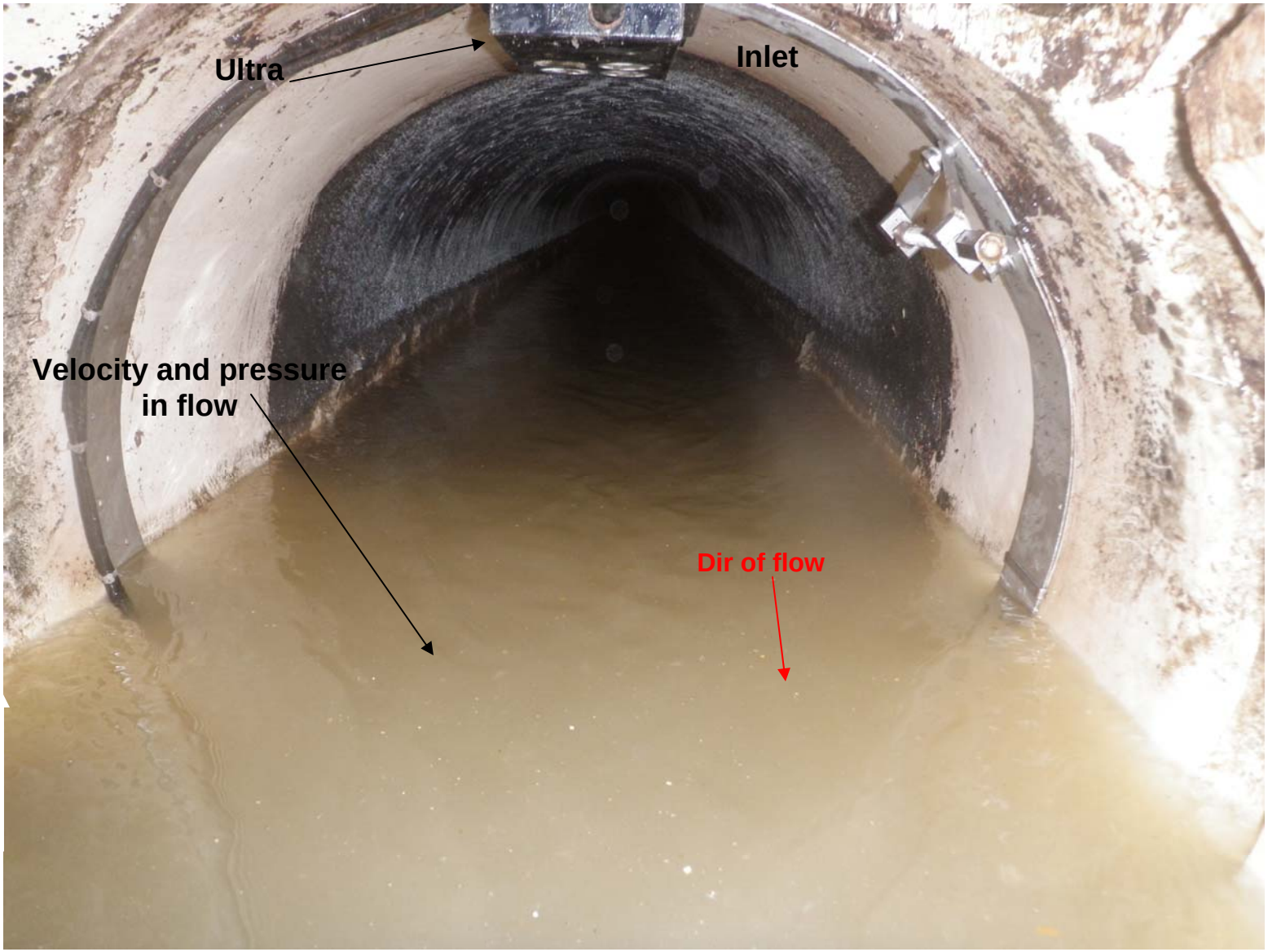


View down manhole facing north

Bend_001962

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_001962

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

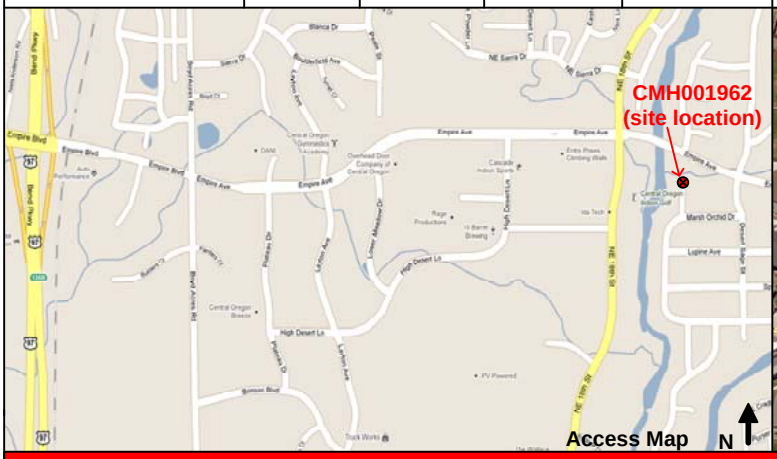
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_001962	**Monitor Series:**	5000 AG
Address/Location:	63063 Wild Buckwheat Ct		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21509
Manhole #	CMH001962
Coordinates:	44° 5'23.83"N 121°16'43.95"W
Pipe Height:	20.50"
Pipe Width:	21.00"
IP Address:	166.219.51.21



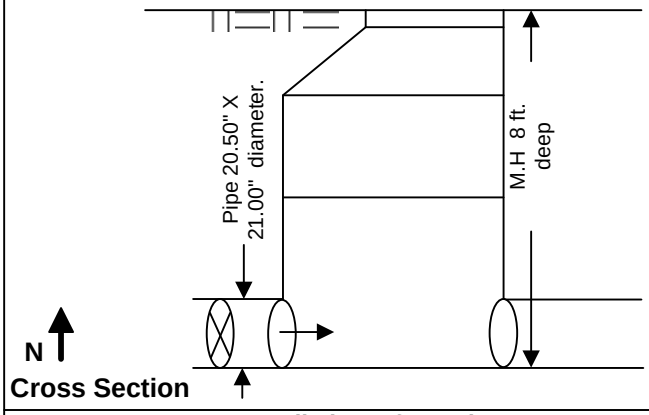
Investigation Information:

Date/Time of Investigation:	4/5/11 @ 08:30
Site Hydraulics:	Smooth and steady flow
Upstream Input: (L/S, P/S)	No immediate input
Upstream Manhole:	1 inlets / 1 outlet (90˚bend)
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	8.50" +/- 0.25"
Range (Air DOF):	12.00" +/- 0.25"
Peak Velocity:	2.42 fps
Silt:	0 Inches

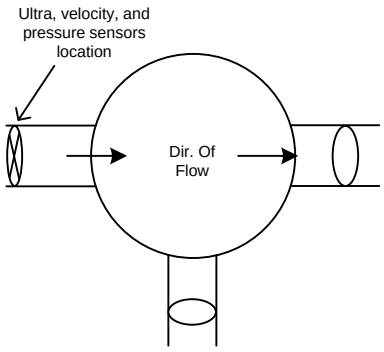
Manhole Information:

Manhole Depth:	8' - 0"					
Manhole Material / Condition	Concrete / Good					
Pipe Material / Condition:	Concrete / Good					
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]		
Telephone Information:	Doesn't apply					
Access Pole #:	Doesn't apply					
Distance From Manhole:	Doesn't apply	Feet				
Road Cut Length:	Doesn't apply	Feet				
Trench Length:	Doesn't apply	Feet				

Other Information:



Cross Section



Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_001962	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

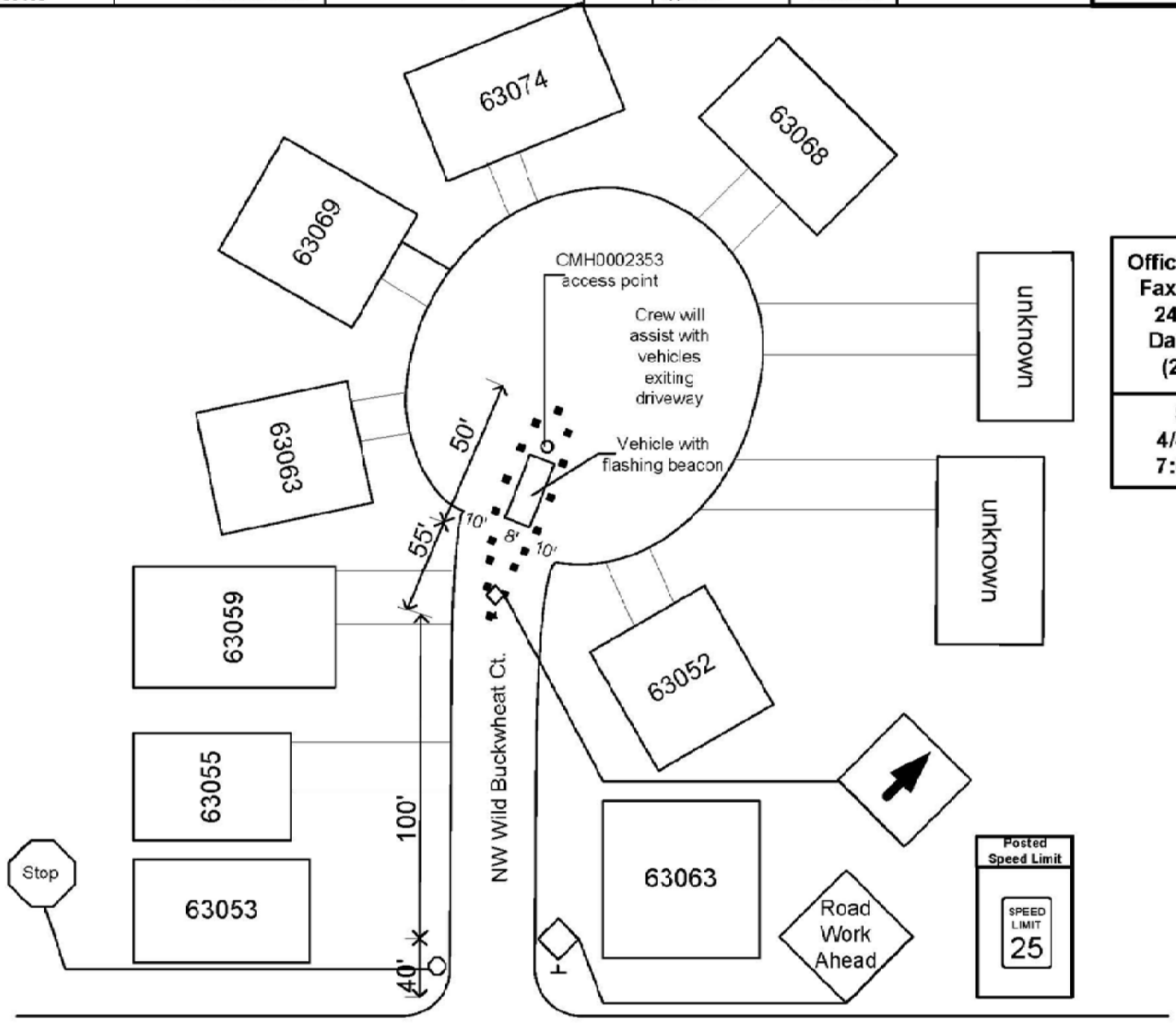
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/5/11	Date: 4/5/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_002353 MH# CMH002353	Address: 63063 NE Wild Buckewheat Ct. Bend, OR	N	Drawn: 03/29/11 Submitted: 04/4/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
4/4/11 – 5/13/11
7:00am-4:00pm

Marsh Orchid
Dr.

SCATTERGRAPH REPORT

Bend_001962

Flow Monitor

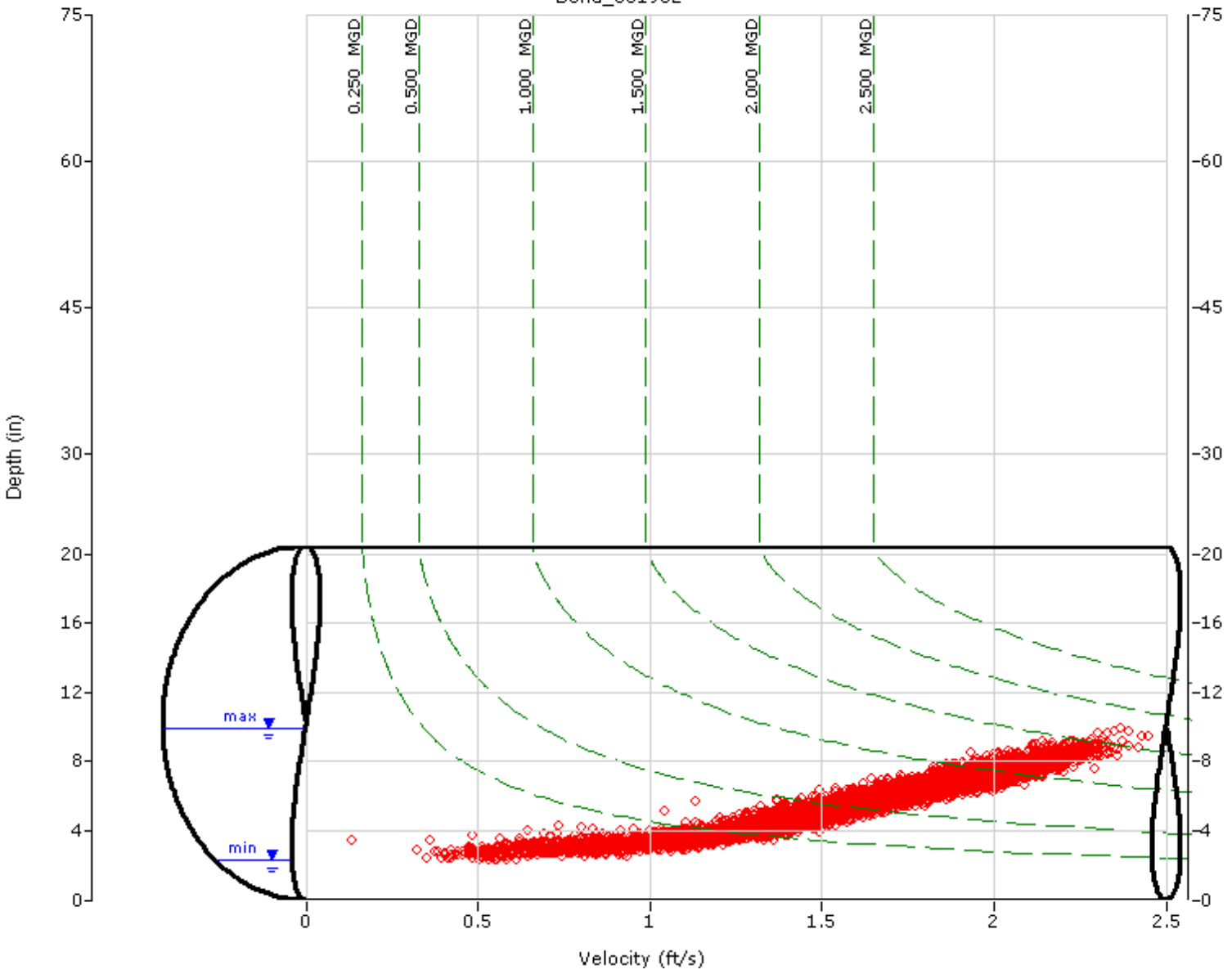
Bend_001962

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_001962

Flow Monitor

Bend_001962

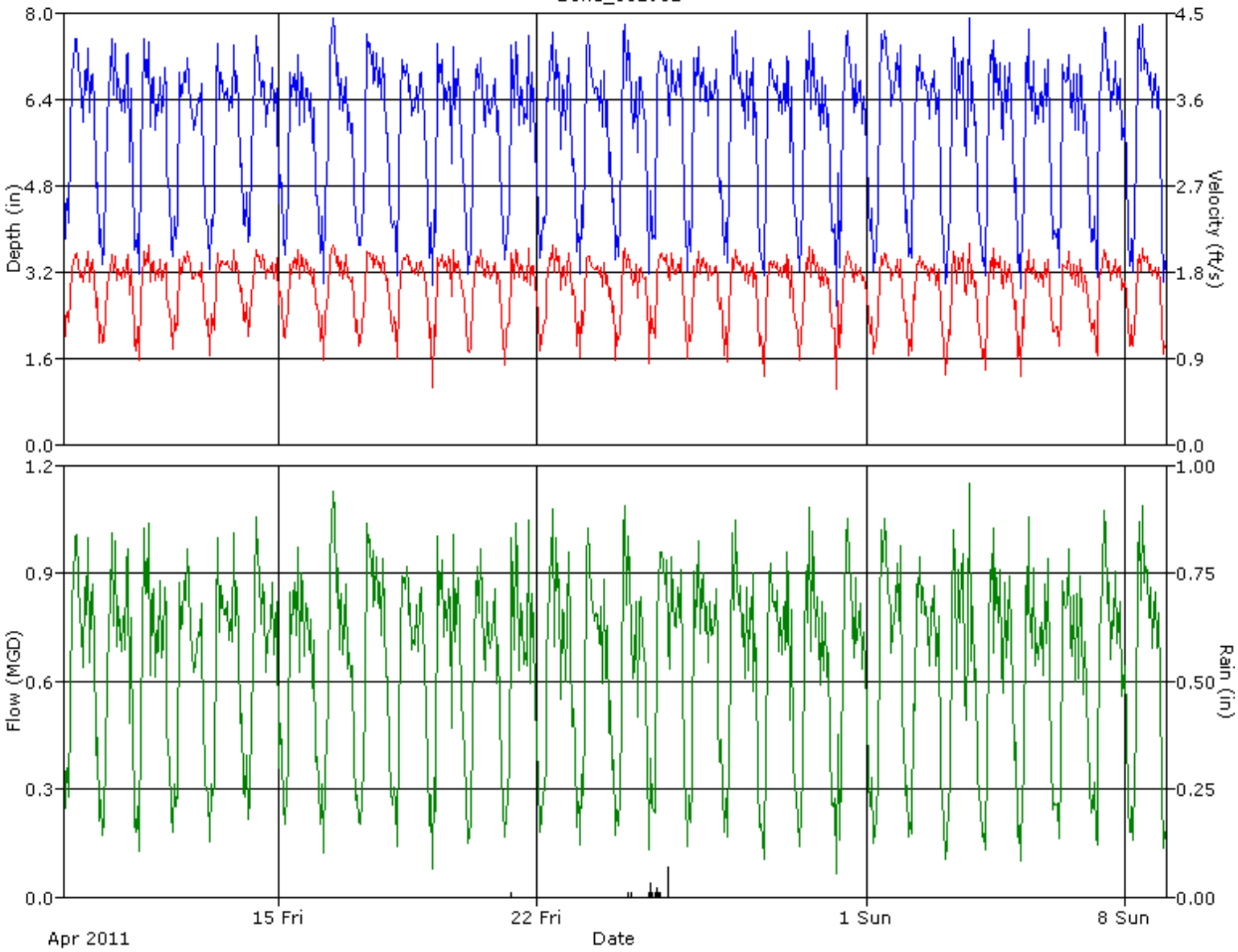
Nominal Diameter
21-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_002155	
Measured Pipe Height (in)	10
Nominal Pipe Height (in)	10
Silt Level (in)	0.00

Overview

Monitoring point Bend_002155 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

During the initial scattergraph data review, it was noted that a hydraulic jump was present. It was decided to move the sensors further up the incoming pipe to mitigate this hydraulic condition. This move was completed on Tuesday, April 19, 2011. The scattergraph post-move indicates a repeatable data set however a hydraulic jump still appears to occur during lift station cycles.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.42	1.47	0.053
Minimum	0.75	0.25	0.003
Maximum	2.86	3.24	0.248
Time of Minimum	4/12/2011 3:50 AM	5/2/2011 3:20 AM	5/2/2011 3:40 AM
Time of Maximum	5/7/2011 11:50 AM	4/19/2011 8:55 PM	5/8/2011 10:25 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_002155

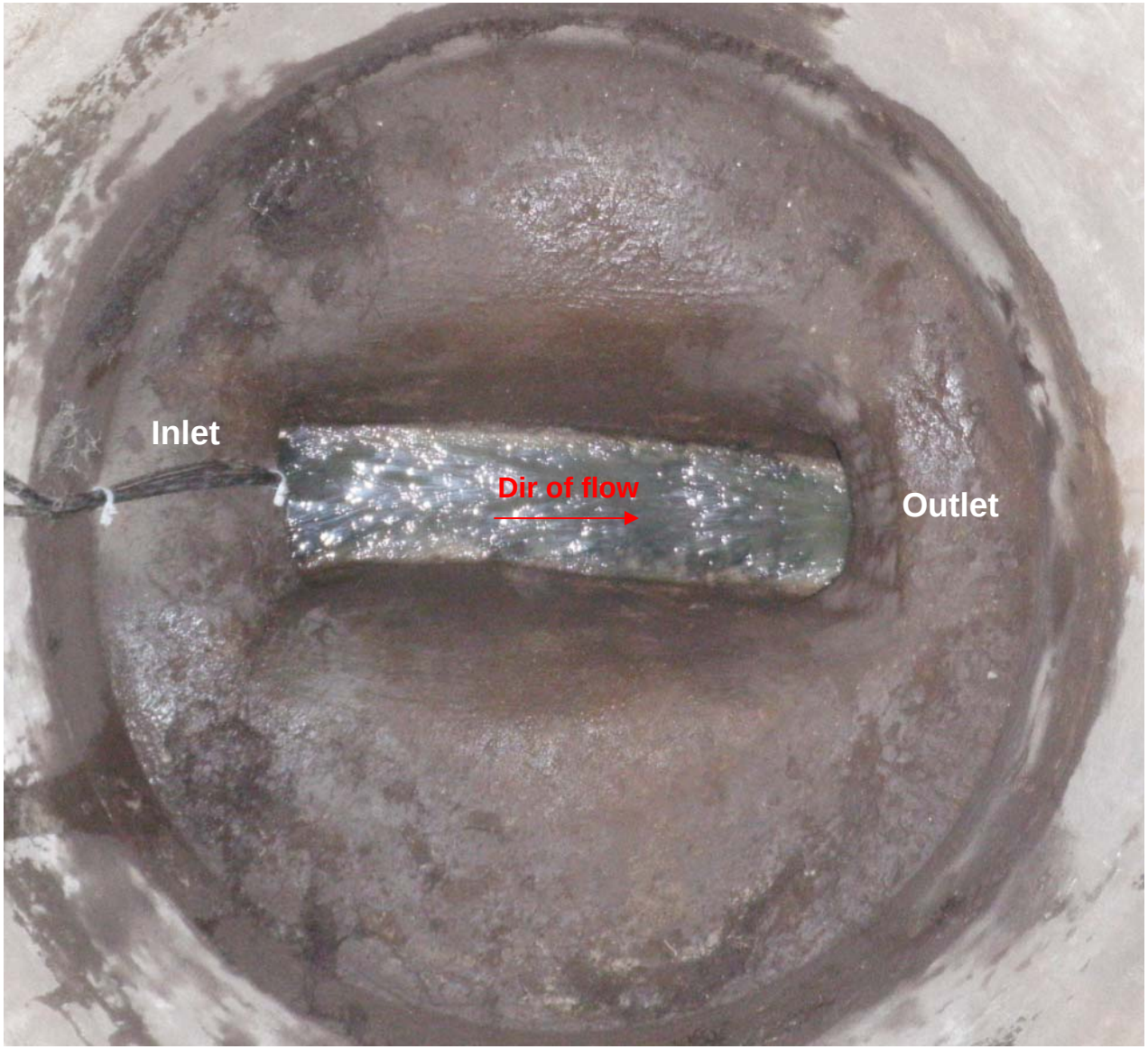
Site location

Site access looking north

Bend_002155

Site set up

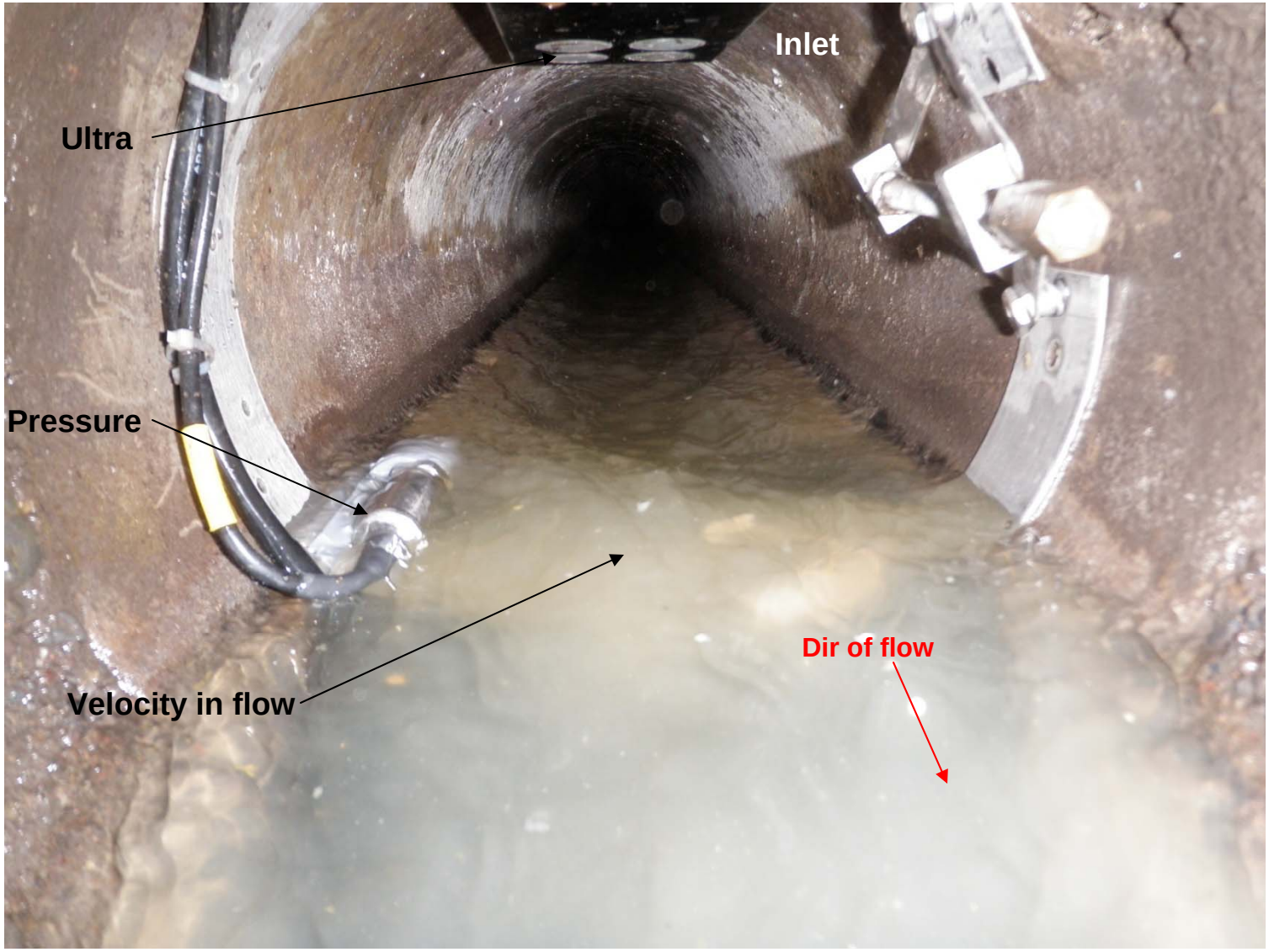
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_002155

Site set up

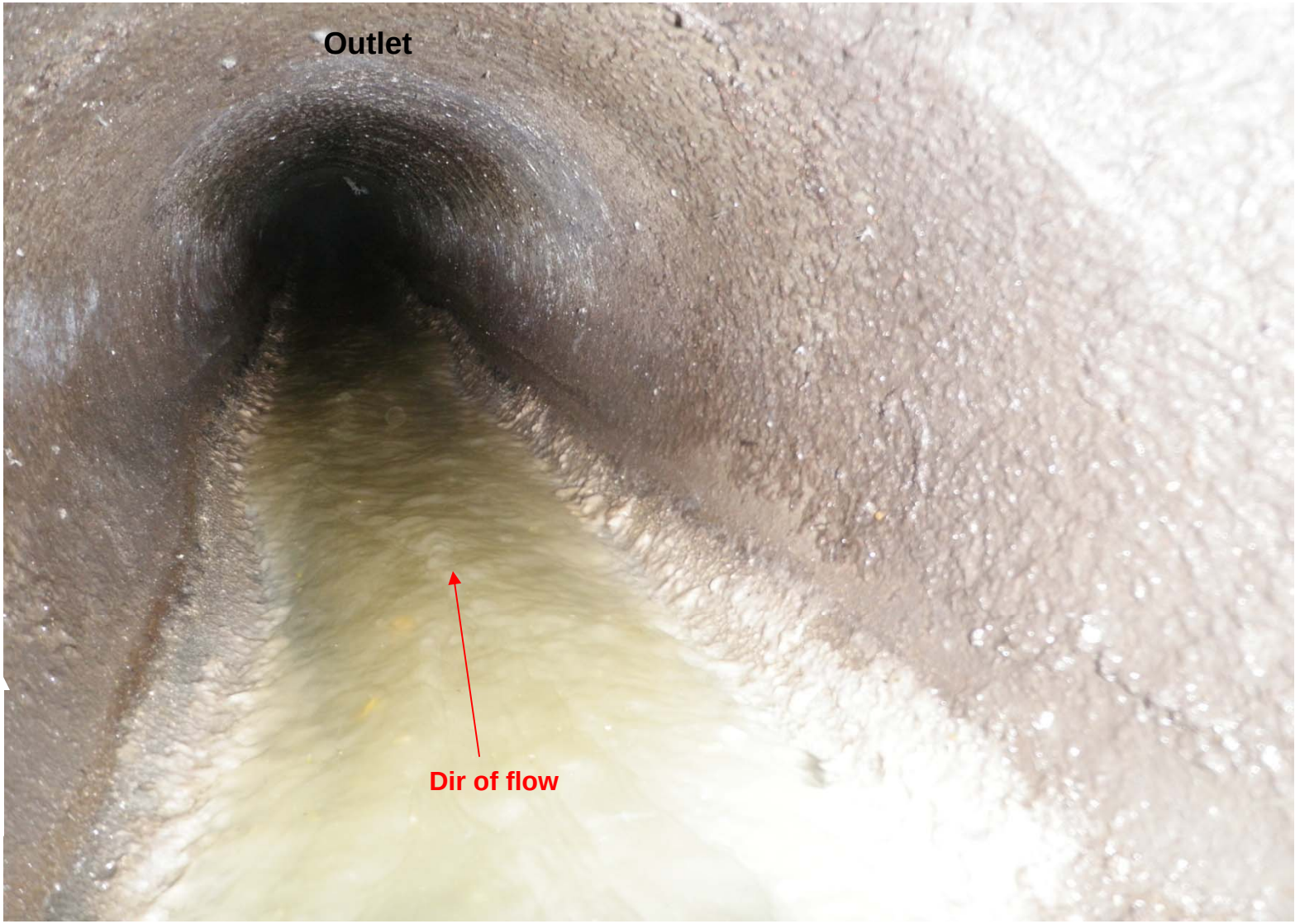


View of sensor placement and site hydraulics

Bend_002155

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

Bend_002155

Site location

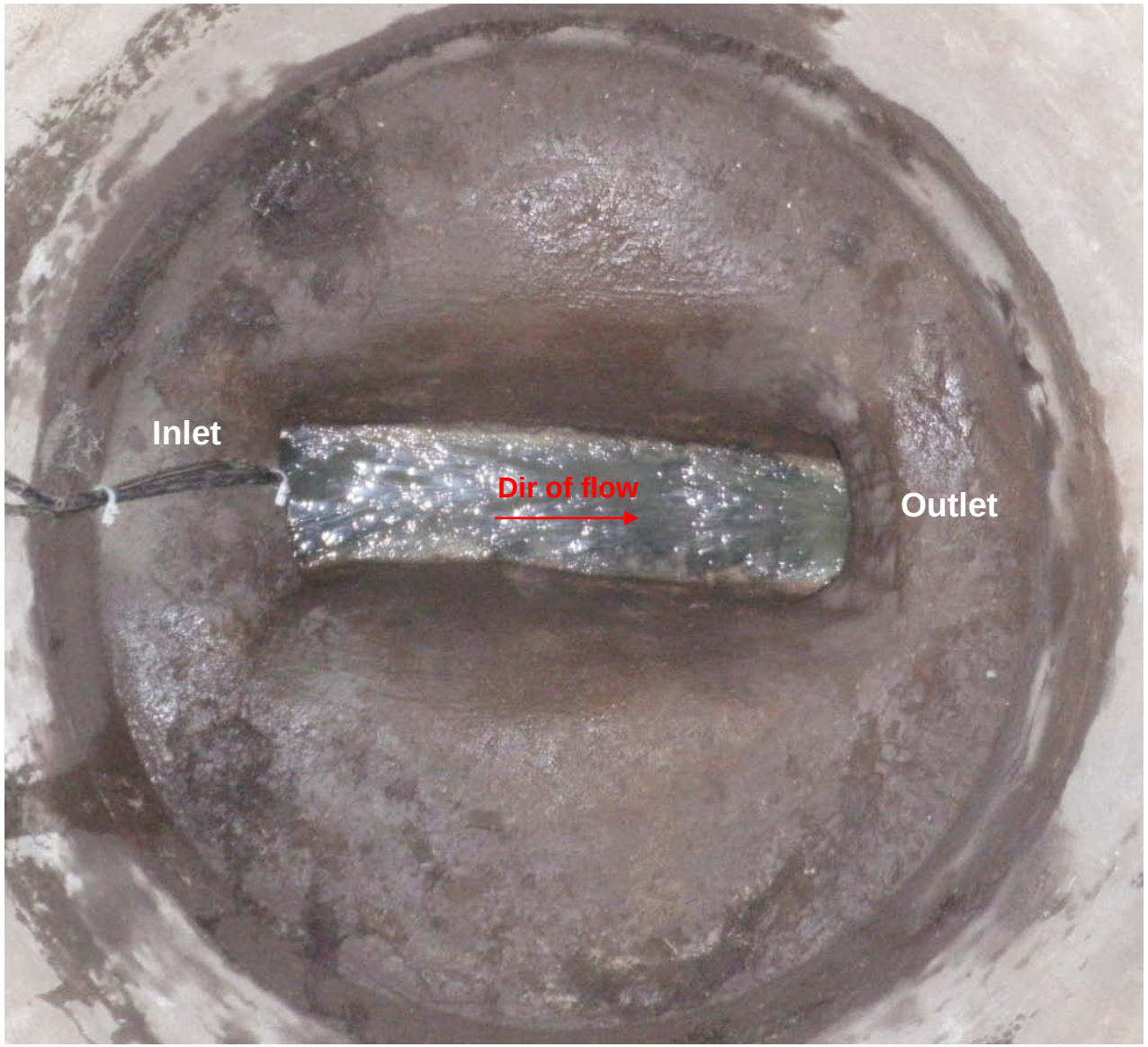
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_002155

Site set up

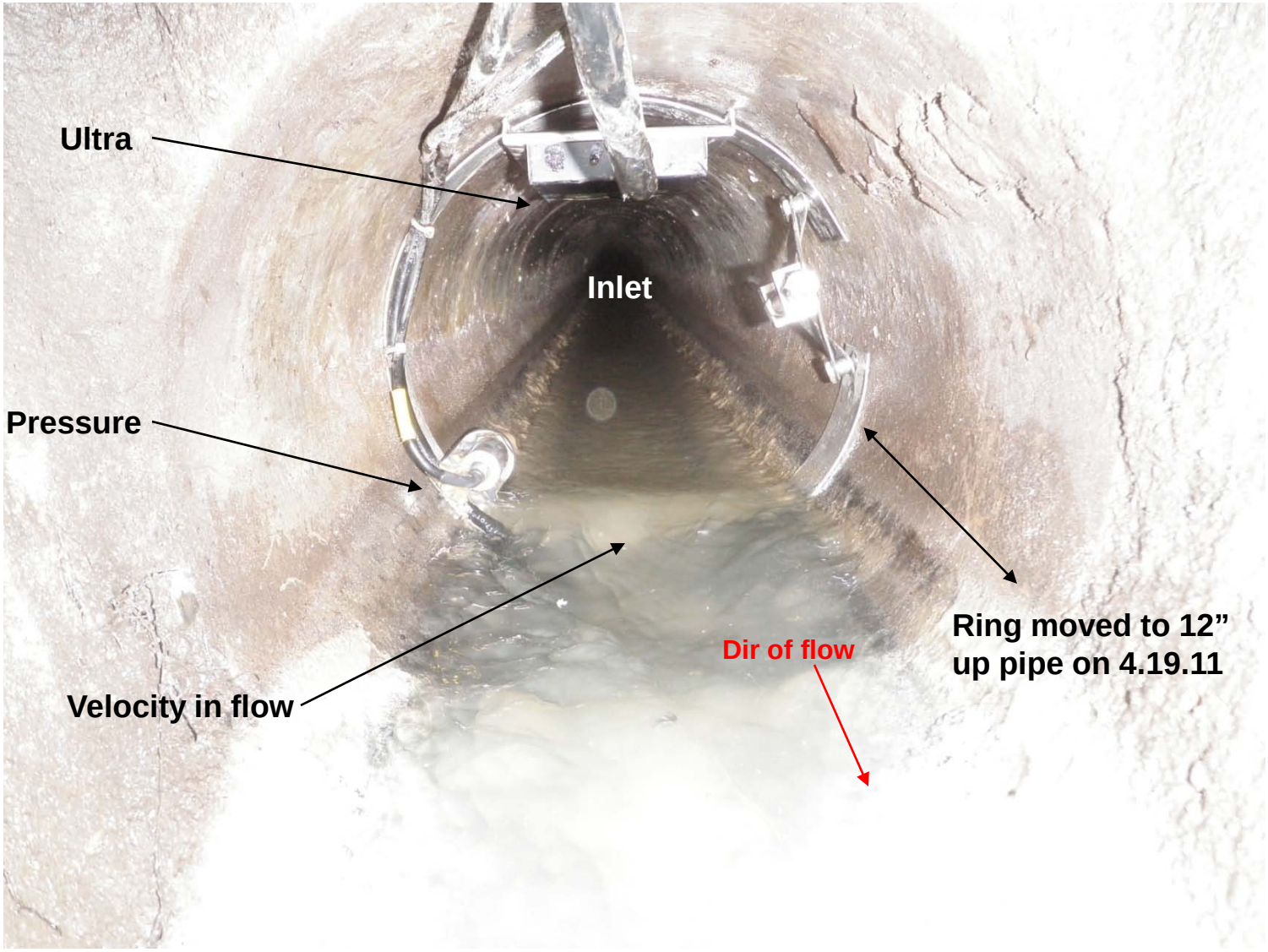
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_002155

Site set up - Modification

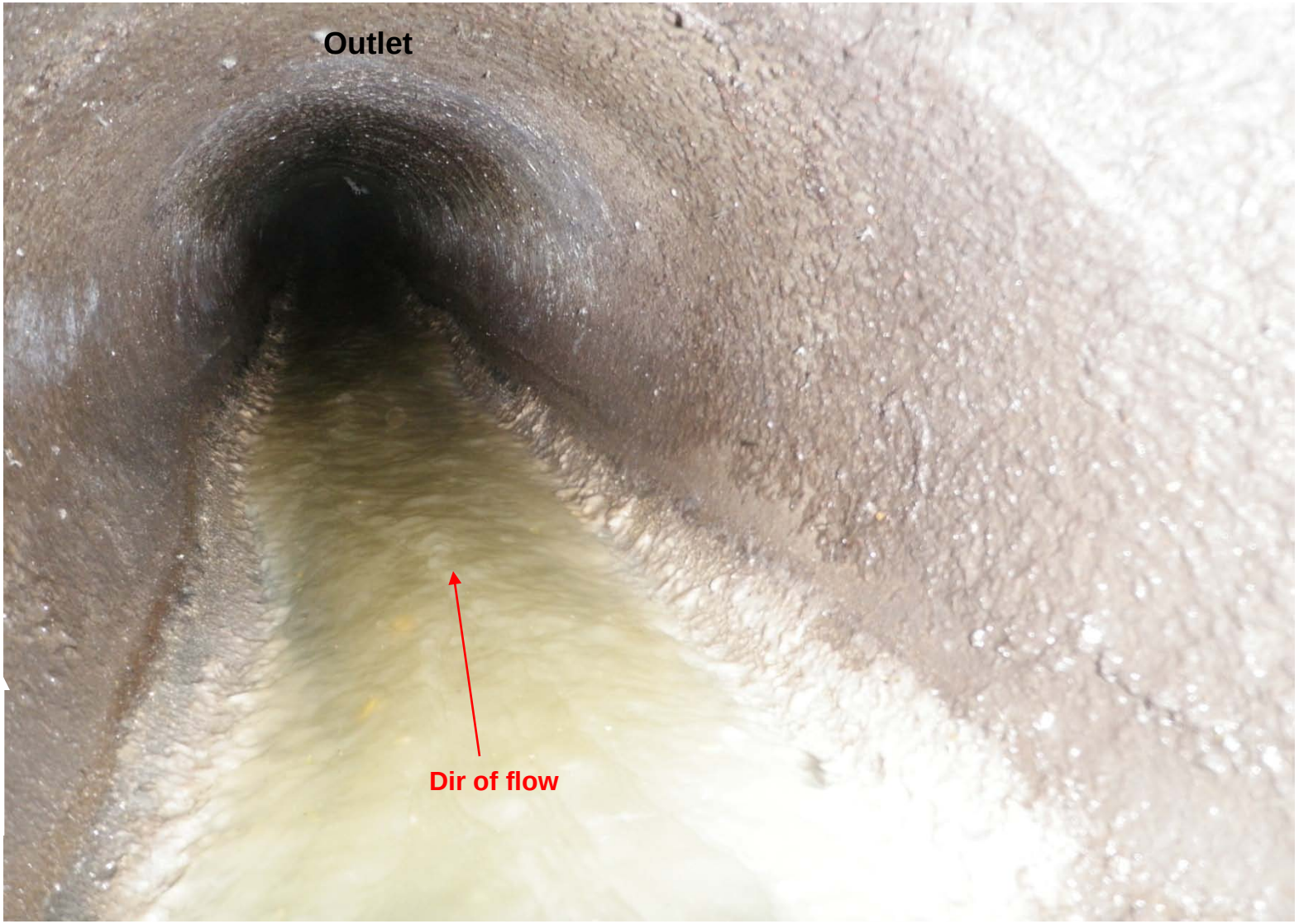


View of sensor placement and site hydraulics

Bend_002155

Site outlet

ADS ENVIRONMENTAL SERVICES®

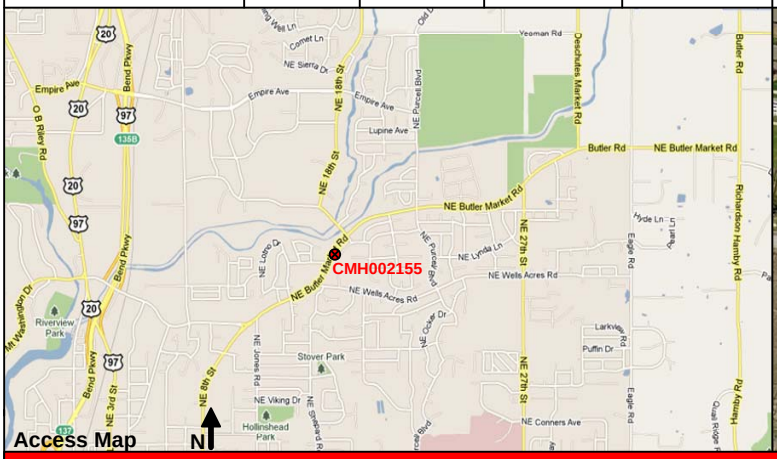


View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW
Site Name:	Bend_002155	**Monitor Series:**	5000 AG	**Monitor S/N:**	21791
Address/Location:	Northeast of NE Rumgay Ln. on NE Butler Market Rd.			**Manhole #**	CMH002155
				Coordinates:	44°04'50.48" N 121°16'54.23" W
				Pipe Height:	10.00"
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]	**Pipe Width:**	10.00"
				IP Address:	166.219.169.170



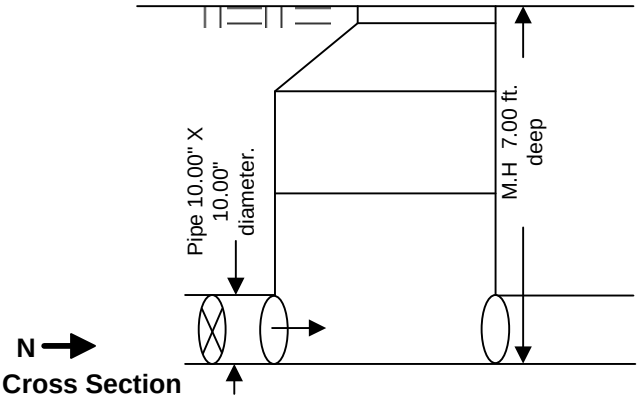
Investigation Information:

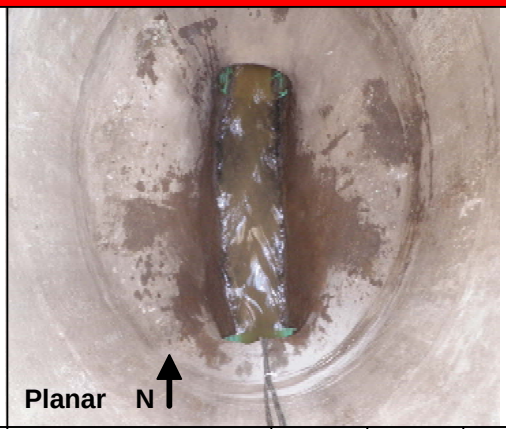
Date/Time of Investigation:	4/7/11 @ 7:45
Site Hydraulics:	Ripples
Upstream Input: (L/S, P/S)	No Influence
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	2.38" +/- .25"
Range (Air DOF):	7.63" +/- .25"
Peak Velocity:	3.16 fps
Silt:	0 Inches

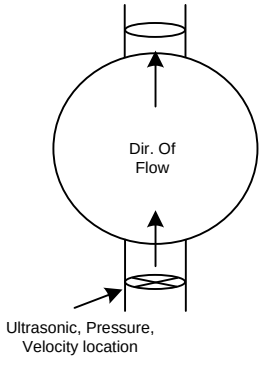
Manhole Information:

Manhole Depth:	7' - 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location.
4/7/11: Ring installed ~3" up pipe initially. 4/19/11: Ring moved to ~13" up pipe.

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_002155	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

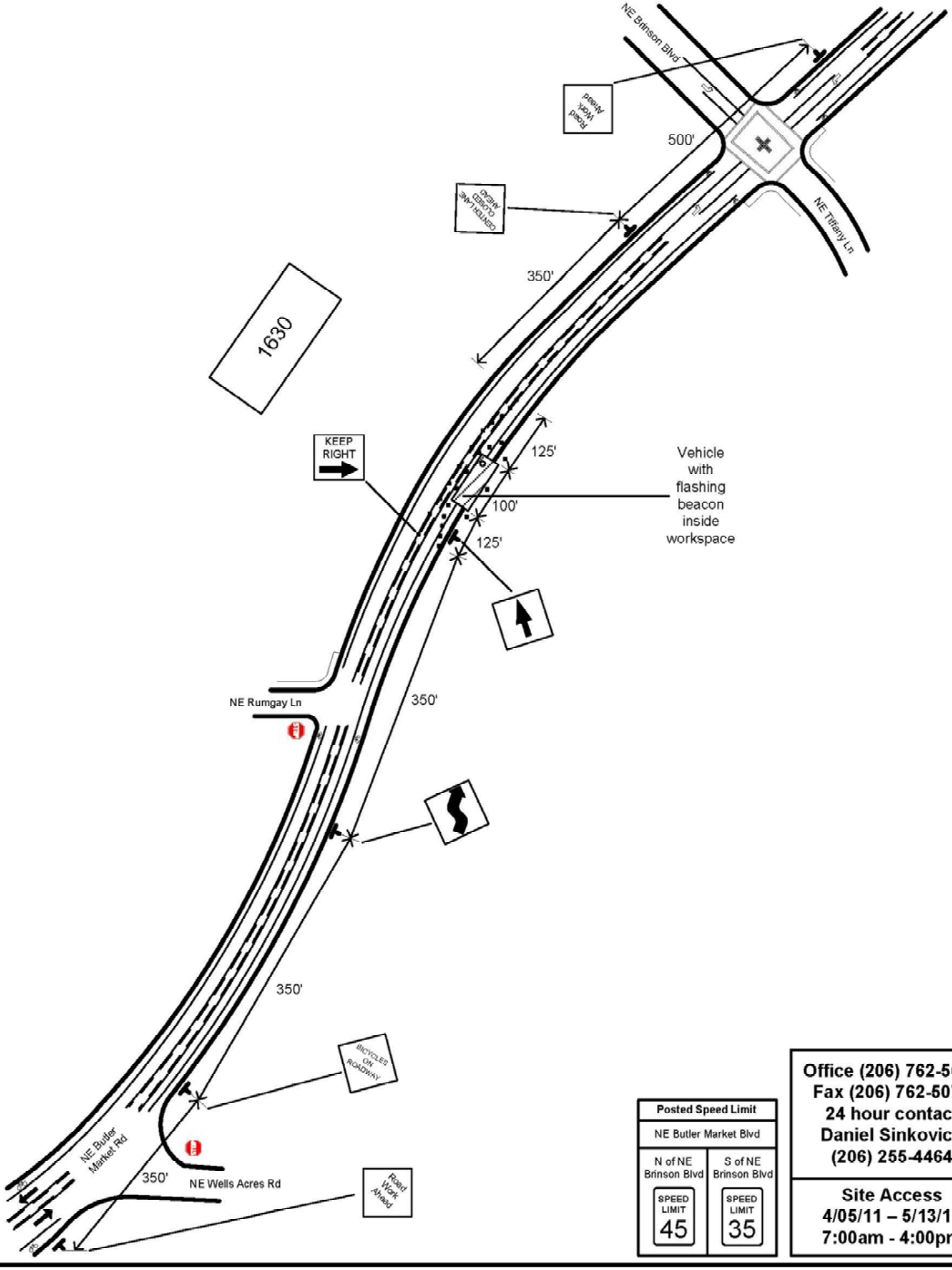
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/7/11	Date: 4/7/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_002155 MH #: CMH002155	Address: 1630 NE Butler Market RD Bend, OR	N	Drawing: 04/04/11 Submitted: 04/05/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Posted Speed Limit	
NE Butler Market Blvd	
N of NE Brinson Blvd	S of NE Brinson Blvd
SPEED LIMIT 45	SPEED LIMIT 35

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

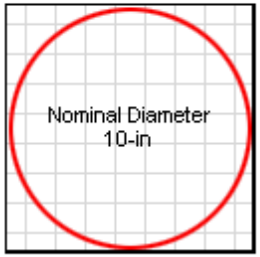
Site Access
4/05/11 – 5/13/11
7:00am - 4:00pm

SCATTERGRAPH REPORT

Bend_002155

Flow Monitor

Bend_002155

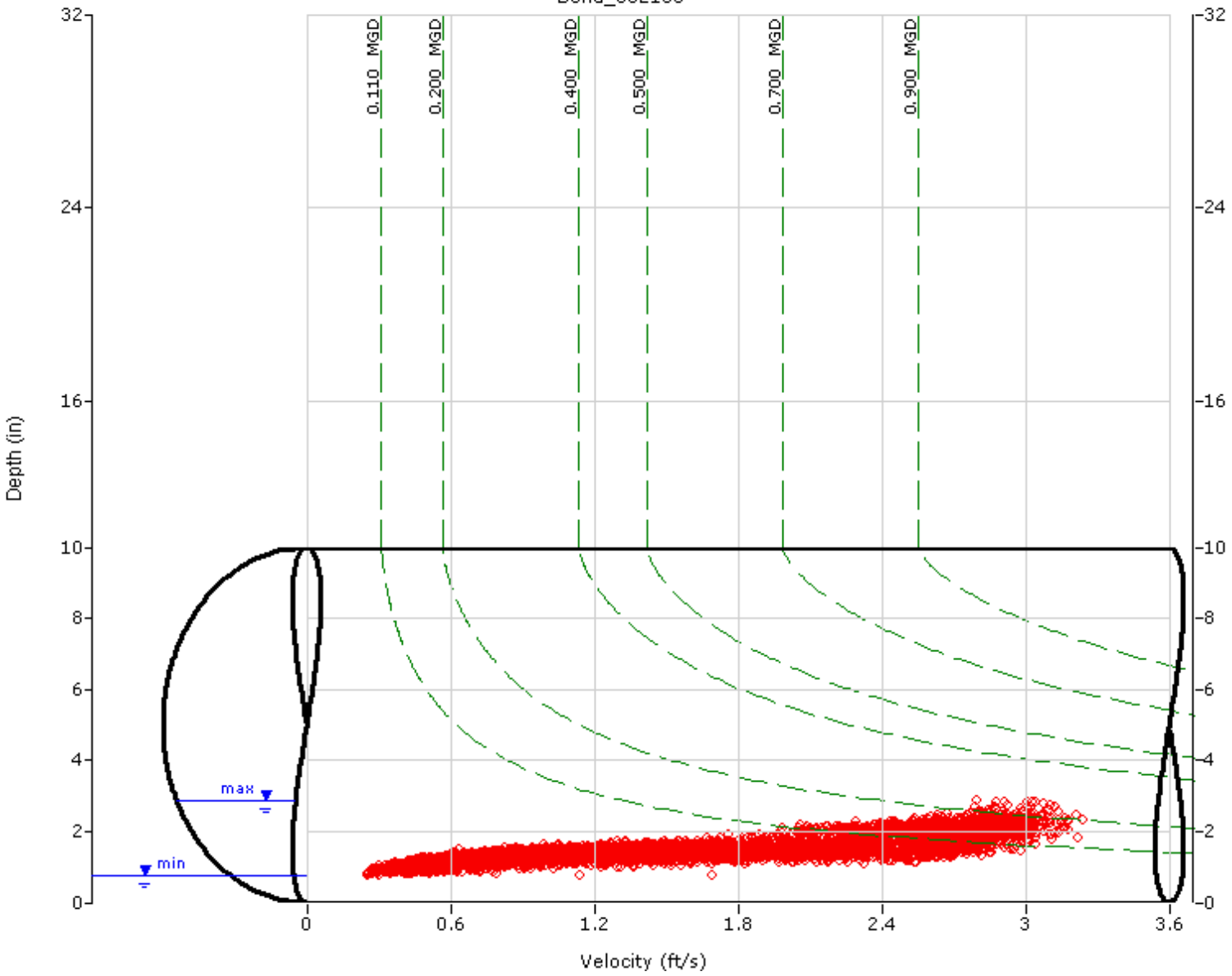


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



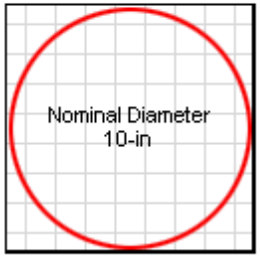
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_002155

Flow Monitor

Bend_002155

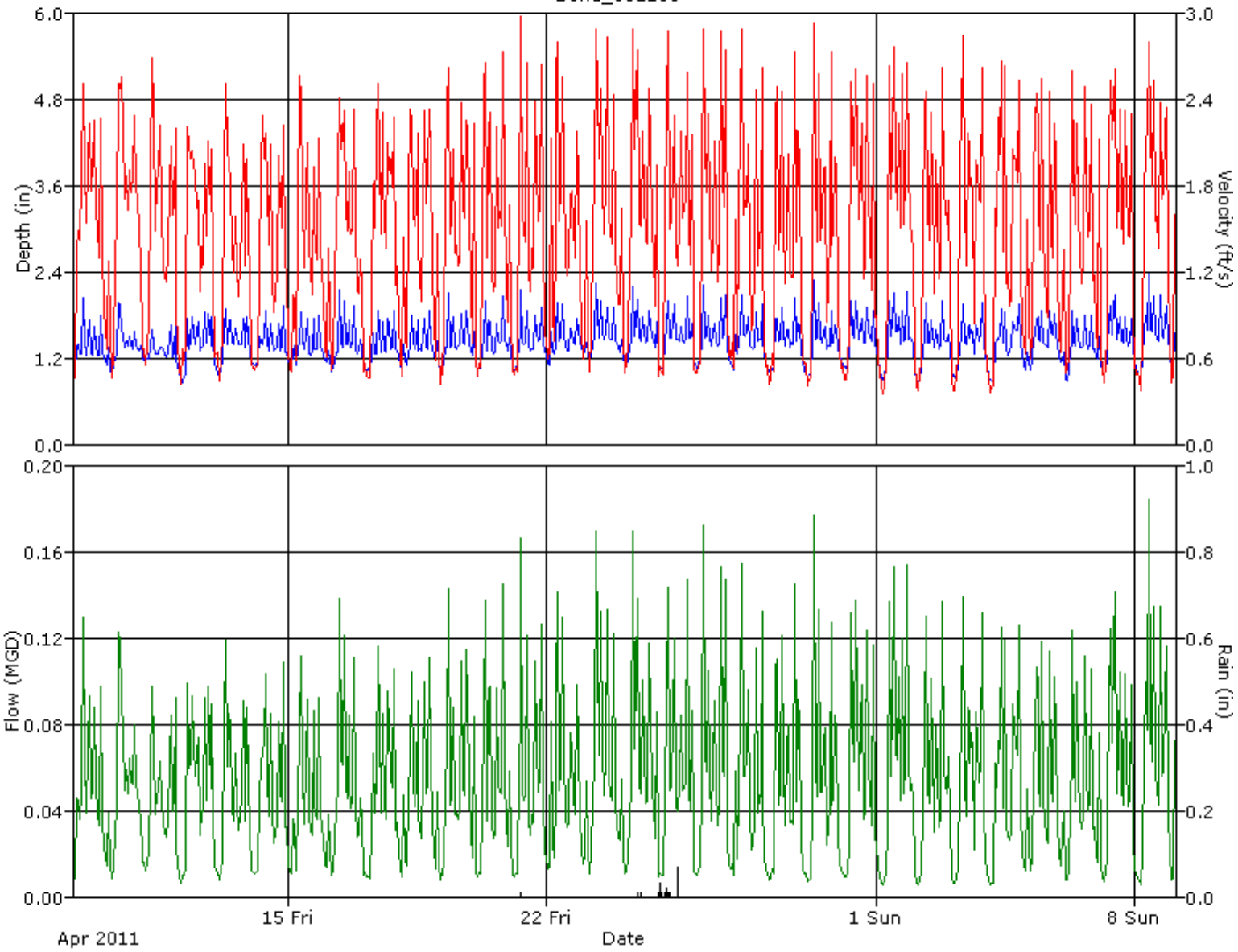


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_002346	
Measured Pipe Height (in)	20.75
Nominal Pipe Height (in)	21
Silt Level (in)	0.00

Overview

Monitoring point Bend_002346 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	4.22	1.99	0.481
Minimum	1.64	0.75	0.043
Maximum	6.80	2.95	1.266
Time of Minimum	4/30/2011 4:30 AM	4/23/2011 2:25 AM	4/30/2011 4:35 AM
Time of Maximum	4/9/2011 6:45 PM	4/28/2011 7:25 PM	4/9/2011 6:45 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.65
Quantity	99.65

Bend_002346
Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_002346

Site set up

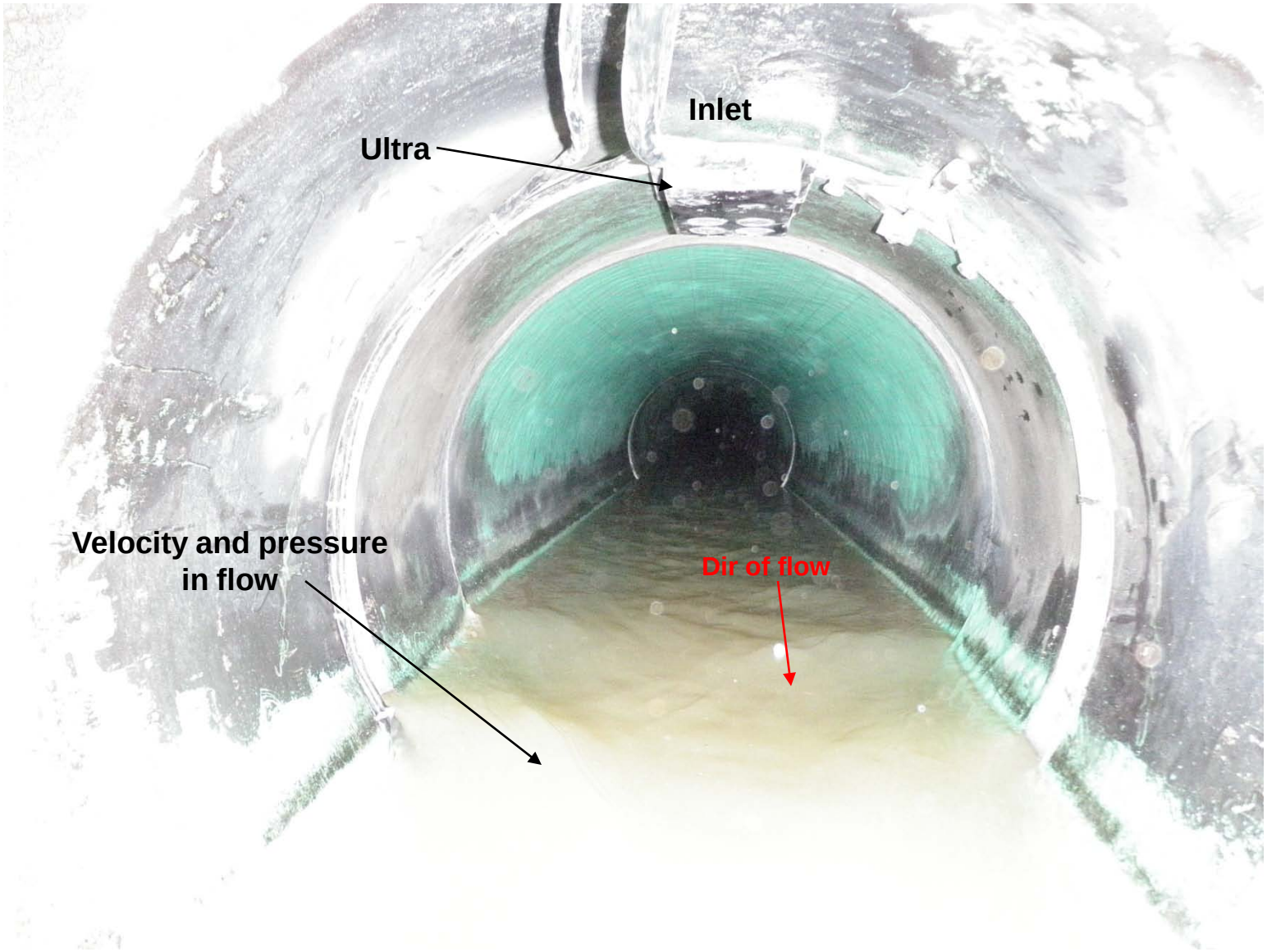
ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_002346

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_002346

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_002346	**Monitor Series:**	5000 AG
Address/Location:	20838 NE Sierra Dr		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	20021
Manhole #	CMH002346
Coordinates:	44° 5'32.28"N 121°16'53.59"W
Pipe Height:	20.75"
Pipe Width:	20.75"
IP Address:	166.219.169.183

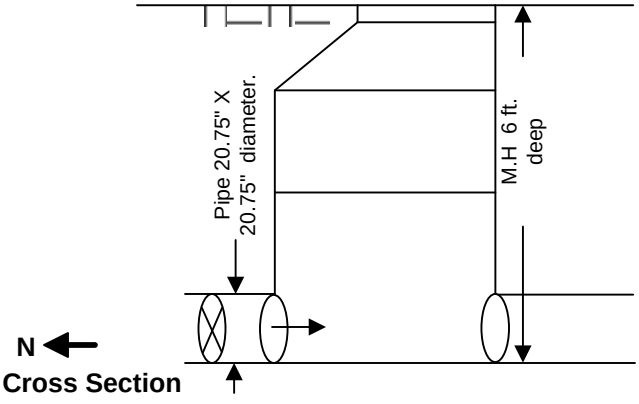
Investigation Information:

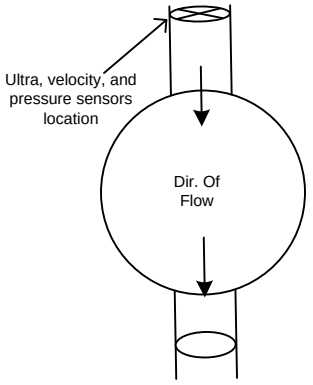
Date/Time of Investigation:	3/24/11 @ 11:34
Site Hydraulics:	Smooth and steady flow
Upstream Input: (L/S, P/S)	No immediate input
Upstream Manhole:	DNI
Downstream Manhole:	2 inlets / 1 outlet (force main ends)
Depth of Flow:	5.13" +/- 0.25"
Range (Air DOF):	15.63" +/- 0.25"
Peak Velocity:	2.87 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	6' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[X]	[ ]	[ ]	~ 300 ft.
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_002346	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

- ☒ This worksite does NOT require a traffic control Plan
- ☐ Standard Traffic Control Plan is to be used at this work site
- ☐ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/24/11	Date: 3/24/11

SCATTERGRAPH REPORT

Bend_002346

Flow Monitor

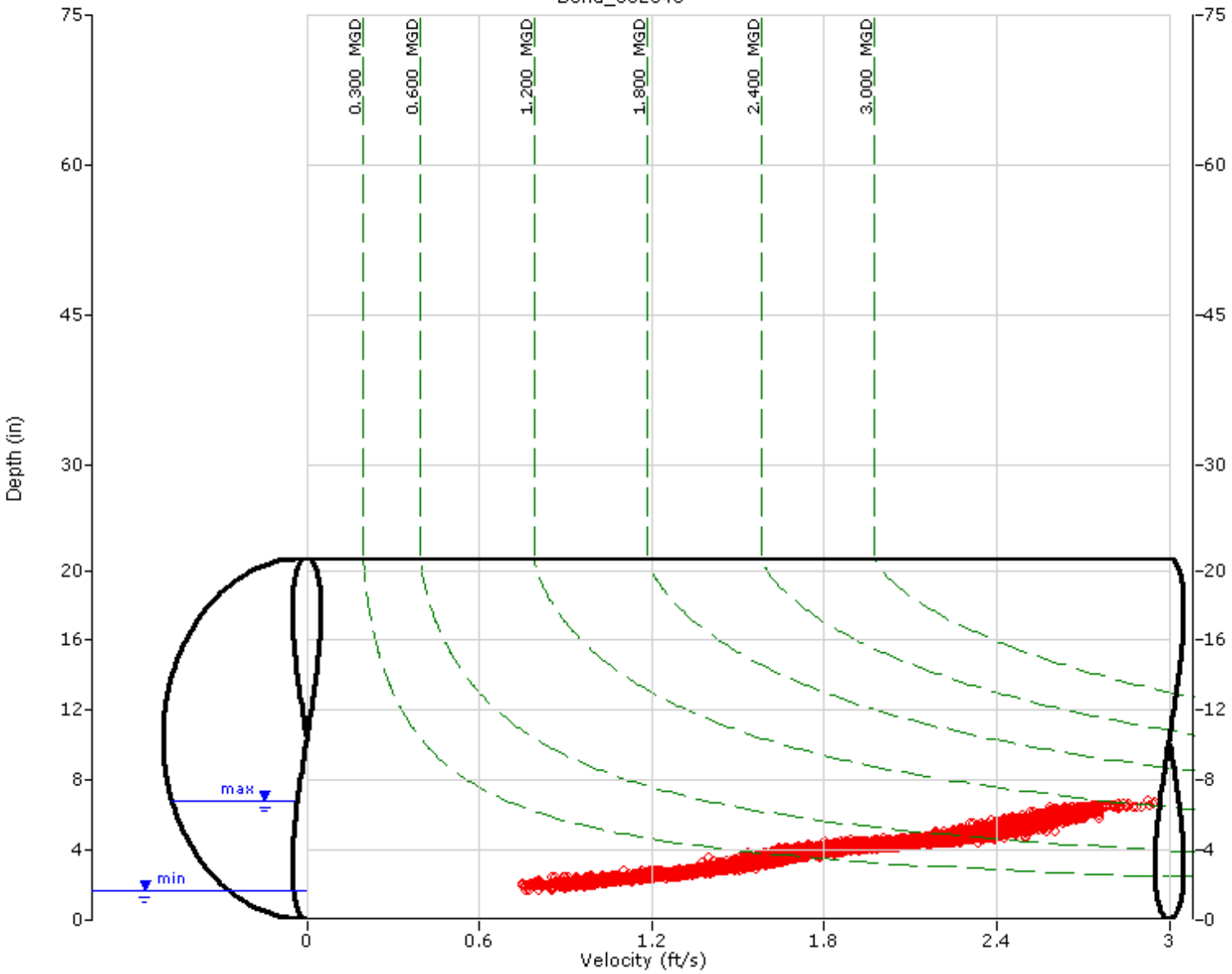
Bend_002346

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_002346

Flow Monitor

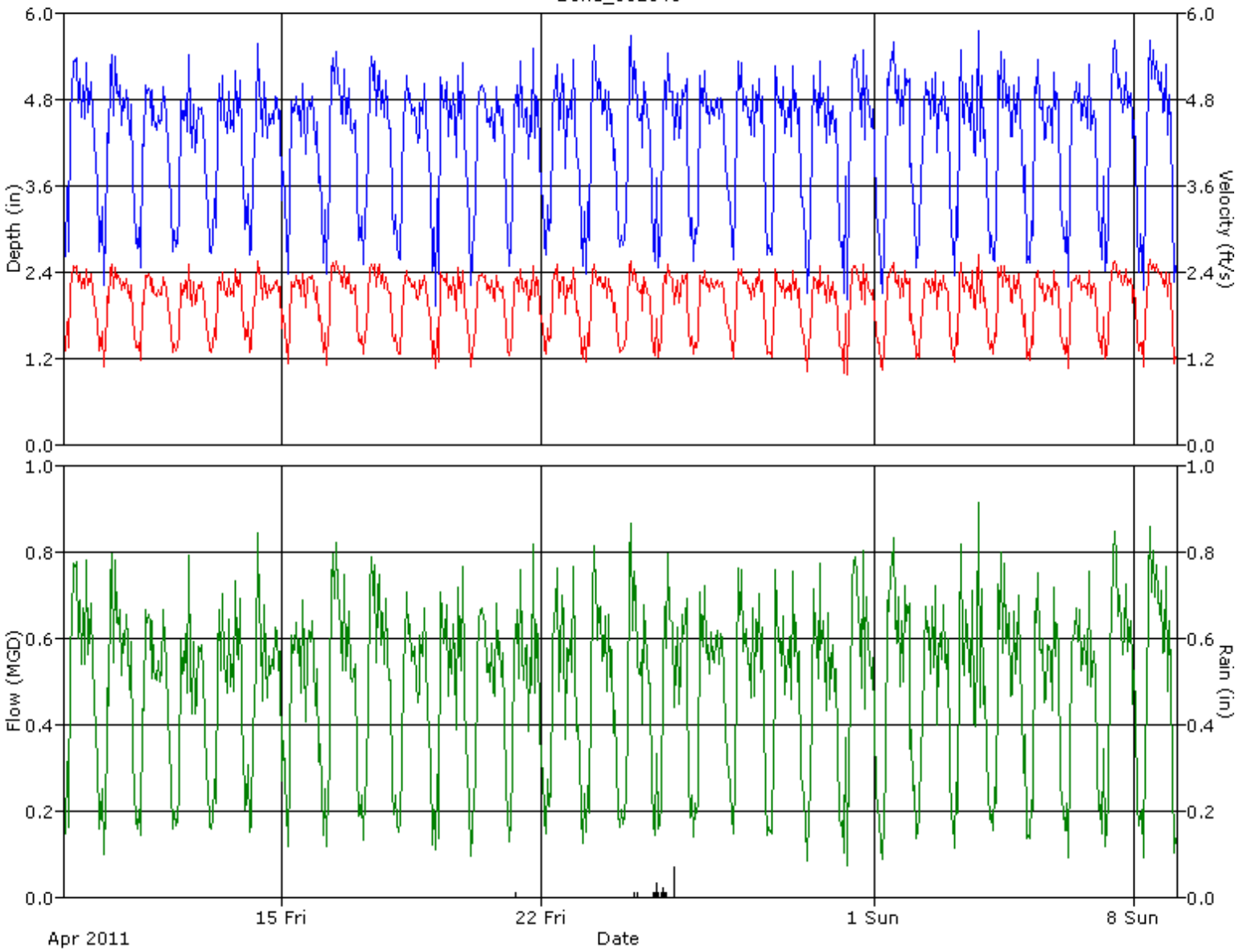
Bend_002346

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_002538	
Measured Pipe Height (in)	9.75
Nominal Pipe Height (in)	10
Silt Level (in)	0.00

Overview

Monitoring point Bend_002538 was located in the West of Bend (see attached site report for details). The monitoring point was previously installed in Bend_002537 and moved to Bend_002538 on Wednesday, April 20, 2011.

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Wednesday, April 20, 2011 to Sunday, May 08, 2011 . In order to try and best capture the lift station peaks, the sample rate was set to 1-minute on Wednesday, April 20, 2011.

The scattergraph for this location indicates a repeatable data set with a grouping of values clustered in the medium depth (>1.75") low velocity (<3 ft/s) range. This grouping could be caused by an undetermined hydraulic influence or possibly by debris buildup affecting the flow conditions.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Wednesday, April 20, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 1-minute sample rate from Wednesday, April 20, 2011 to Sunday, May 08, 2011.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.32	3.20	0.176
Minimum	0.27	0.00	0.000
Maximum	4.07	8.32	1.101
Time of Minimum	4/29/2011 2:13 AM	5/6/2011 5:34 PM	5/6/2011 5:34 PM
Time of Maximum	4/24/2011 10:42 AM	5/7/2011 7:28 AM	4/24/2011 10:42 AM

Data Quality

The data uptime for the Wednesday, April 20, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 1-minute data points divided by the total number of 1-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_002538

Site location

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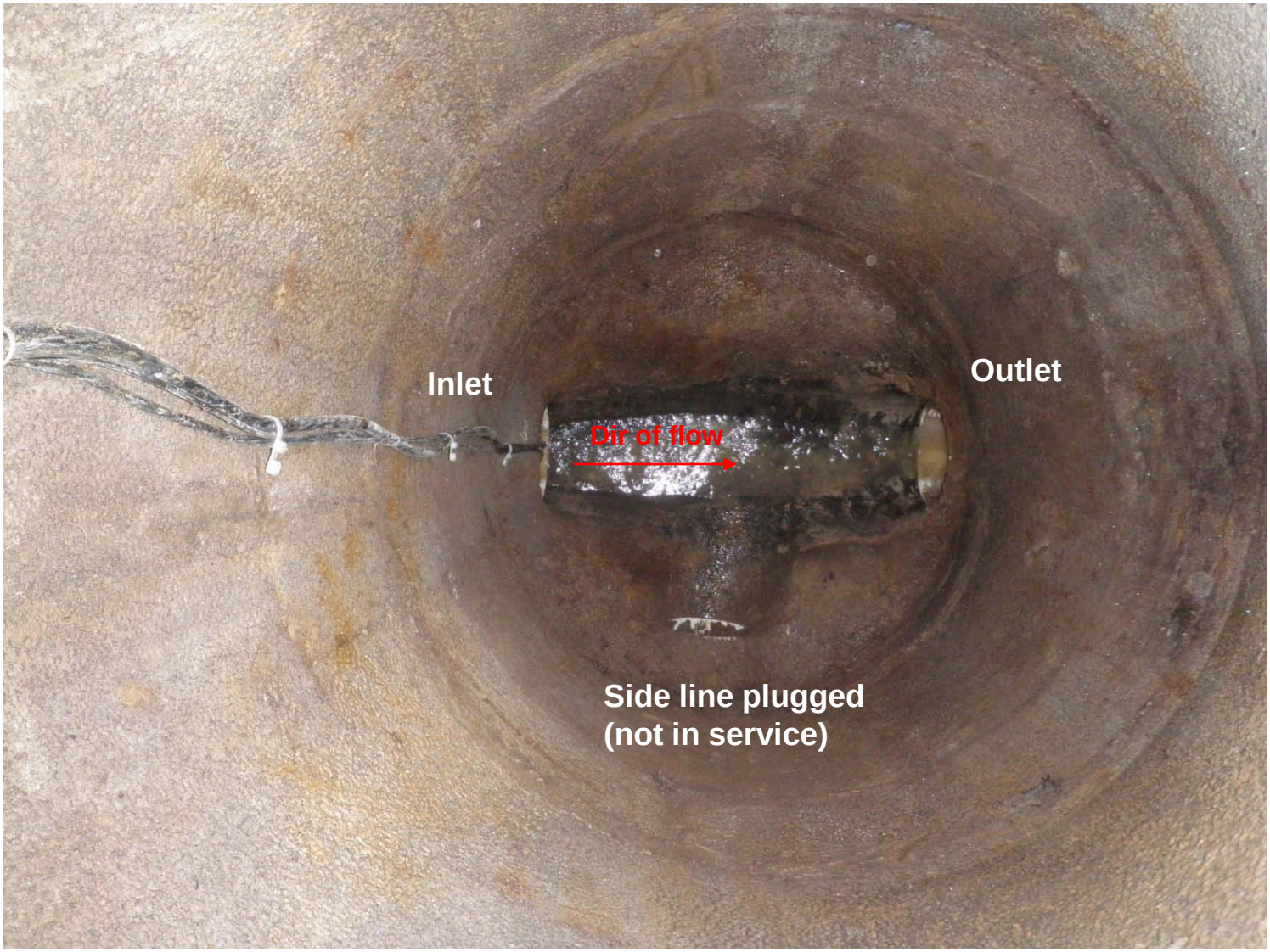
Site access looking north

Bend_002538

Site set up

ADS ENVIRONMENTAL SERVICES®

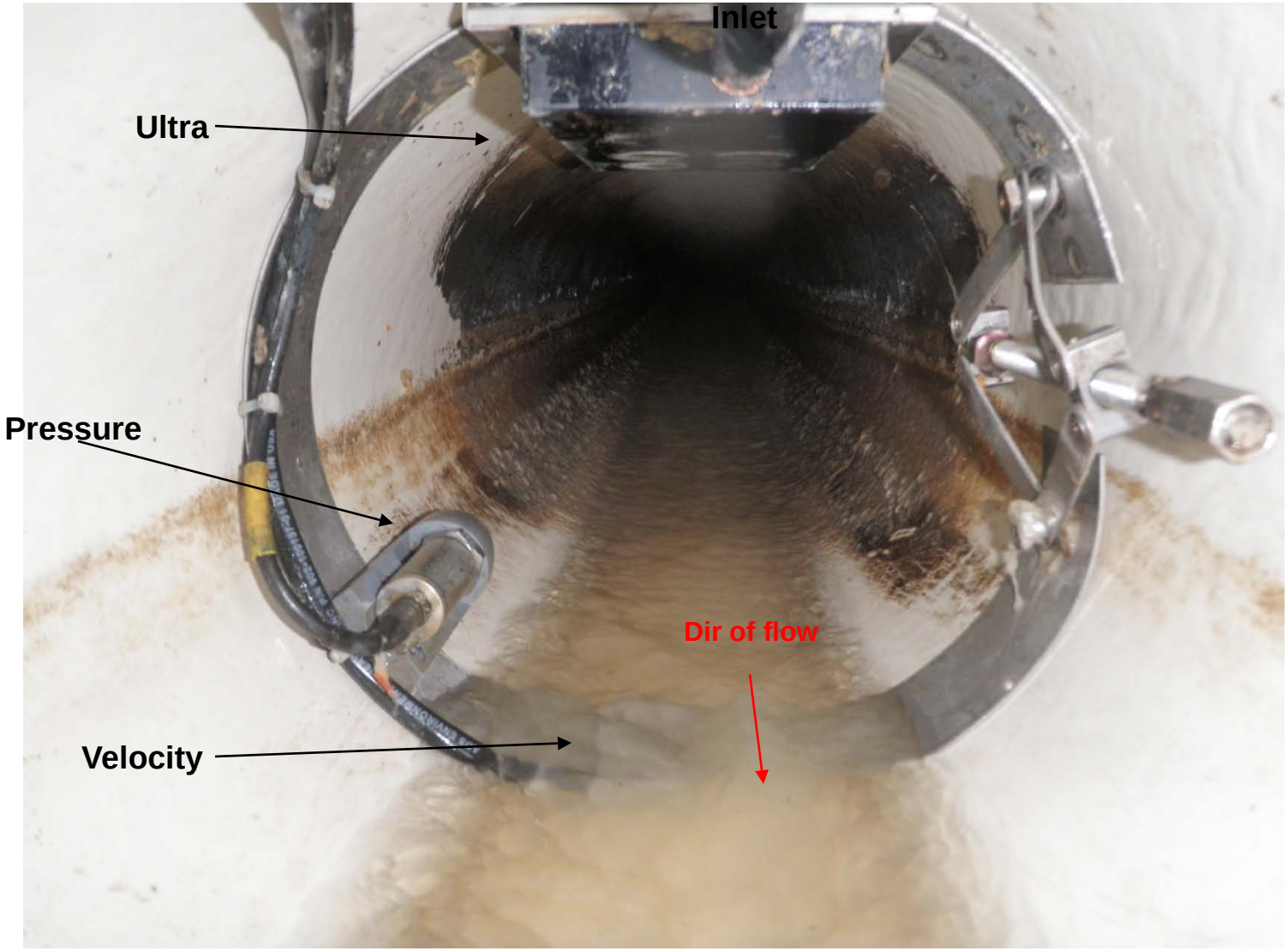


View down manhole facing north

Bend_002538

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_002538

Site outlet

View of outlet and hydraulics

ADS Site Report

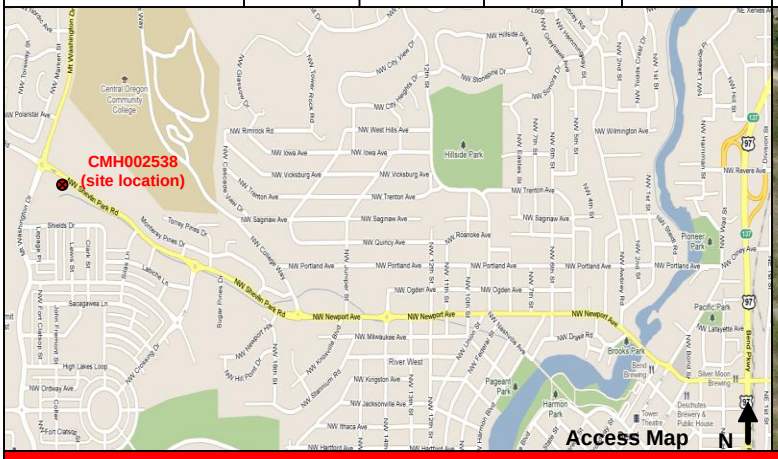
Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_002538	**Monitor Series:**	5000 AG
Address/Location:	2555 NW Shevlin Park Rd (in grass shoulder S of road)		

Access:	**Type of System:**	Sanitary	Storm	Combined
Drive		X		

Monitor S/N:	21810
Manhole #	CMH002538
Coordinates:	44° 4'2.54"N 121°21'14.32"W
Pipe Height:	9.75"
Pipe Width:	10.00"
IP Address:	166.219.169.134



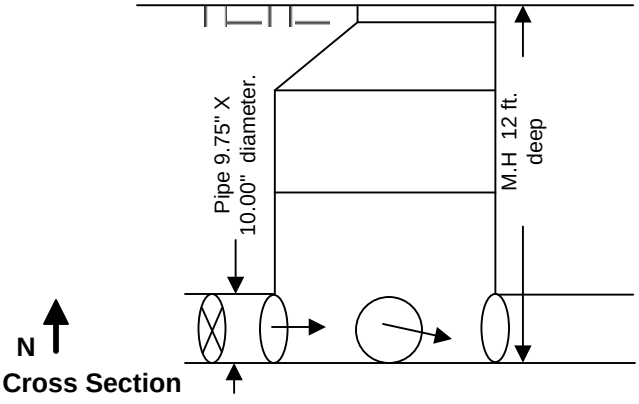
Investigation Information:

Date/Time of Investigation:	4/20/11 @ 10:46
Site Hydraulics:	Smooth, low, and slow flow. Fast wavy w/pumps on.
Upstream Input: (L/S, P/S)	Multiple L/S (~ 500')
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet
Depth of Flow:	0.88" +/- 0.25"
Range (Air DOF):	+/- 0.25"
Peak Velocity:	1.80 fps
Silt:	0 Inches

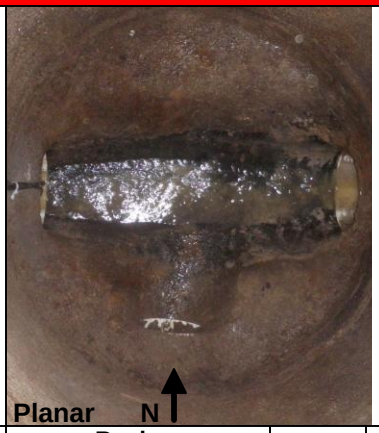
Manhole Information:

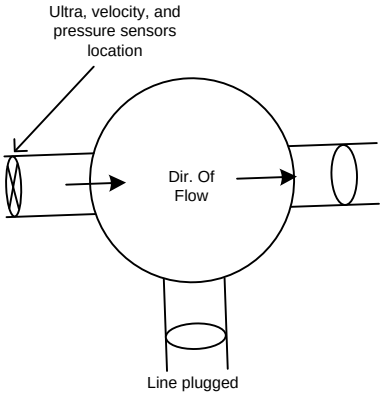
Manhole Depth:	~12' - 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential X	Commercial	Industrial	Trunk	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:



Cross Section





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk		X		
Lift / Pump Station		X		
WWTP		X		
Other		X		

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_002538	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

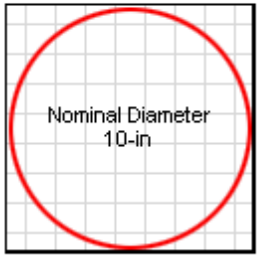
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/19/11	Date: 4/19/11

SCATTERGRAPH REPORT

Bend_002538

Flow Monitor

Bend_002538

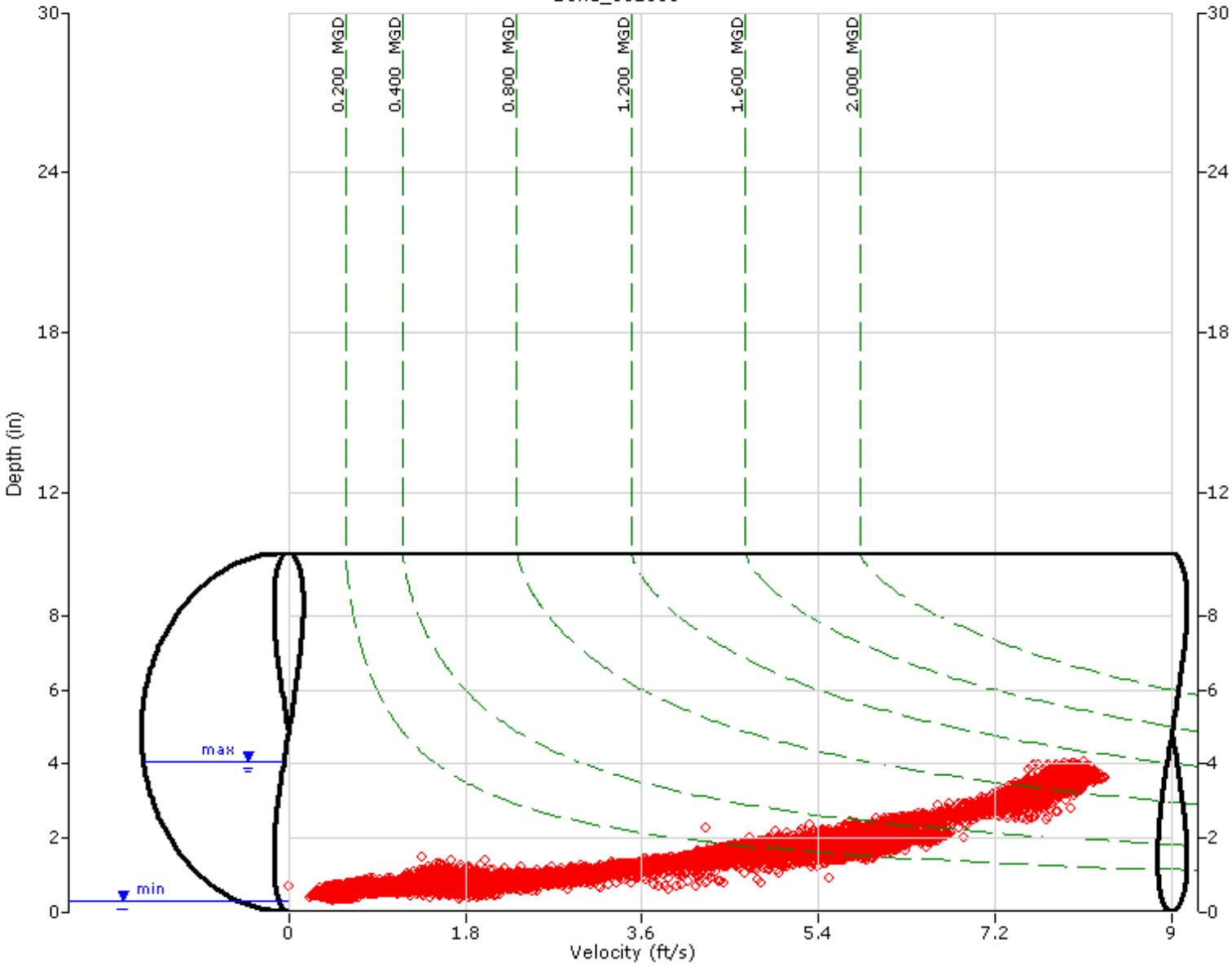


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_002538

Flow Monitor

Bend_002538

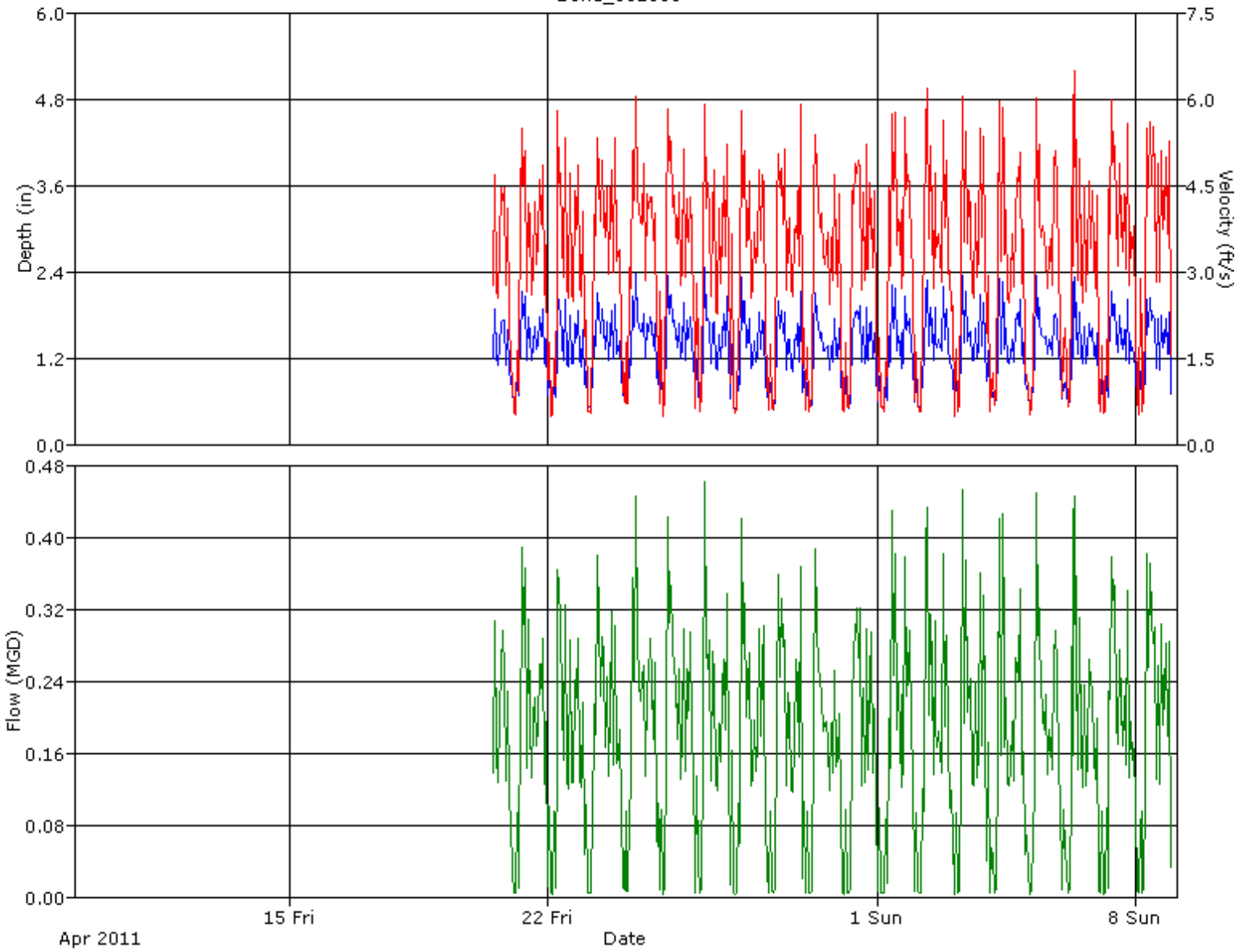
Nominal Diameter
10-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_002683	
Measured Pipe Height (in)	8
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_002683 was located in the West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 . In order to try and best capture the lift station peaks, the sample rate was changed from a 5-minute sample rate to a 1-minute sample rate on Wednesday, April 20, 2011.

The scattergraph for this location indicates a repeatable data set with some scattering of points at the upper and lower boundaries due to the lift station influence.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate from Saturday, April 09, 2011 to Tuesday, April 19, 2011 and a 1-minute sample rate from Wednesday, April 20, 2011 to Sunday, May 08, 2011.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.12	2.34	0.125
Minimum	0.10	0.15	0.000
Maximum	4.79	6.85	0.911
Time of Minimum	4/15/2011 12:55 AM	5/6/2011 10:10 PM	4/15/2011 12:55 AM
Time of Maximum	4/15/2011 9:00 PM	5/7/2011 10:04 AM	4/12/2011 11:40 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage (and 1-minute data points divided by the total number of 1-minute data points available after the sample rate was changed). Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	99.79
Velocity	100.00
Quantity	99.72

Bend_002683

Site location

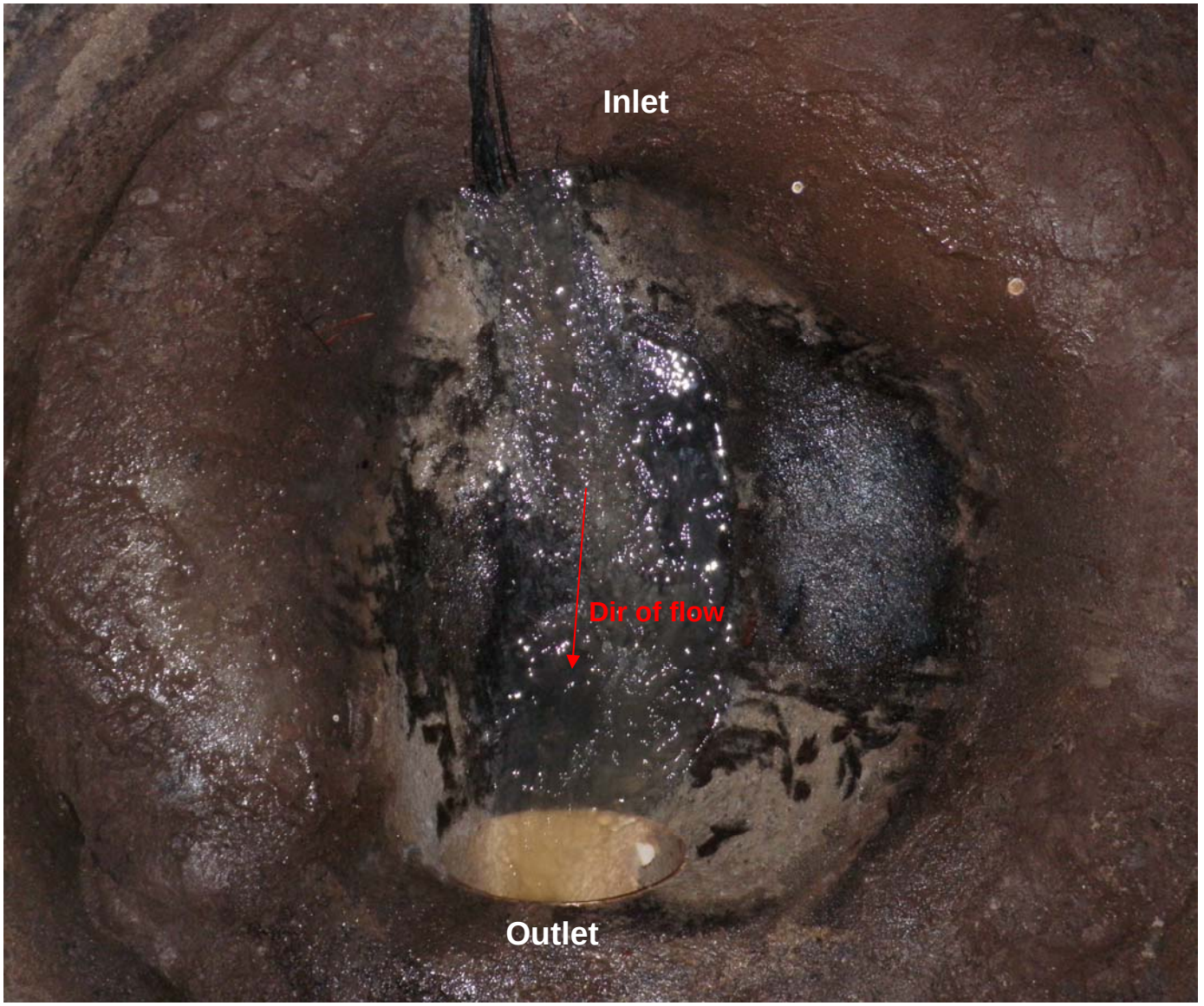
ADS ENVIRONMENTAL SERVICES®

Site access looking northeast

Bend_002683

Site set up

ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_002683

Site set up

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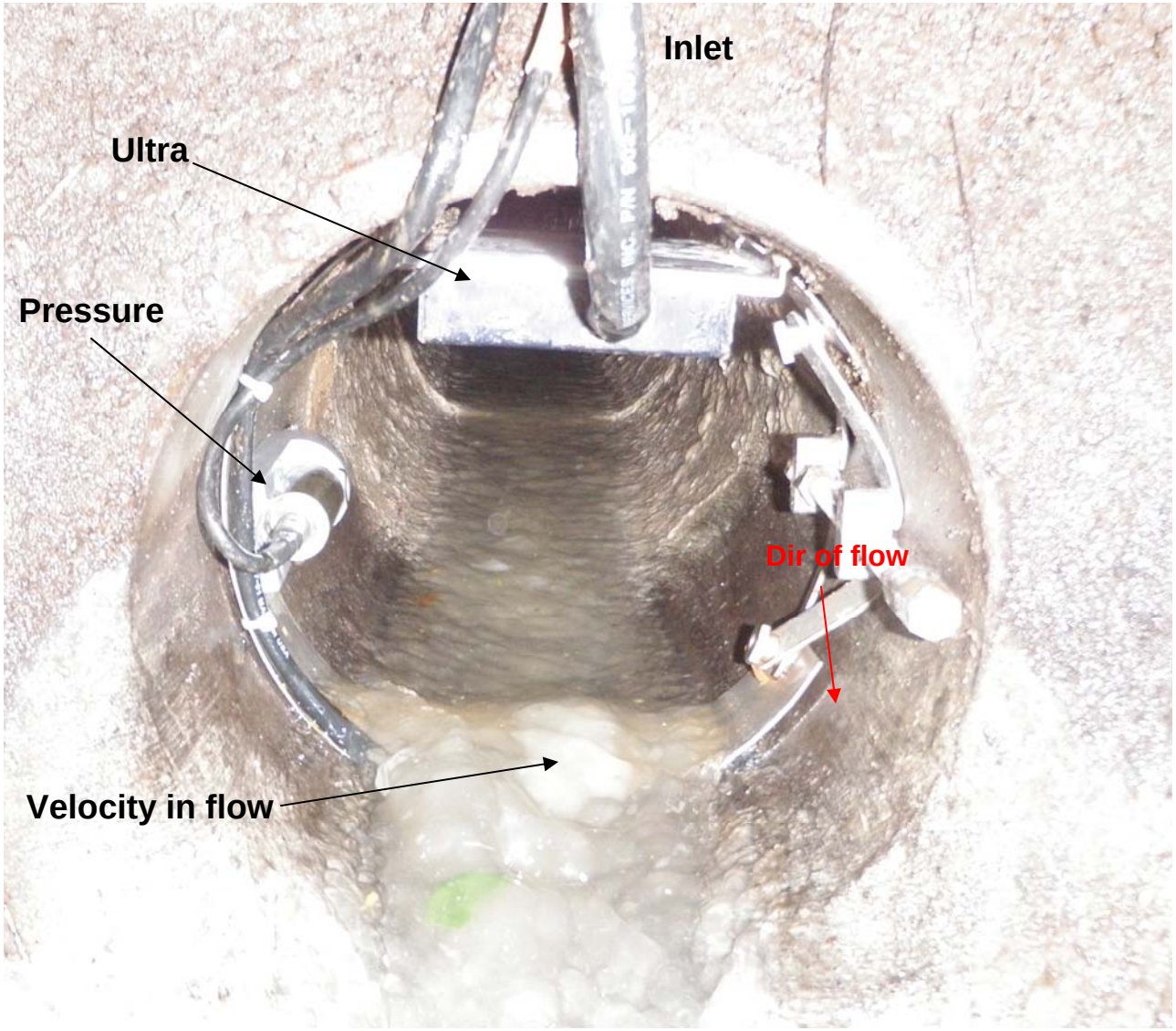
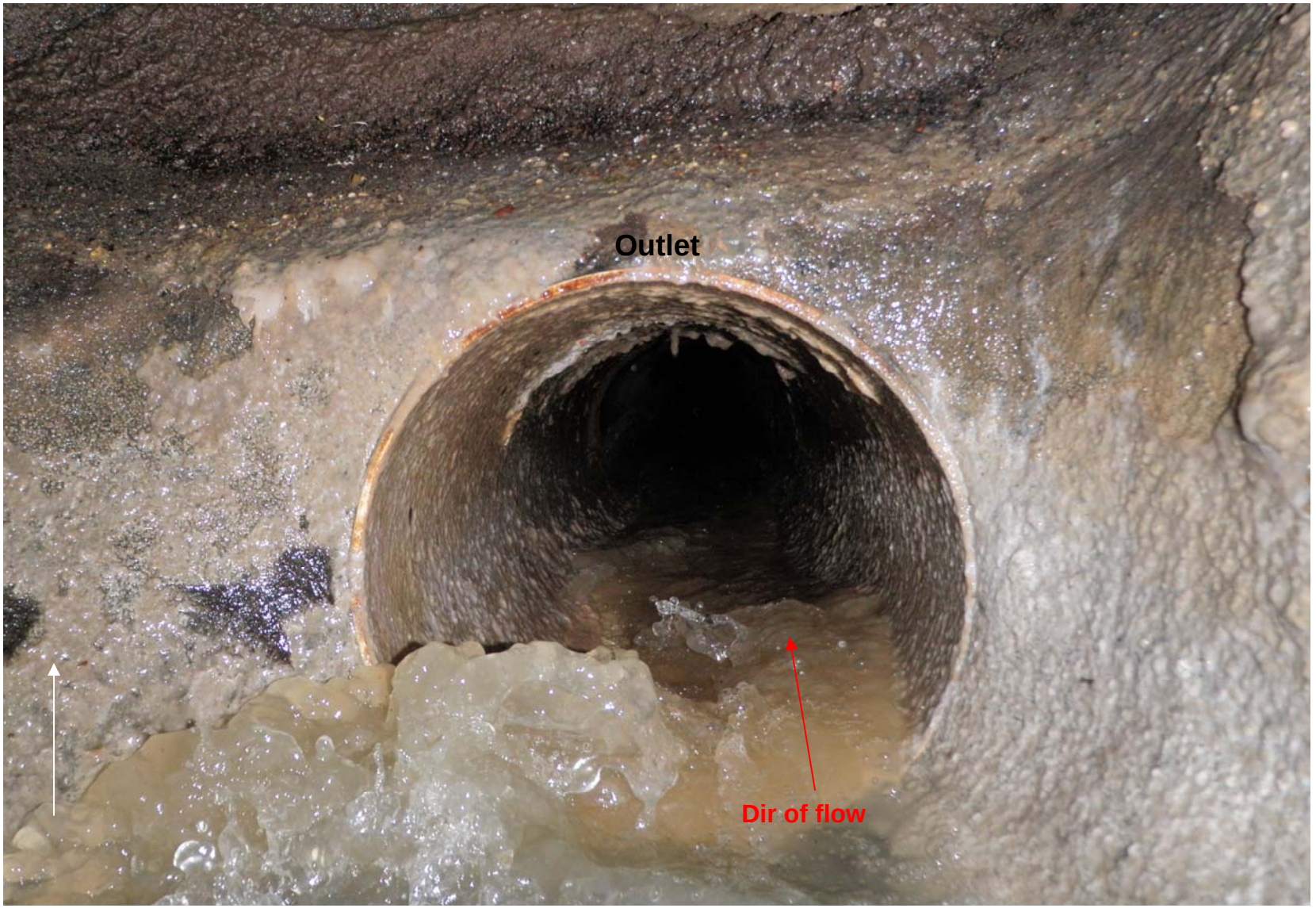


View of sensor placement and site hydraulics

Bend_002683

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_002683	**Monitor Series:**	5000 AG
Address/Location:	West of Mt. Washington Dr. on Shevlin Park Rd.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	20077
Manhole #	CMH002683
Coordinates:	44° 4'5.77"N 121°21'22.77"W
Pipe Height:	8.00"
Pipe Width:	8.00"
IP Address:	166.219.50.112

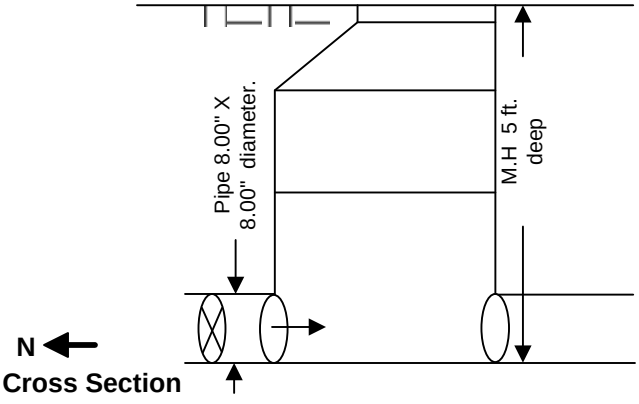
Investigation Information:

Date/Time of Investigation:	3/28/11 @ 9:13
Site Hydraulics:	Flow varies, moderate to fast with ripples
Upstream Input: (L/S, P/S)	Multiple L/S (varied distances)
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet
Depth of Flow:	4.00" +/- 0.38"
Range (Air DOF):	4.00" +/- 0.38"
Peak Velocity:	7.30 fps
Silt:	0 Inches

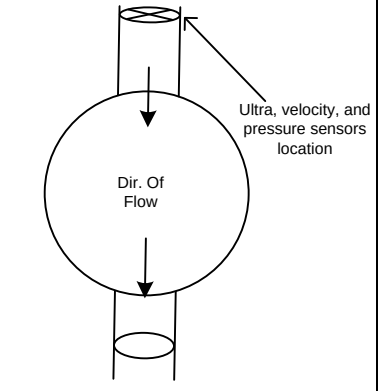
Manhole Information:

Manhole Depth:	5' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:



Cross Section



Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[X]	[ ]	[ ]	Force main input ~10' D/S
WWTP	[ ]	[X]	[ ]	
Other	[X]	[X]	[ ]	Restriction in MH

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_002683	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

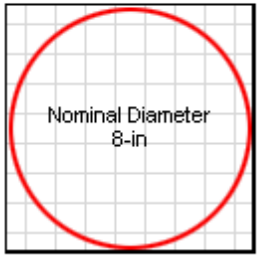
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/28/11	Date: 3/28/11

SCATTERGRAPH REPORT

Bend_002683

Flow Monitor

Bend_002683

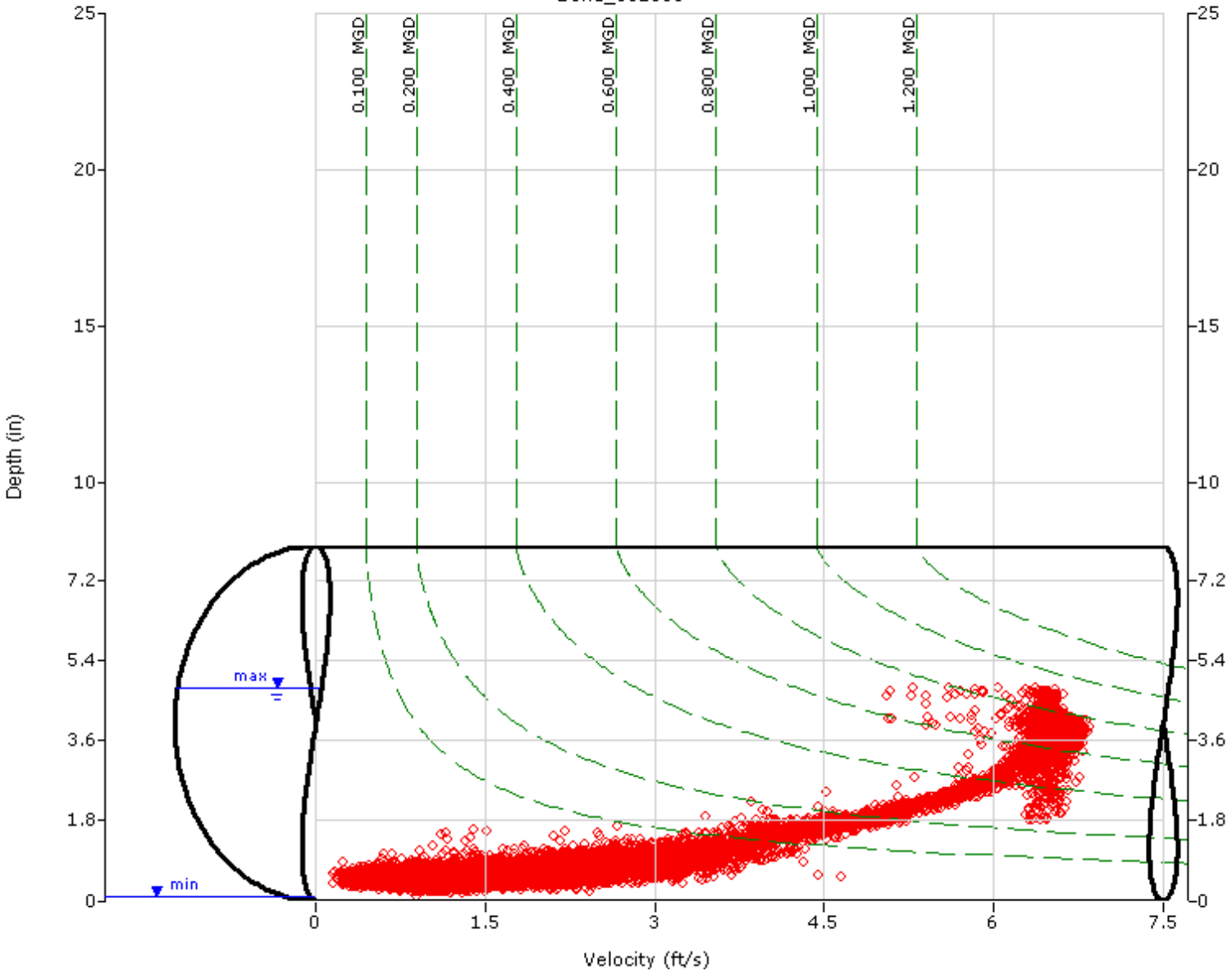


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



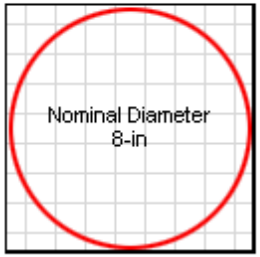
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_002683

Flow Monitor

Bend_002683

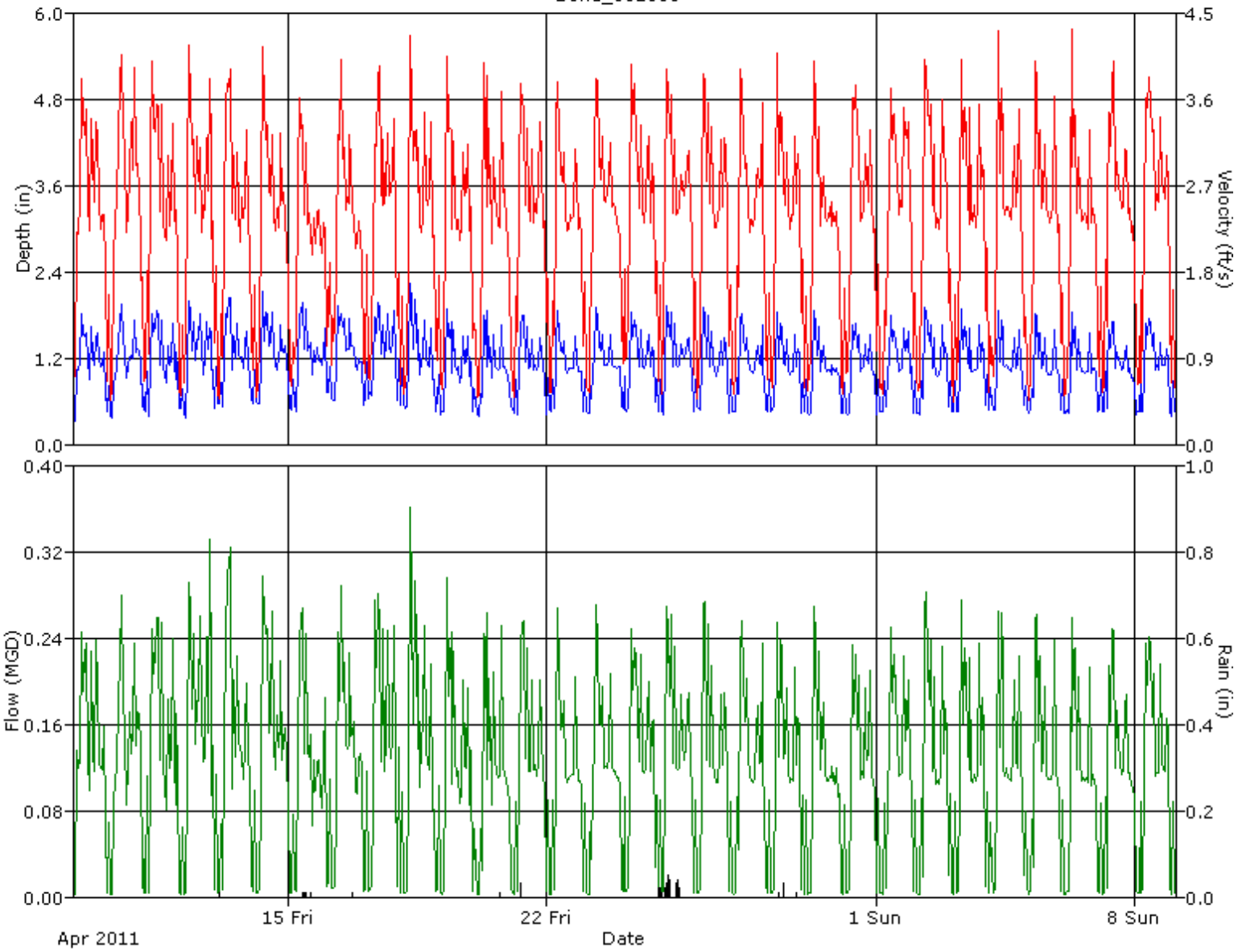


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_003151	
Measured Pipe Height (in)	8.14
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_003151 was located in the North of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with frequent surcharge conditions (depth exceeds crown of pipe) noted. The surcharge conditions necessitated the use of a pressure sensor to measure the depth at this location. The lower depth limit reflects where the flow depth was below the minimum level the pressure sensor needed to be able to measure a valid reading.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	4.80	1.98	0.306
Minimum	2.08	0.23	0.011
Maximum	18.37	3.87	0.904
Time of Minimum	4/9/2011 12:05 AM	5/2/2011 3:05 AM	5/2/2011 3:05 AM
Time of Maximum	4/24/2011 9:20 AM	4/24/2011 9:15 AM	4/24/2011 9:15 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_003151

Site location

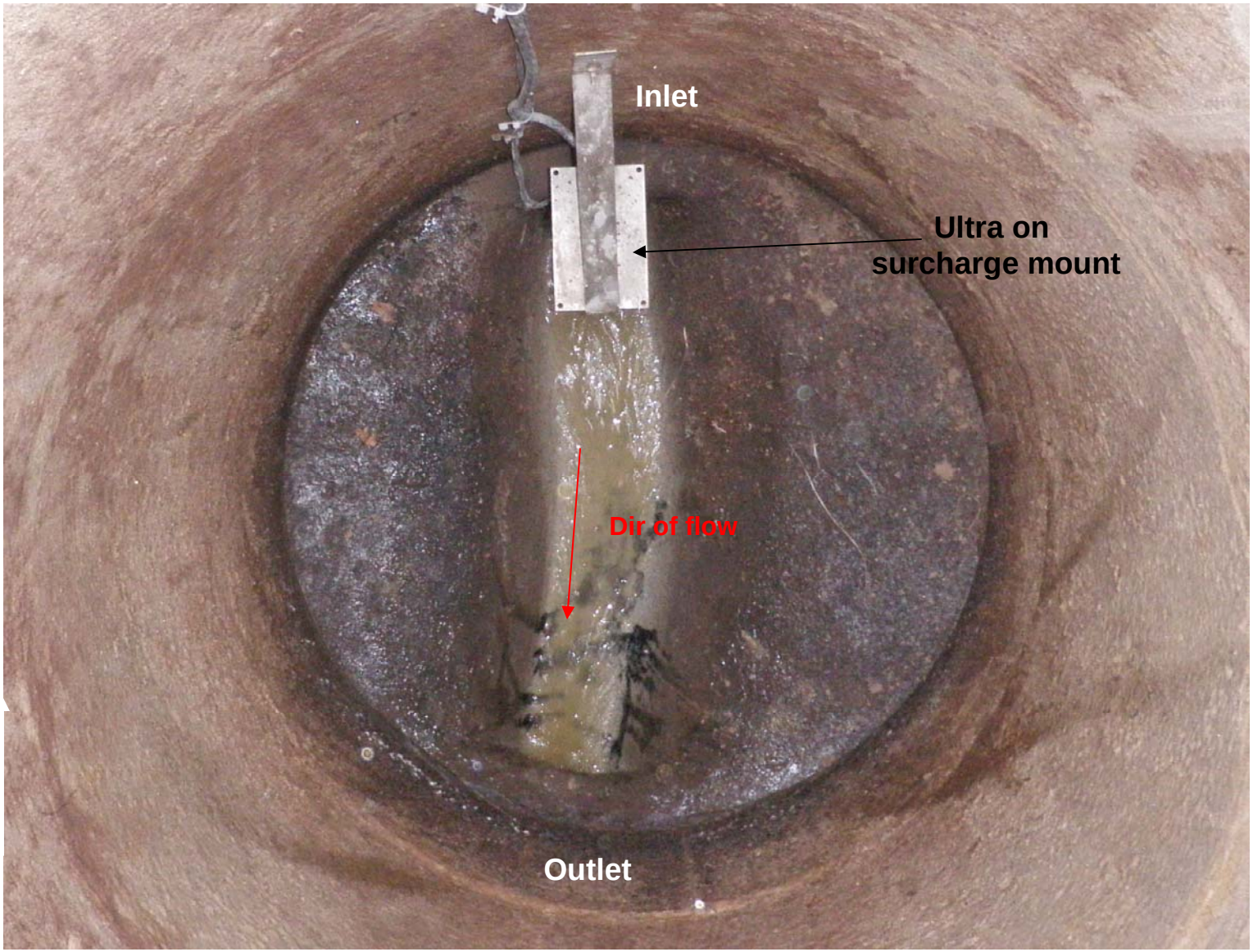
ADS ENVIRONMENTAL SERVICES®

Site access looking northeast

Bend_003151

Site set up

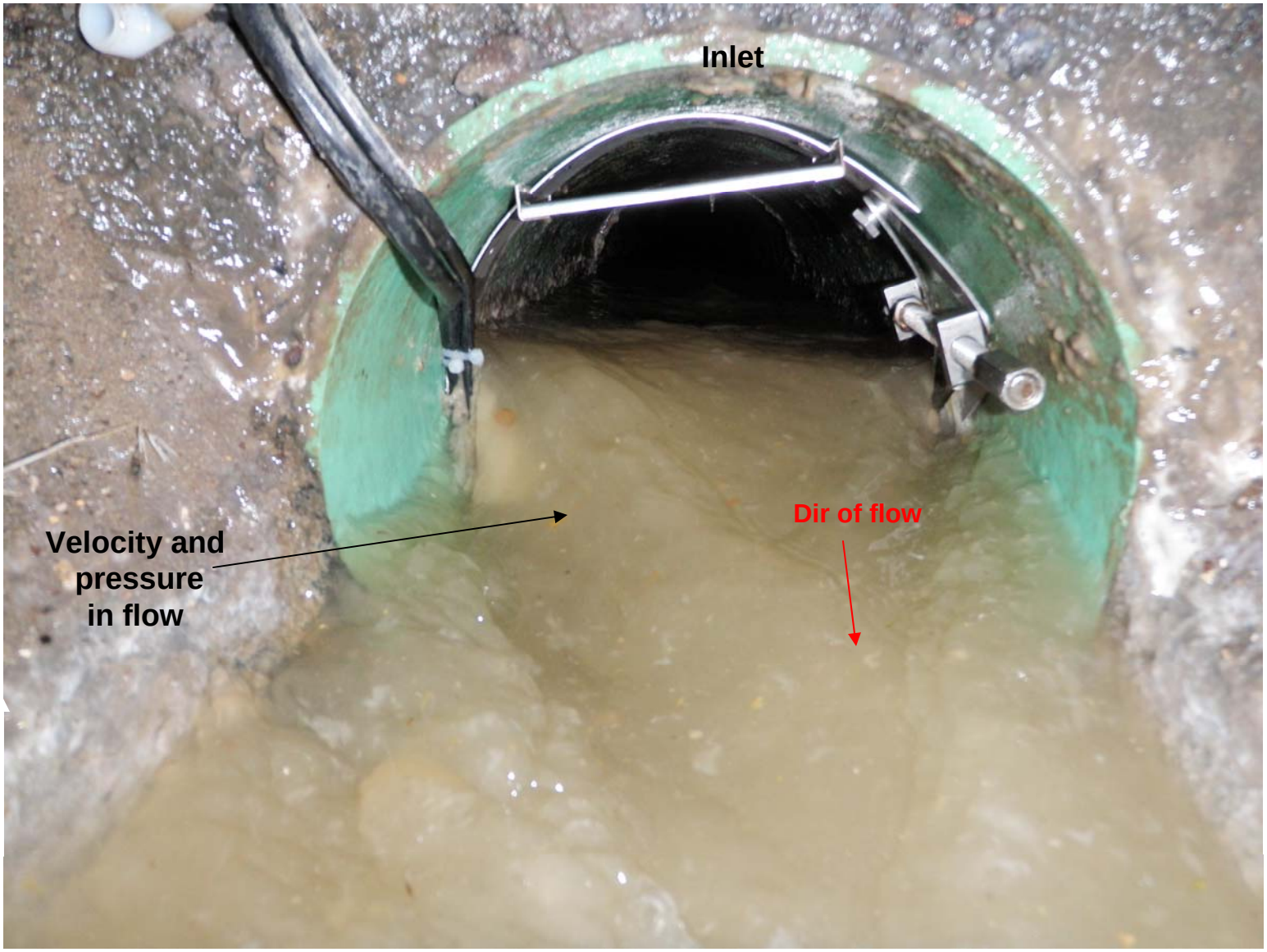
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_003151

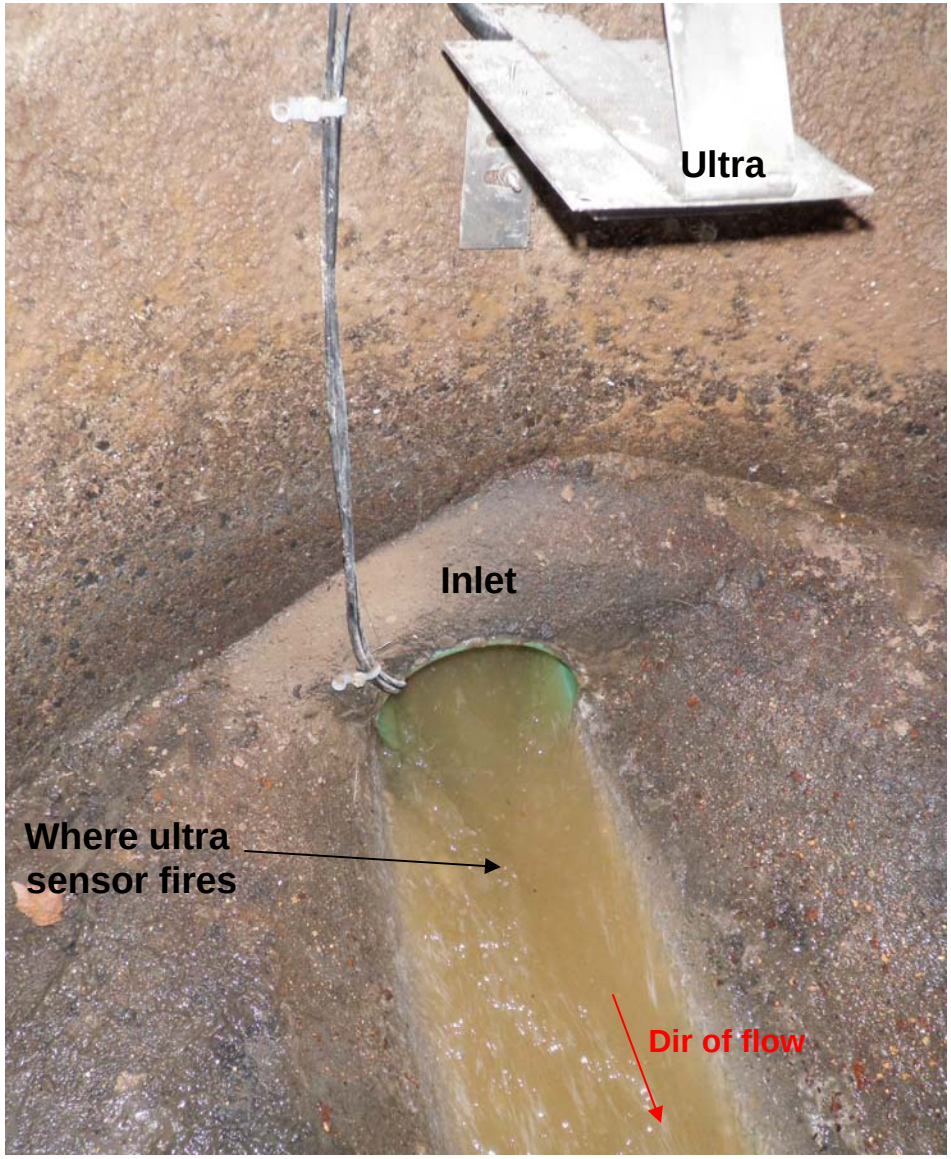
Site set up



View of sensor placement and site hydraulics

Bend_003151

Site set up



View of ultra placement and site hydraulics

Bend_003151

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_003151	**Monitor Series:**	5000 AG
Address/Location:	63273 Nels Anderson Rd		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21706
Manhole #	CMH003151
Coordinates:	44° 5'51.75"N 121°17'51.84"W
Pipe Height:	8.14"
Pipe Width:	8.14"
IP Address:	166.219.169.181

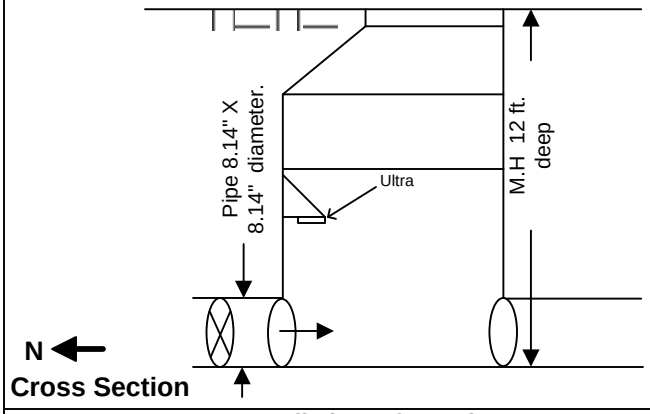
Investigation Information:

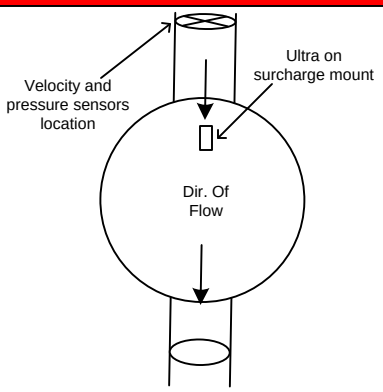
Date/Time of Investigation:	4/4/11 @ 13:54
Site Hydraulics:	Frequent surcharge, otherwise steady wavy flow
Upstream Input: (L/S, P/S)	Multiple L/S (~300`, ~.5mi)
Upstream Manhole:	1 inlet / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	4.25" +/- 0.25"
Range (Air DOF):	3.88" +/- 0.25"
Peak Velocity:	2.80 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	12' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [ ] Commercial [X] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:





Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk	[ ]	[X]	[ ]	
Sensors Devices:	Ultra, Velocity, Pressure	Lift / Pump Station	[ ]	[X]	[ ]	
Surcharge Height:	~1'	WWTP	[ ]	[X]	[ ]	
Rain Gauge Zone:	Bend_JRRG	Other	[X]	[ ]	[ ]	Restriction in CMH003150

Additional Site Information / Comments:

15 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_003151	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☒
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only.
Access only when site is not surcharged.

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☐ This site requires a special Traffic Control Plan which is attached

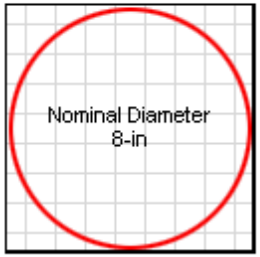
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/4/11	Date: 4/4/11

SCATTERGRAPH REPORT

Bend_003151

Flow Monitor

Bend_003151

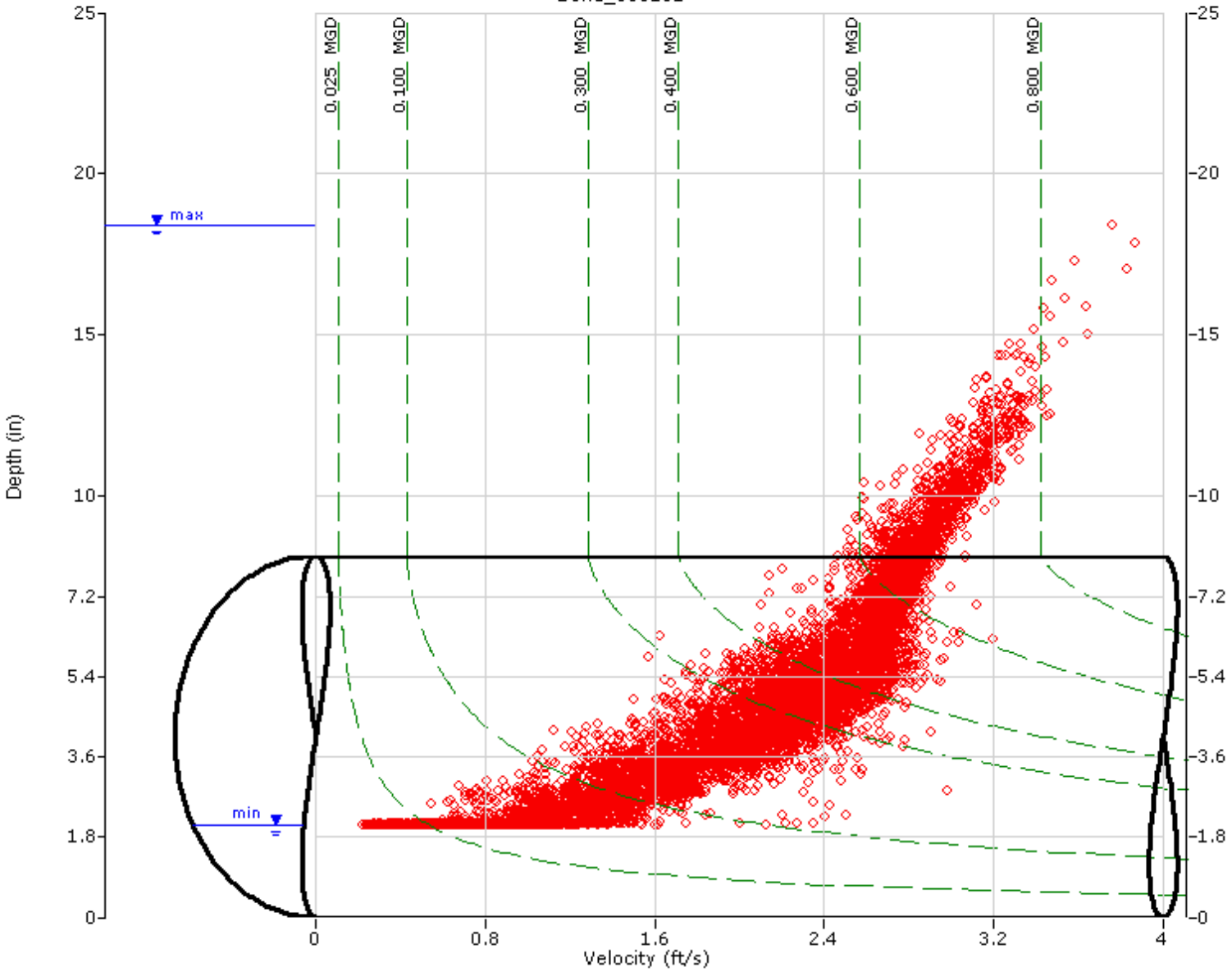


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



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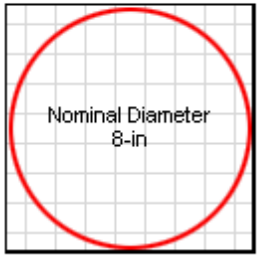
HYDROGRAPH REPORT

Bend_003151

Flow Monitor

Bend_003151

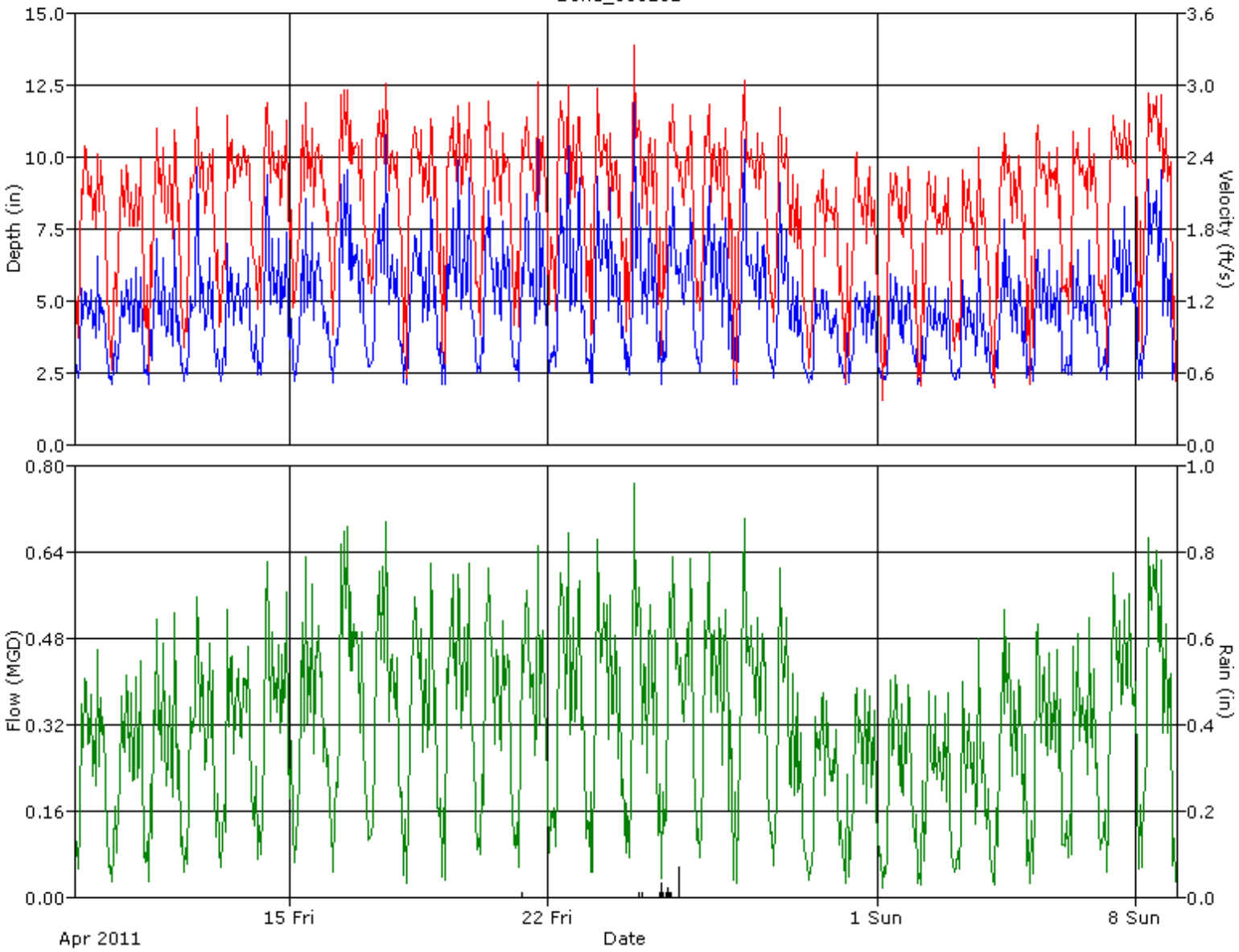


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_003157	
Measured Pipe Height (in)	7.88
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_003157 was located in the North of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with frequent surcharge conditions (depth exceeds crown of pipe) noted. The surcharge conditions necessitated the use of a pressure sensor to measure the depth at this location. The lower depth limit reflects where the flow depth was below the minimum level the pressure sensor needed to be able to measure a valid reading.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	6.82	1.85	0.279
Minimum	1.46	0.16	0.005
Maximum	79.85	4.54	0.993
Time of Minimum	4/9/2011 1:45 AM	5/7/2011 5:35 AM	4/9/2011 7:10 AM
Time of Maximum	4/21/2011 6:20 PM	4/24/2011 9:05 AM	4/24/2011 9:05 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.93
Quantity	99.93

Bend_003157

Site location

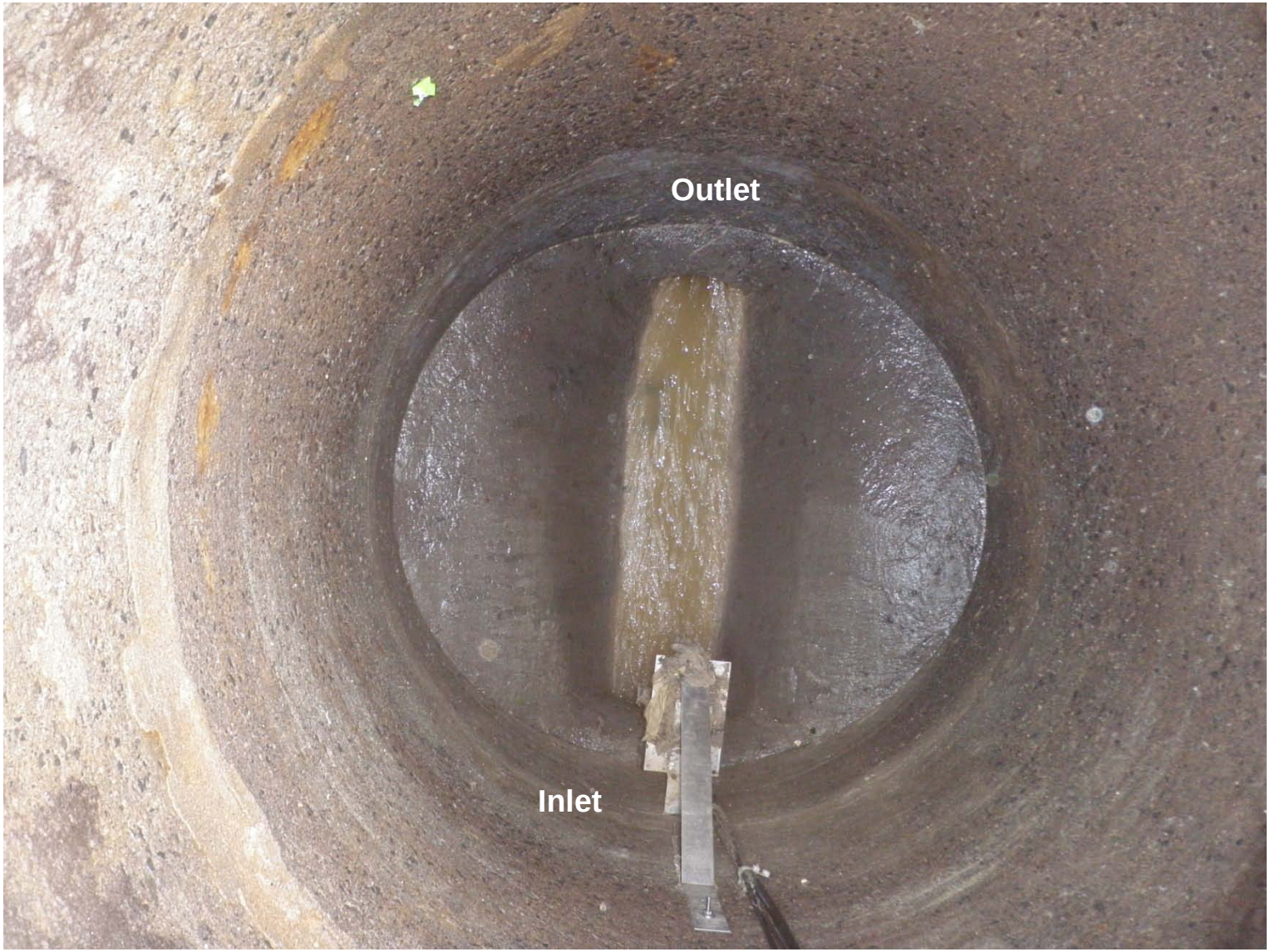
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_003157

Site set up

ADS ENVIRONMENTAL SERVICES®

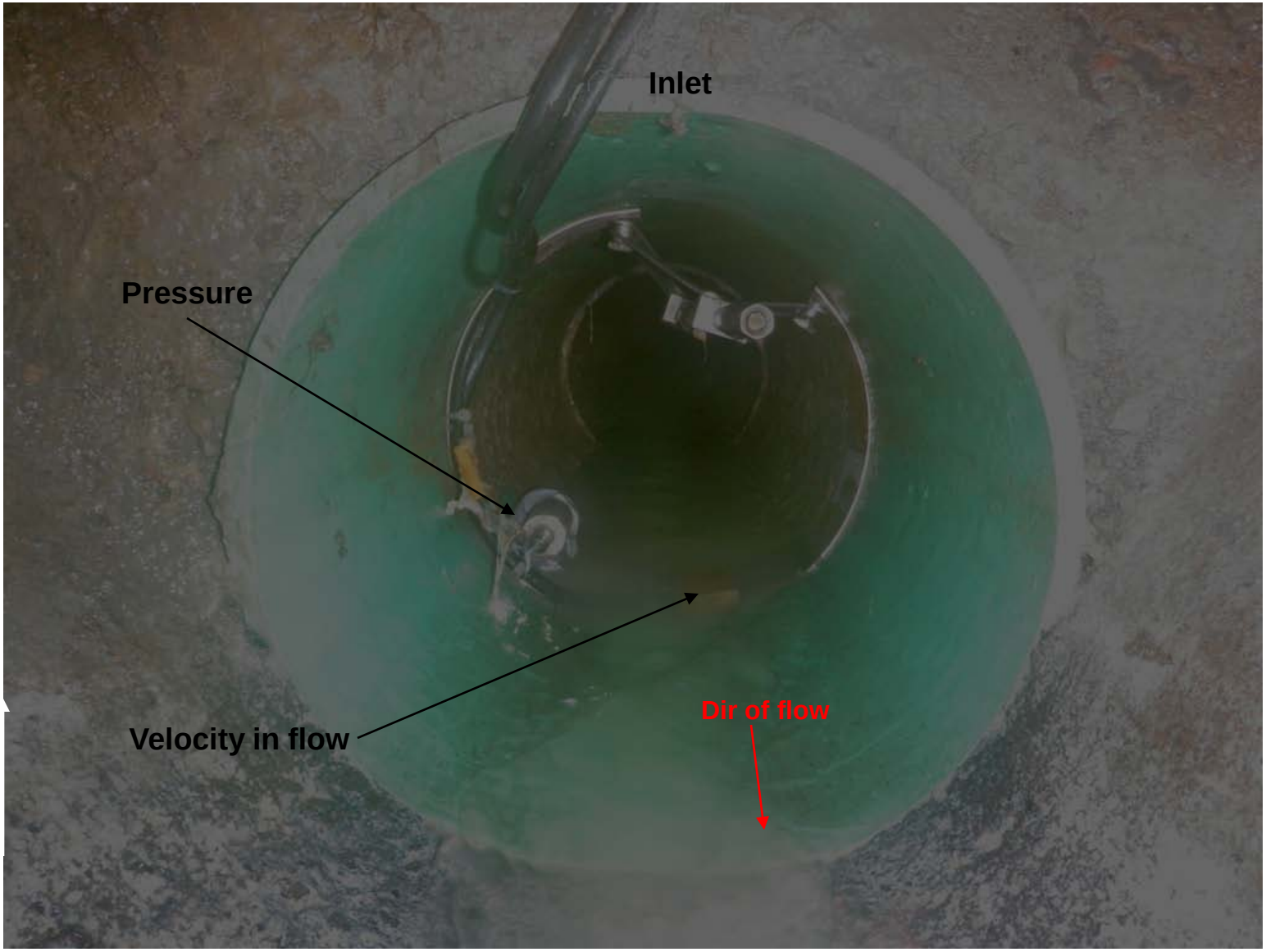


View down manhole facing north

Bend_003157

Site set up

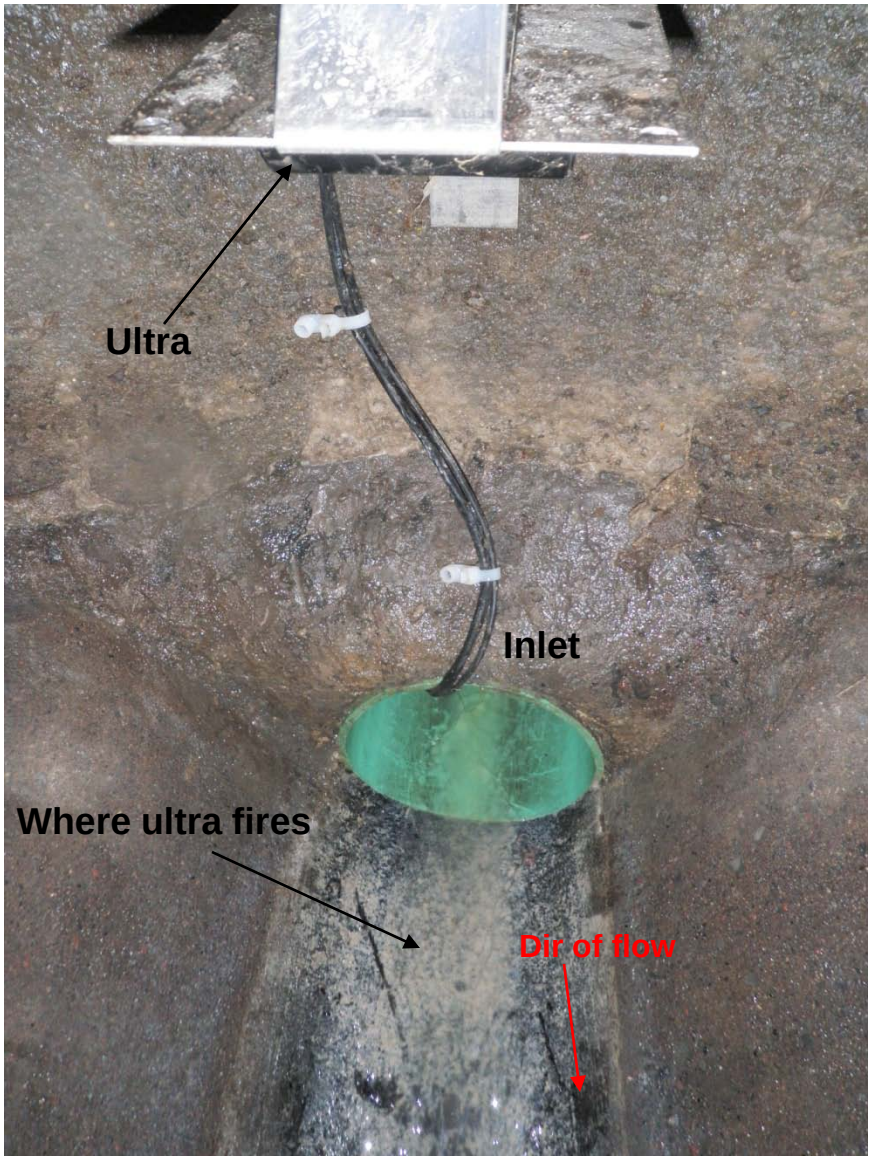
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_003157

Site set up



View of ultra placement and site hydraulics

Bend_003157

Site outlet

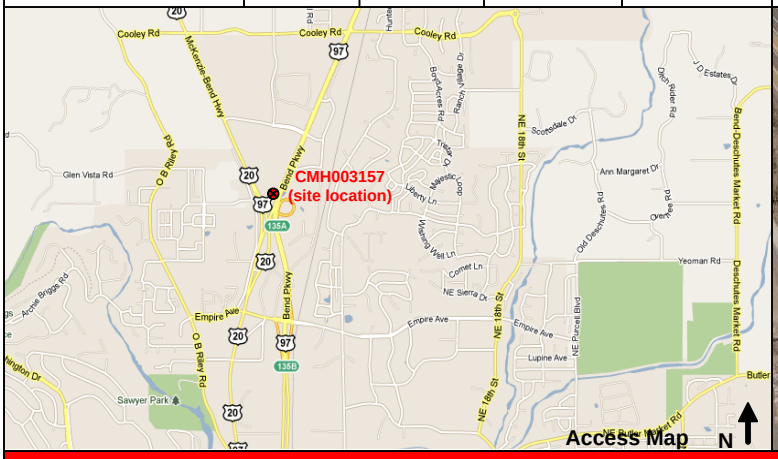
View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_003157	**Monitor Series:**	5000 AG
Address/Location:	63455 N. Hwy 97 (On sidewalk just off of HWY97 next to Trader Joe's)		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21441
Manhole #	CMH003157
Coordinates:	44° 5'55.32"N 121°18'06.82"W
Pipe Height:	7.88"
Pipe Width:	7.88"
IP Address:	166.219.51.172



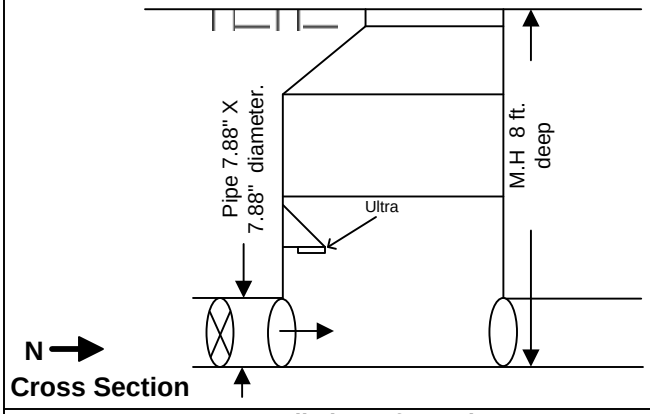
Investigation Information:

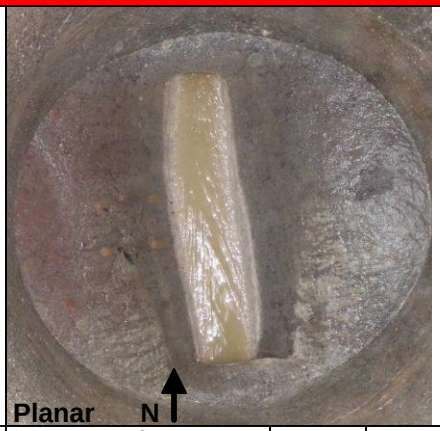
Date/Time of Investigation:	4/07/11 @ 10:35
Site Hydraulics:	Flow varies; moderate with ripples to fast; surcharge conditions
Upstream Input: (L/S, P/S)	L/S (~300')
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet
Depth of Flow:	4.00" +/- 0.25"
Range (Air DOF):	3.88" +/- 0.25"
Peak Velocity:	1.95 fps
Silt:	0 Inches

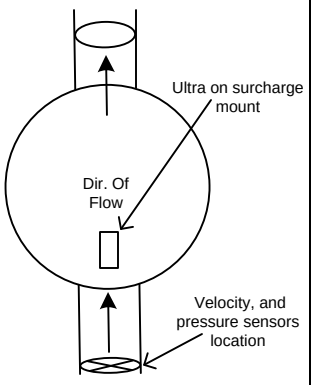
Manhole Information:

Manhole Depth:	8' - 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [X]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information	
Installation Type:	Standard with ultrasonic surcharge mount.
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	2 ft.
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[X]	[ ]	[ ]	D/S ~200', ~.5mi
WWTP	[ ]	[X]	[ ]	
Other	[X]	[ ]	[ ]	Possible restriction in D/S MHs

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_003157	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☒
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only.
Access only when site is not surcharged.

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☐ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/28/11	Date: 3/28/11

SCATTERGRAPH REPORT

Bend_003157

Flow Monitor

Bend_003157

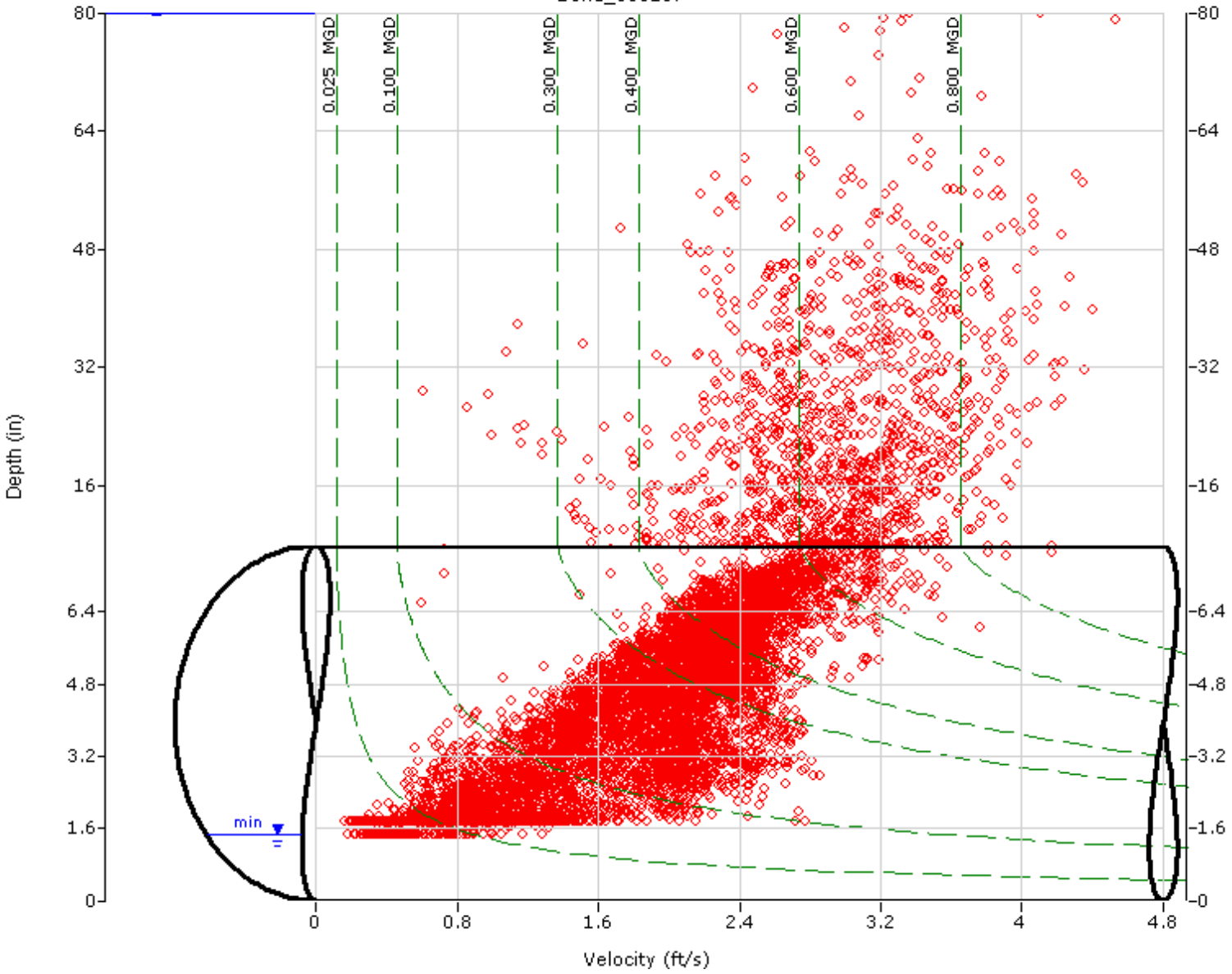
Nominal Diameter
8-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



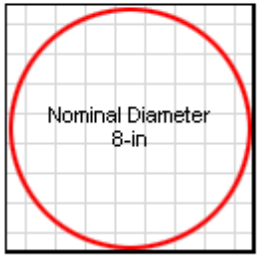
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_003157

Flow Monitor

Bend_003157

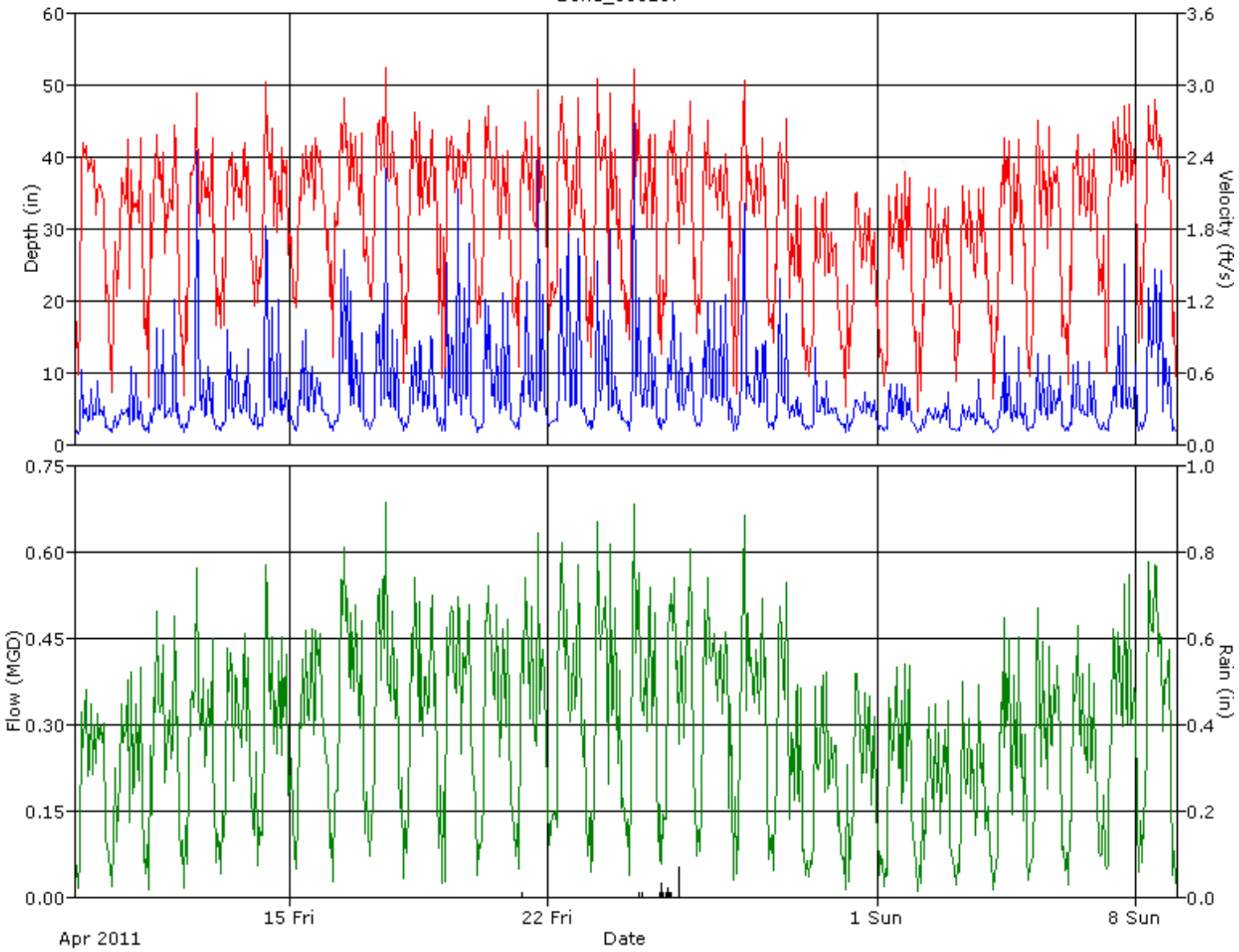


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_003161	
Measured Pipe Height (in)	14.25
Nominal Pipe Height (in)	15
Silt Level (in)	0.00

Overview

Monitoring point Bend_003161 was located in the North of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	4.64	1.71	0.392
Minimum	1.40	0.13	0.008
Maximum	7.26	2.65	0.983
Time of Minimum	4/30/2011 4:20 AM	5/1/2011 3:55 AM	5/1/2011 3:55 AM
Time of Maximum	4/30/2011 10:55 AM	5/4/2011 9:50 AM	5/4/2011 9:50 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_003161

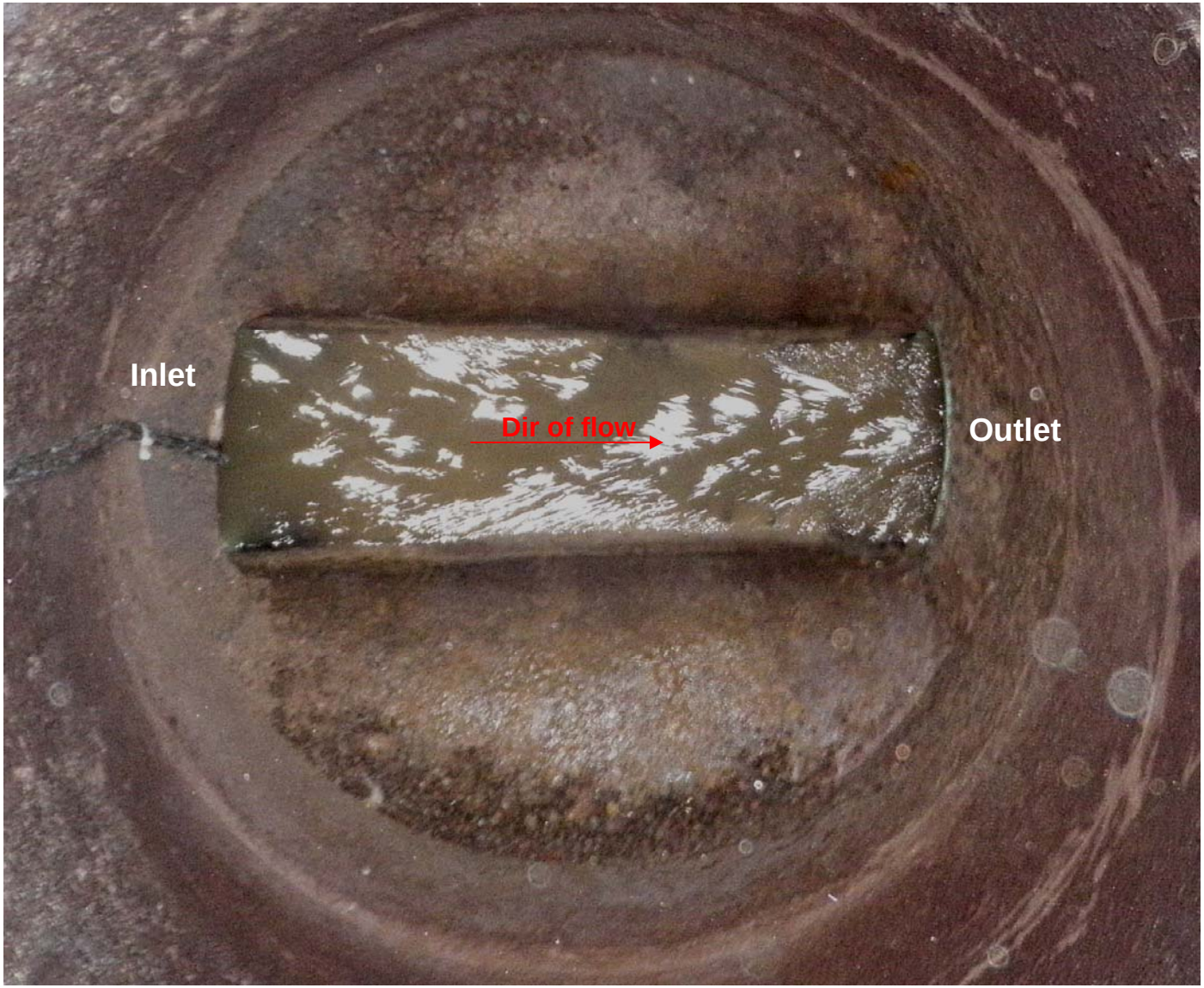
Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking east

Bend_003161

Site set up

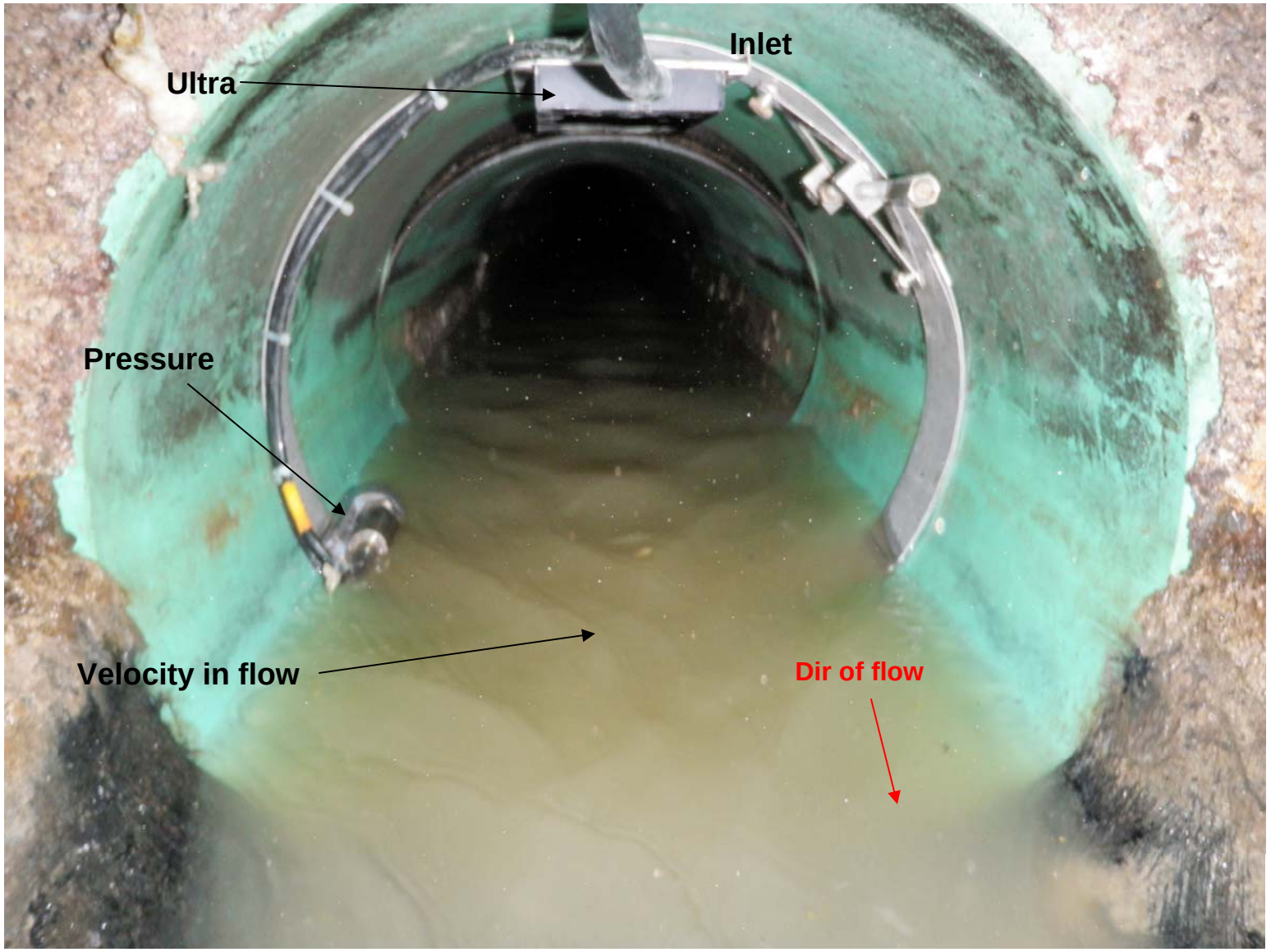


View down manhole facing north

Bend_003161

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_003161

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

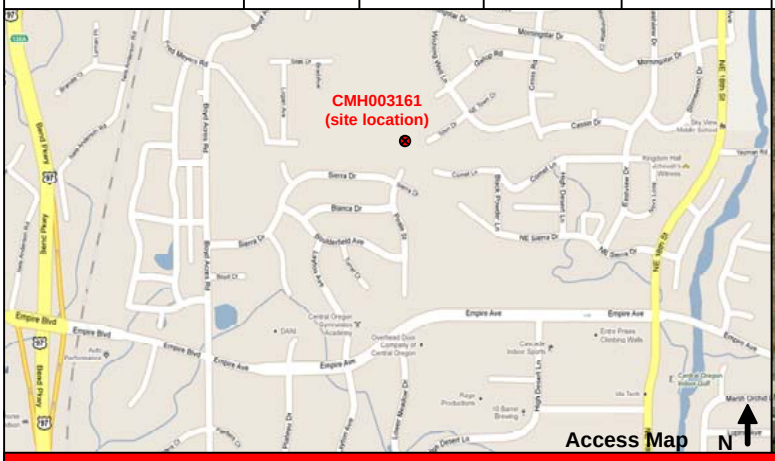
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_003161	**Monitor Series:**	5000 AG
Address/Location:	West on dirt road from intersection of Town Dr. and Wishing Well Ln.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21256
Manhole #	CMH003161
Coordinates:	44° 5'41.63"N 121°17'22.47"W
Pipe Height:	14.25"
Pipe Width:	14.50"
IP Address:	166.219.48.37



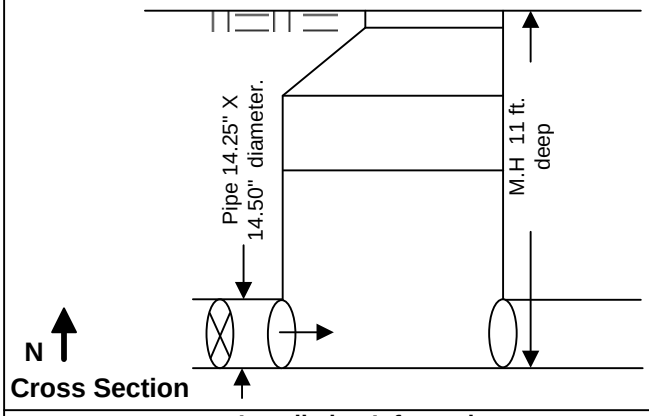
Investigation Information:

Date/Time of Investigation:	3/24/11 @ 10:35
Site Hydraulics:	Steady flow with ripples
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet
Depth of Flow:	4.00" +/- 0.25"
Range (Air DOF):	10.25" +/- 0.25"
Peak Velocity:	1.95 fps
Silt:	0 Inches

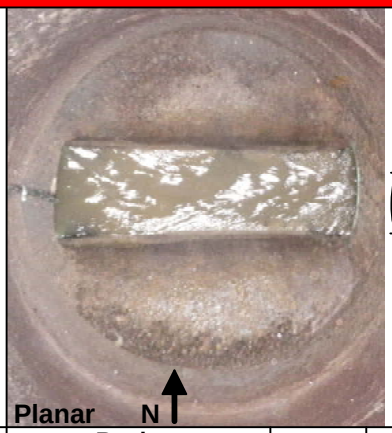
Manhole Information:

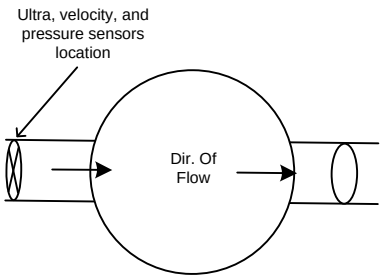
Manhole Depth:	11' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:



Cross Section





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_003161	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

- ☒ This worksite does NOT require a traffic control Plan
- ☐ Standard Traffic Control Plan is to be used at this work site
- ☐ This site requires a special Traffic Control Plan which is attached

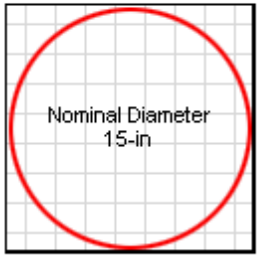
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/24/11	Date: 3/24/11

SCATTERGRAPH REPORT

Bend_003161

Flow Monitor

Bend_003161

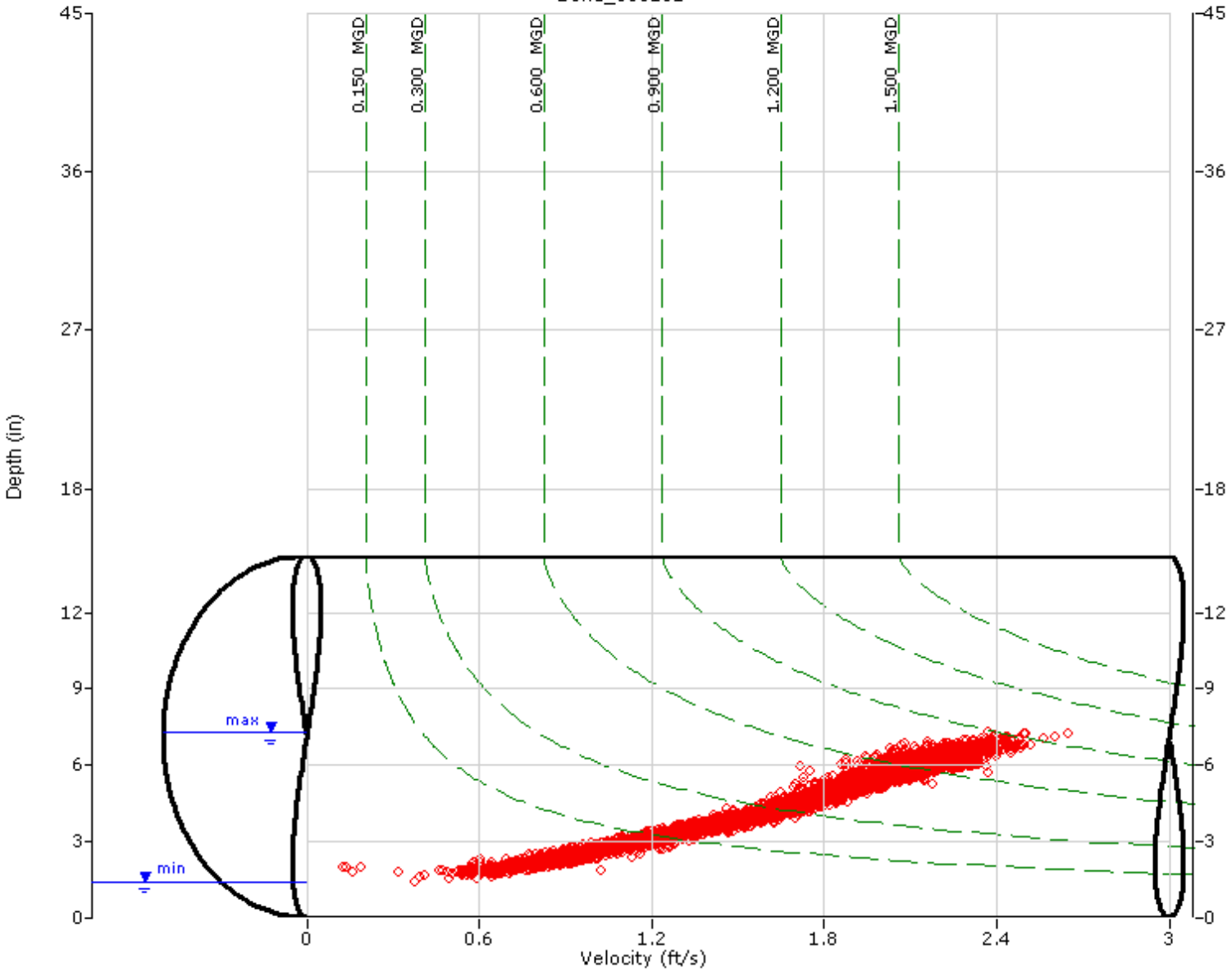


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



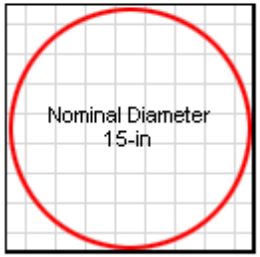
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_003161

Flow Monitor

Bend_003161

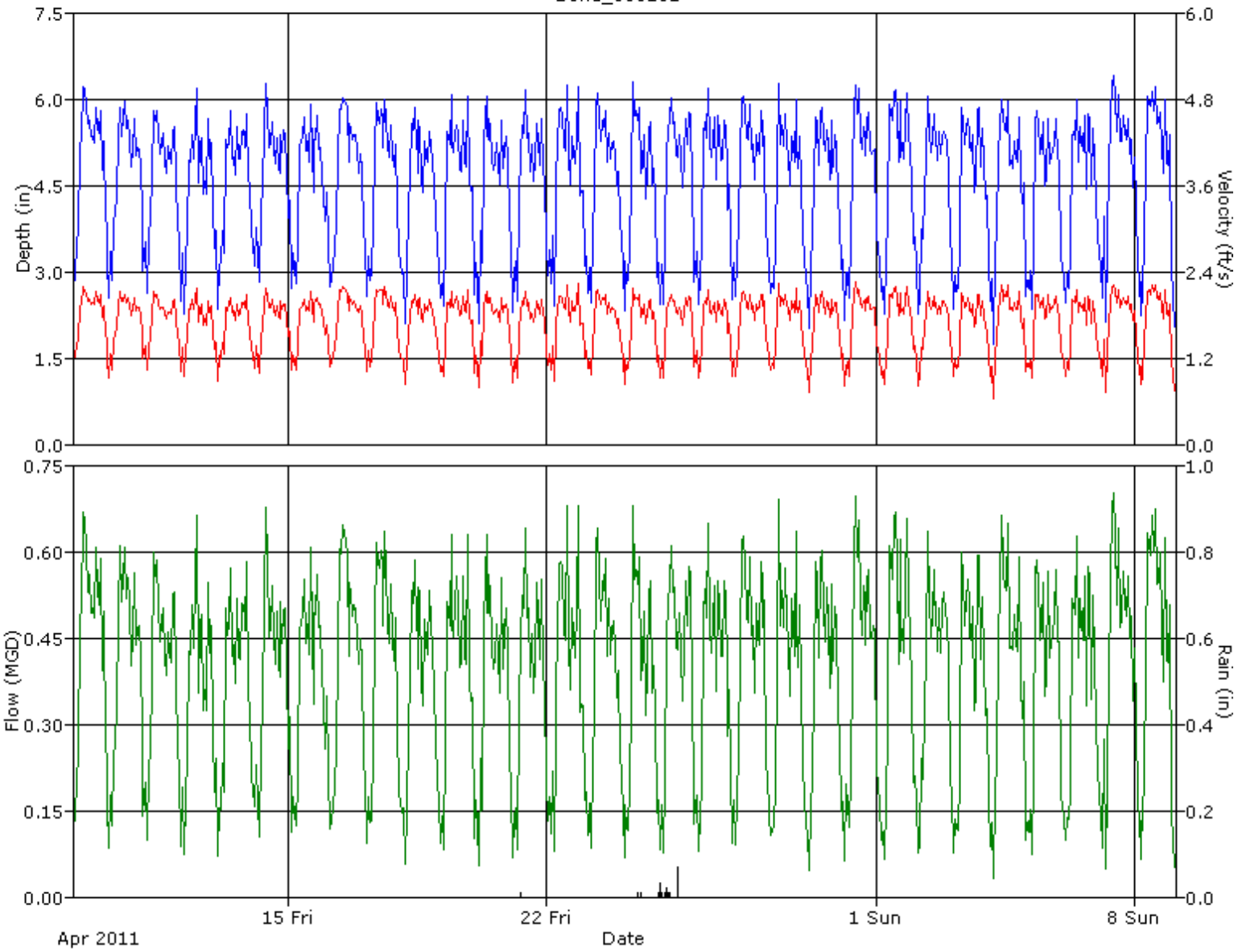


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_003337	
Measured Pipe Height (in)	20.73
Nominal Pipe Height (in)	21
Silt Level (in)	2.00

Overview

Monitoring point Bend_003337 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 . The silt measurement reflects a single moment in time, but it is important to note that it may in fact have varied during the monitoring period.

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	11.40	0.99	0.797
Minimum	6.55	0.39	0.134
Maximum	16.46	1.49	1.719
Time of Minimum	4/30/2011 5:10 AM	4/9/2011 4:50 AM	4/30/2011 4:55 AM
Time of Maximum	5/7/2011 11:20 AM	5/3/2011 7:50 PM	4/21/2011 12:05 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_003337
Site location

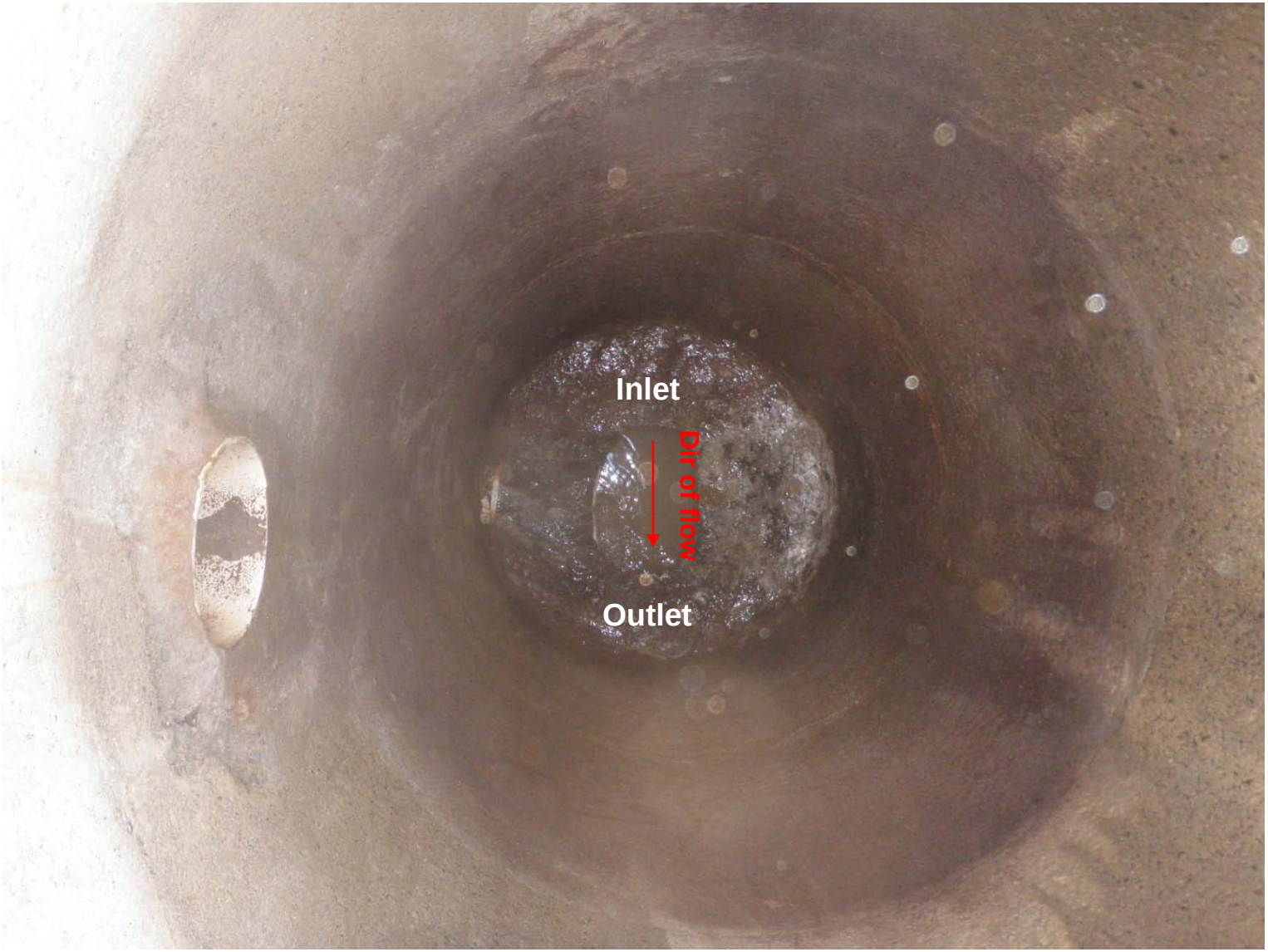
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_003337

Site set up

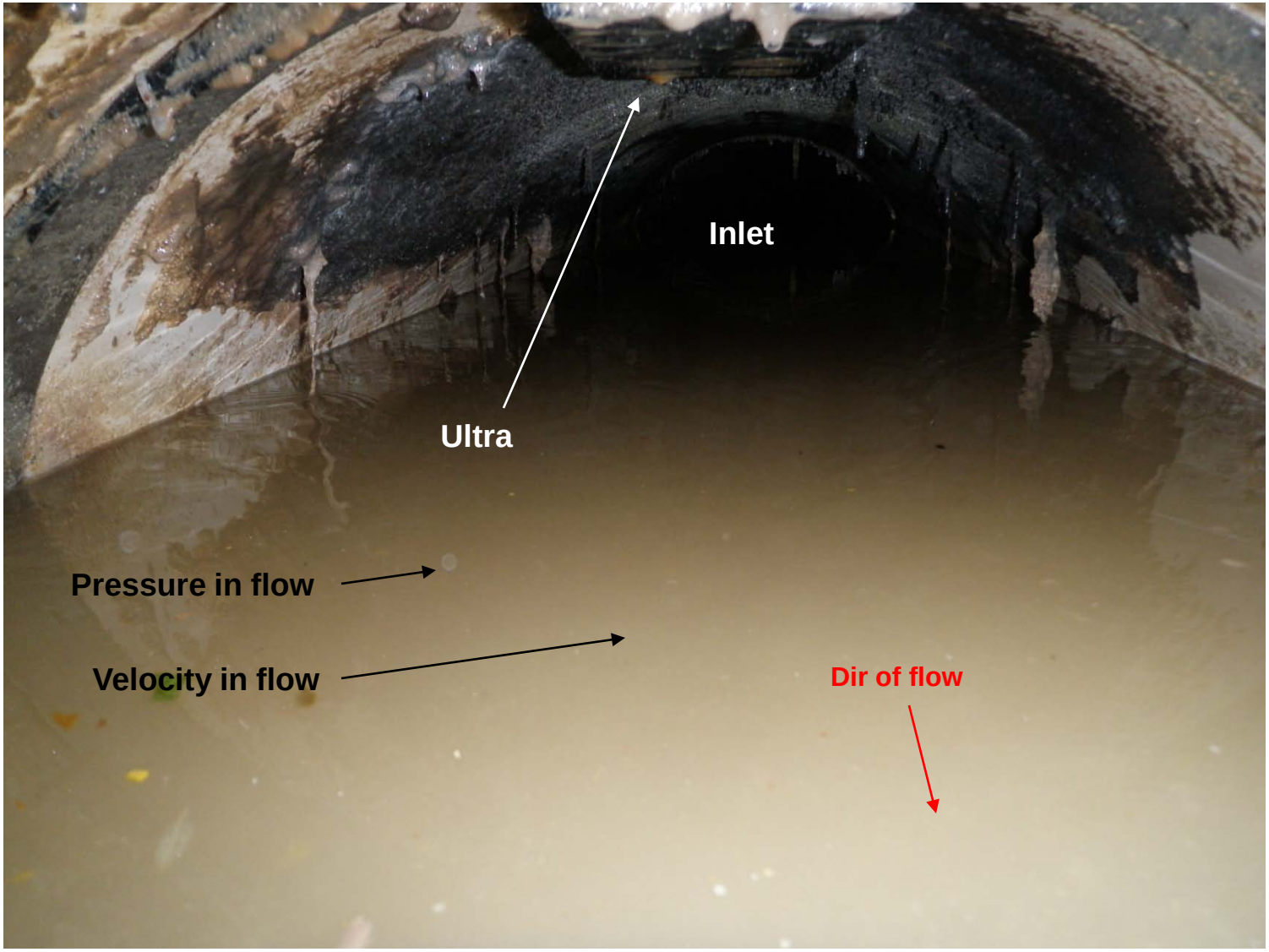
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_003337

Site set up

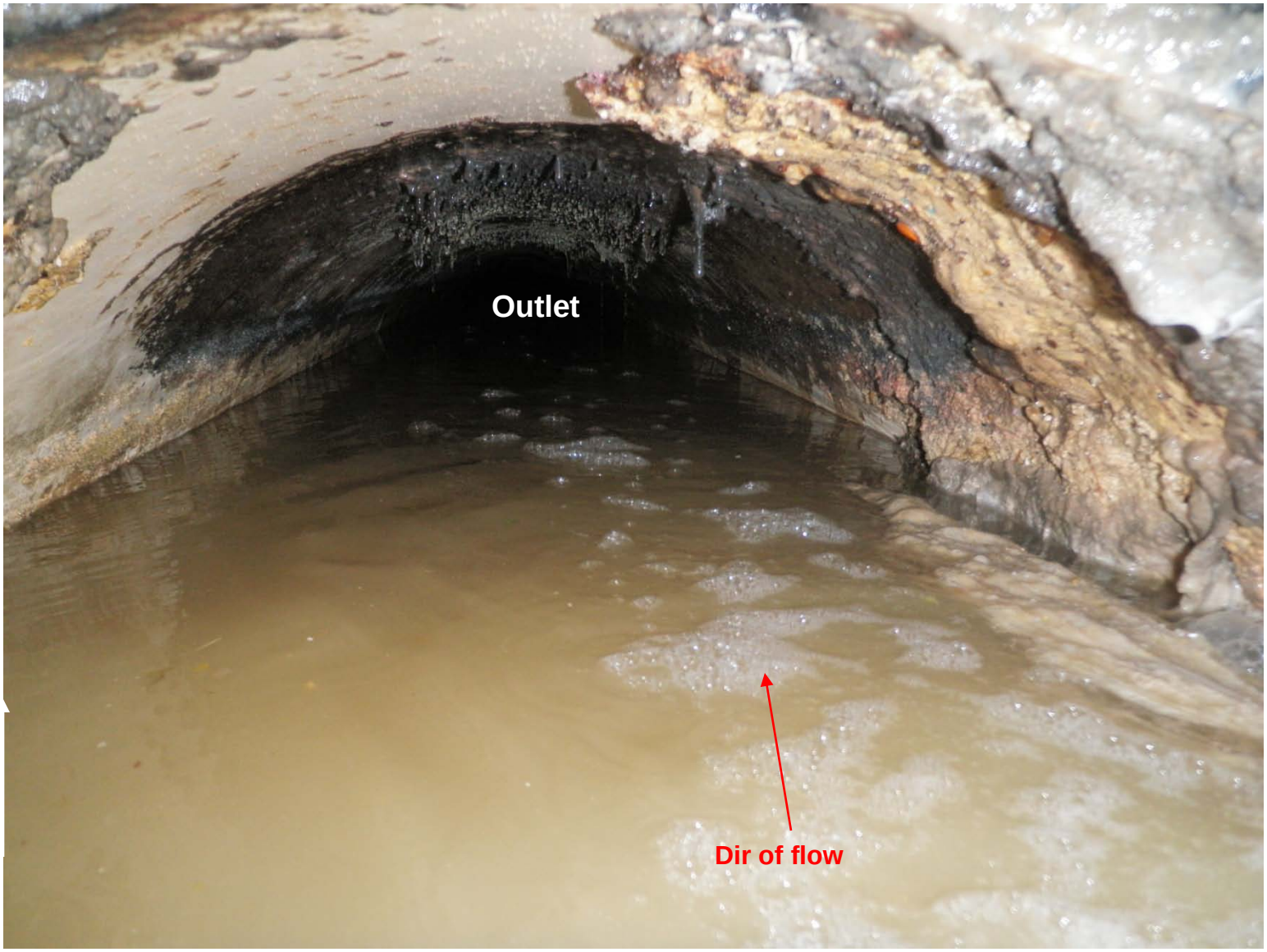


View of sensor placement and site hydraulics

Bend_003337

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

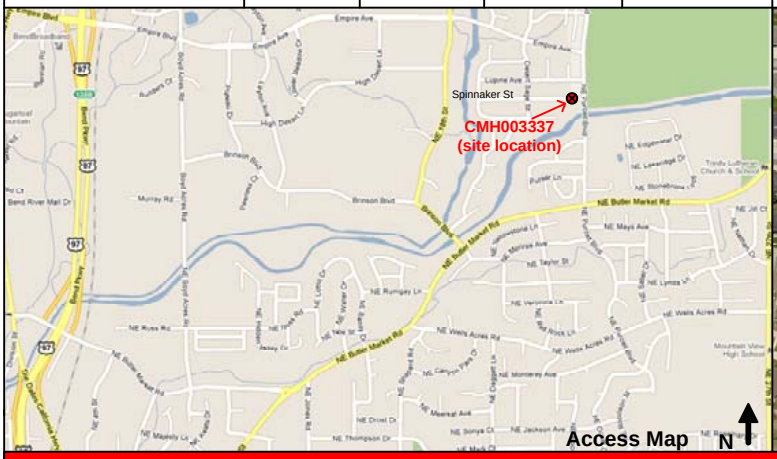
ADS Site Report

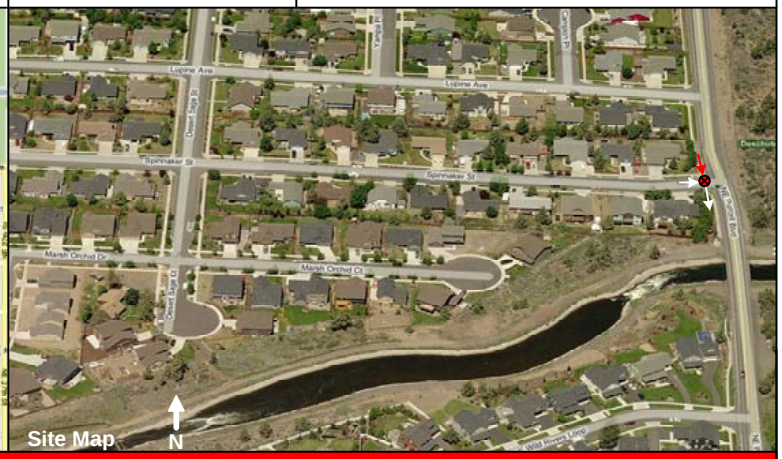
Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_003337	**Monitor Series:**	5000 AG
Address/Location:	20996 Spinnaker St		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21709
Manhole #	CMH003337
Coordinates:	44° 5'16.13"N 121°16'26.02"W
Pipe Height:	20.73"
Pipe Width:	20.73"
IP Address:	166.219.48.58





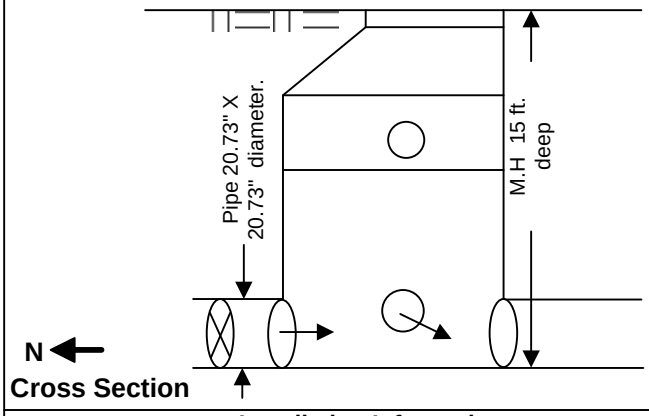
Investigation Information:

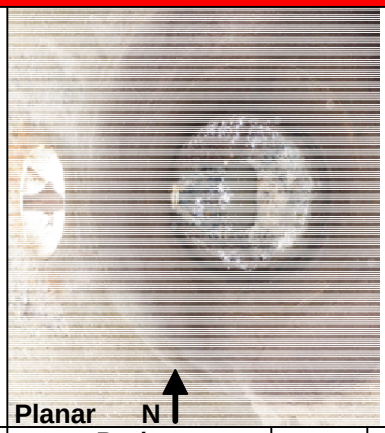
Date/Time of Investigation:	4/8/11 @ 10:35
Site Hydraulics:	Steady flow with ripples
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	1 inlet / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet (90˚bend)
Depth of Flow:	4.00" +/- 0.25"
Range (Air DOF):	10.25" +/- 0.25"
Peak Velocity:	1.95 fps
Silt:	0 Inches

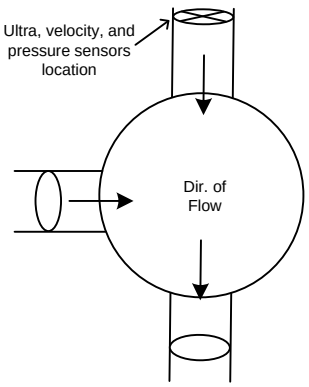
Manhole Information:

Manhole Depth:	15' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

15 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_003337	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

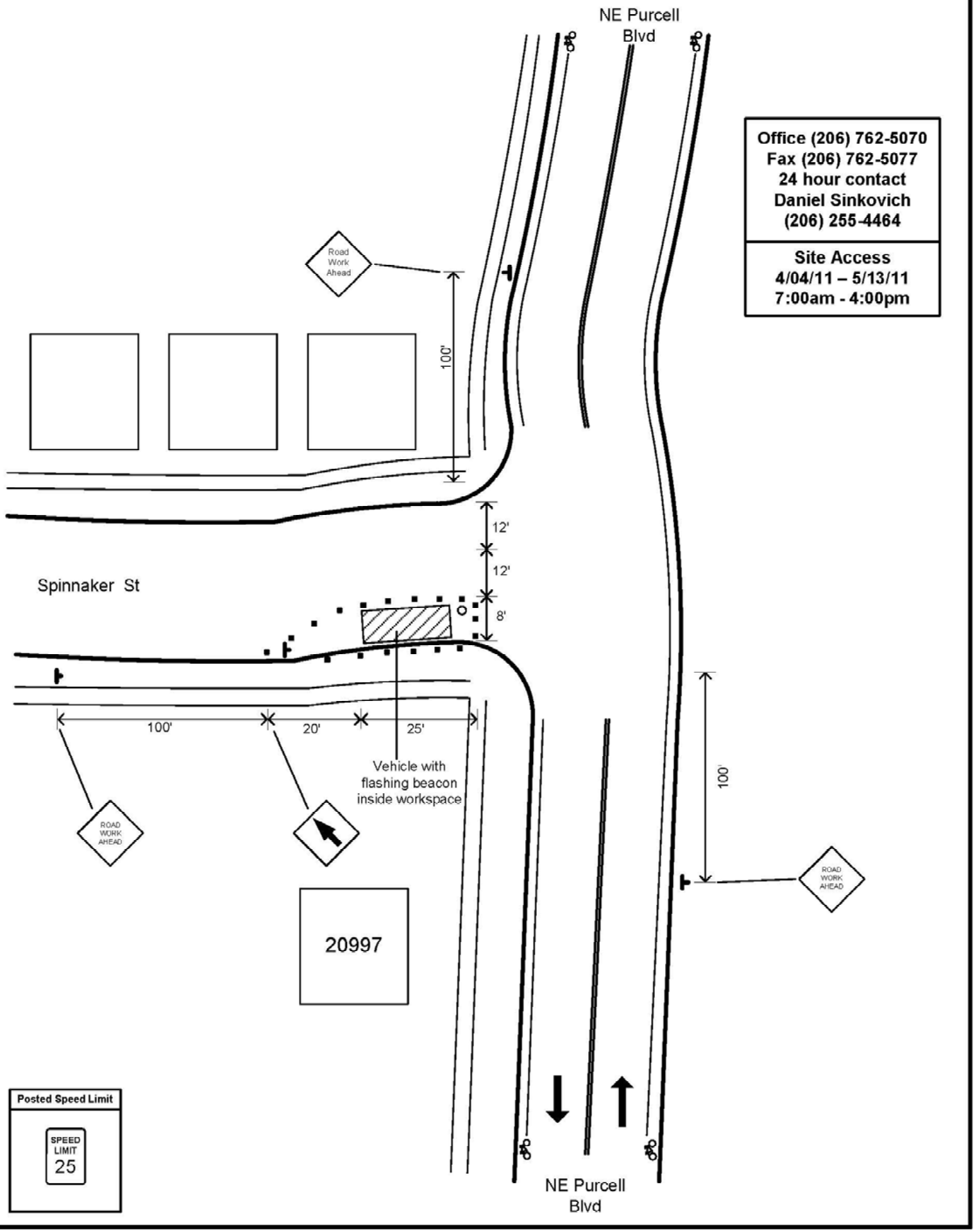
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/24/11	Date: 3/24/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_003337	Address: 20997 Spinnaker St Bend, OR	N	Drawing: 04/03/11 Submitted: 04/04/11 Approved:	Rev. 0	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring
					Not to Scale		



SCATTERGRAPH REPORT

Bend_003337

Flow Monitor

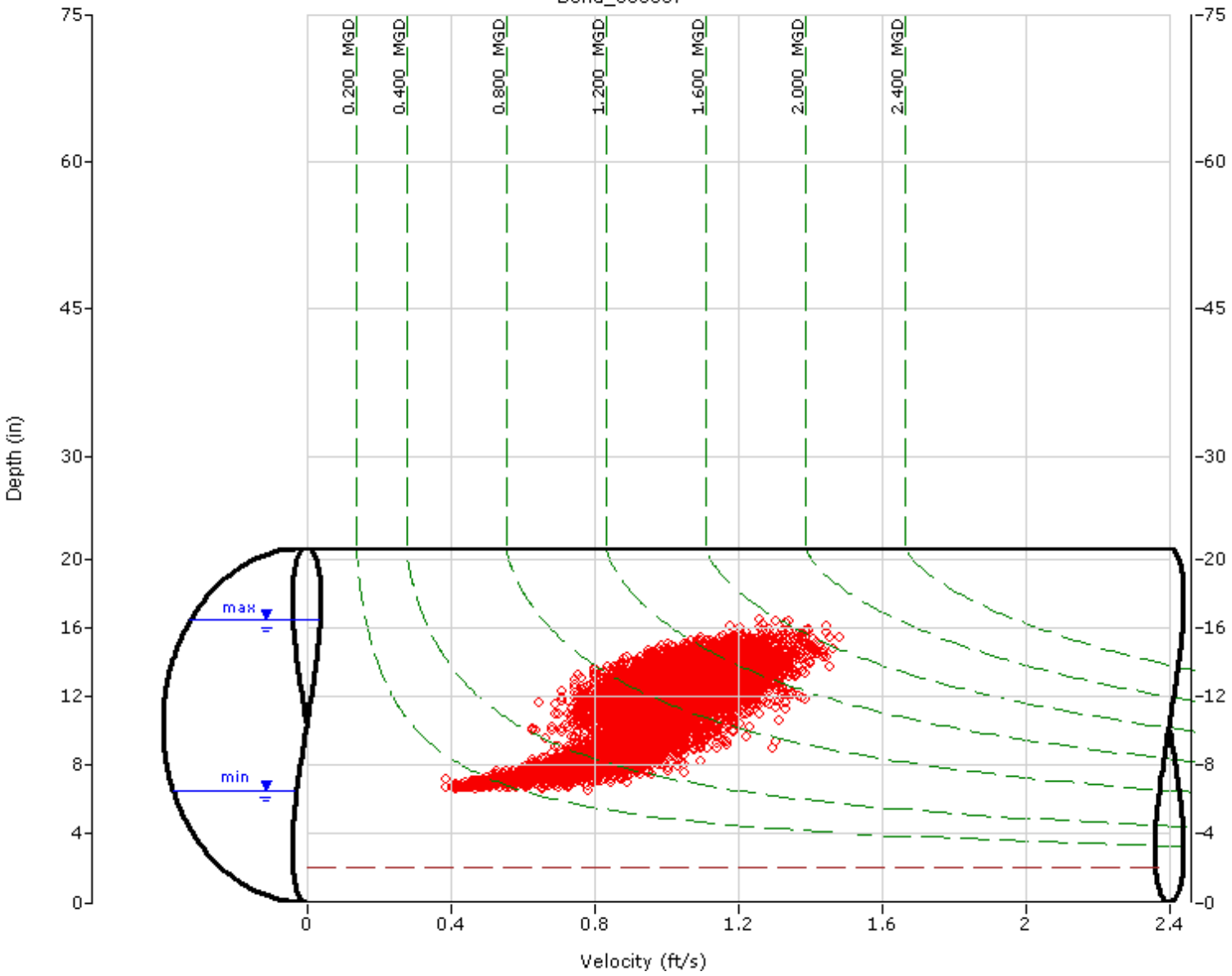
Bend_003337

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_003337

Flow Monitor

Bend_003337

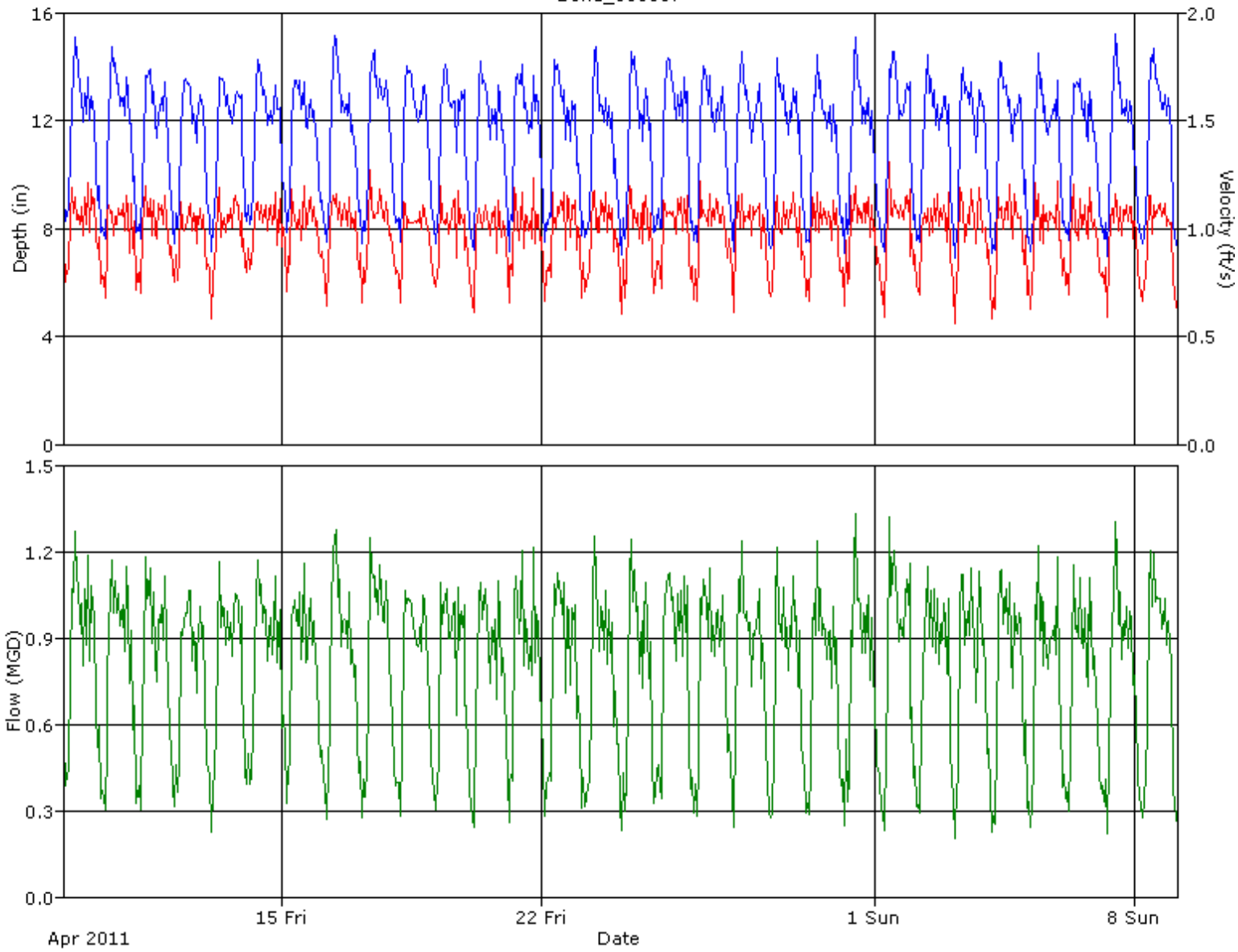
Nominal Diameter
21-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_003505	
Measured Pipe Height (in)	7.88
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_003505 was located in the North of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	2.26	1.43	0.095
Minimum	0.75	0.28	0.003
Maximum	5.80	3.53	0.544
Time of Minimum	4/20/2011 5:15 AM	4/29/2011 4:15 AM	4/29/2011 4:15 AM
Time of Maximum	4/30/2011 10:45 AM	5/2/2011 1:50 PM	4/30/2011 10:45 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_003505

Site location

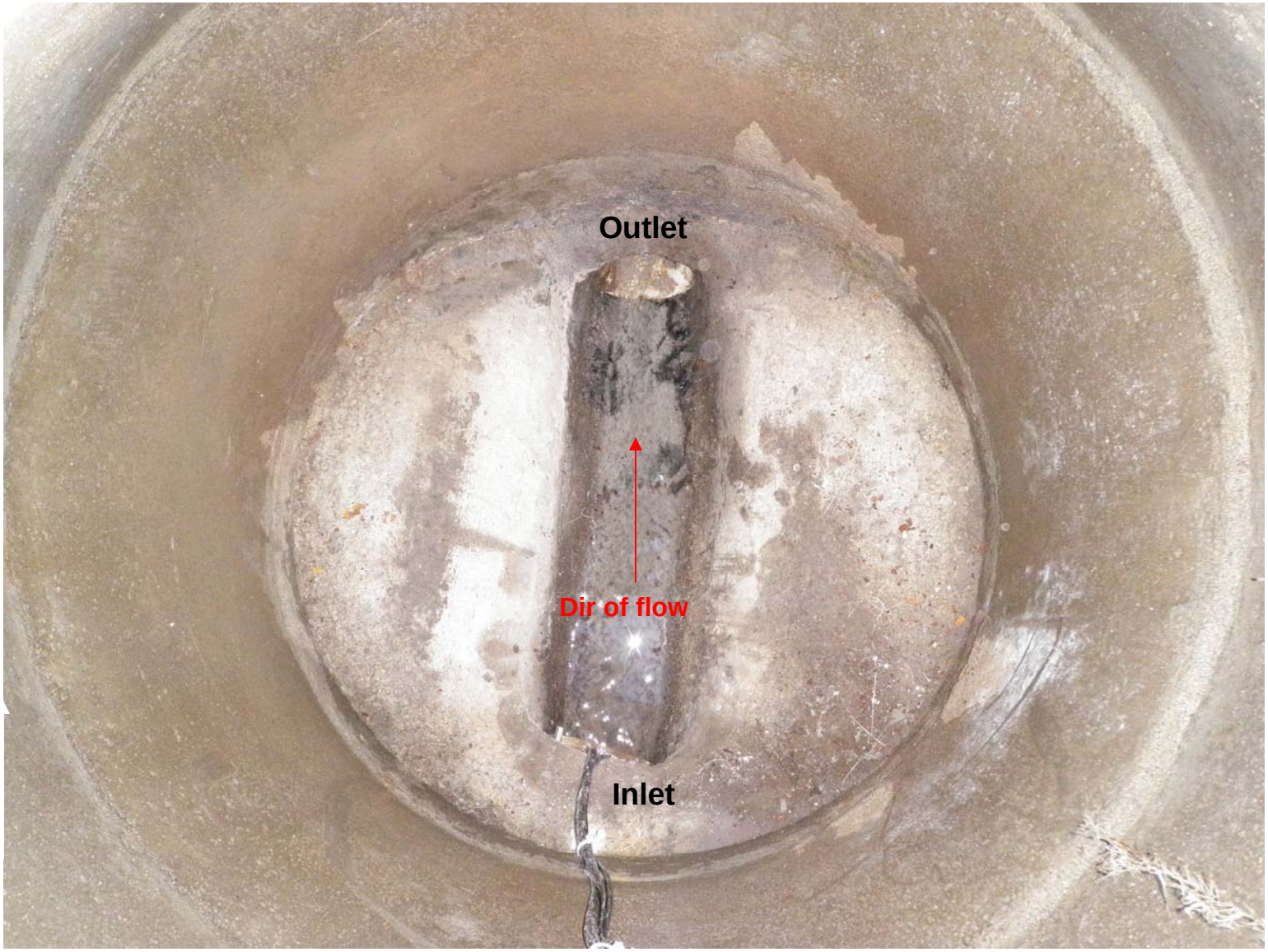
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_003505

Site set up

ADS ENVIRONMENTAL SERVICES®

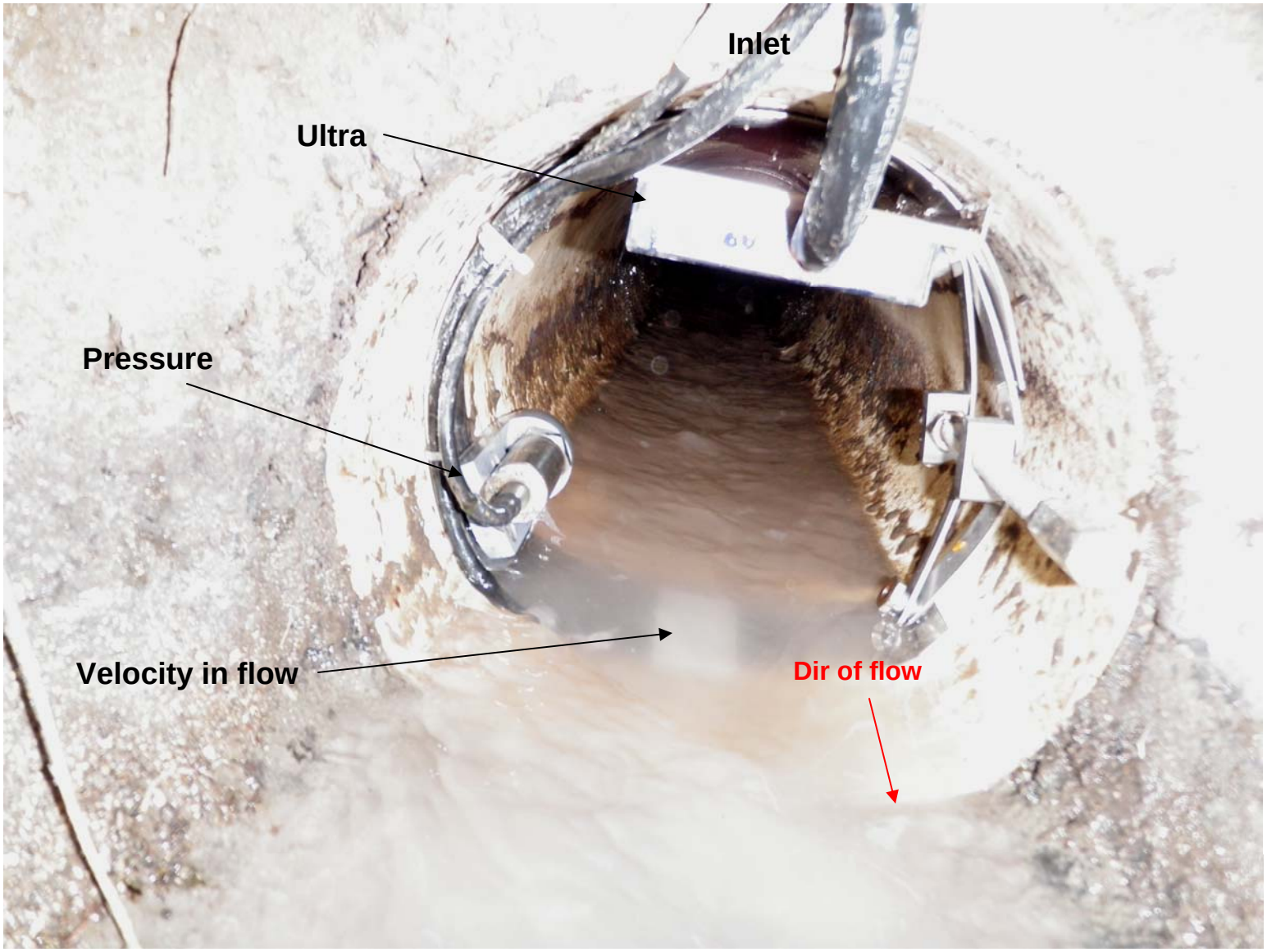


View down manhole facing north

Bend_003505

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_003505

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

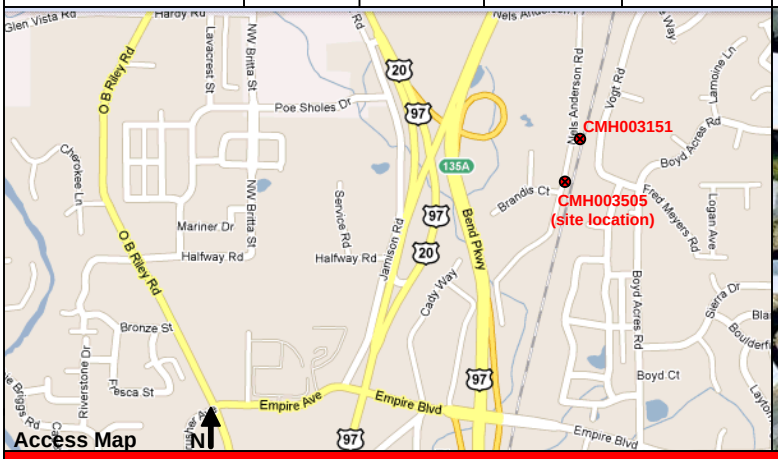
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_003505	**Monitor Series:**	5000 AG
Address/Location:	63257 Nels Anderson Rd.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21713
Manhole #	Unnamed MH D/S of CMH003505
Coordinates:	44° 5'47.88"N 121°17'52.87"W
Pipe Height:	7.88"
Pipe Width:	7.88"
IP Address:	166.219.169.139



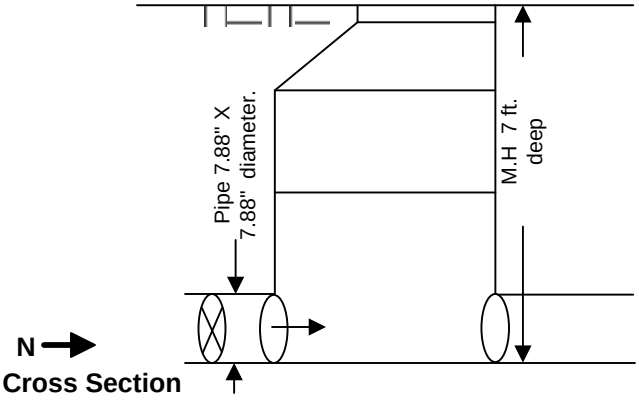
Investigation Information:

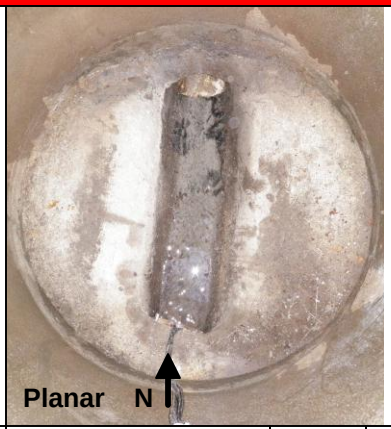
Date/Time of Investigation:	3/29/11 @ 18:00
Site Hydraulics:	Ripples, Slow
Upstream Input: (L/S, P/S)	No influences
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	3 inlets / 1 outlet
Depth of Flow:	1.38" +/- 0.25"
Range (Air DOF):	6.50" +/- 0.25"
Peak Velocity:	0.70 fps
Silt:	0 Inches

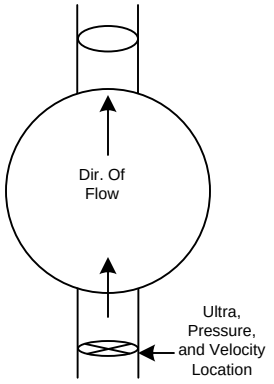
Manhole Information:

Manhole Depth:	7'- 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [ ] Commercial [X] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_003505	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

No site specific hazards found at this site.

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

No site specific hazards found at this site.

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

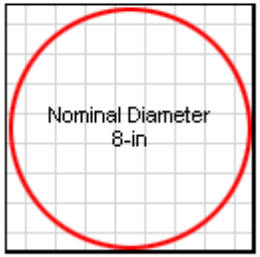
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/29/11	Date: 3/29/11

SCATTERGRAPH REPORT

Bend_003505

Flow Monitor

Bend_003505

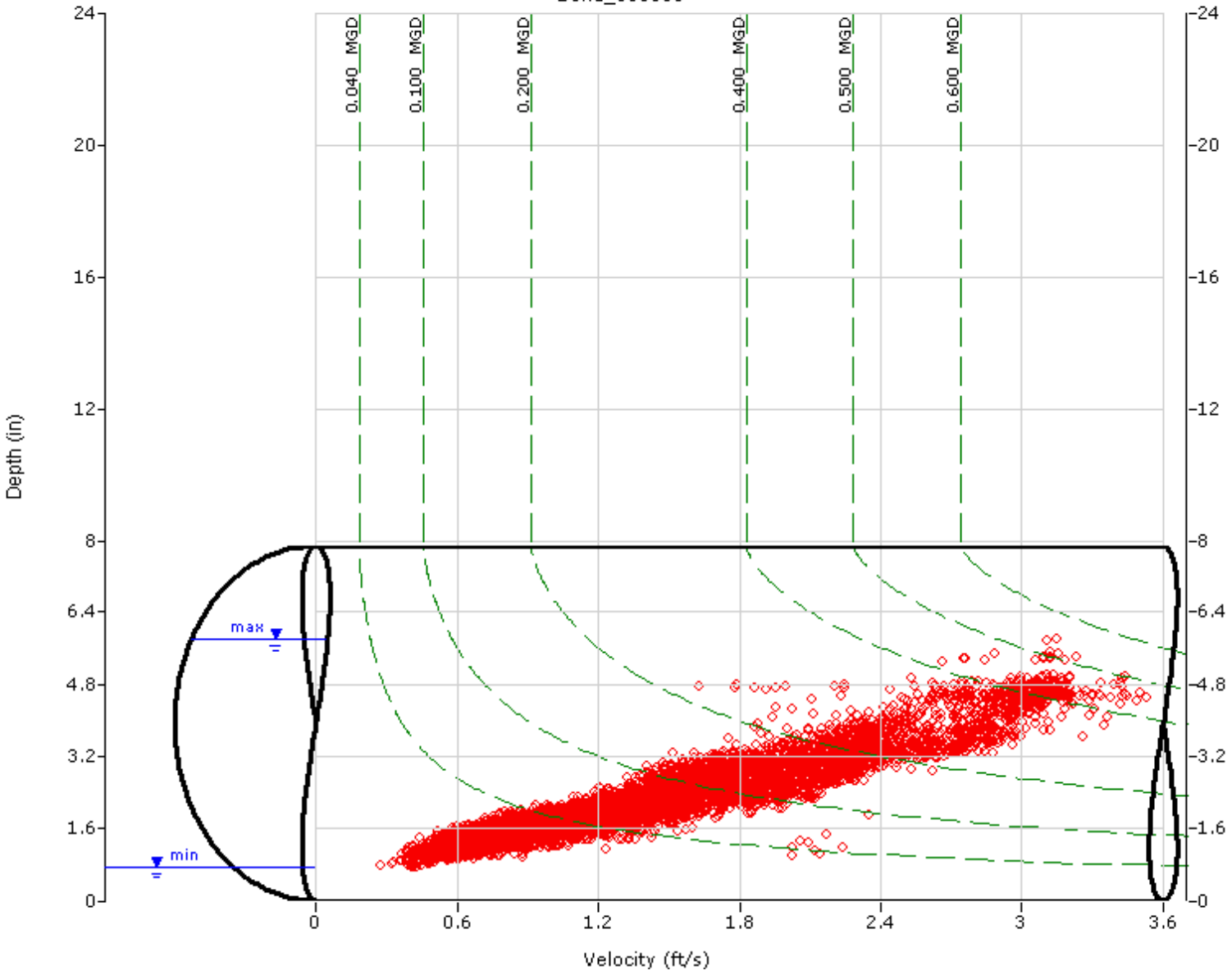


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



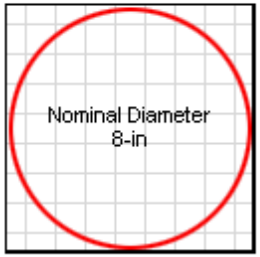
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_003505

Flow Monitor

Bend_003505

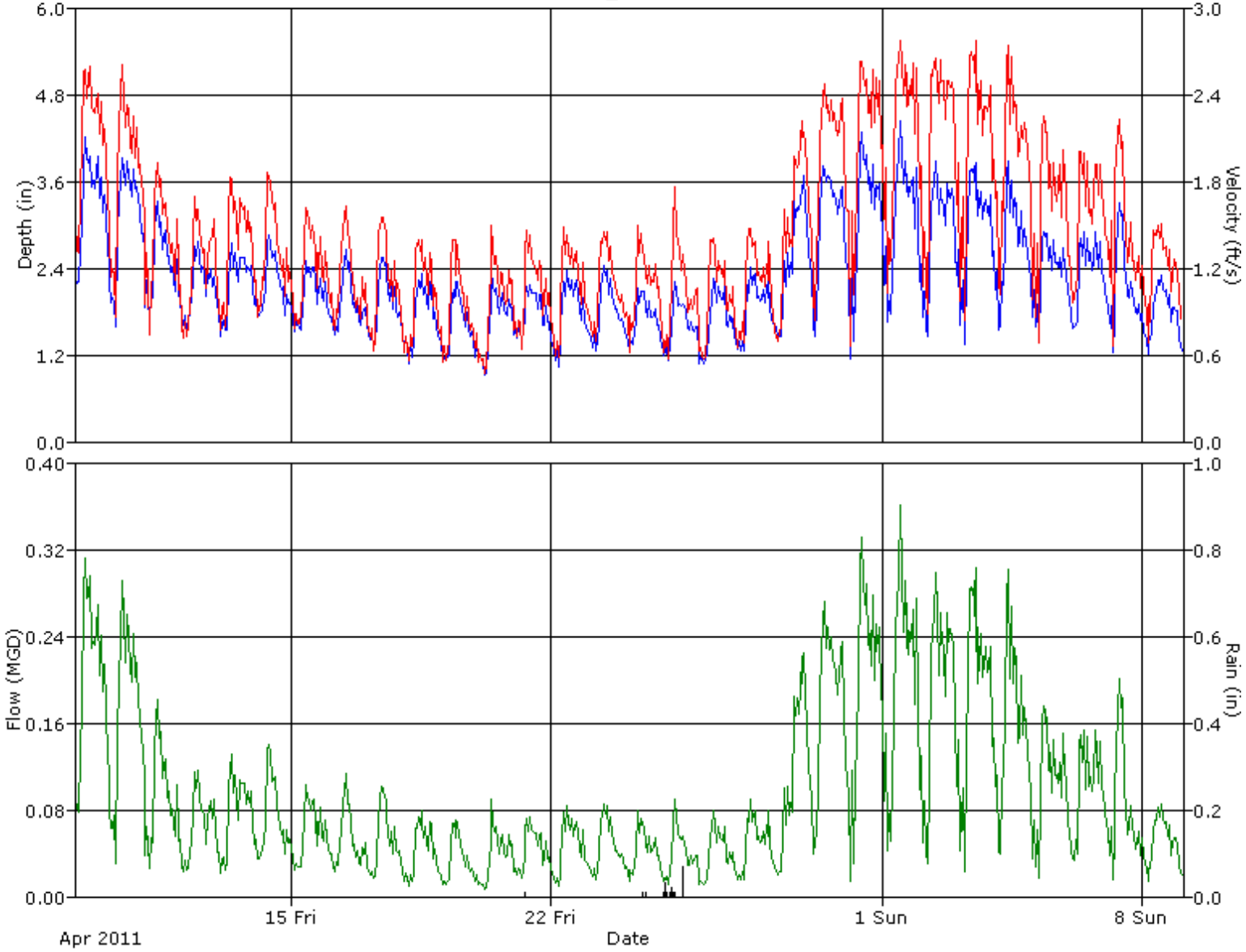


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_006520	
Measured Pipe Height (in)	35.25
Nominal Pipe Height (in)	36
Silt Level (in)	0.00

Overview

Monitoring point Bend_006520 was located in the Northwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	2.52	1.01	0.160
Minimum	1.33	0.00	0.013
Maximum	25.30	1.63	0.483
Time of Minimum	5/2/2011 4:45 AM	4/11/2011 8:45 AM	4/13/2011 5:20 AM
Time of Maximum	4/11/2011 8:50 AM	4/30/2011 6:50 PM	4/10/2011 10:15 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.93
Quantity	99.86

Bend_006520
Site location

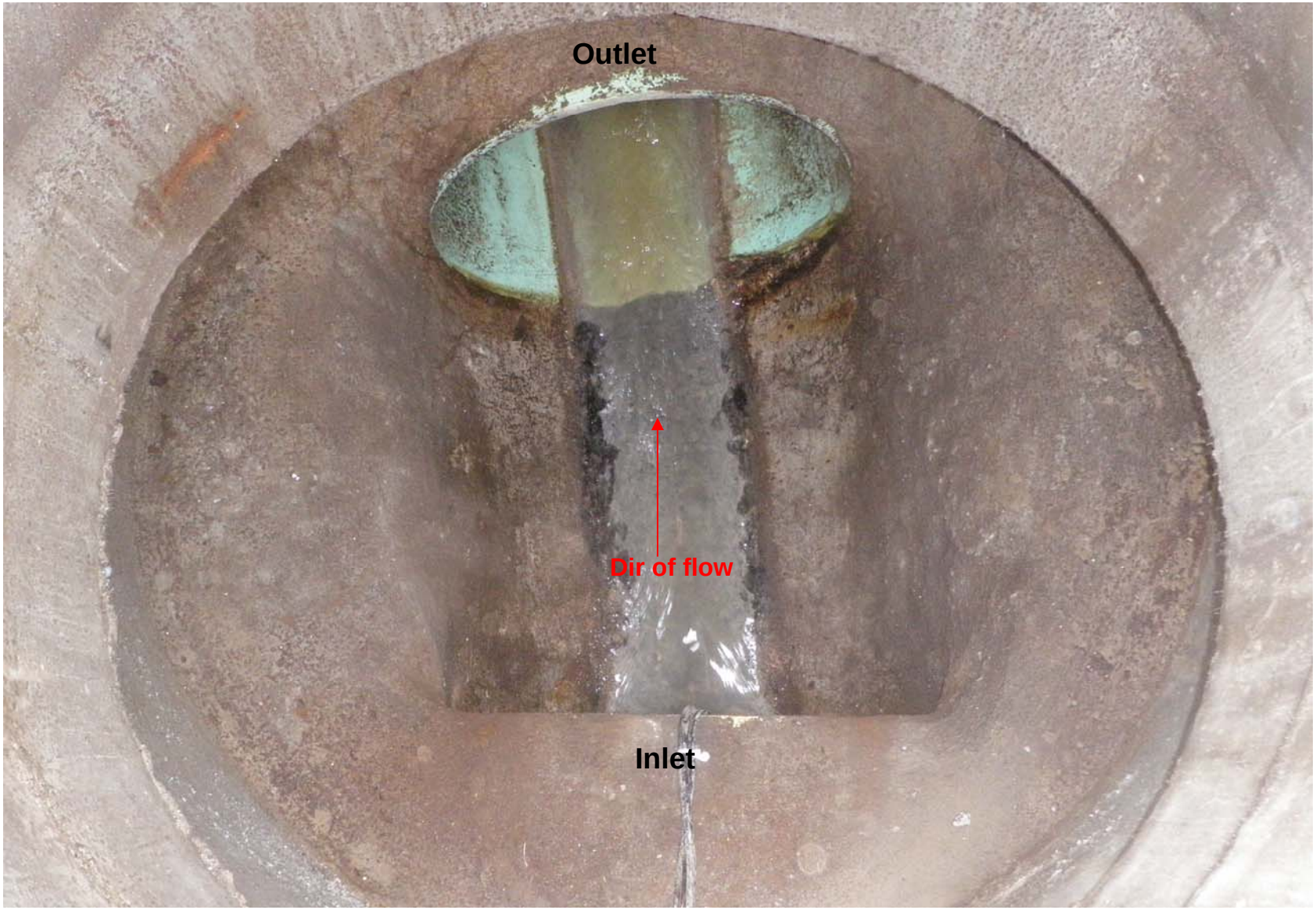
ADS ENVIRONMENTAL SERVICES®

Site access looking northeast

Bend_006520

Site set up

ADS ENVIRONMENTAL SERVICES®

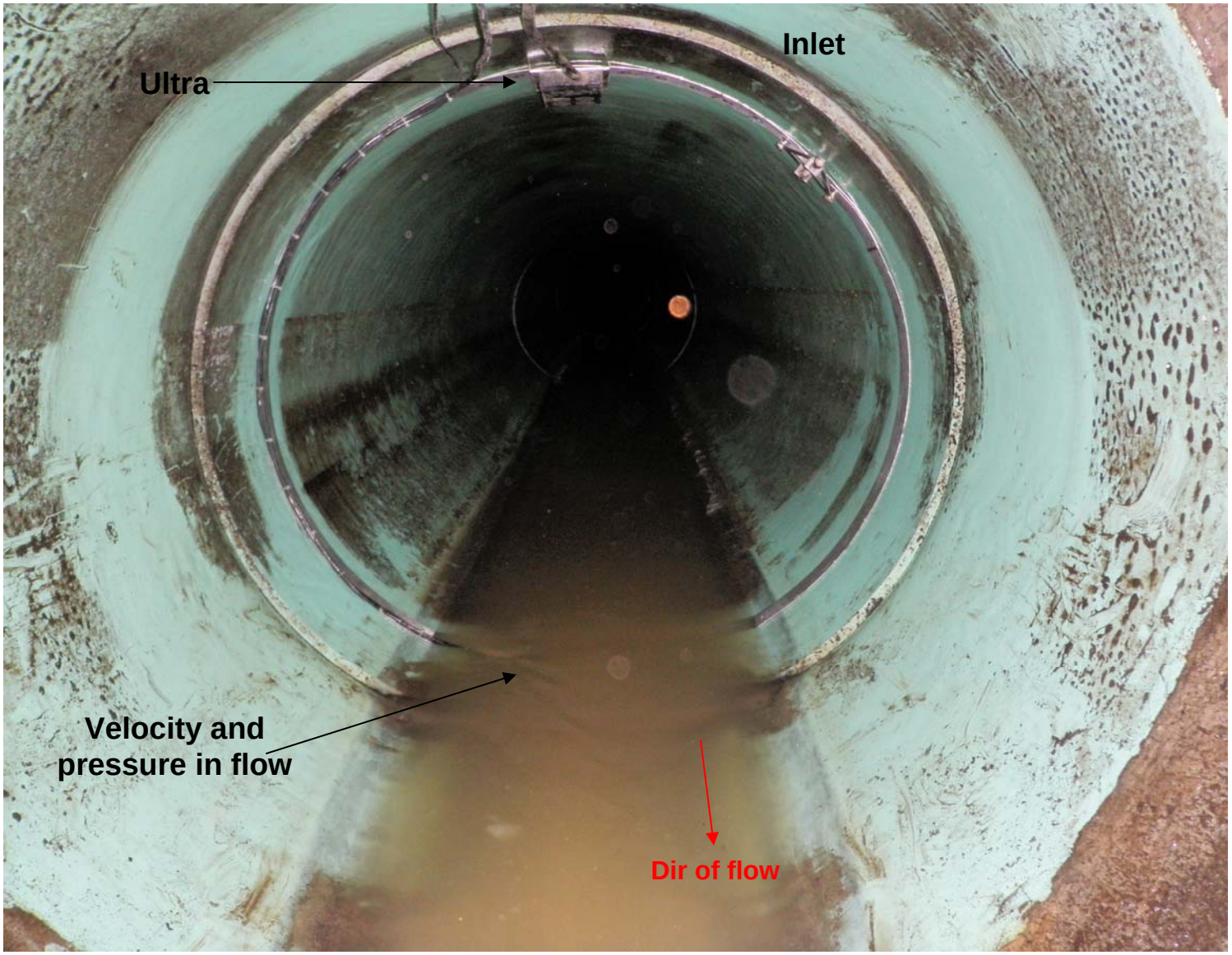


View down manhole facing north

Bend_006520

Site set up

ADS ENVIRONMENTAL SERVICES®

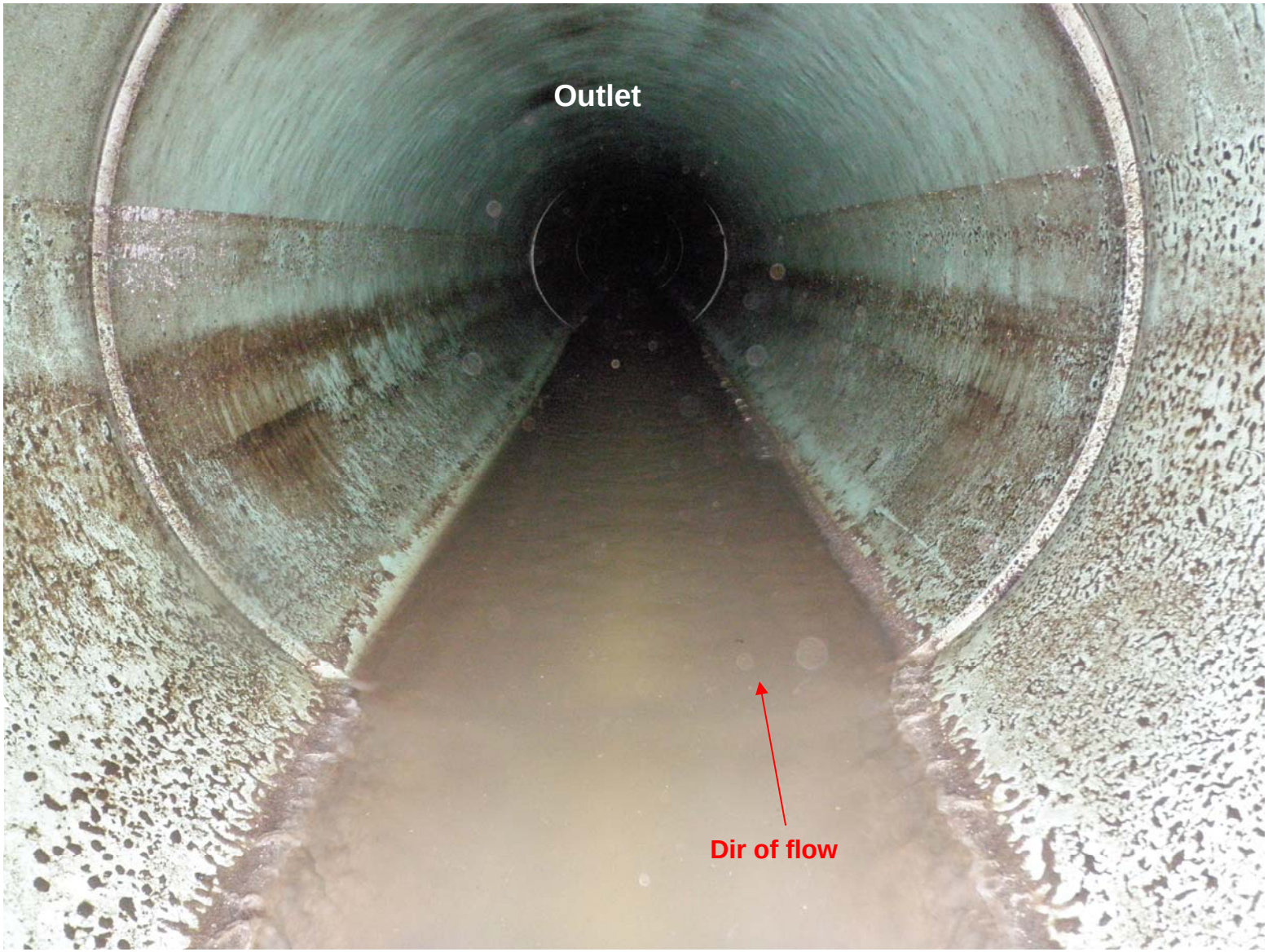


View of sensor placement and site hydraulics

Bend_006520

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_006520	**Monitor Series:**	5000 AG
Address/Location:	62950 O B Riley Rd.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21515
Manhole #	CMH006520
Coordinates:	44° 5'7.49"N 121°18'29.73"W
Pipe Height:	35.25"
Pipe Width:	37.00"
IP Address:	166.219.169.179

Access Map

Site Map

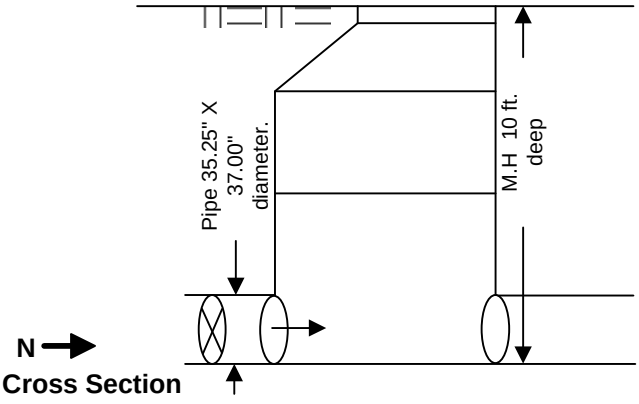
Investigation Information:

Date/Time of Investigation:	4/7/11 @ 15:17
Site Hydraulics:	Smooth
Upstream Input: (L/S, P/S)	No influences
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	2.63" +/- 0.25"
Range (Air DOF):	33.13" +/- 0.25"
Peak Velocity:	1.10 fps
Silt:	0 Inches

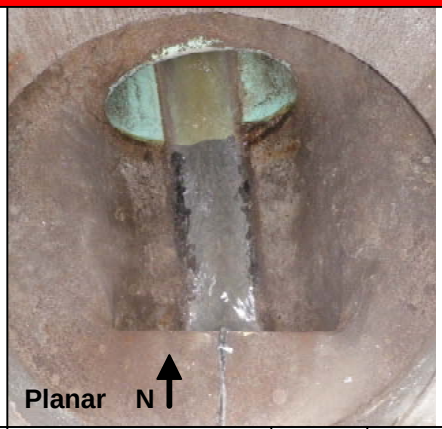
Manhole Information:

Manhole Depth:	10'- 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [ ] Commercial [X] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

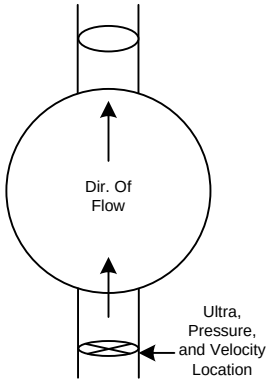
Other Information:



Cross Section



Planar



Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	N/A
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_006520	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

No site specific hazards found at this site.

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

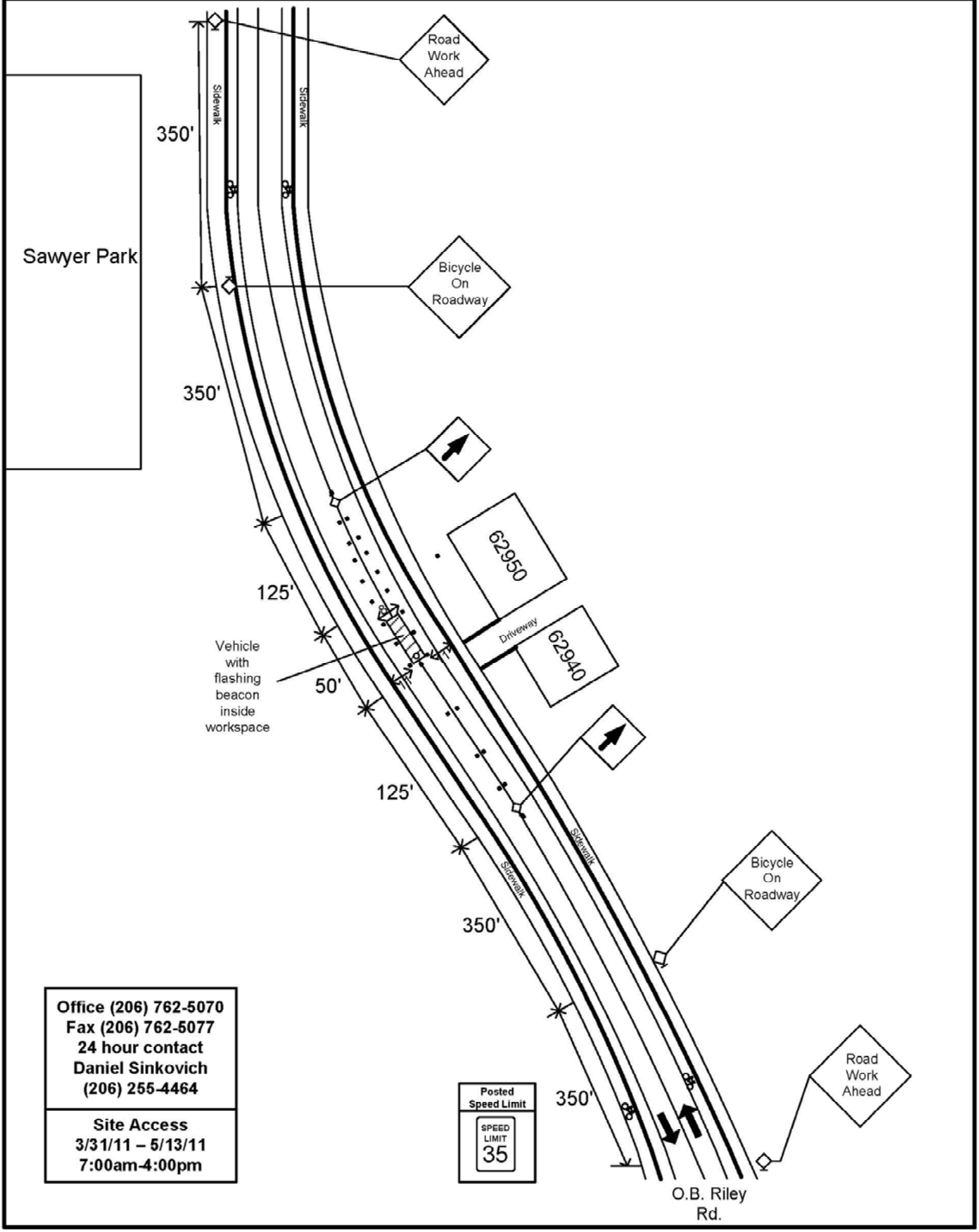
Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/07/11	Date: 4/07/11

ADS ENVIRONMENTAL SERVICES®
4455 South 134th Place
Tukwila, WA 98168

Site Name:	Address:	Drawing: 03/31/11	Rev.	Pg.	**Bend, OR Temporary Flow Monitoring**
Bend_006520	62950 O.B Riley Rd.	Submitted: 03/31/11	0	1 of 1	
M.H# CMH006520		Approved:	Not to Scale		



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
3/31/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_006520

Flow Monitor

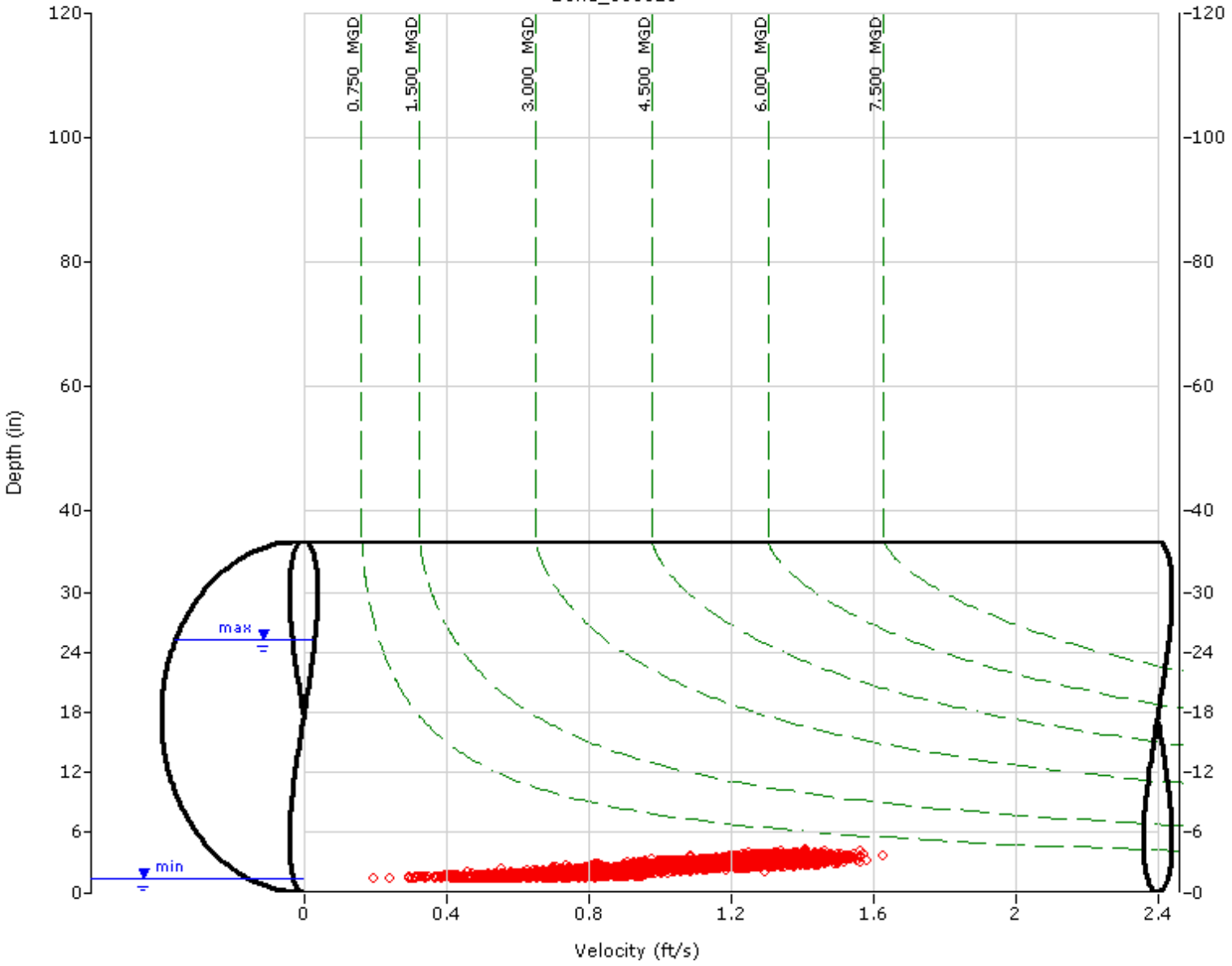
Bend_006520

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_006520

Flow Monitor

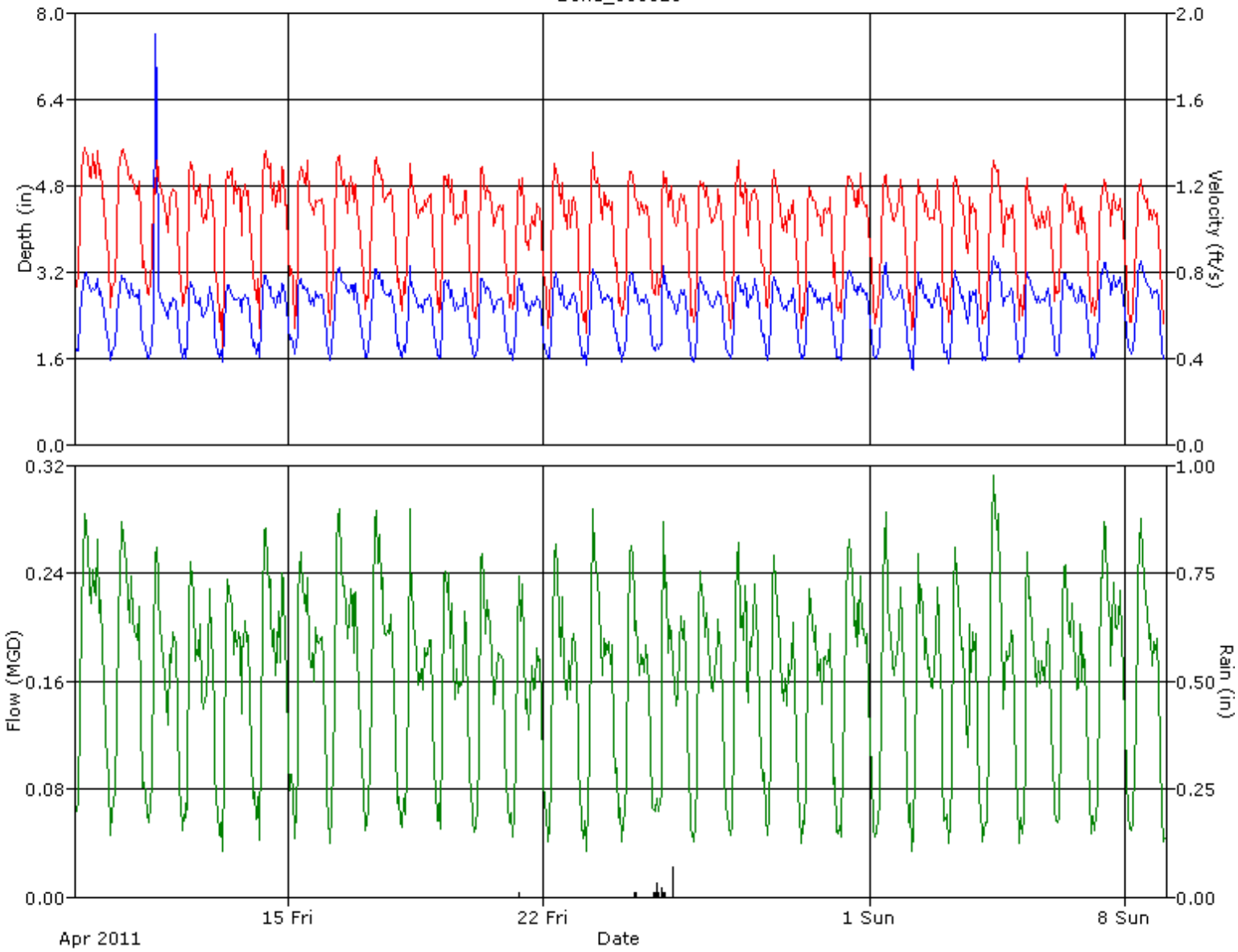
Bend_006520

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_007683	
Measured Pipe Height (in)	11.75
Nominal Pipe Height (in)	12
Silt Level (in)	0.00

Overview

Monitoring point Bend_007683 was located in the Northwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.39	1.21	0.044
Minimum	0.60	0.08	0.001
Maximum	2.76	2.05	0.140
Time of Minimum	5/5/2011 3:15 AM	4/16/2011 5:30 AM	4/16/2011 5:30 AM
Time of Maximum	4/19/2011 1:25 PM	4/19/2011 7:50 PM	4/24/2011 9:30 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_007683

Site location

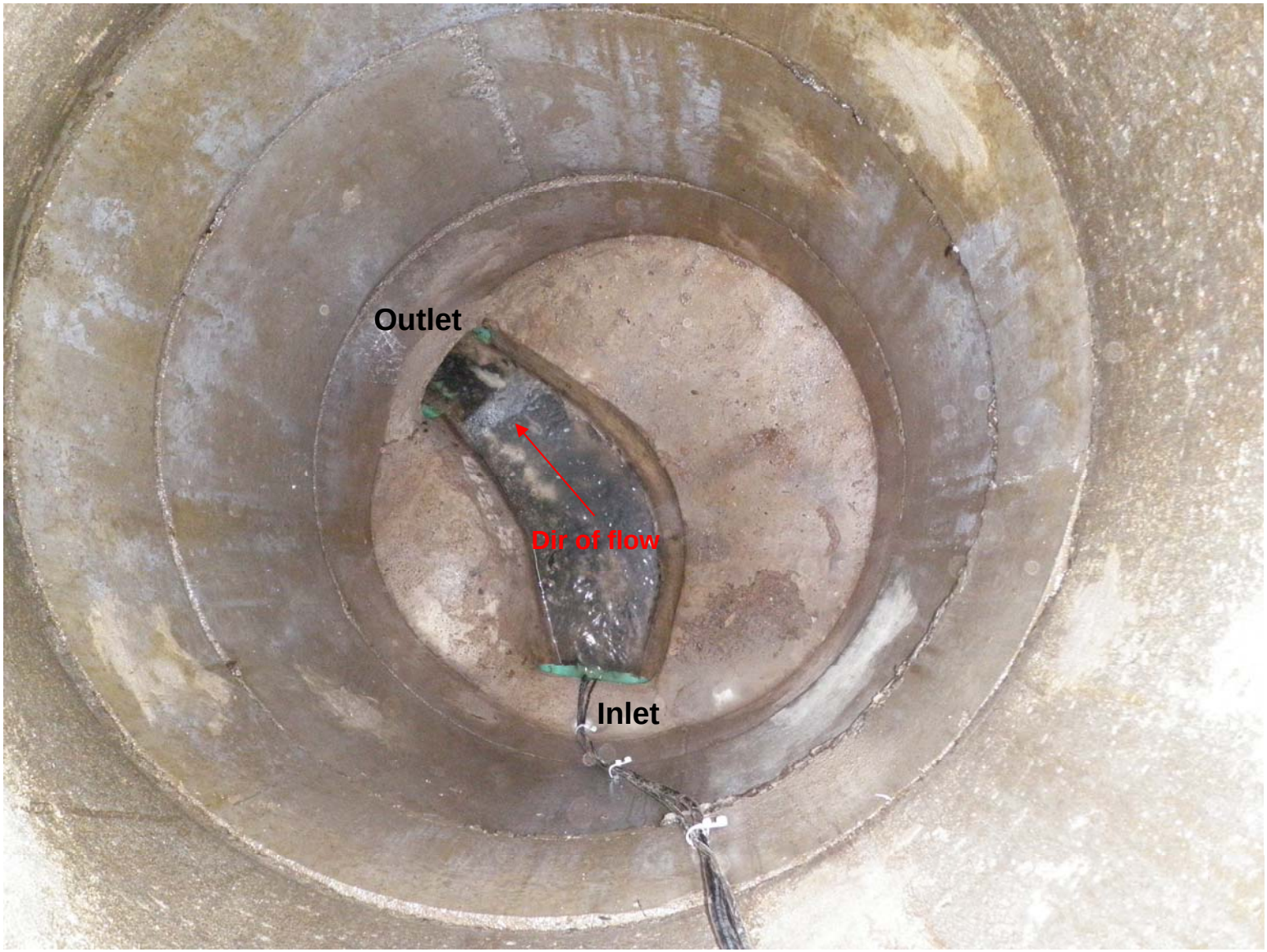
ADS ENVIRONMENTAL SERVICES®

Site access looking northeast

Bend_007683

Site set up

ADS ENVIRONMENTAL SERVICES®

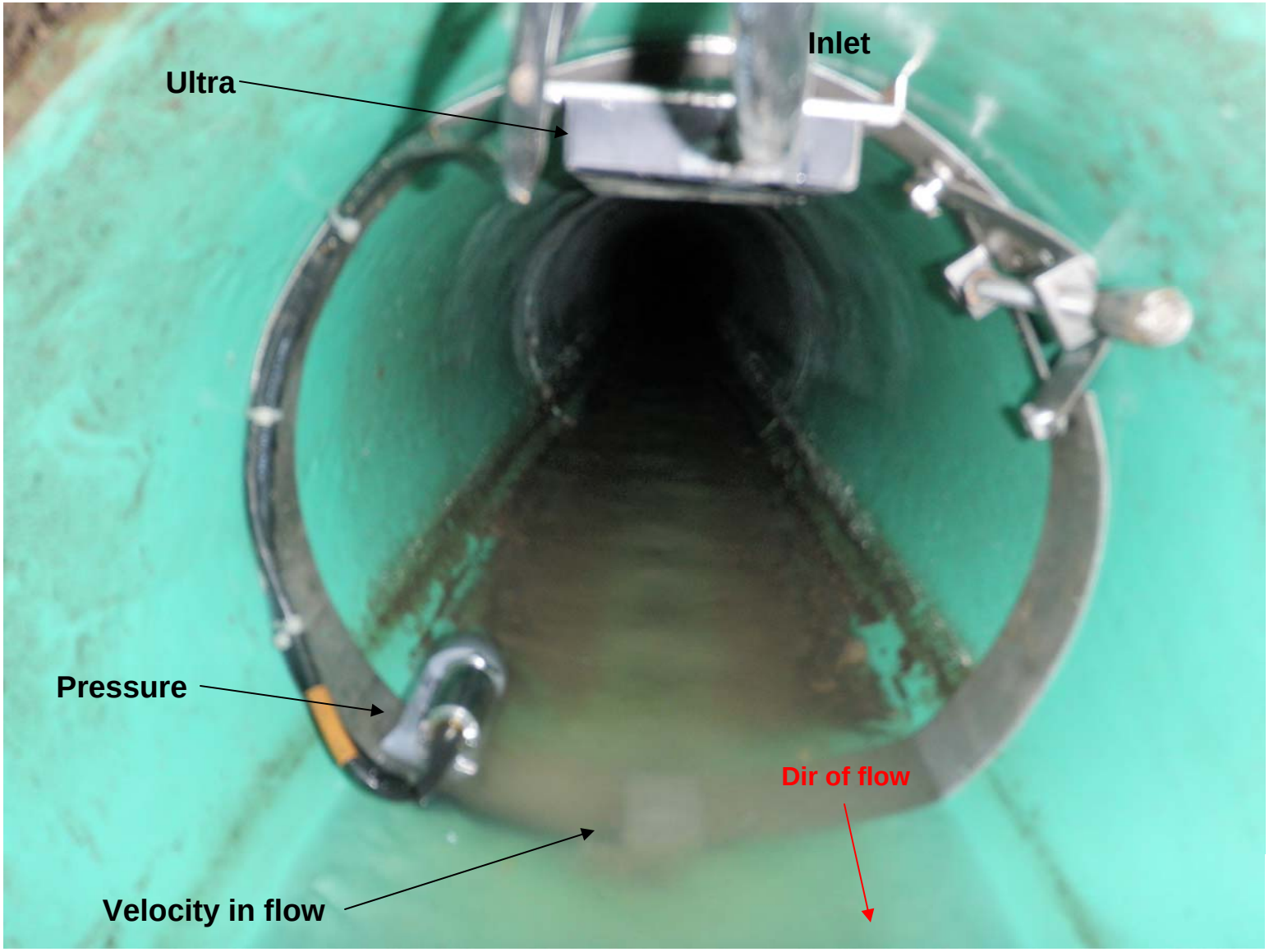


View down manhole facing north

Bend_007683

Site set up

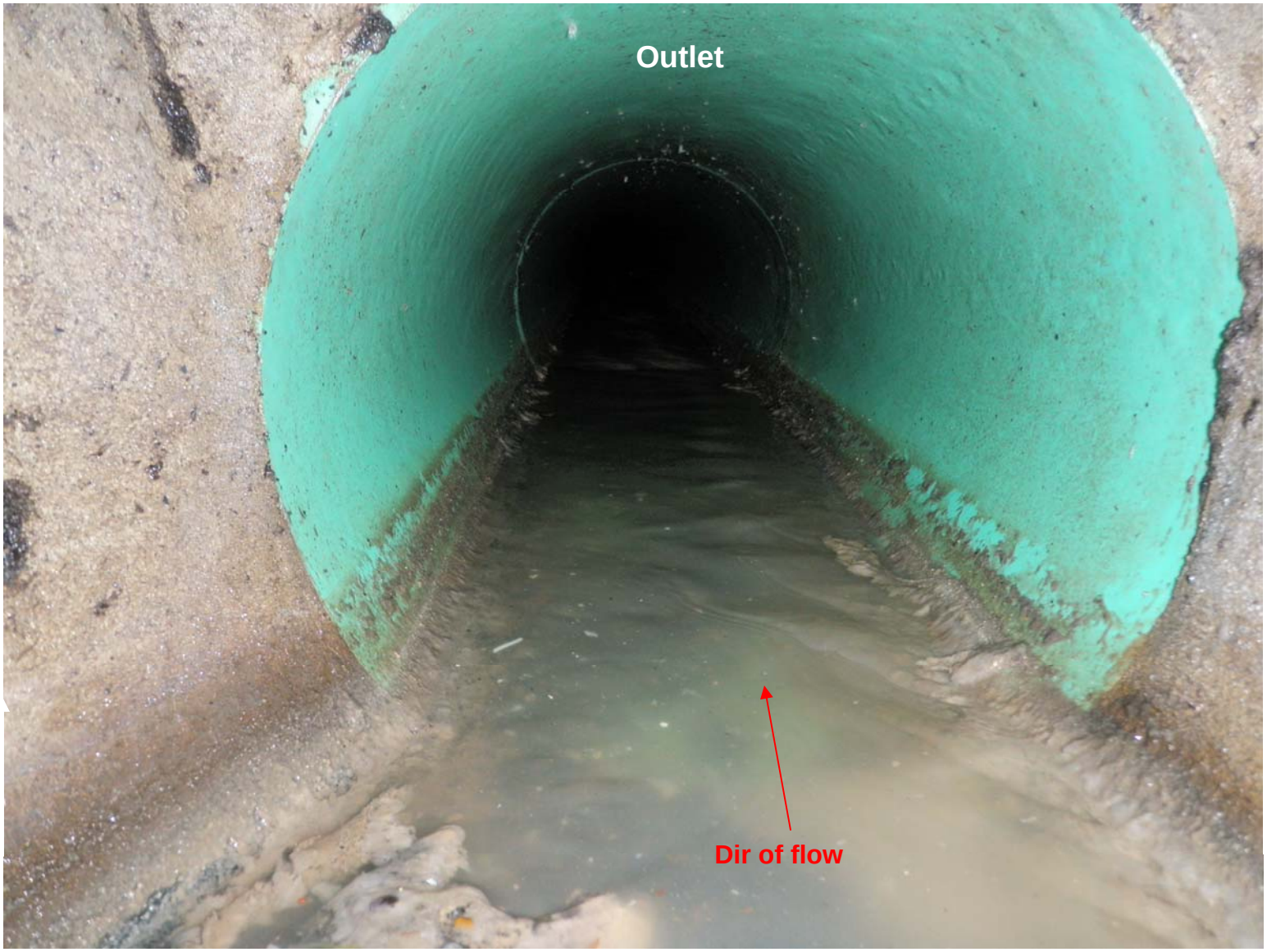
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_007683

Site outlet



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_007683	**Monitor Series:**	5000 AG
Address/Location:	East of Lower Village Rd. off shoulder of north side of Archie Briggs Rd.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21243
Manhole #	CMH007683
Coordinates:	44° 5'32.74"N 121°19'03'63"W
Pipe Height:	11.75"
Pipe Width:	11.75"
IP Address:	166.219.48.71

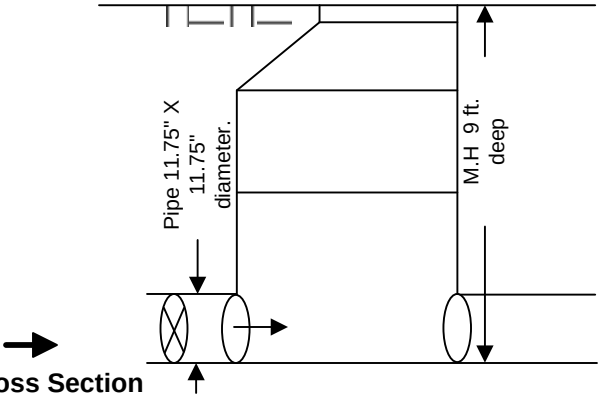
Investigation Information:

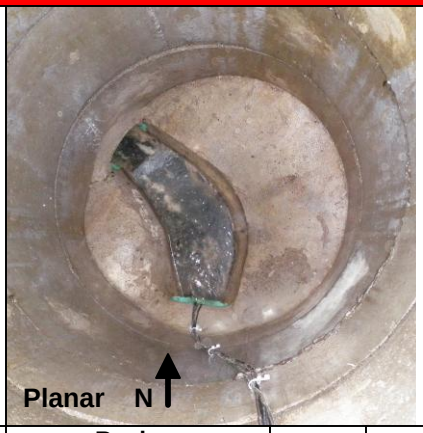
Date/Time of Investigation:	3/24/11 @ 12:42
Site Hydraulics:	Ripples
Upstream Input: (L/S, P/S)	No influences
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	1.88" +/- 0.25"
Range (Air DOF):	9.88" +/- 0.25"
Peak Velocity:	1.20 fps
Silt:	0 Inches

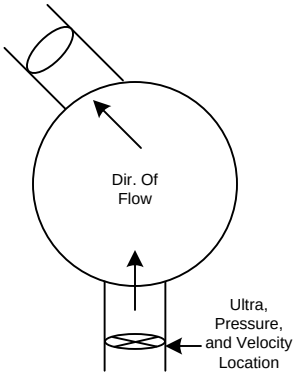
Manhole Information:

Manhole Depth:	9'- 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_007683	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

.Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

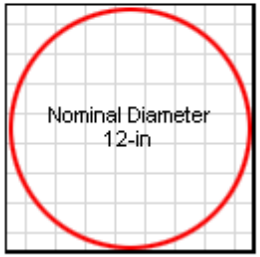
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

SCATTERGRAPH REPORT

Bend_007683

Flow Monitor

Bend_007683

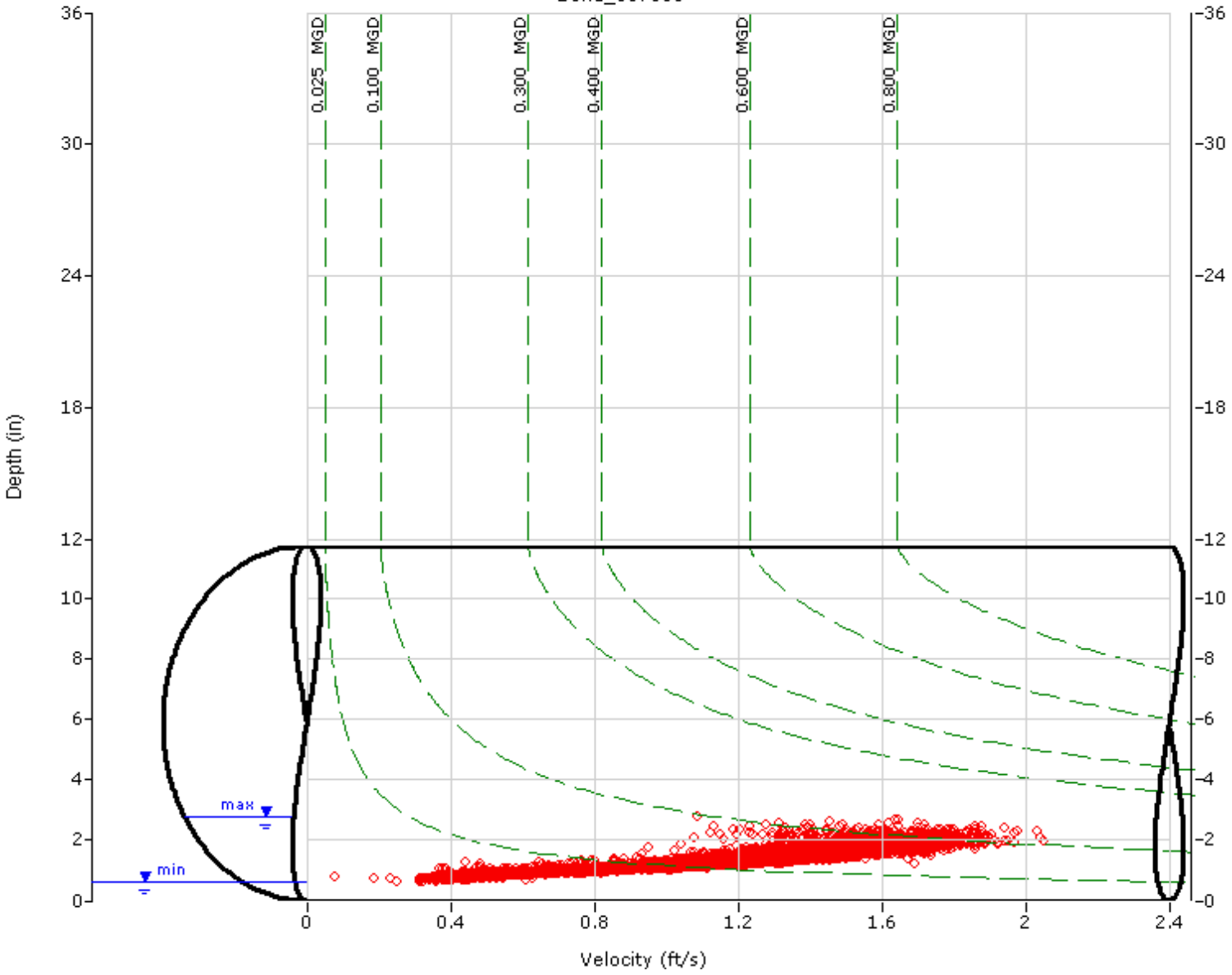


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



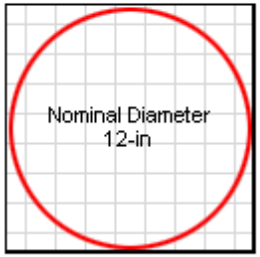
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_007683

Flow Monitor

Bend_007683

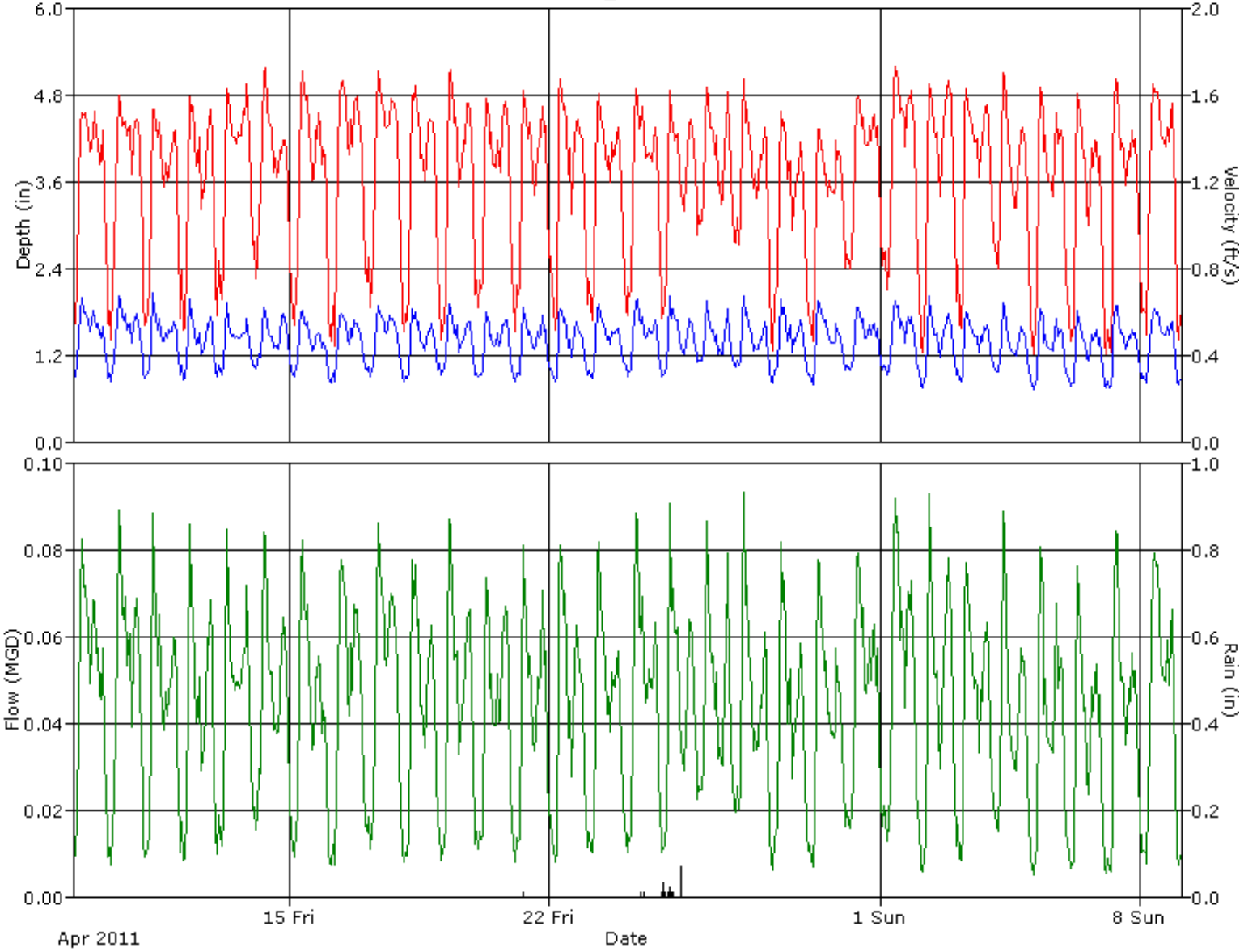


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_007686	
Measured Pipe Height (in)	7.88
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_007686 was located in the Northwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 . Field observation indicates that the duration of lift station cycles could be as little as 30 seconds.

This location measures flow with a short lift station cycle influence and as a result sometimes the depth and velocity readings do not correspond to the actual hydraulic conditions. These readings are visible in the low depth (<.25") high velocity (>3 ft/s), the high depth (>1") low velocity (<2 ft/s) range and all recorded zero velocity values of the scattergraph. An unedited data set has been provided.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	0.33	0.59	0.002
Minimum	0.03	0.00	0.000
Maximum	1.91	5.12	0.149
Time of Minimum	4/13/2011 1:50 PM	4/9/2011 12:10 AM	4/9/2011 12:10 AM
Time of Maximum	5/3/2011 2:05 PM	5/6/2011 10:45 AM	5/7/2011 8:55 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_007686

Site location

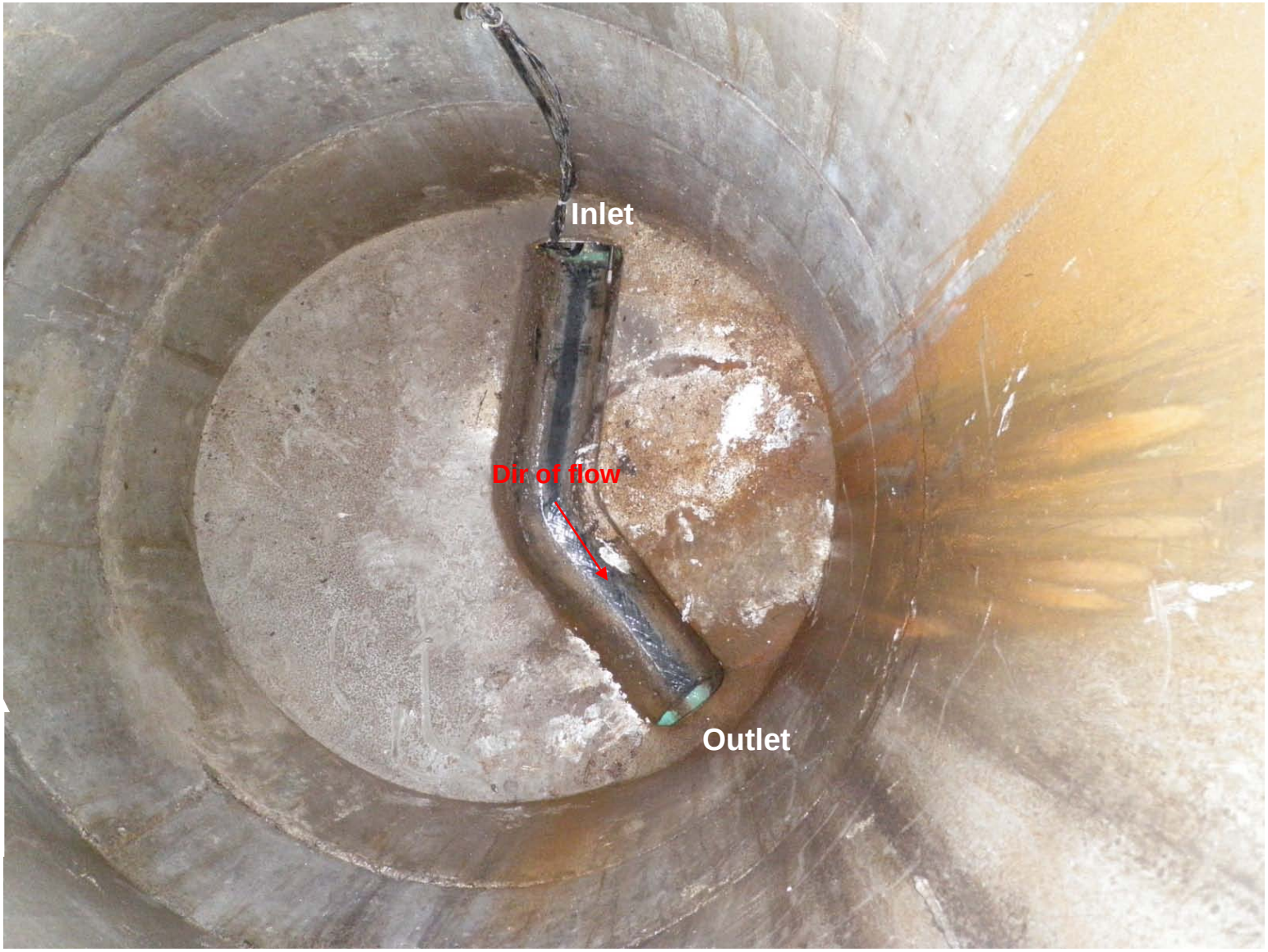
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_007686

Site set up

ADS ENVIRONMENTAL SERVICES®

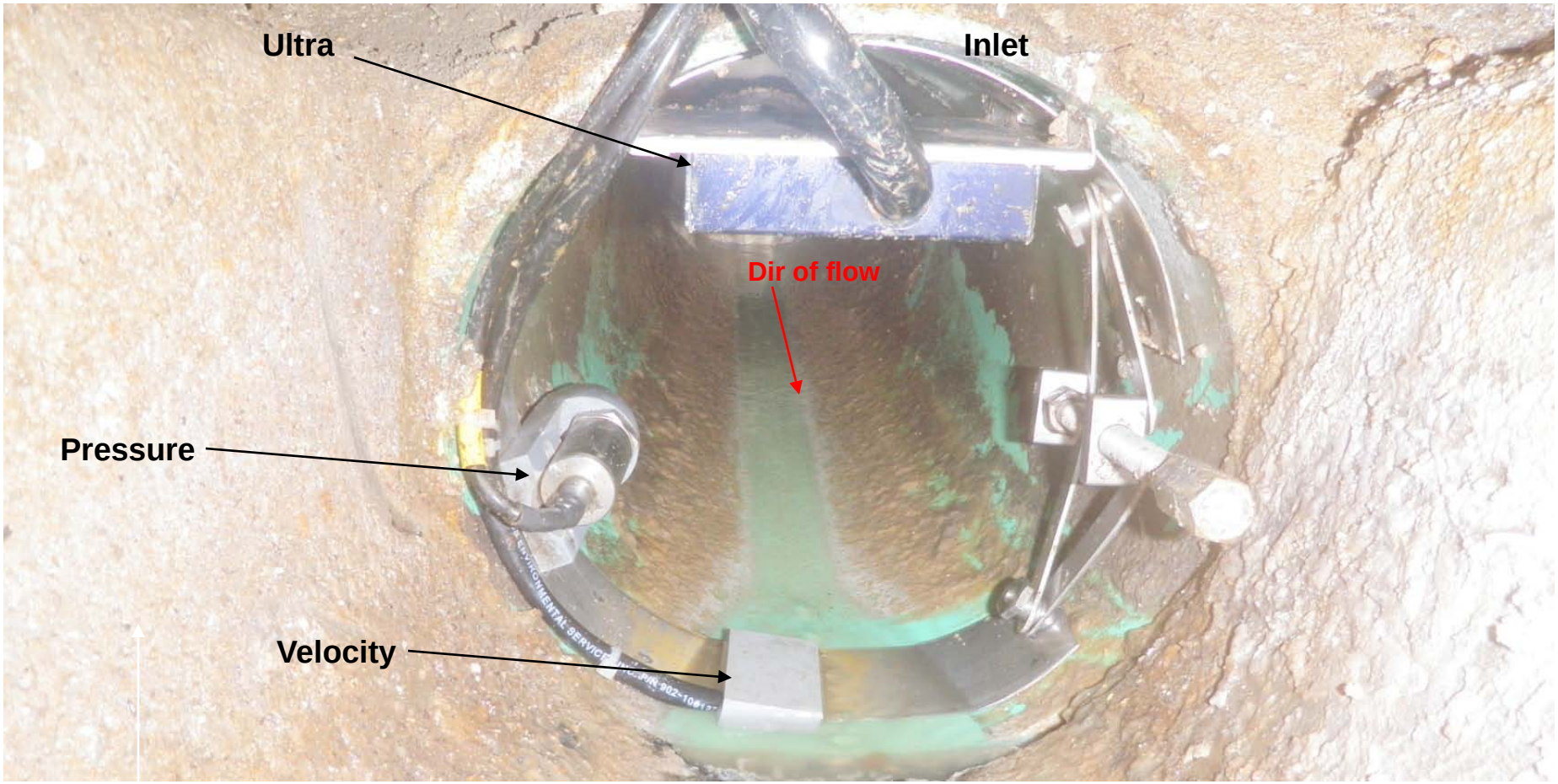


View down manhole facing north

Bend_007686

Site set up

ADS ENVIRONMENTAL SERVICES®

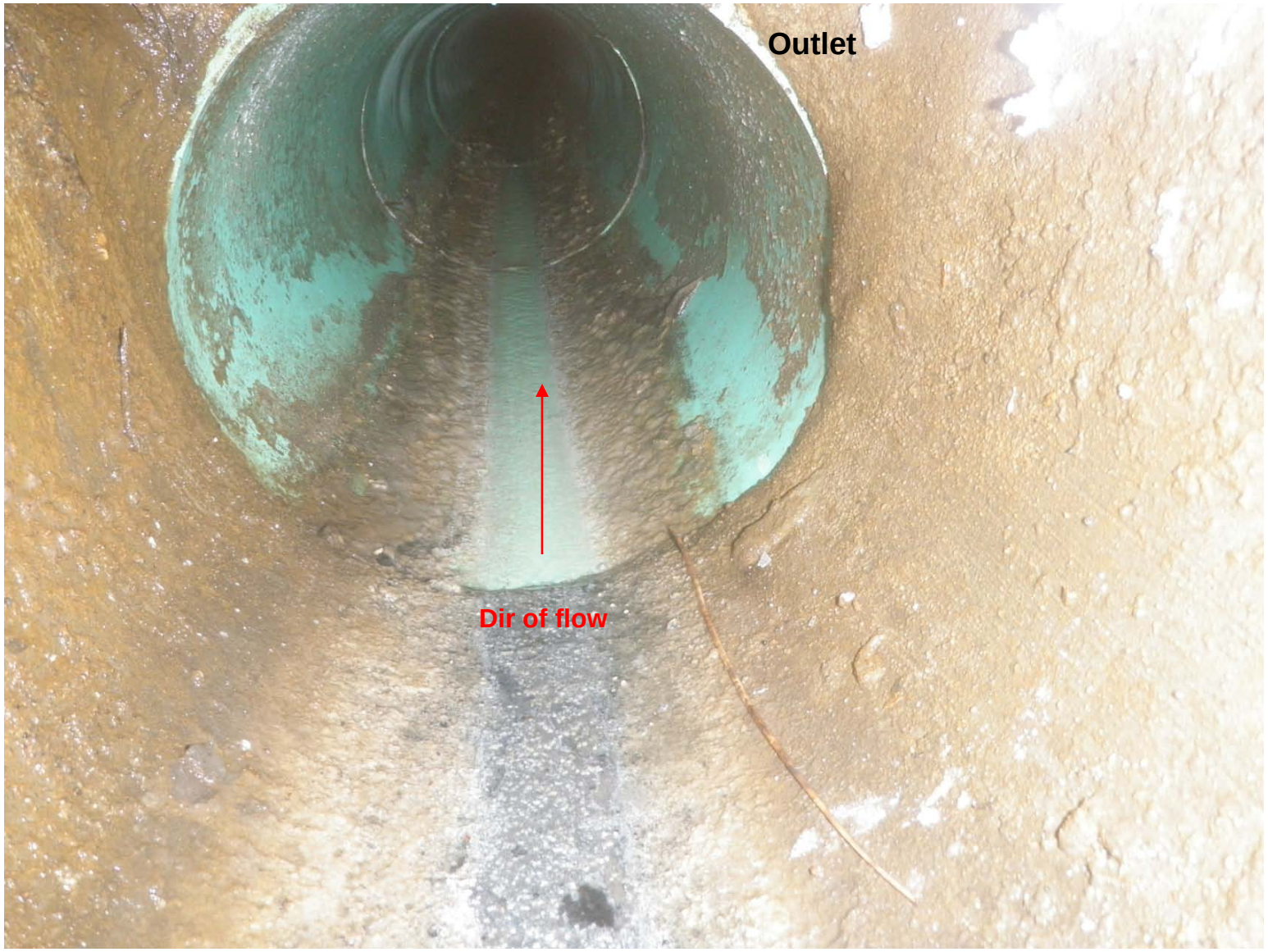


View of sensor placement and site hydraulics

Bend_007686

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_007686	**Monitor Series:**	5000 AG
Address/Location:	East of Lower Village Rd. off shoulder of north side of Archie Briggs Rd.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21251
Manhole #	CMH007686
Coordinates:	44° 5'34.20"N 121°19'05'99"W
Pipe Height:	7.88"
Pipe Width:	7.88"
IP Address:	166.219.169.169

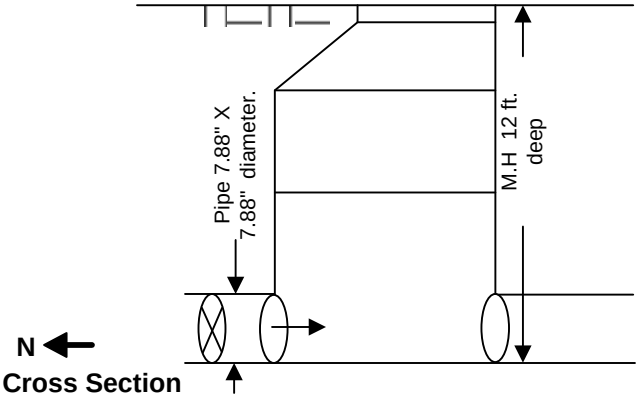
Investigation Information:

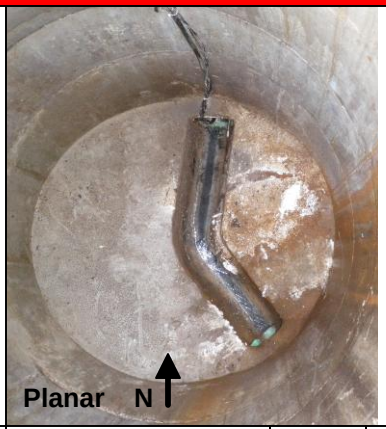
Date/Time of Investigation:	4/06/11 @ 14:10
Site Hydraulics:	Small waves
Upstream Input: (L/S, P/S)	L/S
Upstream Manhole:	No U/s MH (Force Main)
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	0.38" +/- 0.25"
Range (Air DOF):	7.50" +/- 0.25"
Peak Velocity:	2.40 fps
Silt:	0 Inches

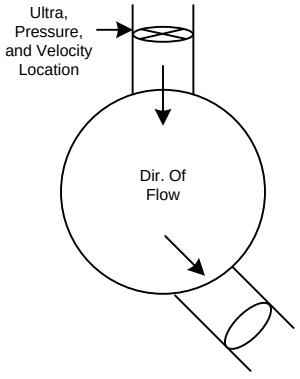
Manhole Information:

Manhole Depth:	12"- 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

15 PSI pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_007686	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

.Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

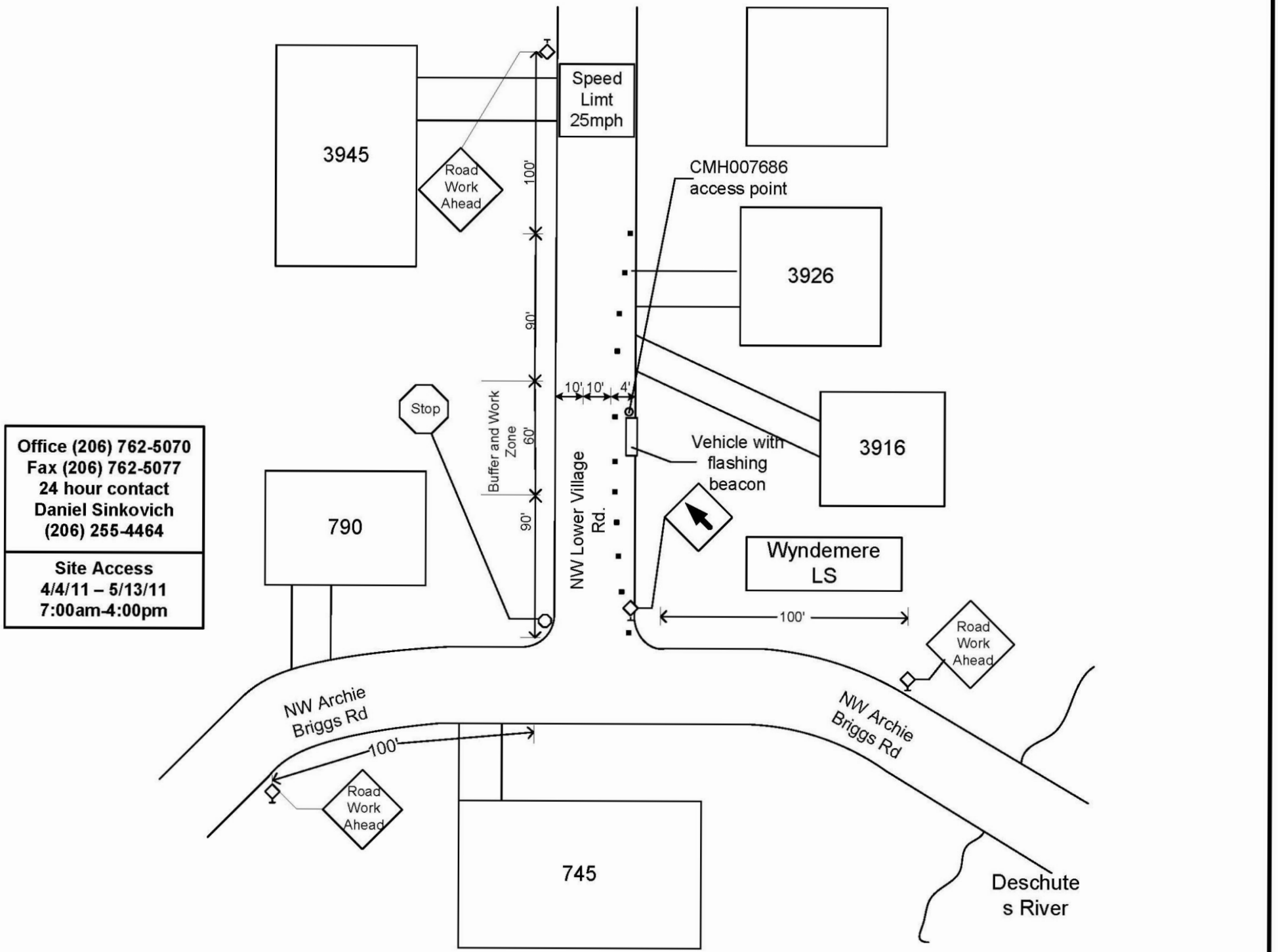
☐ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_007686 MH #: CMH007686	Address: 3916 NW Lower Village Rd. Bend, OR	N	Drawn: 03/28/11 Submitted: 04/1/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
4/4/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_007686

Flow Monitor

Bend_007686

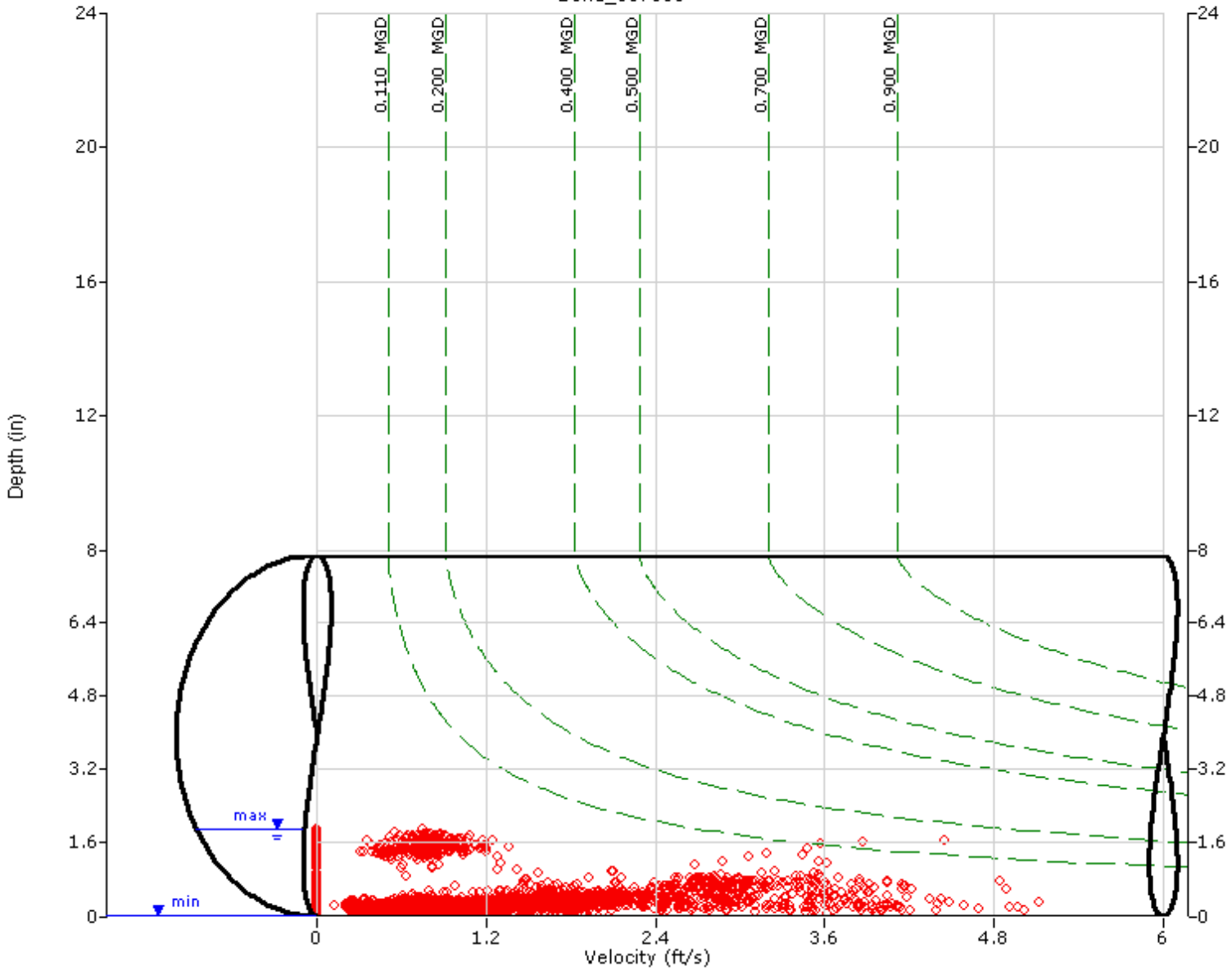
Nominal Diameter
8-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



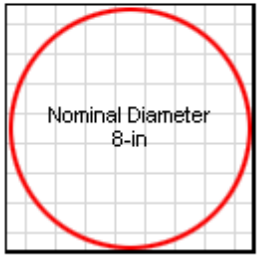
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_007686

Flow Monitor

Bend_007686

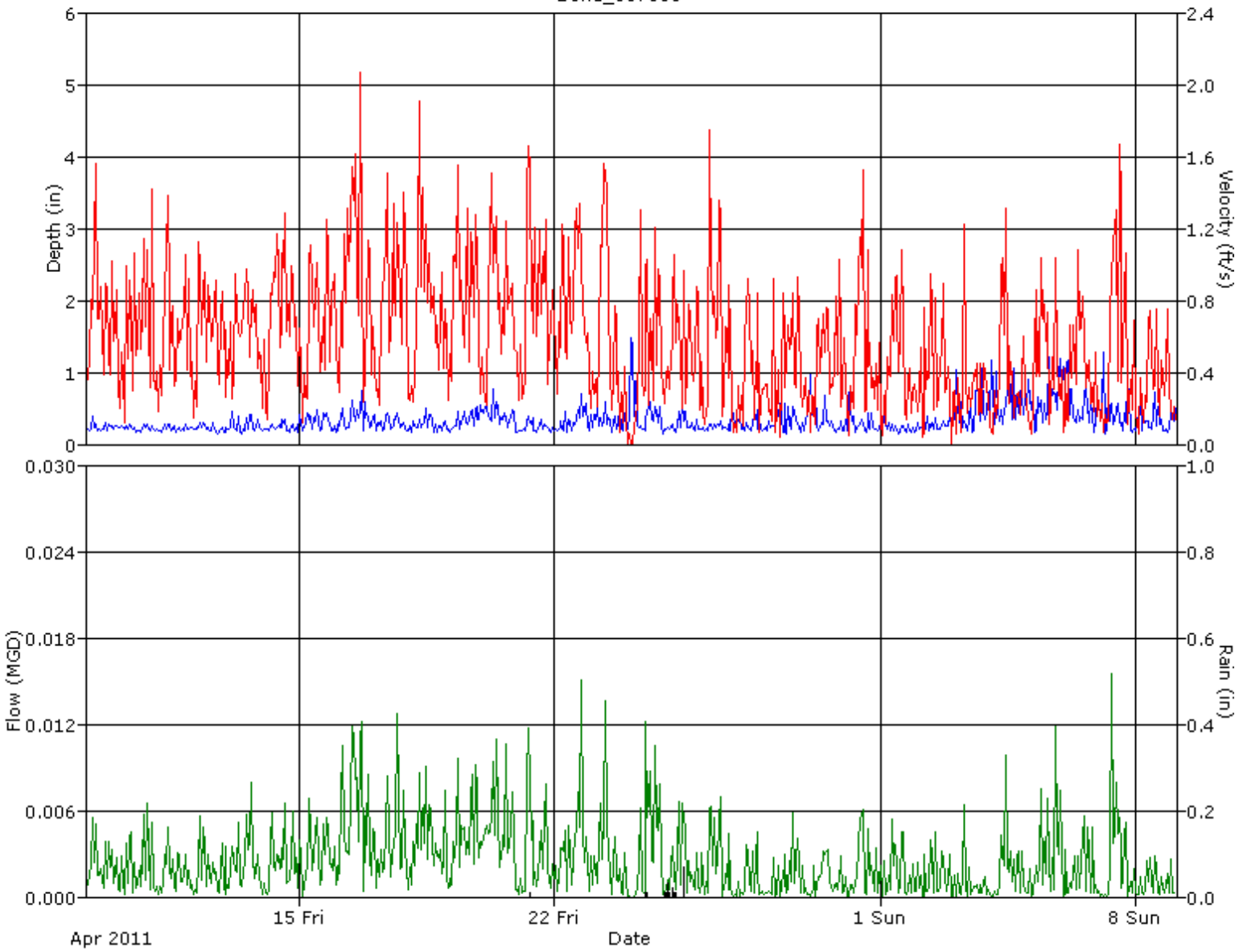


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_007995	
Measured Pipe Height (in)	27
Nominal Pipe Height (in)	27
Silt Level (in)	0.00

Overview

Monitoring point Bend_007995 was located in the Northeast of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with a slight hydraulic shift, that is most likely due to shifting debris.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	5.91	2.44	1.078
Minimum	2.99	1.33	0.243
Maximum	8.38	3.08	2.068
Time of Minimum	4/26/2011 4:45 AM	4/18/2011 5:00 AM	4/26/2011 4:45 AM
Time of Maximum	5/2/2011 10:40 AM	4/15/2011 10:30 AM	5/2/2011 10:40 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_007995

Site location

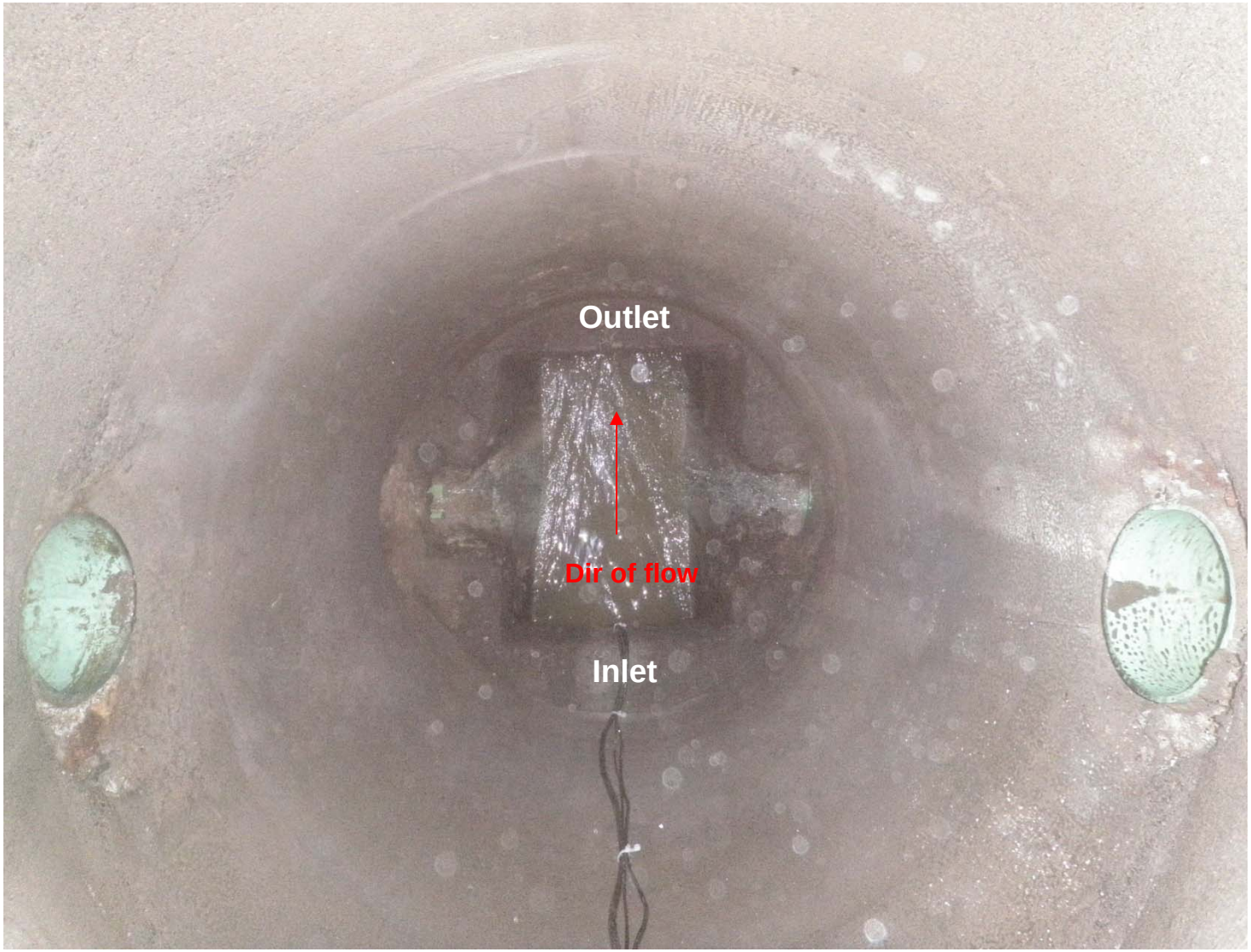
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_007995

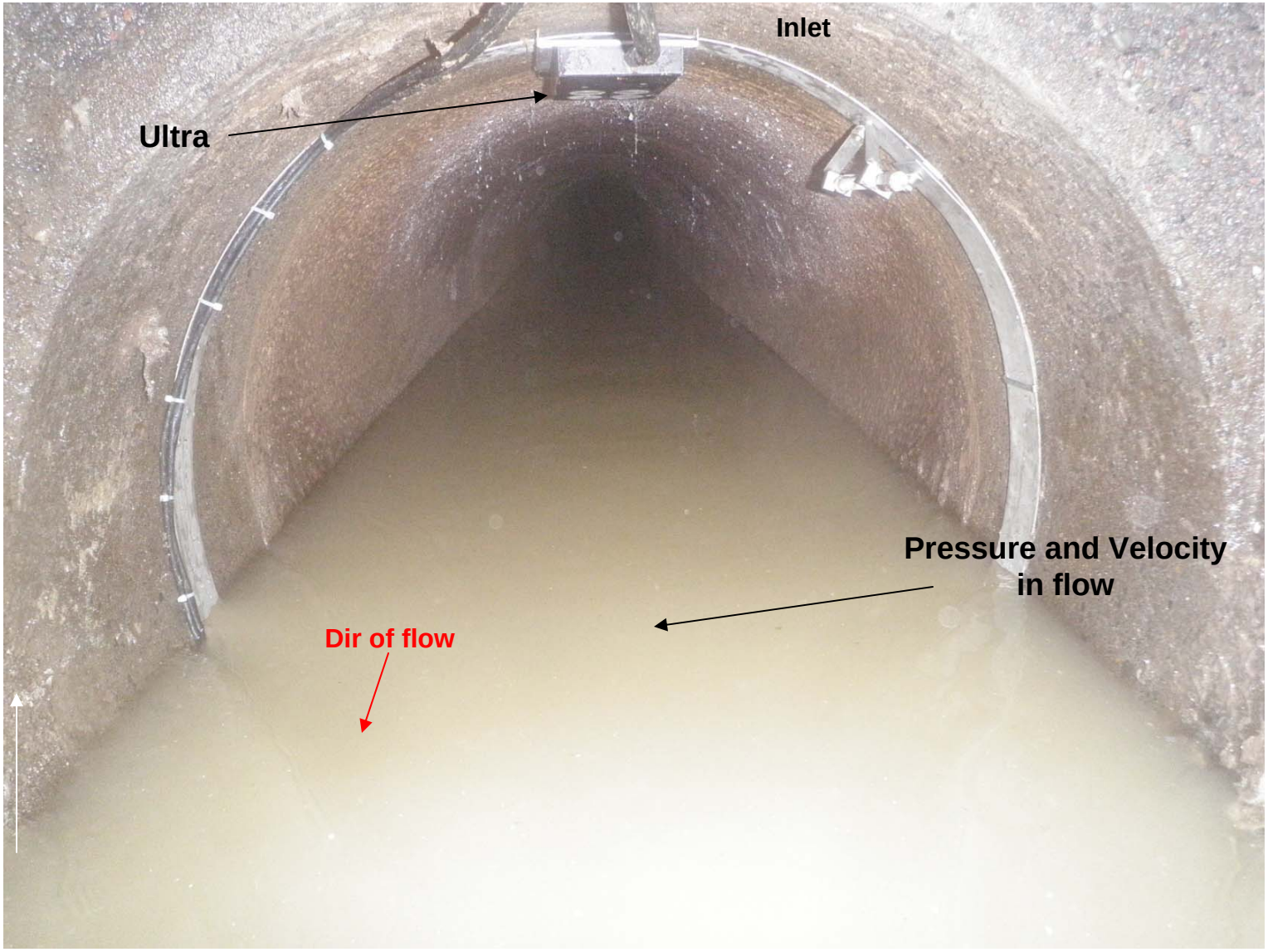
Site set up

ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

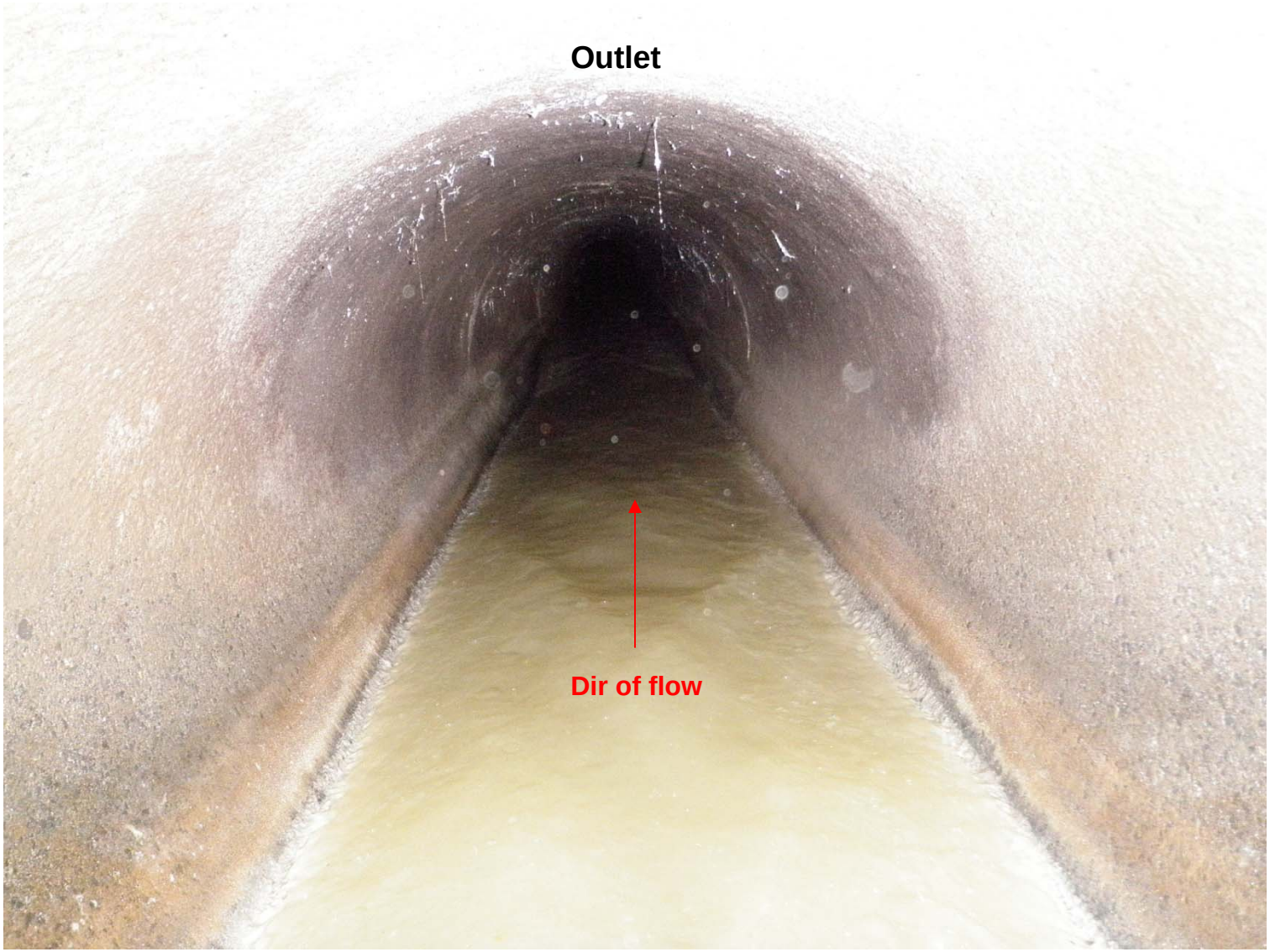
Bend_007995
Site set up



View of sensor placement and site hydraulics

Bend_007995

Site outlet



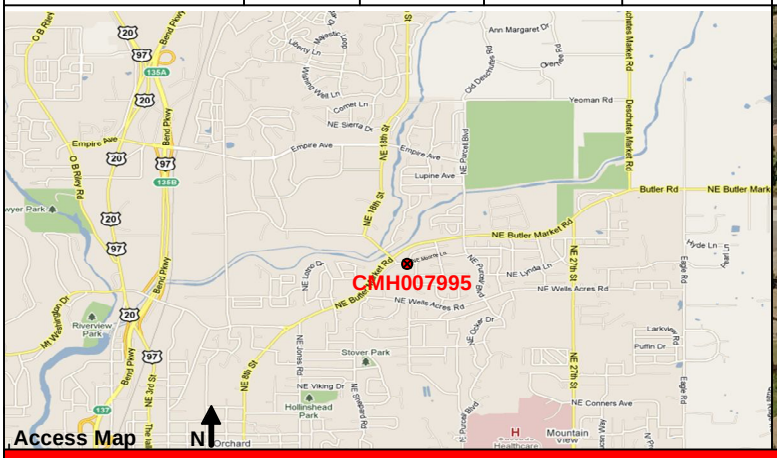
View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_007995	**Monitor Series:**	5000 AG
Address/Location:	Intersection of NE Yellowstone Ln. and NE Crackler Ln.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21707
Manhole #	CMH007995
Coordinates:	44°04'53.35" N 121°16'43.35" W
Pipe Height:	27.00"
Pipe Width:	27.00"
IP Address:	166.219.169.174



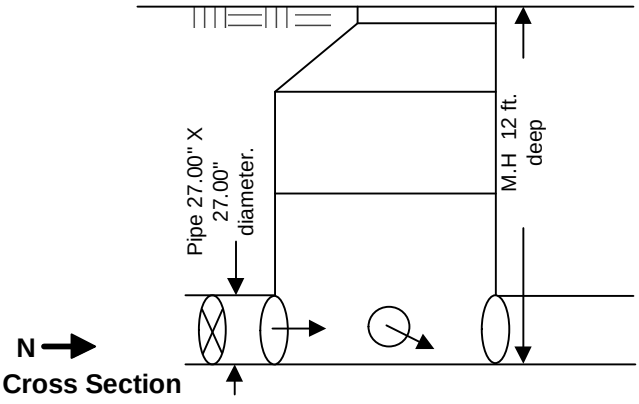
Investigation Information:

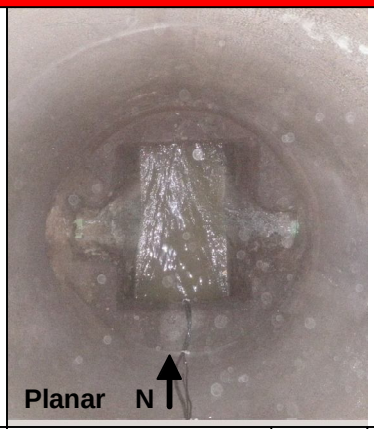
Date/Time of Investigation:	4/05/11 @ 9:50
Site Hydraulics:	Smooth
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	6.75" +/- .25"
Range (Air DOF):	20.25" +/- .25"
Peak Velocity:	3.30 fps
Silt:	0 Inches

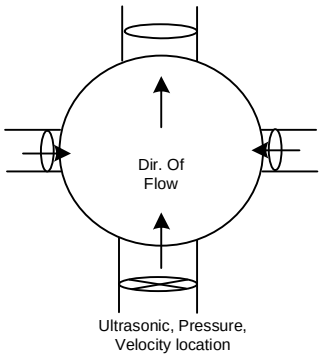
Manhole Information:

Manhole Depth:	12' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good
Mini System Character:	Residential [ ] Commercial [ ] Industrial [ ] Trunk [X]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

15 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	Site ID: Bend_007995	Site Classification: (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

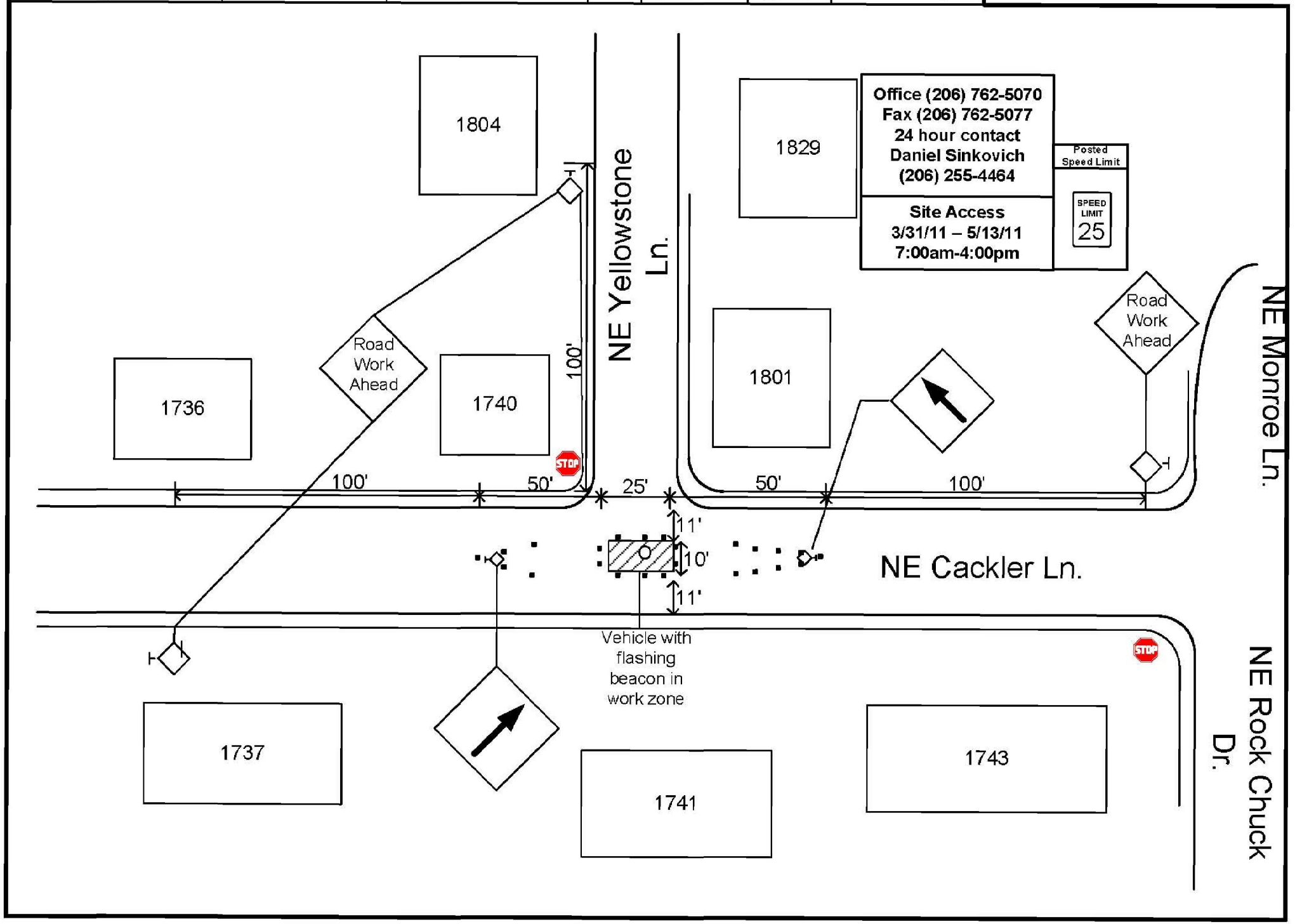
☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	Reviewed
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/05/11	Date: 4/05/11

ADS ENVIRONMENTAL SERVICES®
4455 South 134th Place
Tukwila, WA 98168

Site Name:	Address:	Drawn: 03/31/11	Rev.	Pg.
Bend_007995	1740 NE Cackler Ln.	Submitted: 04/4/11	0	1 of 1
MH# CMH007995	Bend, OR	Approved:	Not to Scale	

Bend, OR Temporary Flow Monitoring

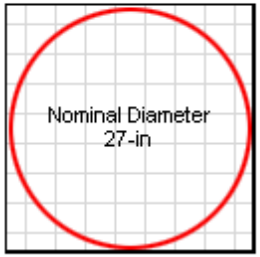


SCATTERGRAPH REPORT

Bend_007995

Flow Monitor

Bend_007995

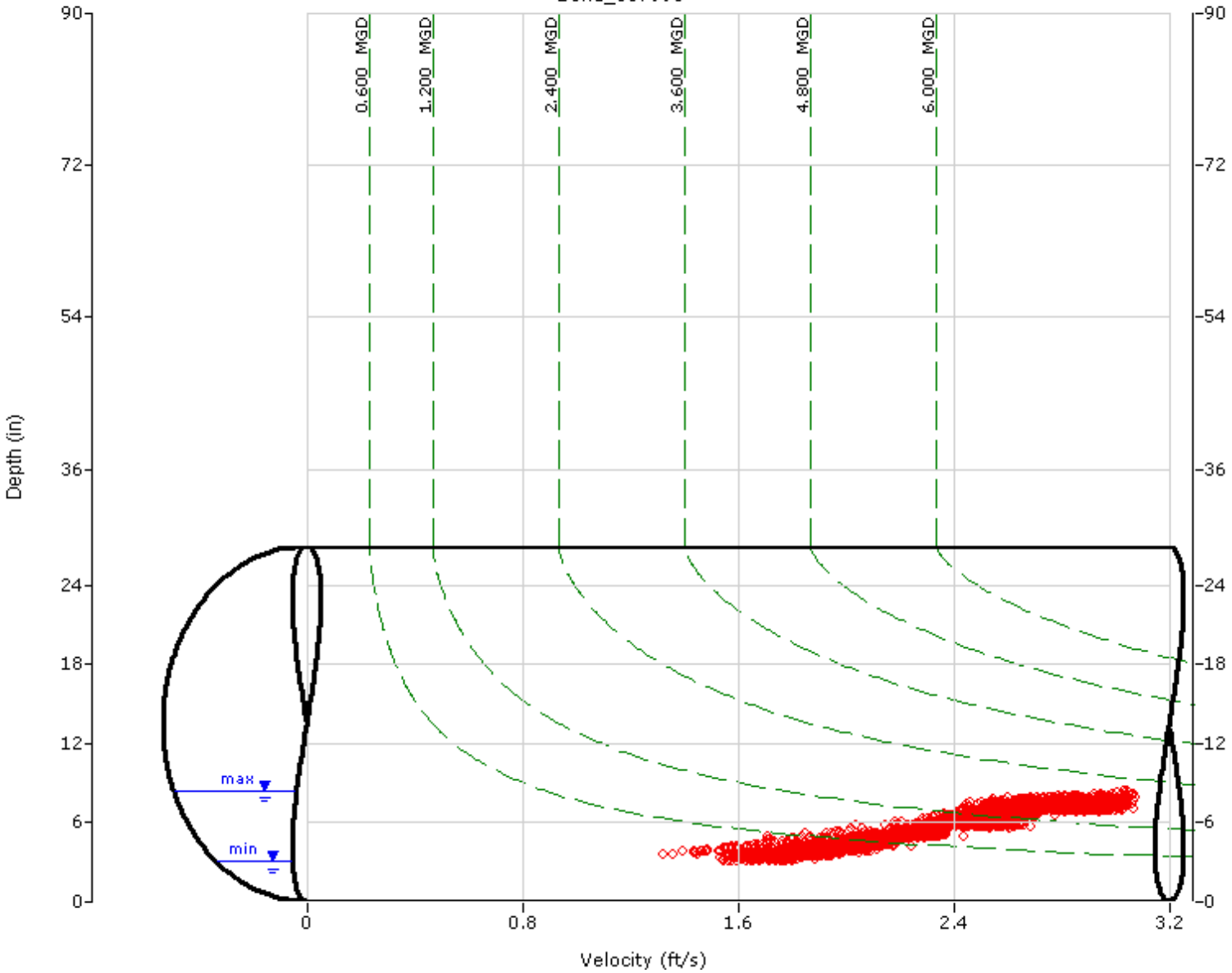


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



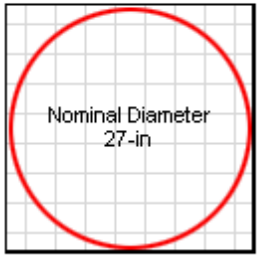
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_007995

Flow Monitor

Bend_007995

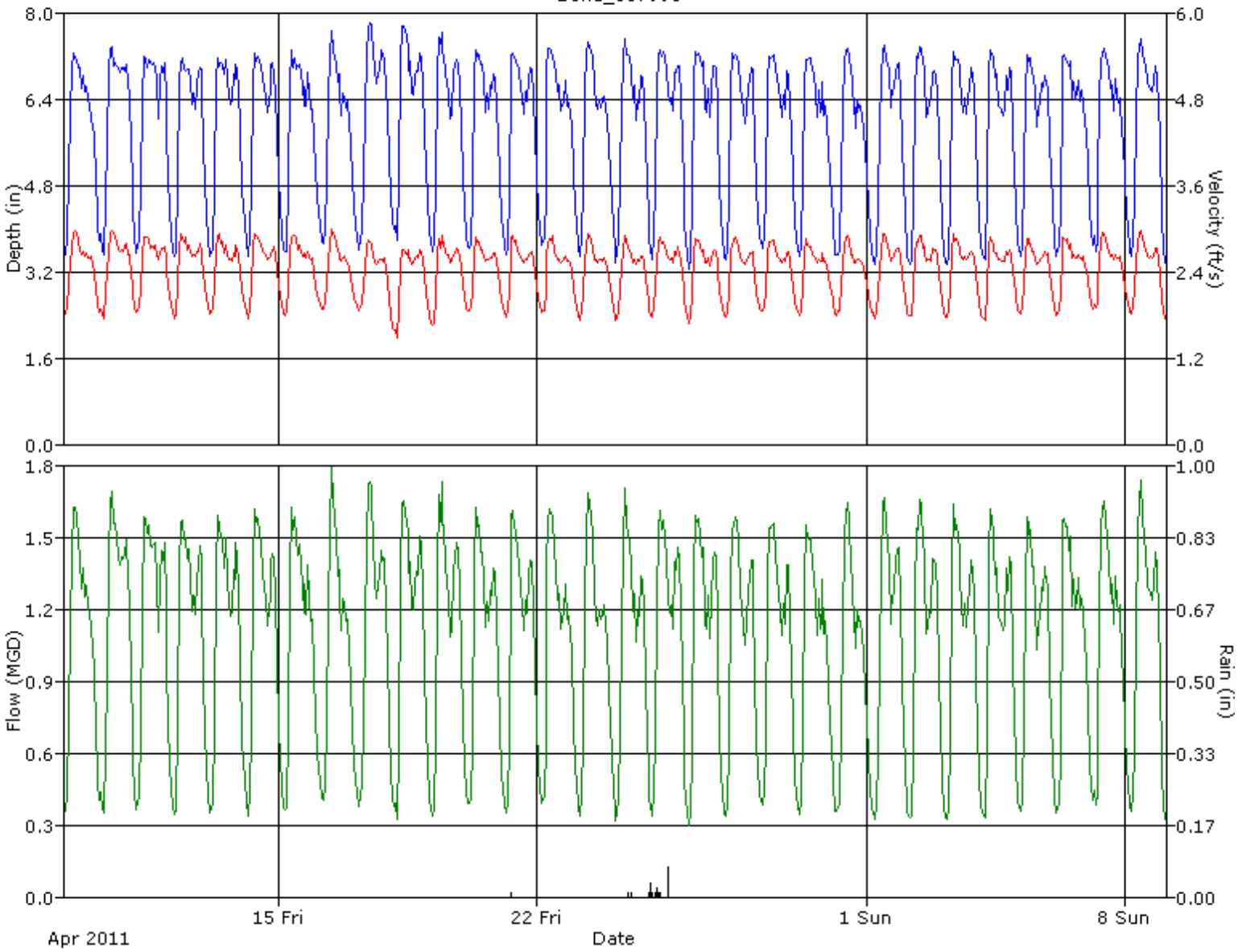


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008025	
Measured Pipe Height (in)	11.75
Nominal Pipe Height (in)	12
Silt Level (in)	0.00

Overview

Monitoring point Bend_008025 was located in the Southwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph indicates a repeatable data set with minimum period velocity dropouts (data points that are invalid usually due to clear and/or shallow flow conditions). Sensor parameters were adjusted to best suit flow conditions on Friday, April 15, 2011.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.16	5.26	0.147
Minimum	0.42	1.85	0.016
Maximum	2.52	7.86	0.602
Time of Minimum	5/4/2011 6:15 AM	4/19/2011 4:35 AM	5/7/2011 4:50 AM
Time of Maximum	4/22/2011 11:20 AM	4/22/2011 11:20 AM	4/22/2011 11:20 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	98.78
Quantity	98.78

Bend_008025

Site location

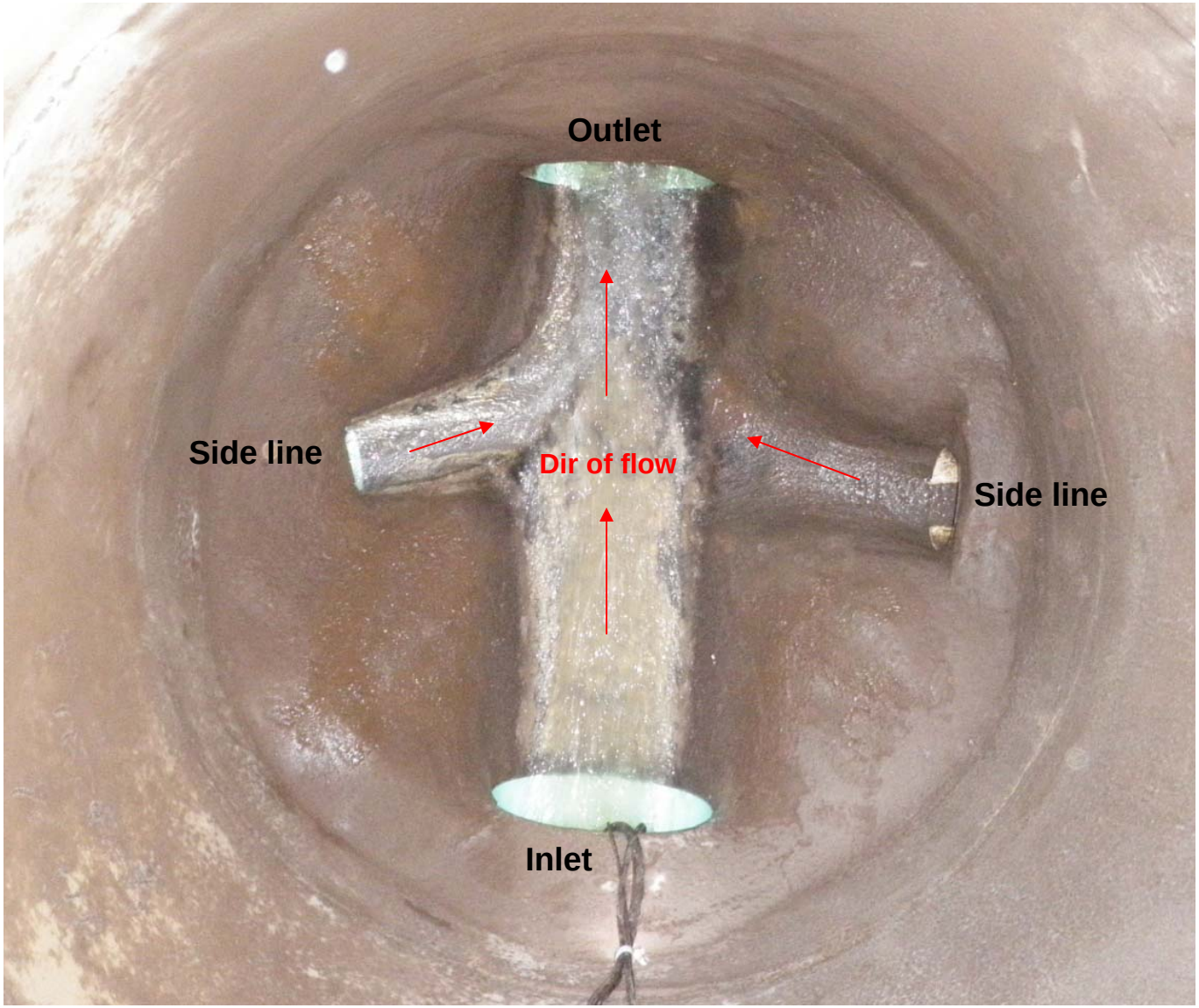
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008025

Site set up

ADS ENVIRONMENTAL SERVICES®

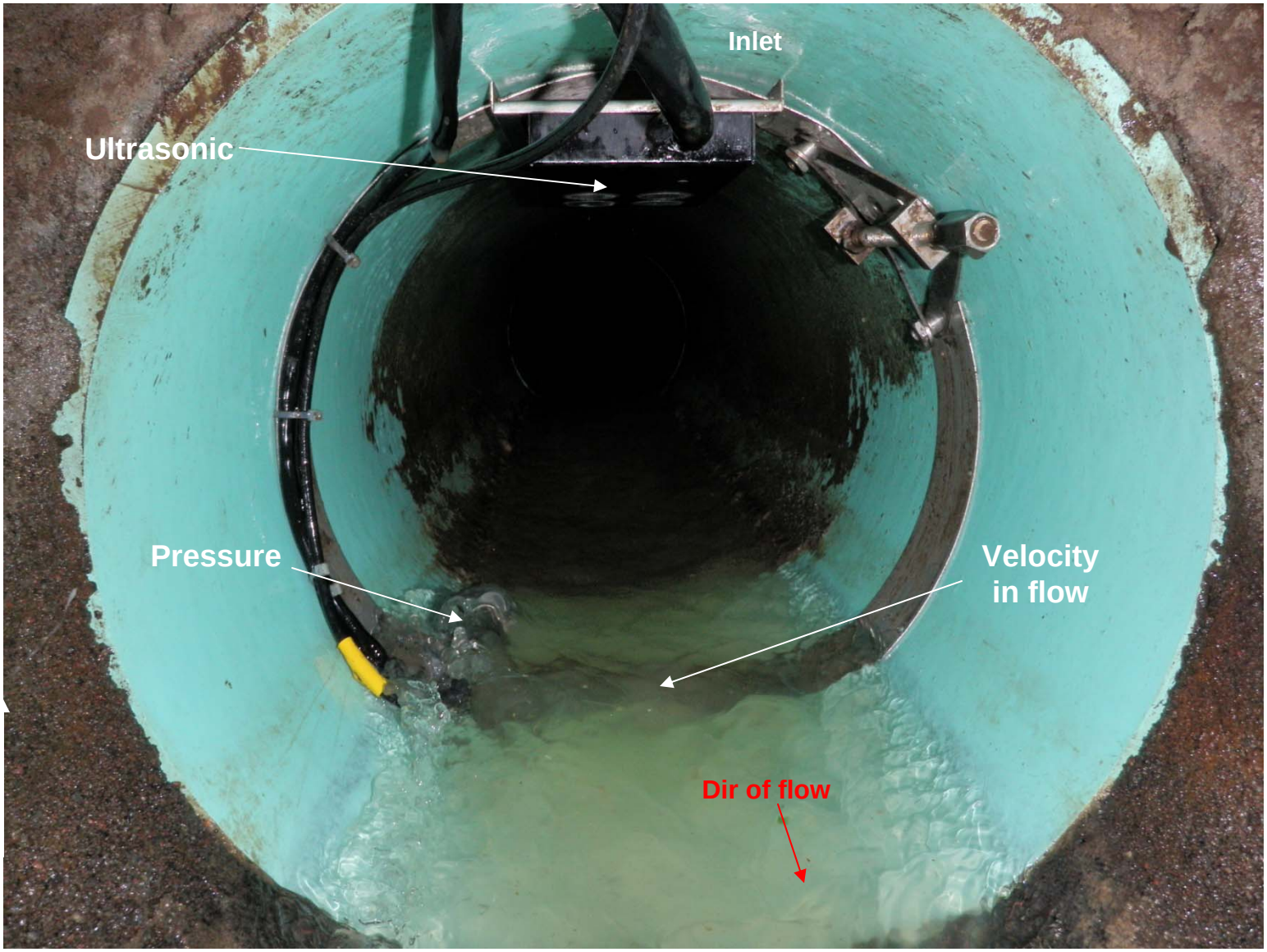


View down manhole facing north

Bend_008025

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008025

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

ADS Site Report

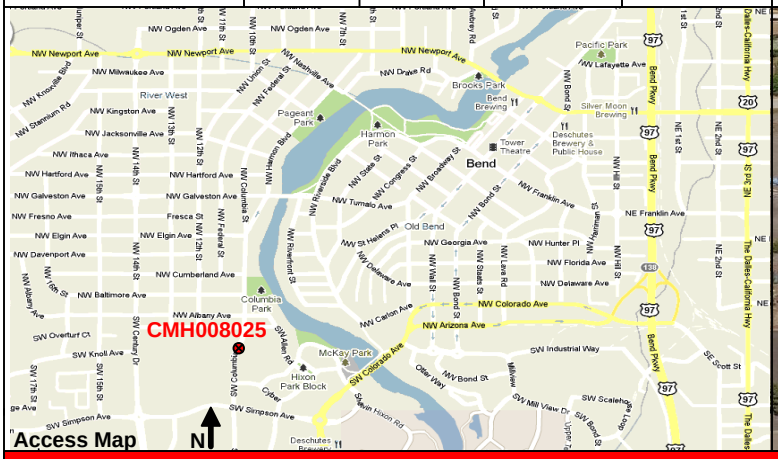
Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		

Site Name:	Bend_008025	**Monitor Series:**	5000 AG
Address/Location:	107 SW Columbia St.		

Access:	Drive	**Type of System:**	Sanitary [X]	Storm [ ] Combined [ ]

Monitor S/N:	21511
Manhole #	CMH008025
Coordinates:	44°03'00.43" N, 121°19'37.59" W
Pipe Height:	11.75"
Pipe Width:	11.75"
IP Address:	166.219.48.73



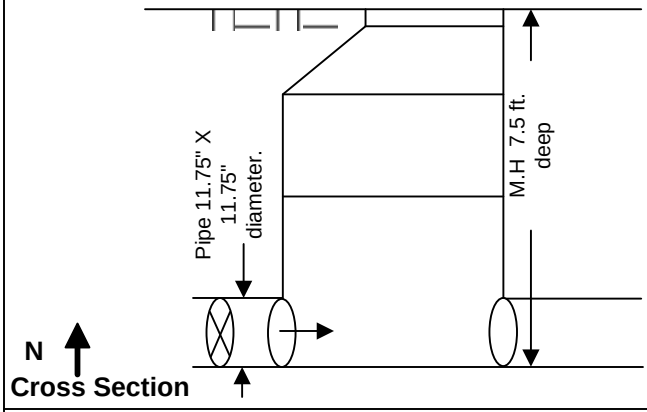
Investigation Information:

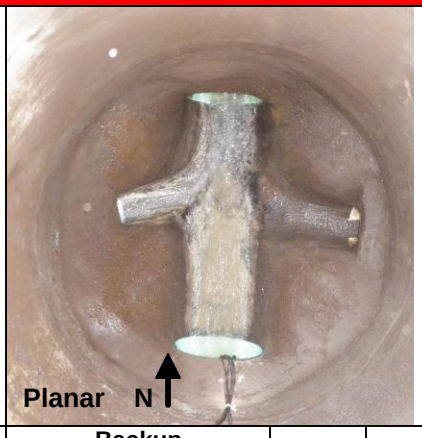
Date/Time of Investigation:	4/06/11 @ 15:40
Site Hydraulics:	Ripples, Fast
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	1.38" +/- .25"
Range (Air DOF):	10.38" +/- .25"
Peak Velocity:	6.25 fps
Silt:	0 Inches

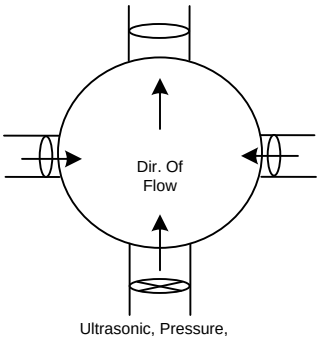
Manhole Information:

Manhole Depth:	7' – 6"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [ ]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008025	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

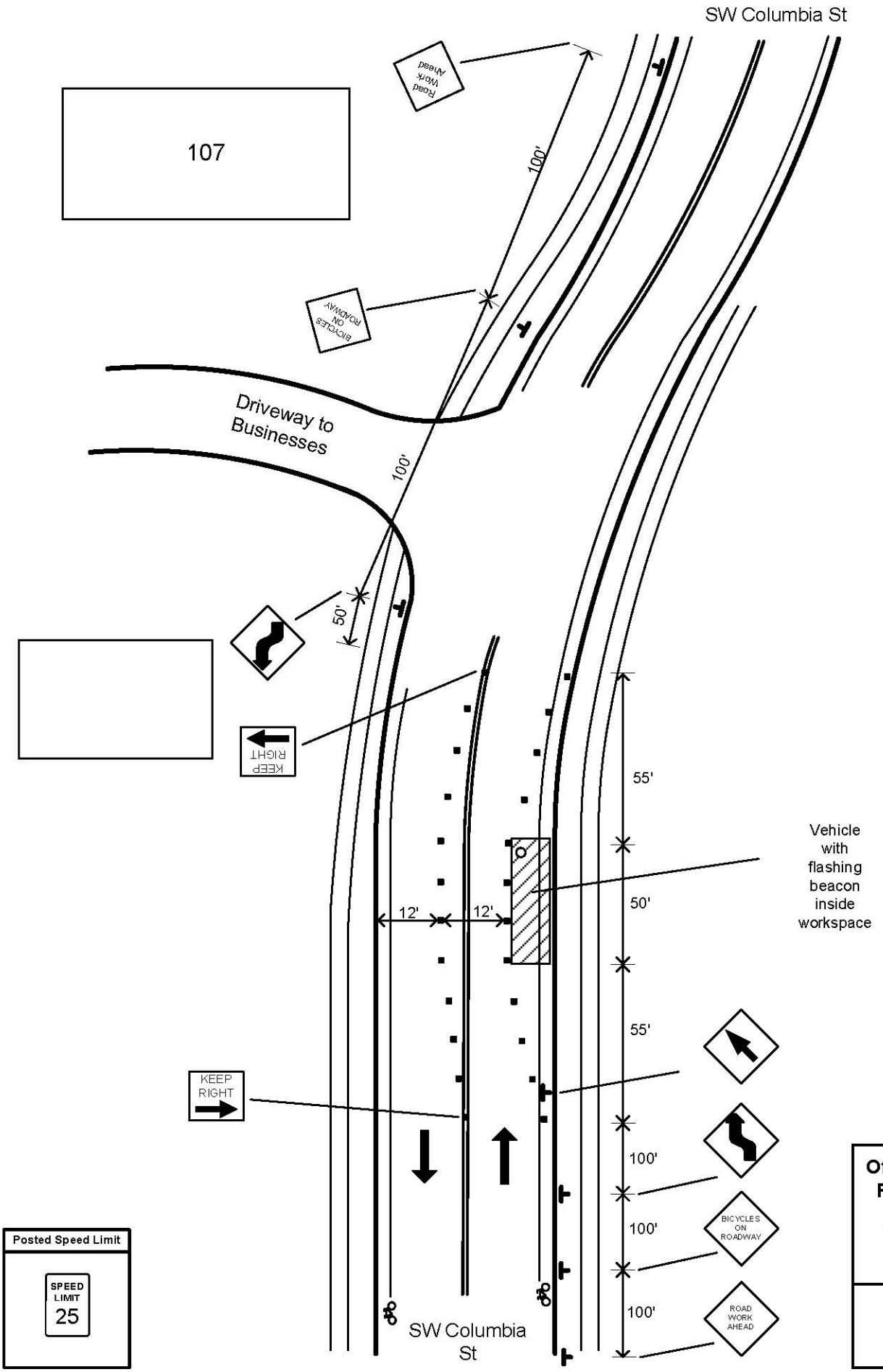
☐ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008025 MH #: CMH008025	Address: 107 SW Columbia St Bend, OR	N	Drawing: 04/01/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Posted Speed Limit

SPEED LIMIT 25

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
4/04/11 – 5/13/11
7:00am - 4:00pm

SCATTERGRAPH REPORT

Bend_008025

Flow Monitor

Bend_008025

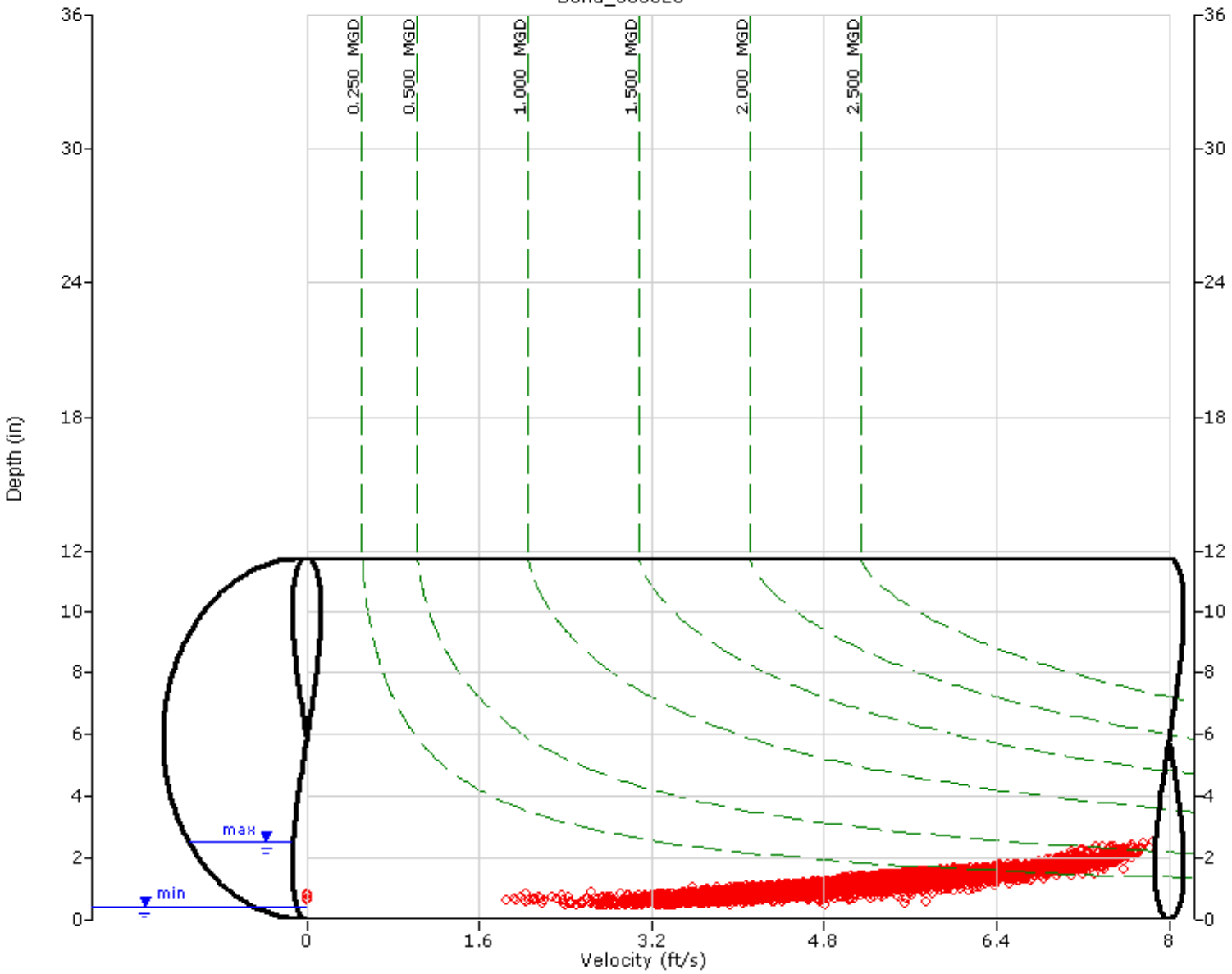
Nominal Diameter
12-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



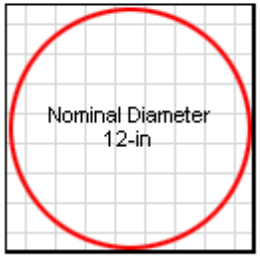
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008025

Flow Monitor

Bend_008025

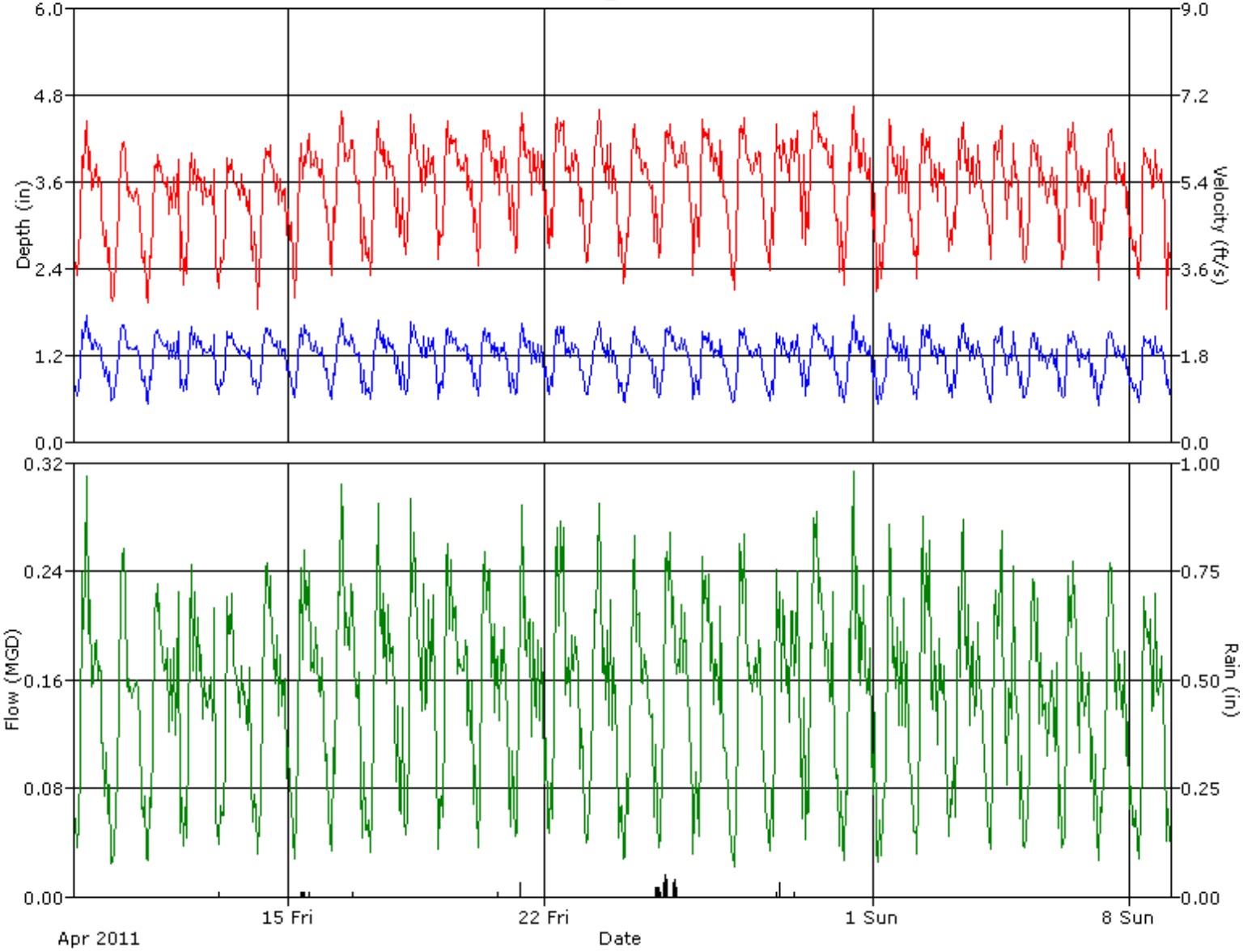


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008030	
Measured Pipe Height (in)	18.065
Nominal Pipe Height (in)	18
Silt Level (in)	0.00

Overview

Monitoring point Bend_008030 was located in the East of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	3.52	2.06	0.360
Minimum	1.87	0.42	0.027
Maximum	5.50	3.18	0.889
Time of Minimum	4/14/2011 4:05 AM	4/14/2011 4:05 AM	4/14/2011 4:05 AM
Time of Maximum	4/18/2011 11:45 AM	4/19/2011 10:00 AM	4/19/2011 9:55 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008030

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008030

Site set up

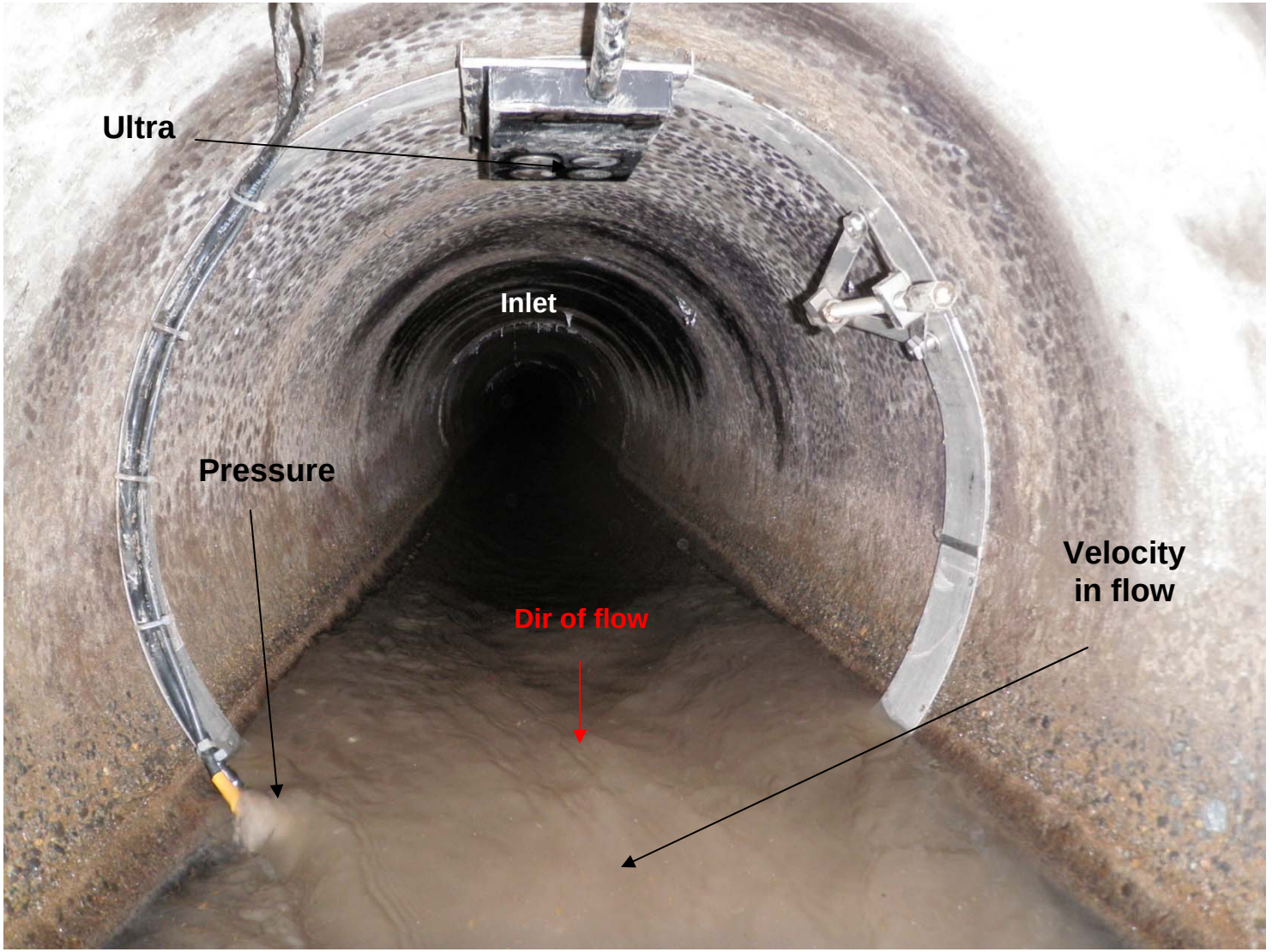
ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_008030

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008030

Site outlet

View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008030	**Monitor Series:**	5000 AG
Address/Location:	Intersection of NE 4th St. and NE Penn Ave.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21502
Manhole #	CMH008030
Coordinates:	44°03'57.14" N, 121°18'2.55" W
Pipe Height:	18.065"
Pipe Width:	18.065"
IP Address:	166.219.8.128

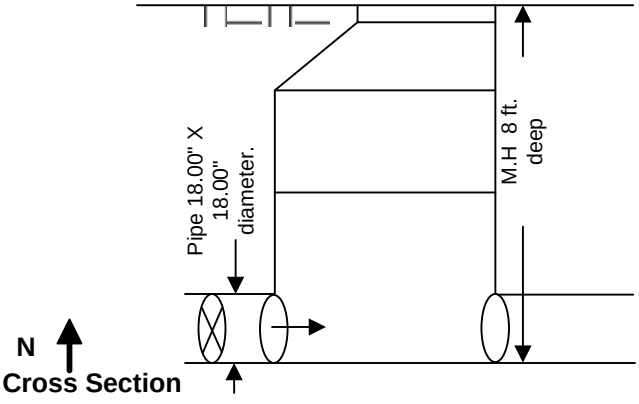
Investigation Information:

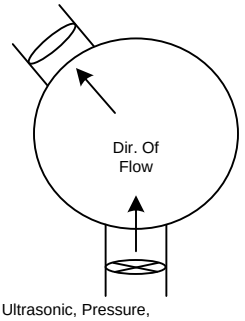
Date/Time of Investigation:	4/06/11 @ 13:45
Site Hydraulics:	Smooth
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	3 inlets / 1 outlet
Depth of Flow:	3.88" +/- .25"
Range (Air DOF):	14.13" +/- .38"
Peak Velocity:	2.75 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	8' – 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good
Mini System Character:	Residential [X] Commercial [X] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008030	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

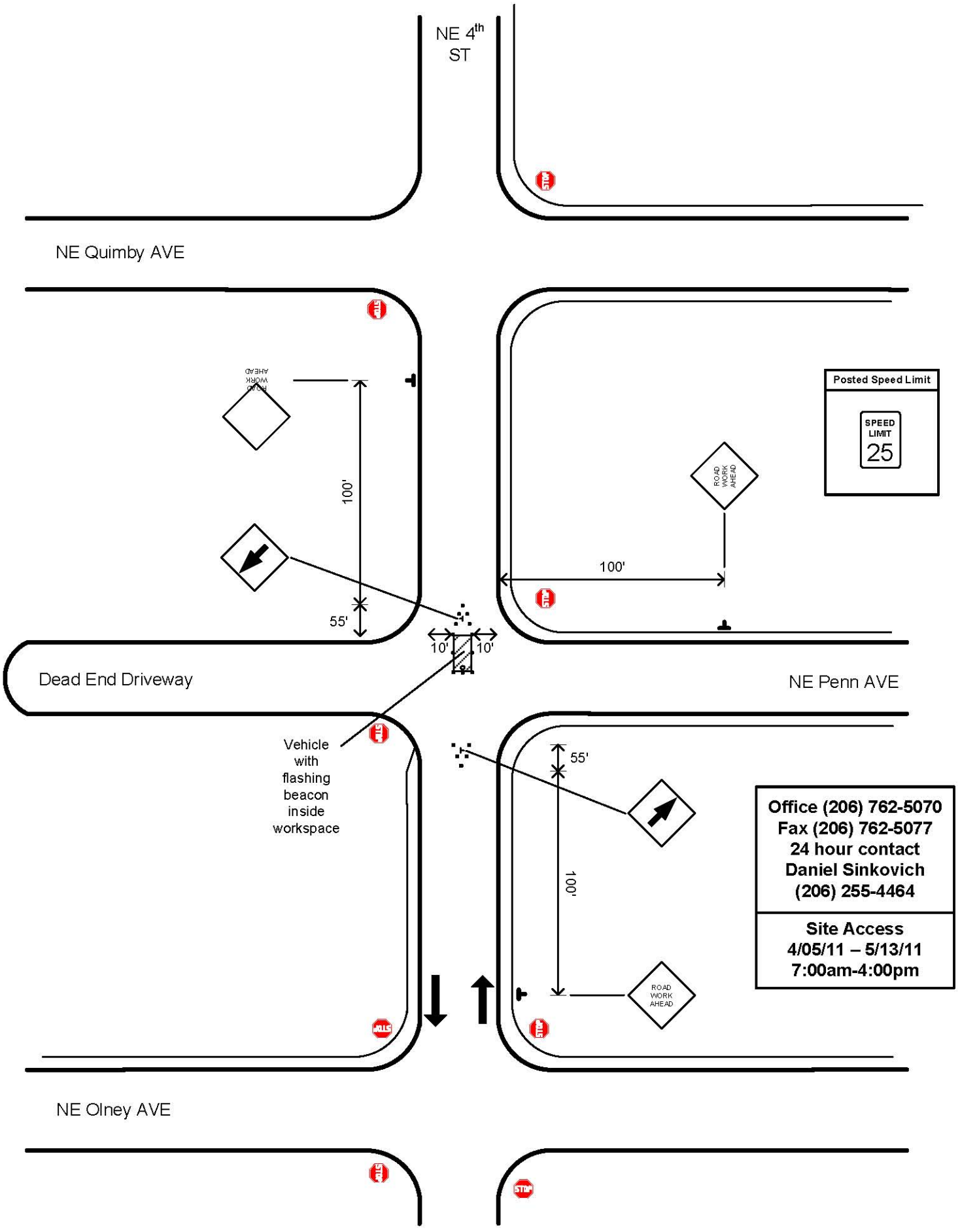
☐ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan is to be used at this work site

☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008030 MH #: CMH008030	Address: NE Penn AVE & NE 4th ST Bend, OR	N	Drawn: 04/04/11 Submitted: 04/05/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
4/05/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_008030

Flow Monitor

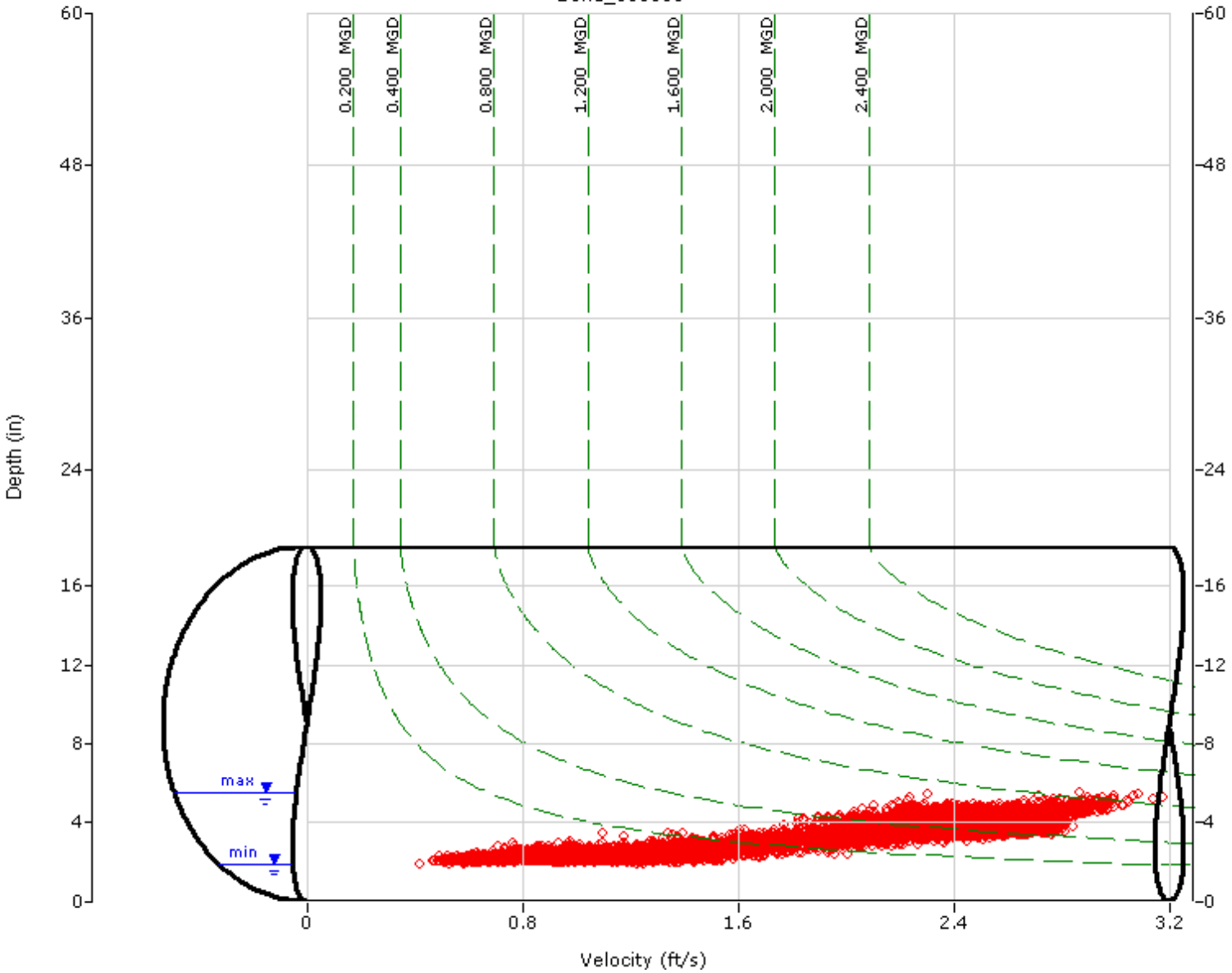
Bend_008030

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008030

Flow Monitor

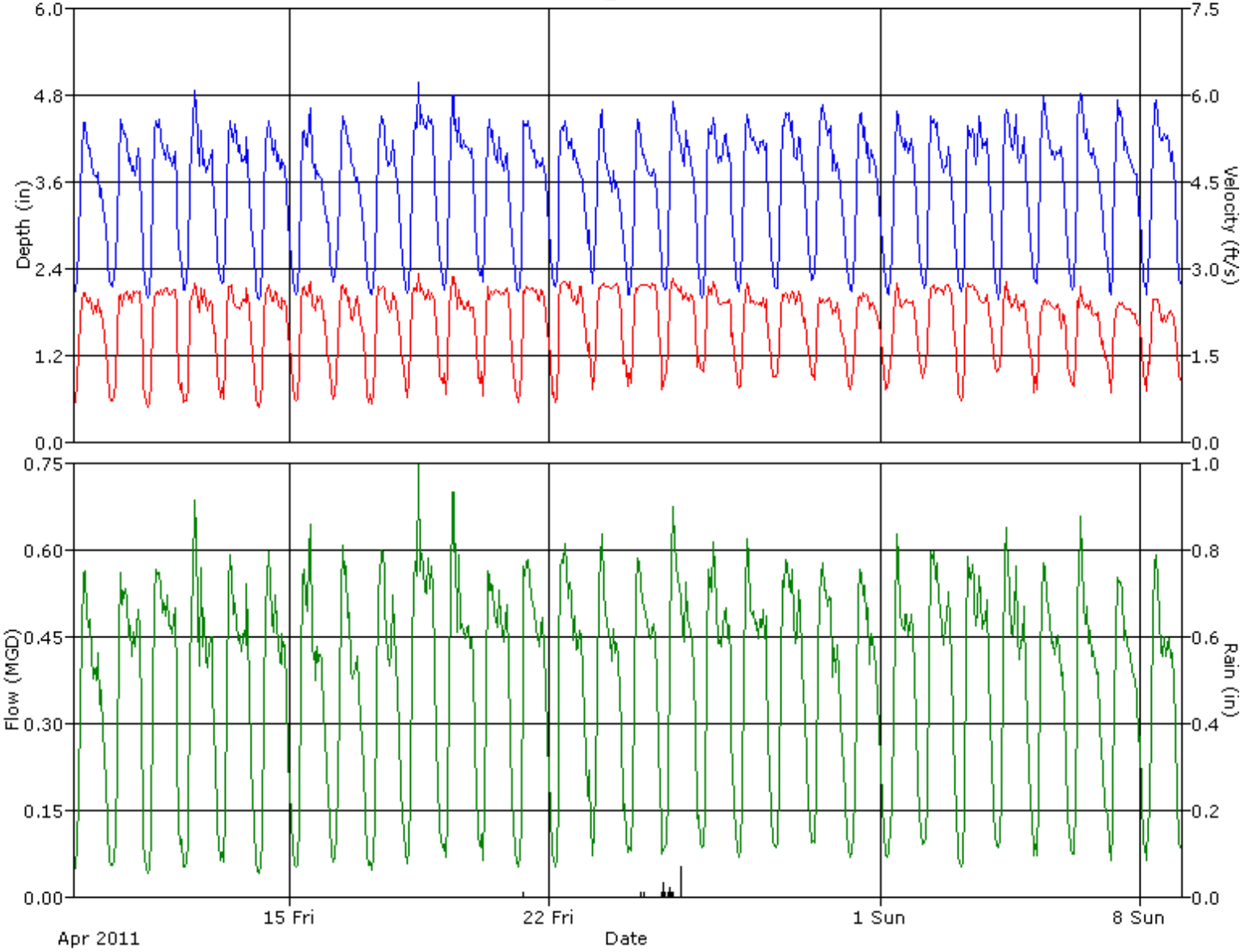
Bend_008030

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008141	
Measured Pipe Height (in)	27.13
Nominal Pipe Height (in)	27
Silt Level (in)	0.00

Overview

Monitoring point Bend_008141 was located in the East of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with pump station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with hydraulic stratification caused by undetermined hydraulic influences.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	6.80	2.24	1.214
Minimum	3.47	0.54	0.206
Maximum	9.77	3.22	2.580
Time of Minimum	4/14/2011 4:55 AM	5/6/2011 3:20 AM	5/6/2011 3:20 AM
Time of Maximum	4/17/2011 11:50 AM	4/30/2011 1:20 PM	4/17/2011 11:45 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008141

Site location

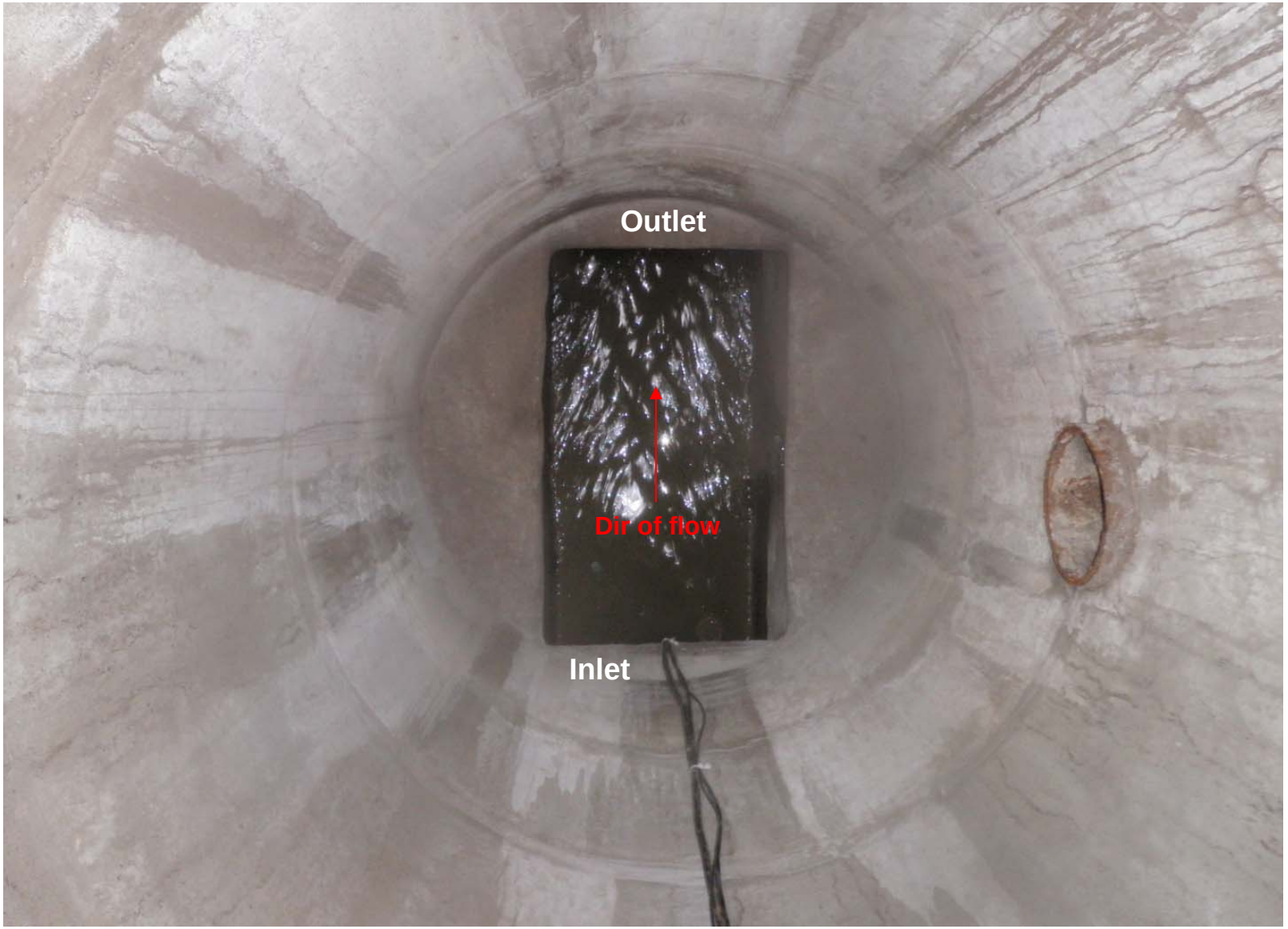
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008141

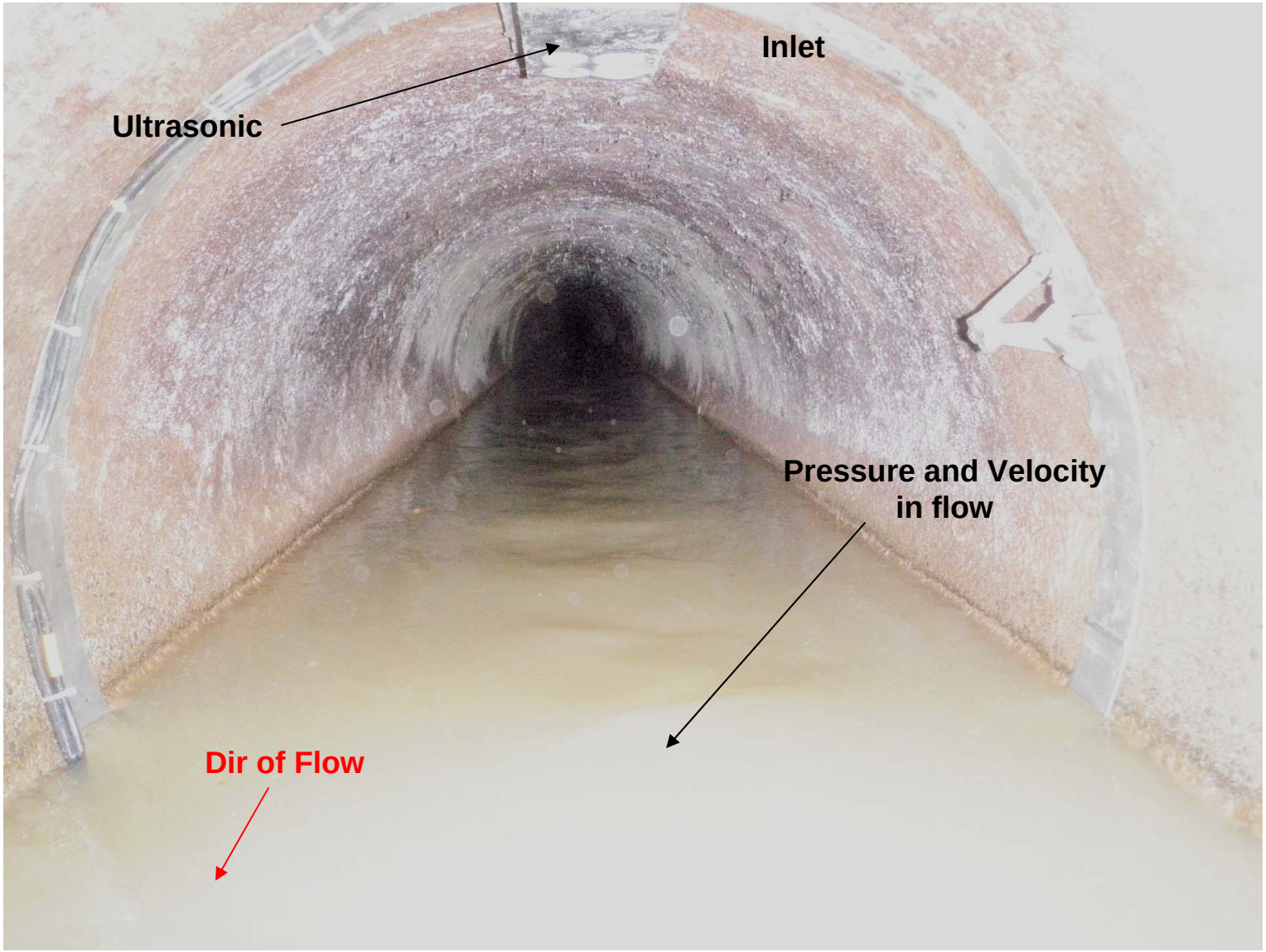
Site set up

ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

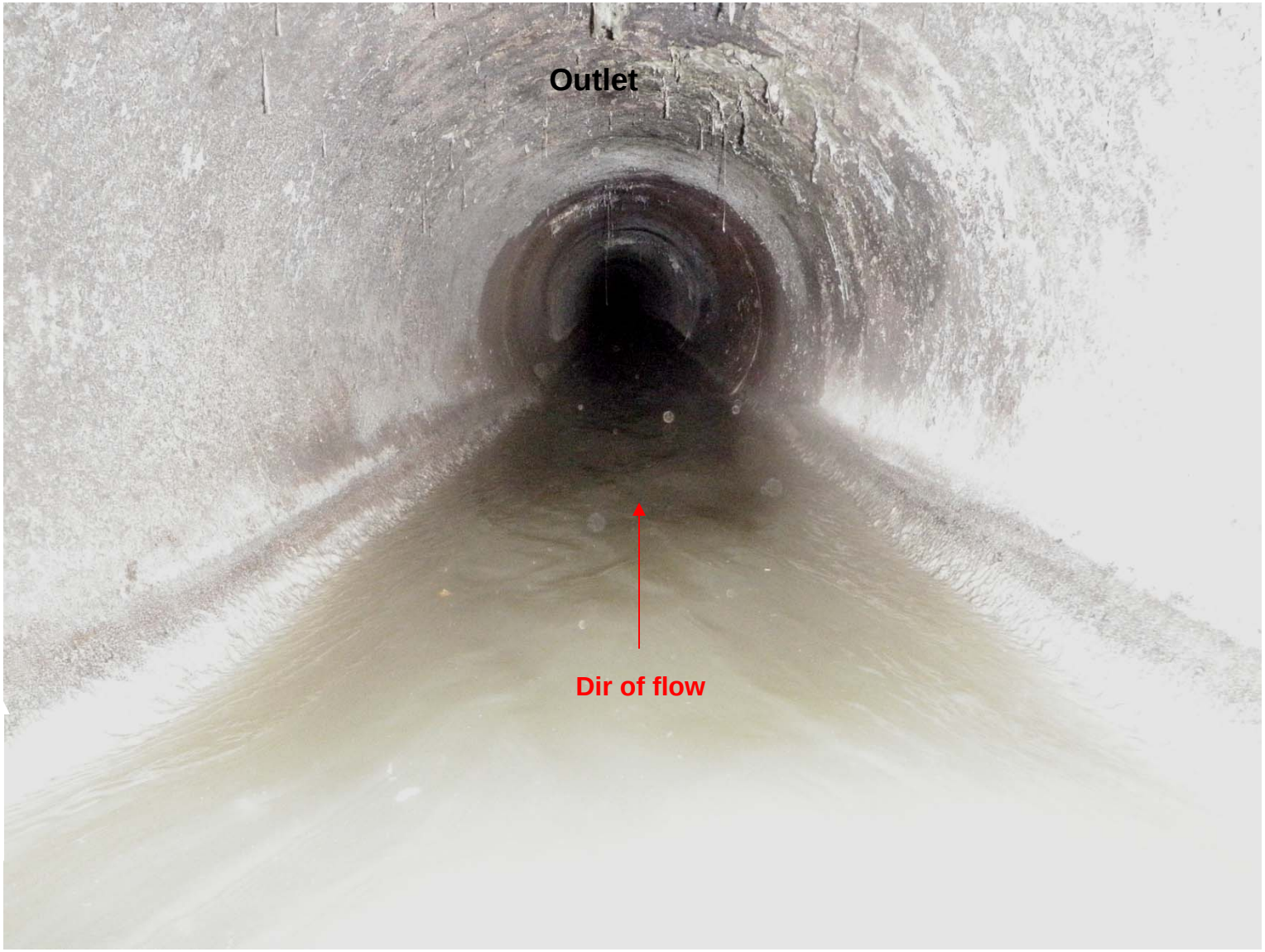
Bend_008141
Site set up



View of sensor placement and site hydraulics

Bend_008141

Site outlet



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008141	**Monitor Series:**	5000 AG
Address/Location:	Intersection of NE 2nd St. and NE Norton Ave.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21959
Manhole #	CMH008141
Coordinates:	44°03'50.19" N 121°18'14.14" W
Pipe Height:	27.13"
Pipe Width:	27.13"
IP Address:	166.219.169.173

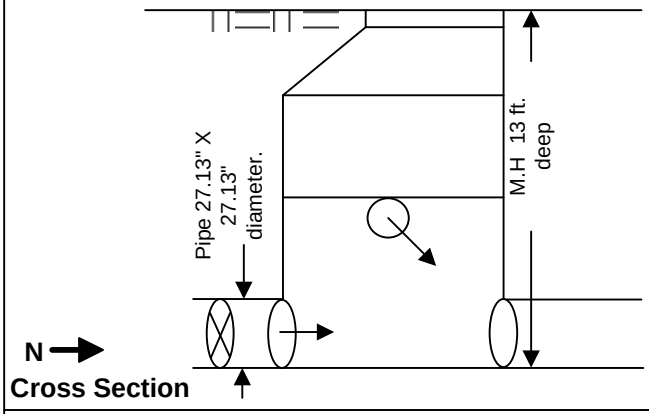
Investigation Information:

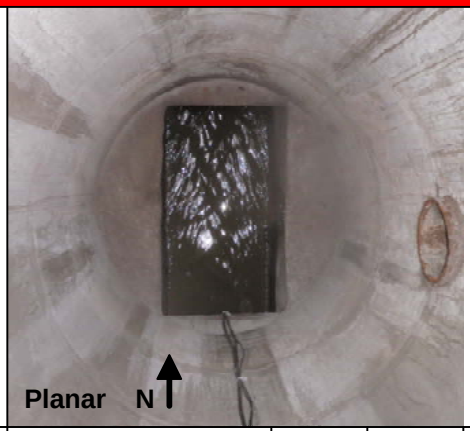
Date/Time of Investigation:	4/05/11 @ 12:30
Site Hydraulics:	Smooth
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	7.75" +/- .25"
Range (Air DOF):	19.38" +/- .25"
Peak Velocity:	3.20 fps
Silt:	0 Inches

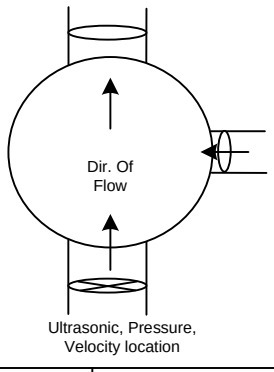
Manhole Information:

Manhole Depth:	13' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good
Mini System Character:	Residential [ ] Commercial [ ] Industrial [ ] Trunk [X]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

15 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008141	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

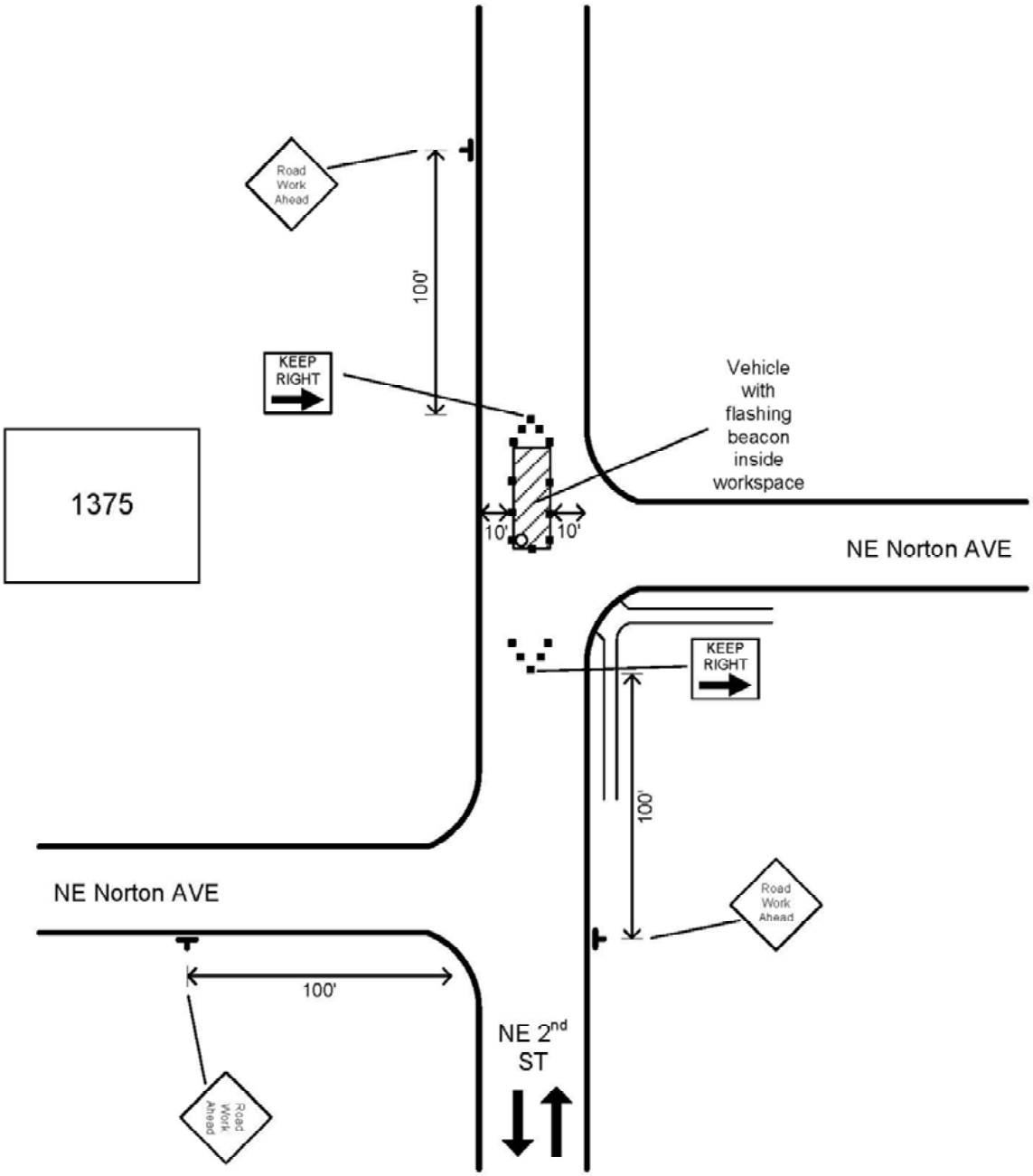
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/05/11	Date: 4/05/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008141	Address: 1375 NE 2nd ST Bend, OR	N	Drawn: 04/04/11 Submitted: 04/04/11 Approved:	Rev. 0	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring
					Not to Scale		



Posted Speed Limit
SPEED LIMIT 25

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

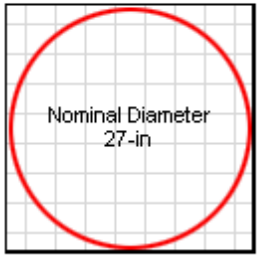
Site Access
4/04/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_008141

Flow Monitor

Bend_008141

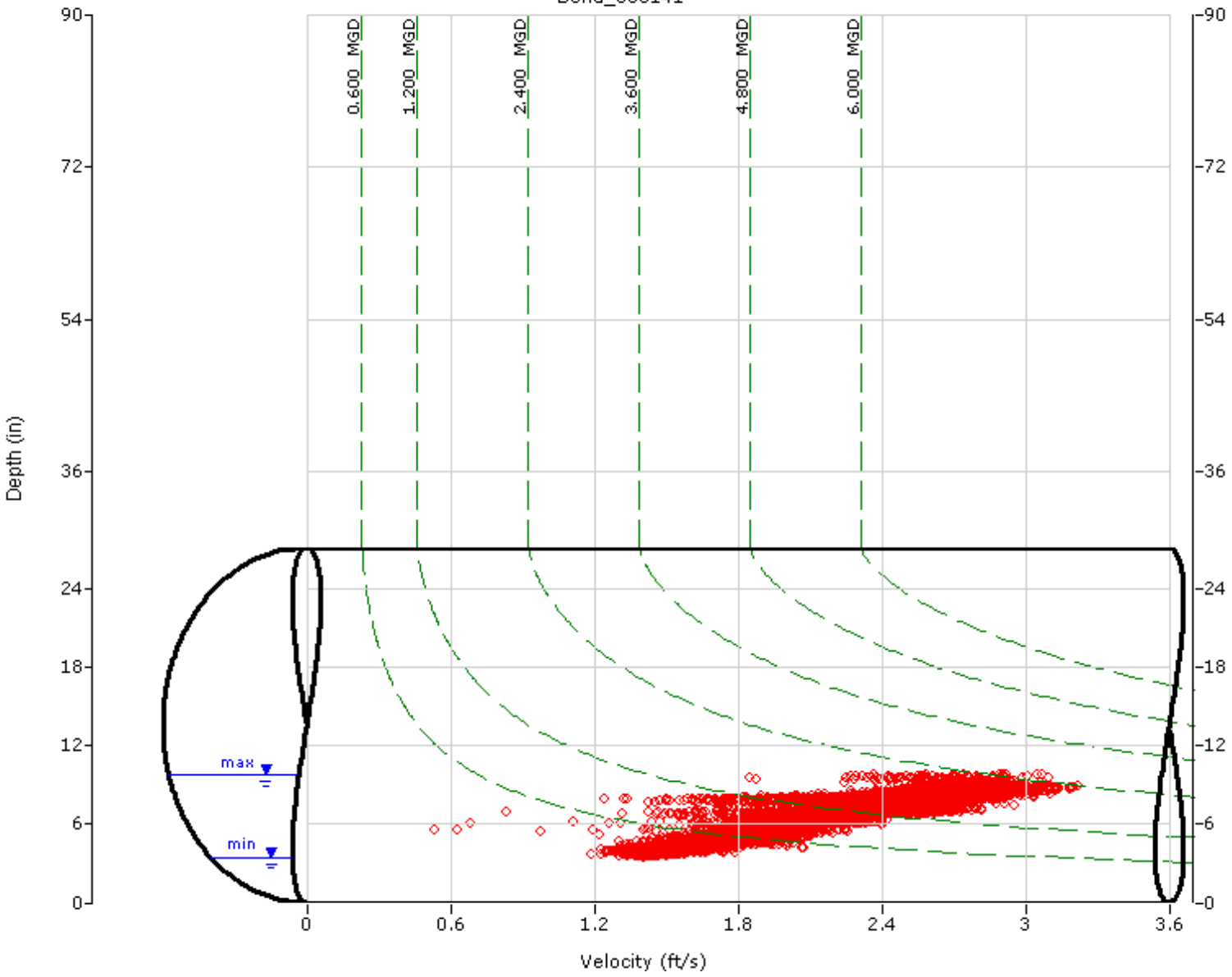


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



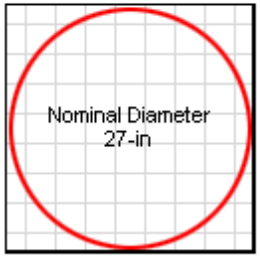
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008141

Flow Monitor

Bend_008141

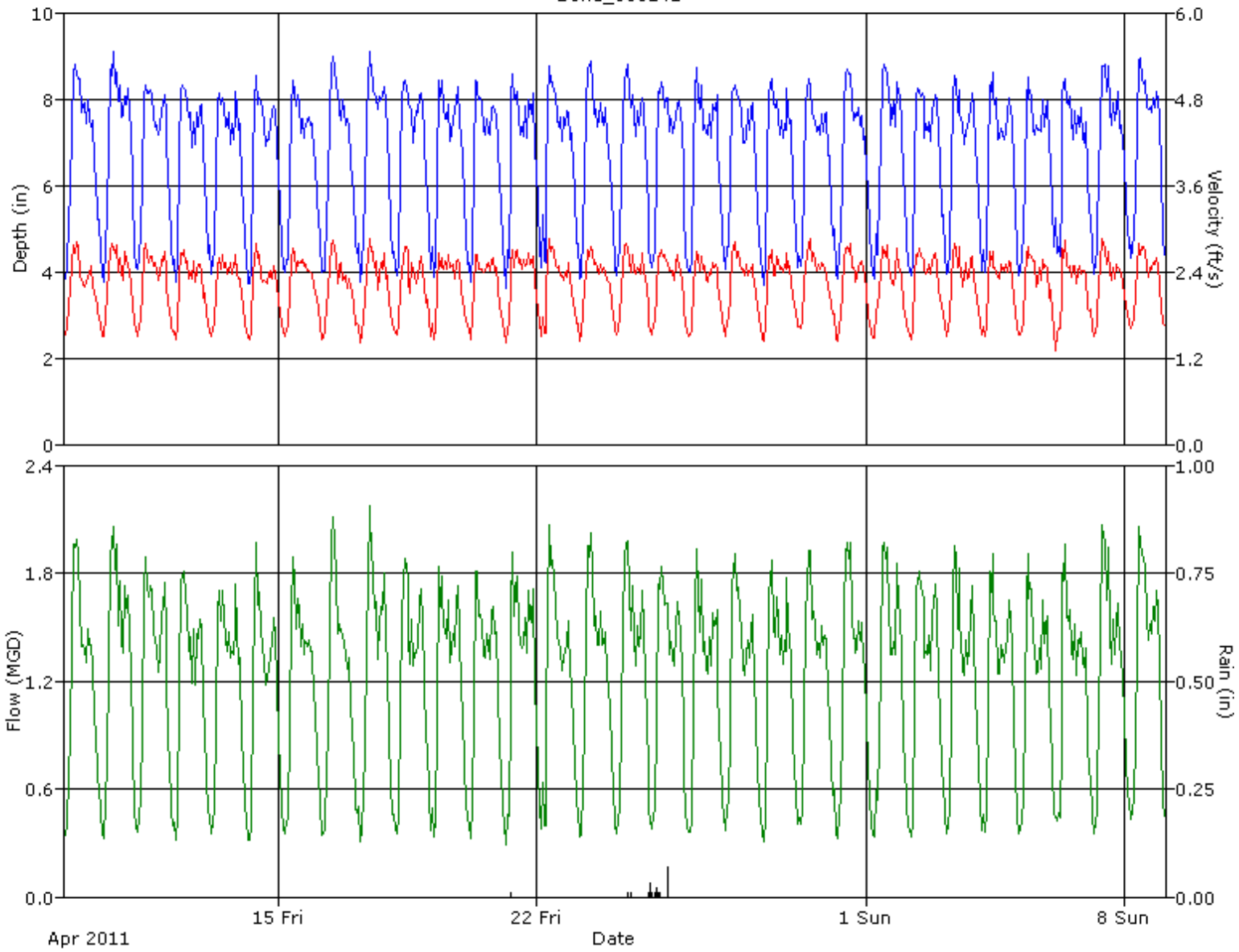


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008170	
Measured Pipe Height (in)	10.13
Nominal Pipe Height (in)	10
Silt Level (in)	0.00

Overview

Monitoring point Bend_008170 was located in the East of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with a slight hydraulic shift, that is most likely due to shifting debris.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	2.17	1.47	0.108
Minimum	0.35	0.20	0.004
Maximum	4.38	4.24	0.573
Time of Minimum	4/14/2011 7:30 AM	4/18/2011 2:55 AM	4/10/2011 6:10 AM
Time of Maximum	4/11/2011 12:00 PM	4/15/2011 9:10 AM	4/11/2011 12:00 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	99.17
Velocity	100.00
Quantity	99.17

Bend_008170

Site location

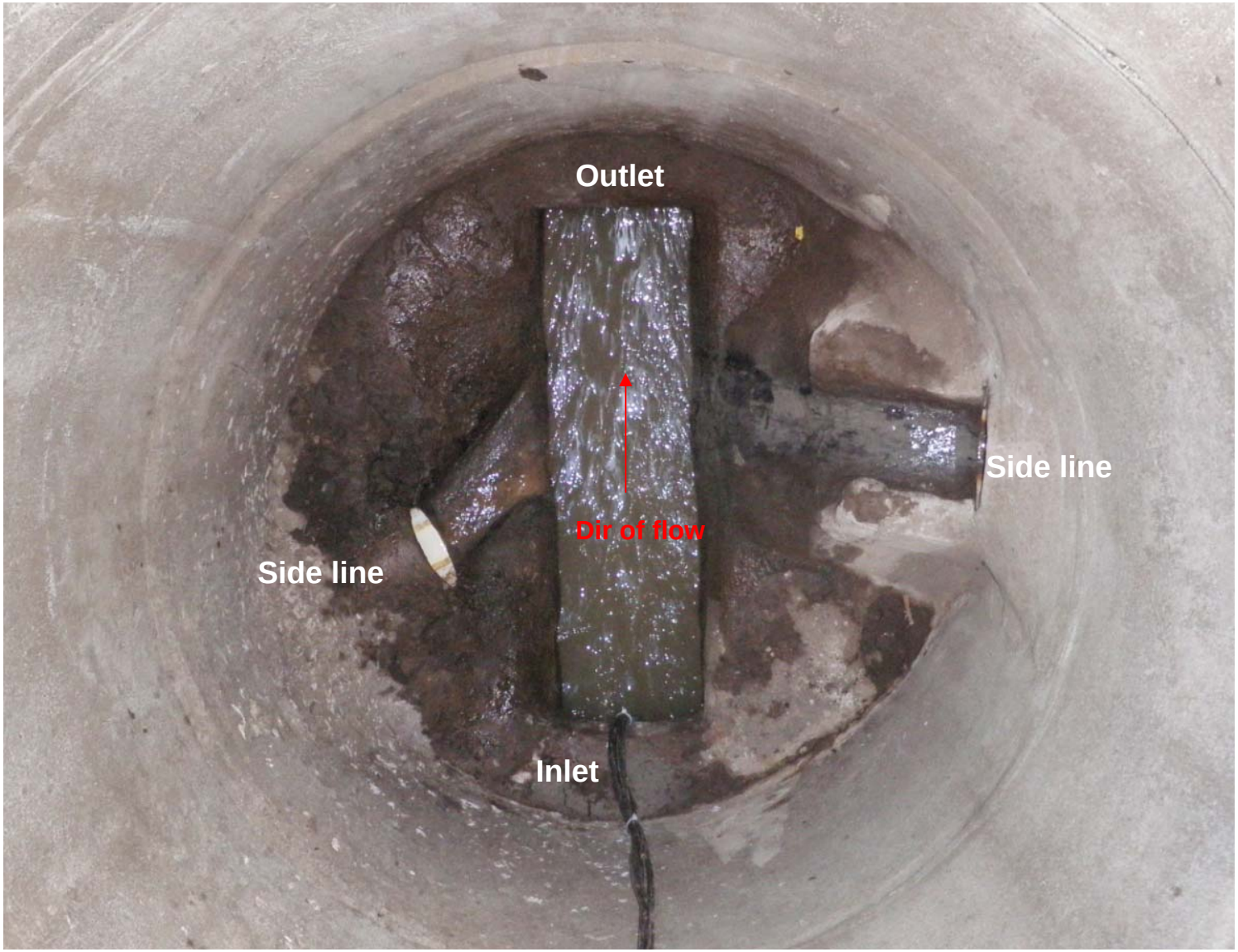
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008170

Site set up

ADS ENVIRONMENTAL SERVICES®

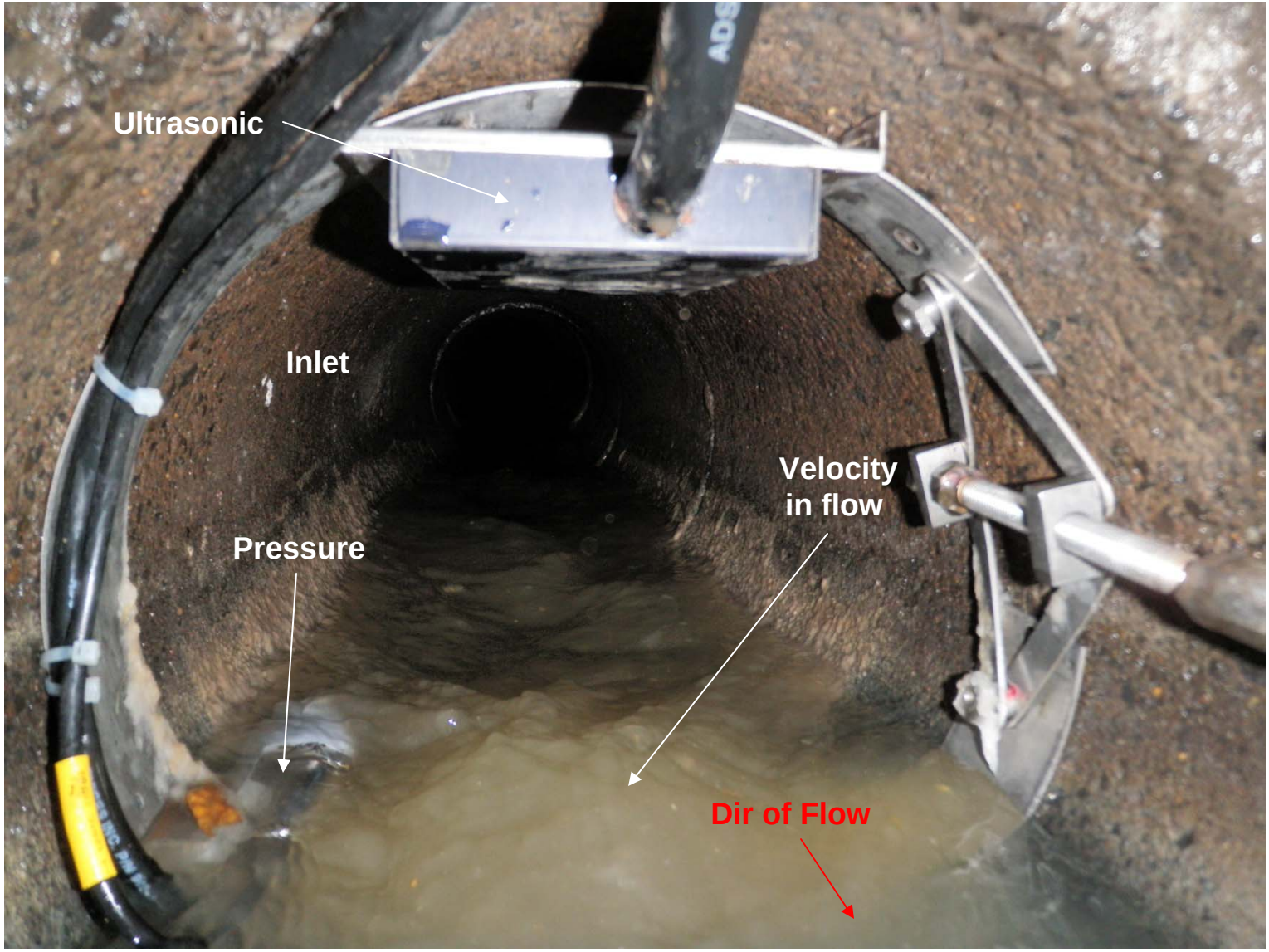


View down manhole facing north

Bend_008170

Site set up

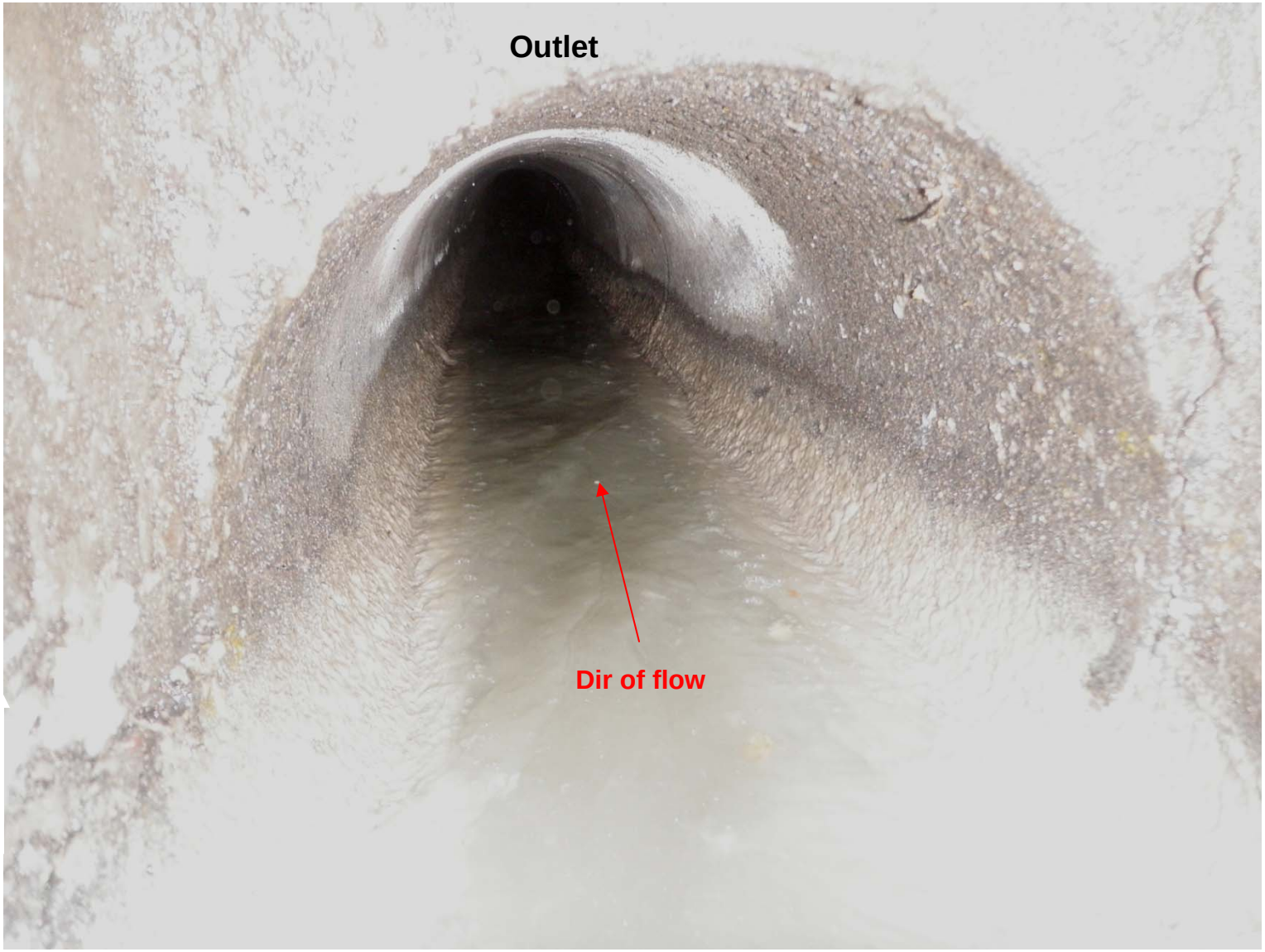
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008170

Site outlet



View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:** Bend, OR	**FM Initials:** SW
Site Name:	Bend_008170	**Monitor Series:**	5000 AG
Address/Location:	345 NE 3rd St. (Bi-Mart Store)		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21470
Manhole #	CMH008170
Coordinates:	44°03'12.51" N 121°18'14.07" W
Pipe Height:	10.13"
Pipe Width:	10.13"
IP Address:	166.219.169.165

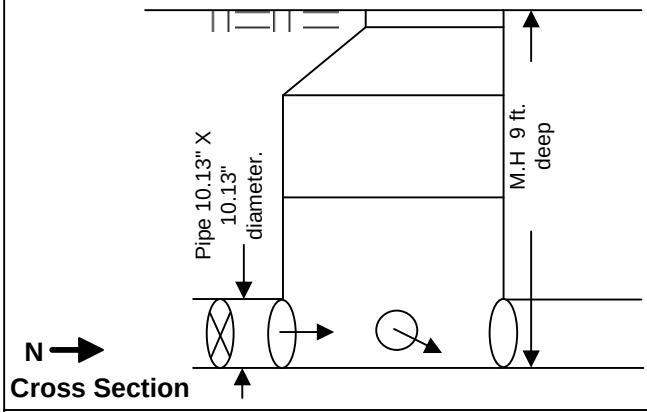
Investigation Information:

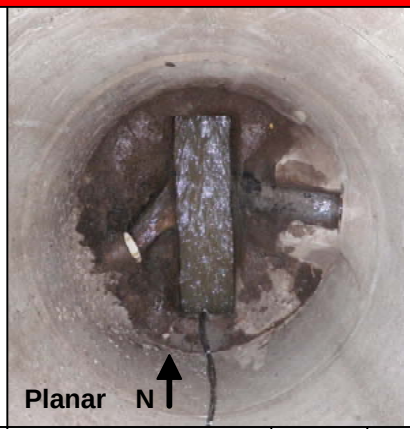
Date/Time of Investigation:	4/06/11 @ 16:40
Site Hydraulics:	Varied, small waves
Upstream Input: (L/S, P/S)	No immediate influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	2.00" +/- .25"
Range (Air DOF):	8.13" +/- .25"
Peak Velocity:	1.50 fps
Silt:	0 Inches

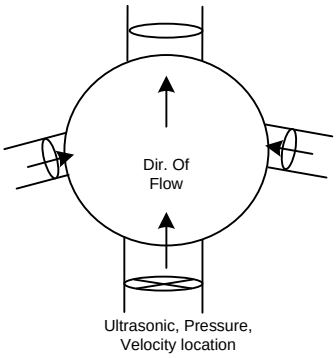
Manhole Information:

Manhole Depth:	9' - 0"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	Concrete / Good
Mini System Character:	Residential [ ] Commercial [X] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008170	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

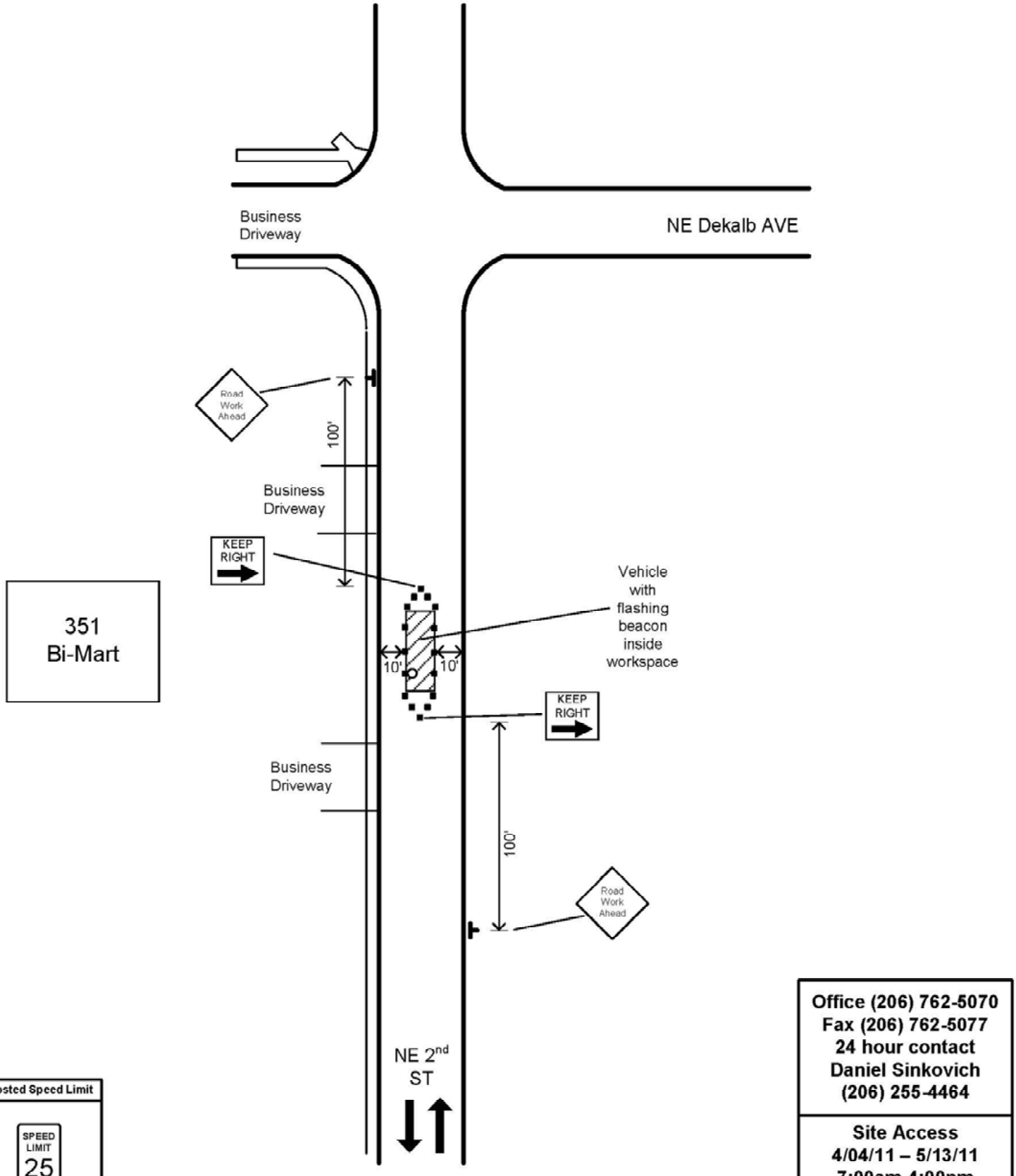
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008170	Address: 351 NE 2nd ST Bend, OR	N	Drawn: 04/04/11 Submitted: 04/04/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Posted Speed Limit

SPEED LIMIT 25

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

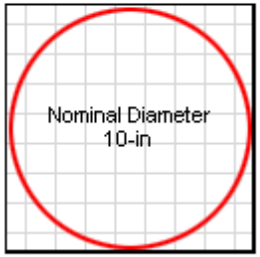
Site Access
4/04/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_008170

Flow Monitor

Bend_008170

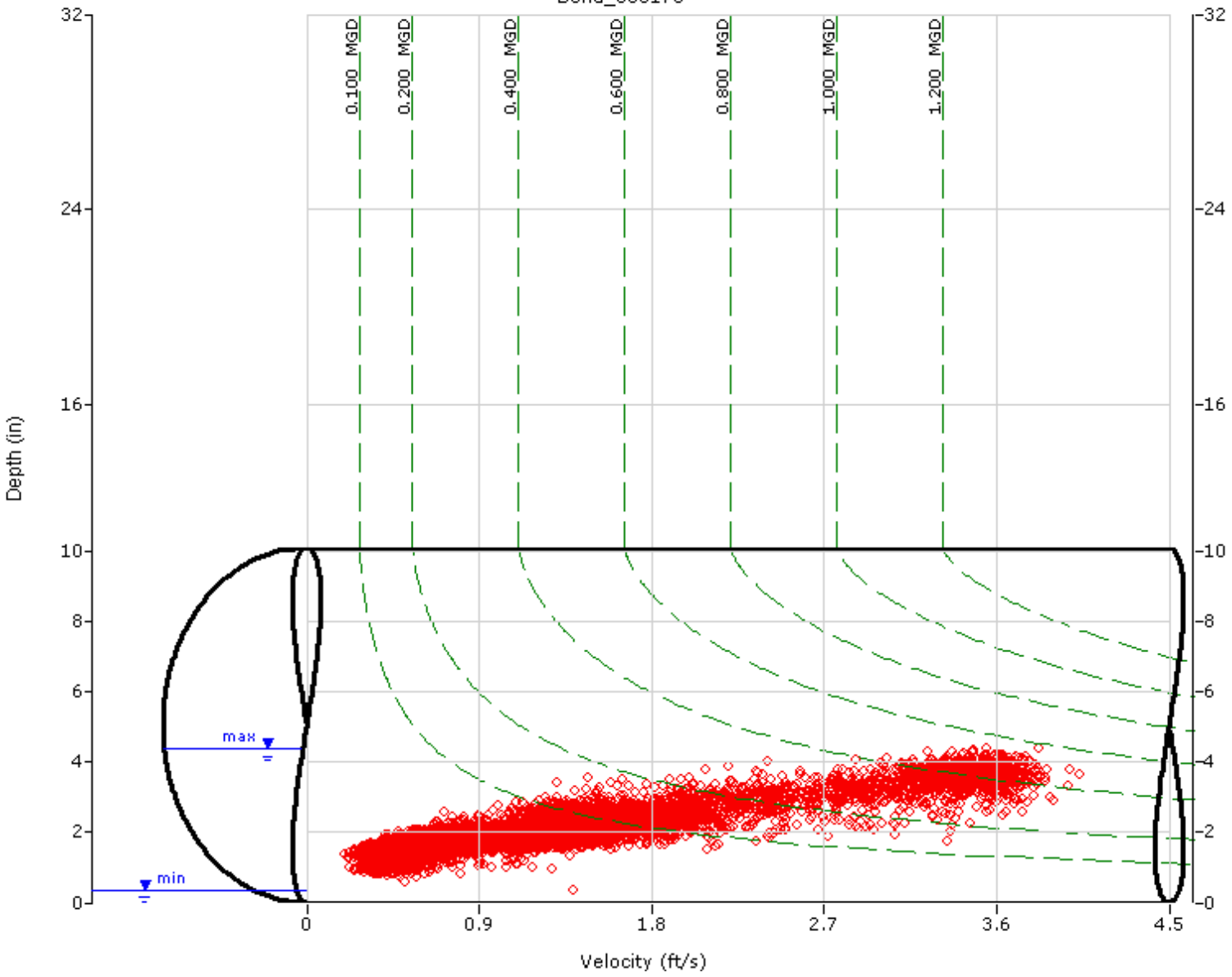


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



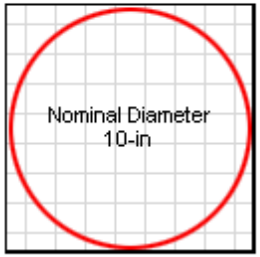
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008170

Flow Monitor

Bend_008170

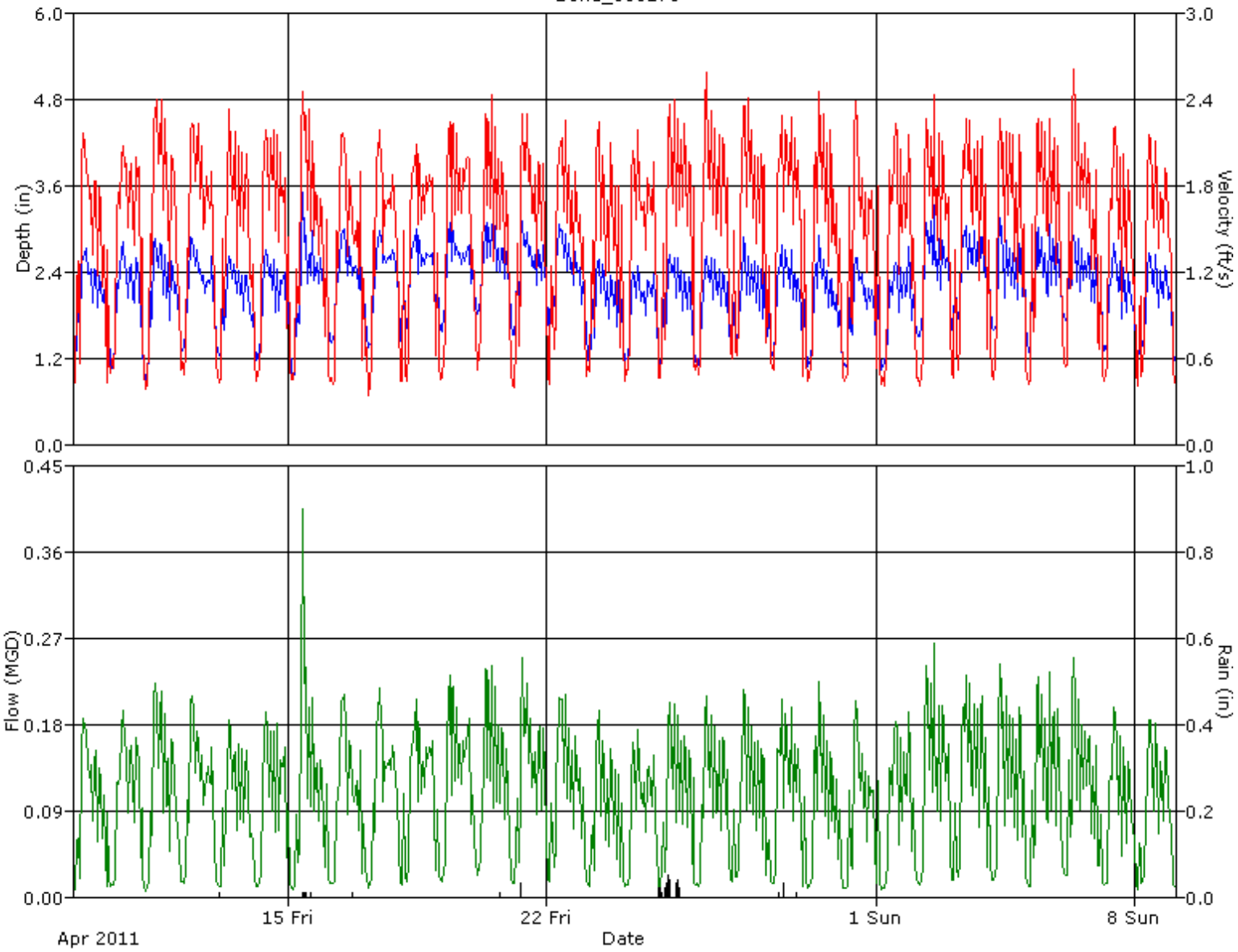


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008322	
Measured Pipe Height (in)	12.13
Nominal Pipe Height (in)	12
Silt Level (in)	0.00

Overview

Monitoring point Bend_008322 was located in the Center of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 . In order to try and best capture the lift station peaks, the sample rate was changed from a 5-minute sample rate to a 1-minute sample rate on Wednesday, April 20, 2011.

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate from Saturday, April 09, 2011 to Tuesday, April 19, 2011 and a 1-minute sample rate from Wednesday, April 20, 2011 to Sunday, May 08, 2011.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	2.16	1.07	0.111
Minimum	0.61	0.23	0.003
Maximum	6.35	2.85	0.775
Time of Minimum	4/11/2011 5:30 AM	4/23/2011 12:44 AM	5/8/2011 4:16 AM
Time of Maximum	4/28/2011 11:03 AM	4/24/2011 10:50 AM	4/28/2011 8:16 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage (and 1-minute data points divided by the total number of 1-minute data points available after the sample rate was changed). Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008322

Site location

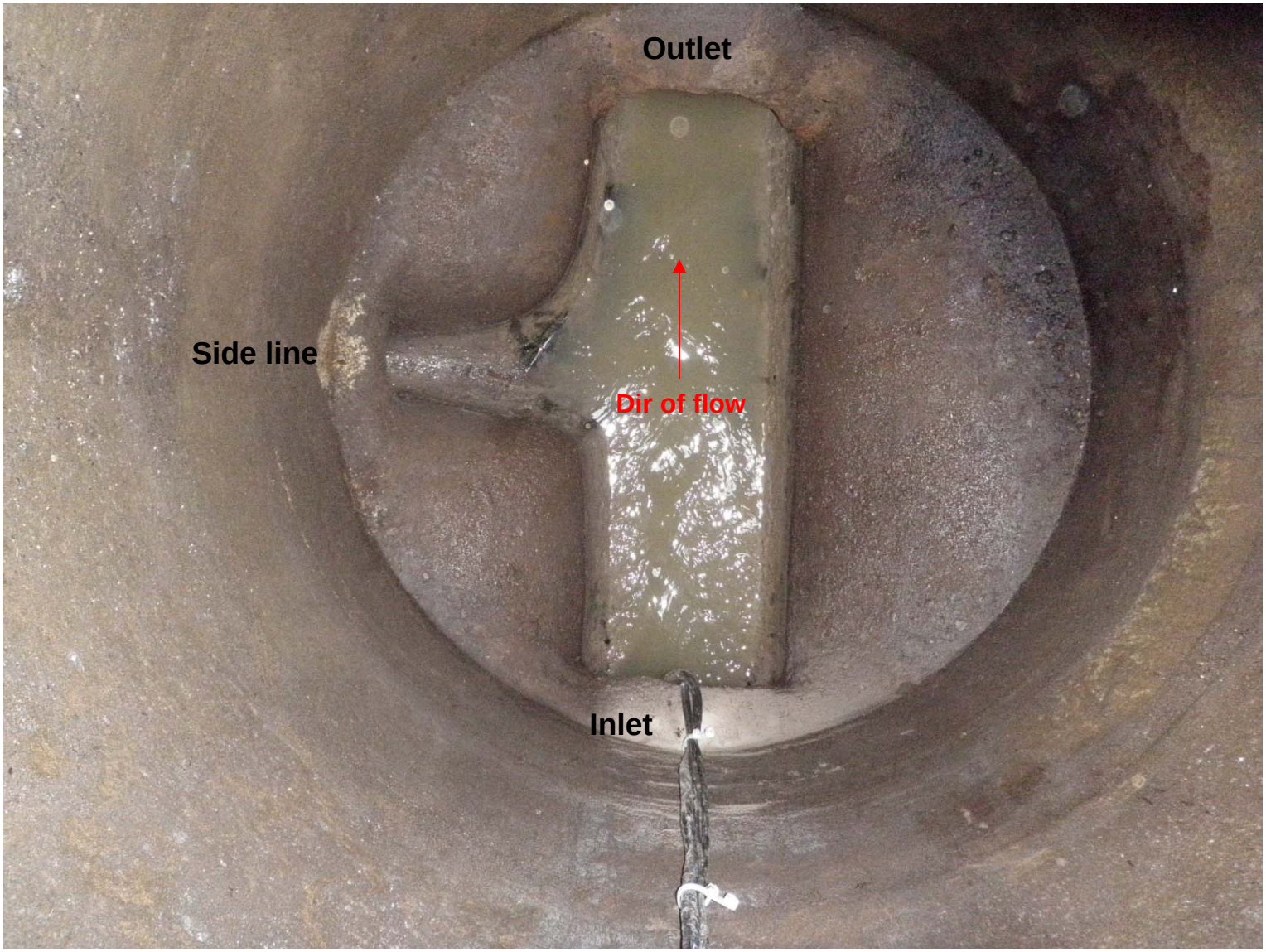
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008322

Site set up

ADS ENVIRONMENTAL SERVICES®

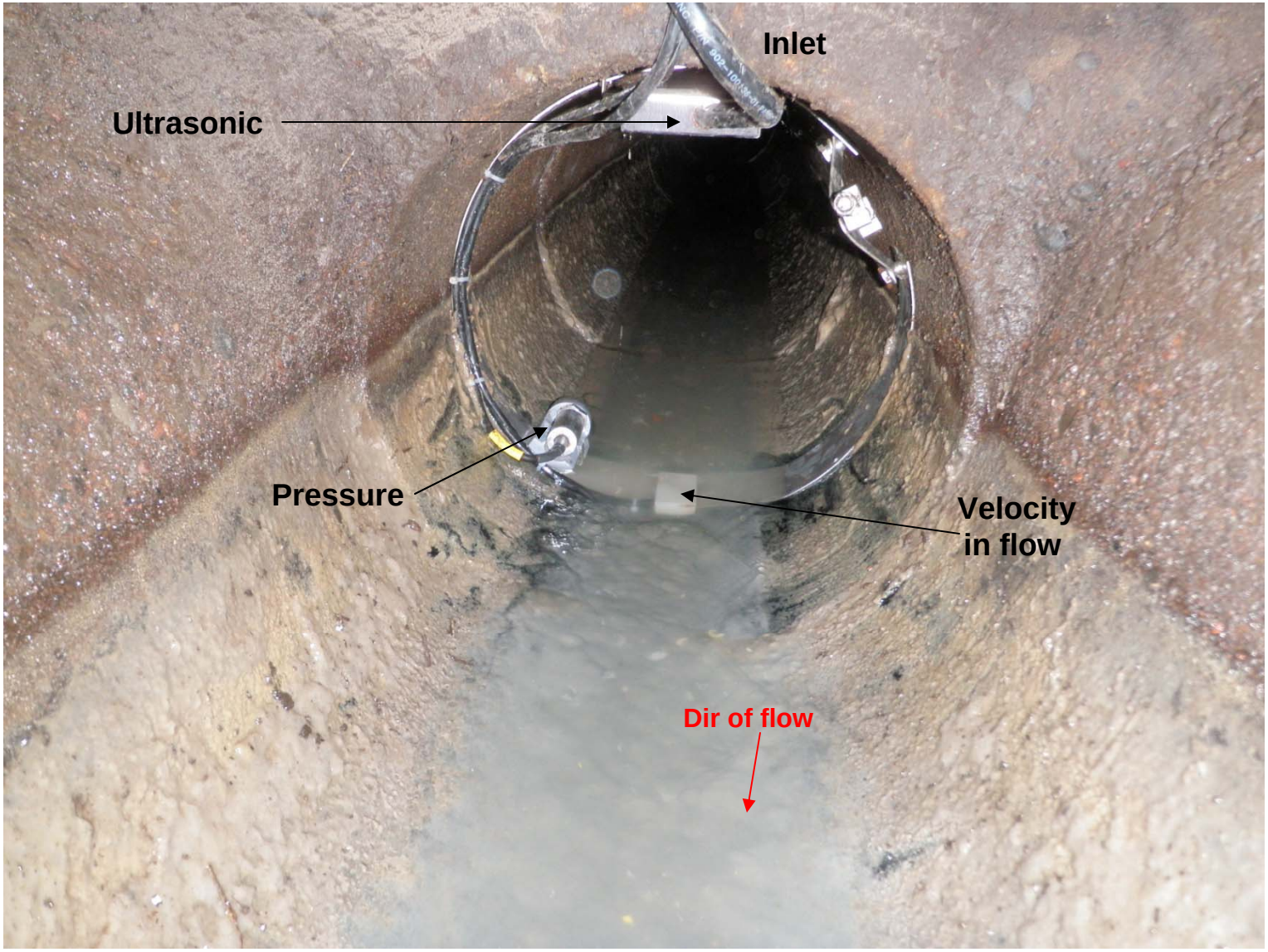


View down manhole facing north

Bend_008322

Site set up

ADS ENVIRONMENTAL SERVICES®

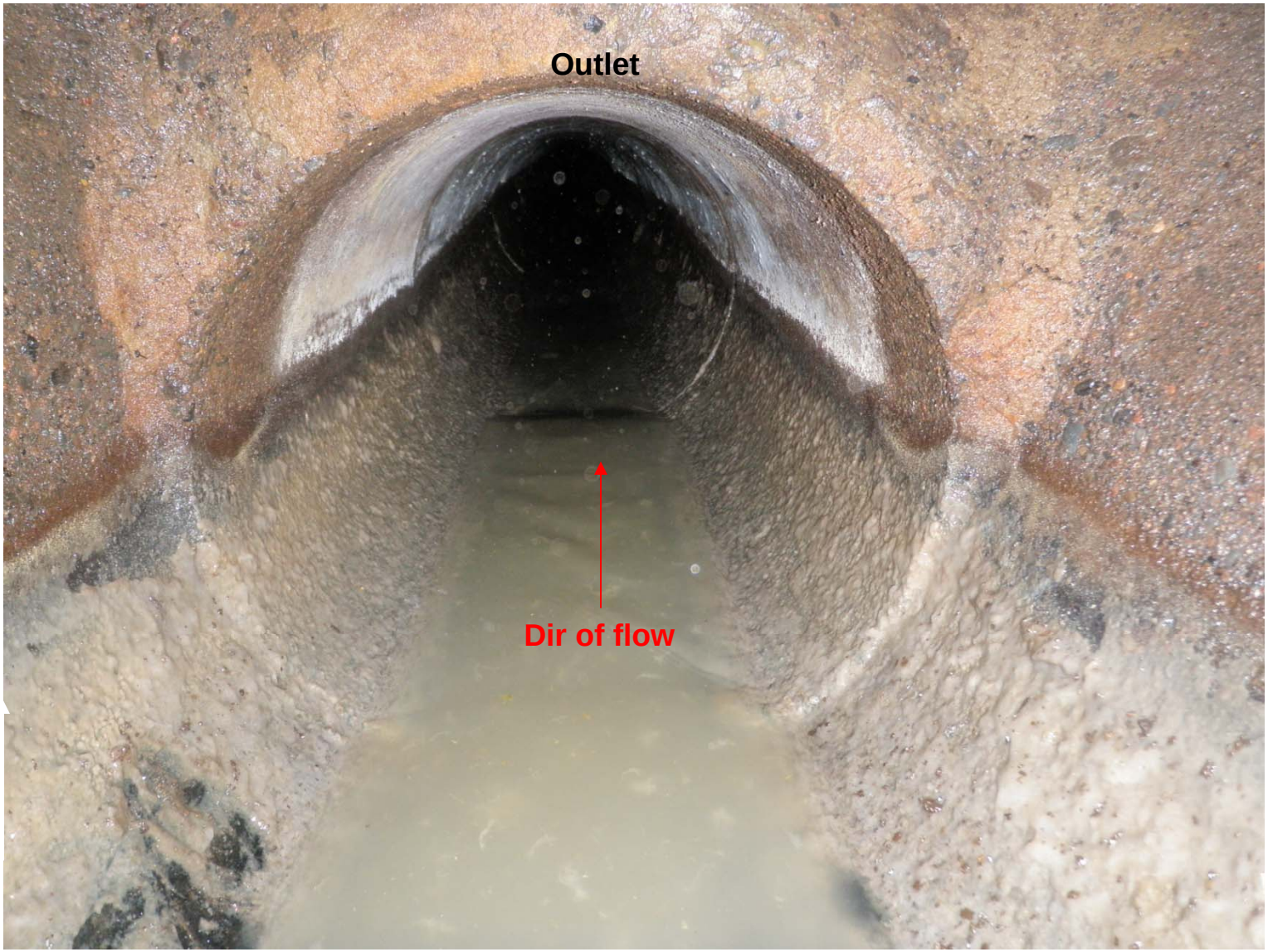


View of sensor placement and site hydraulics

Bend_008322

Site outlet

ADS ENVIRONMENTAL SERVICES®



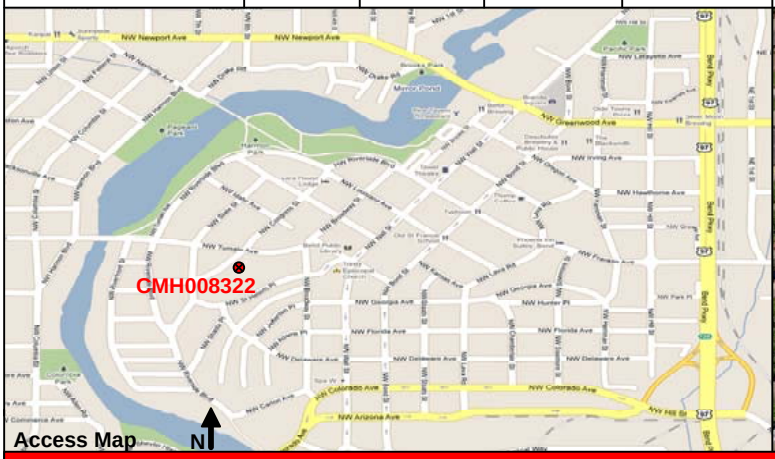
View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:** Bend, OR	**FM Initials:** SW
Site Name:	Bend_008322	**Monitor Series:**	5000 AG
Address/Location:	336 NW Congress St (behind house in alley way)		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21484
Manhole #	CMH008322
Coordinates:	44° 3'20.95"N 121°19'12.99"W
Pipe Height:	12.13"
Pipe Width:	12.13"
IP Address:	166.219.169.171



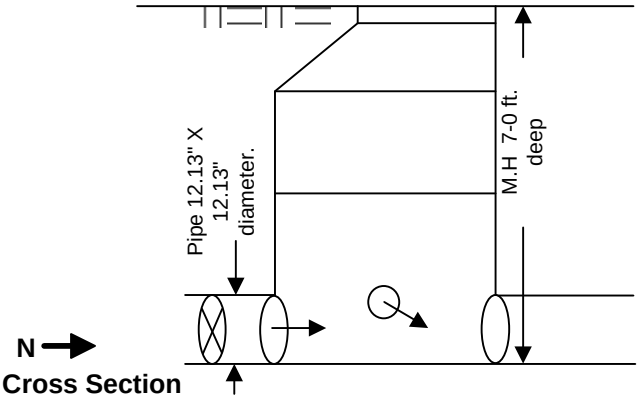
Investigation Information:

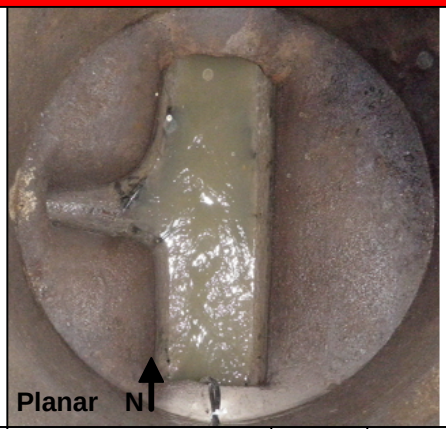
Date/Time of Investigation:	3/29/11 @ 09:40
Site Hydraulics:	Fluctuating flow due to L/S up stream, otherwise small ripples steady flow
Upstream Input: (L/S, P/S)	L/S (~300')
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	1 inlets / 1 outlet
Depth of Flow:	5.88" +/- .25"
Range (Air DOF):	6.25" +/- .25"
Peak Velocity:	2.63 fps
Silt:	0 Inches

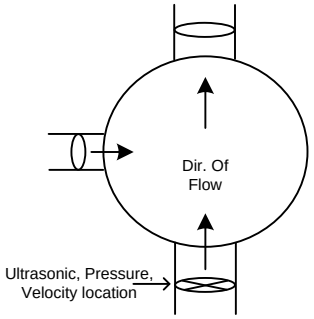
Manhole Information:

Manhole Depth:	7'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008322	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

- ☒ This worksite does NOT require a traffic control Plan
- ☐ Standard Traffic Control Plan is to be used at this work site
- ☐ This site requires a special Traffic Control Plan which is attached

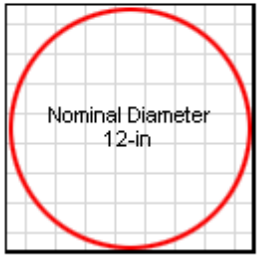
Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 3/29/11	Date: 3/29/11

SCATTERGRAPH REPORT

Bend_008322

Flow Monitor

Bend_008322

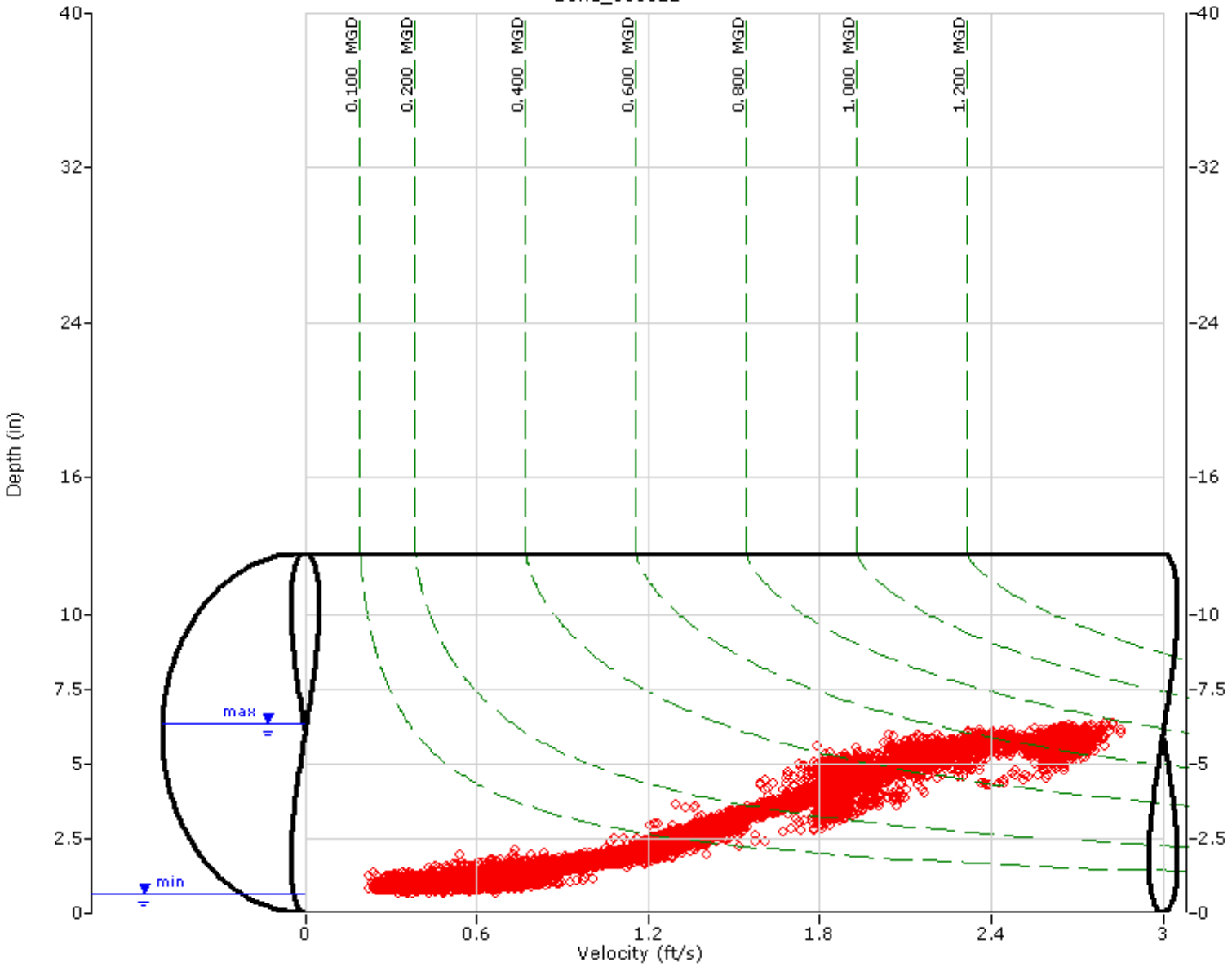


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



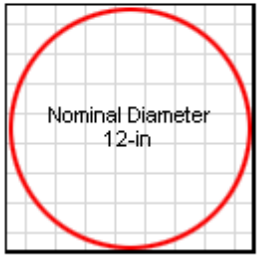
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008322

Flow Monitor

Bend_008322

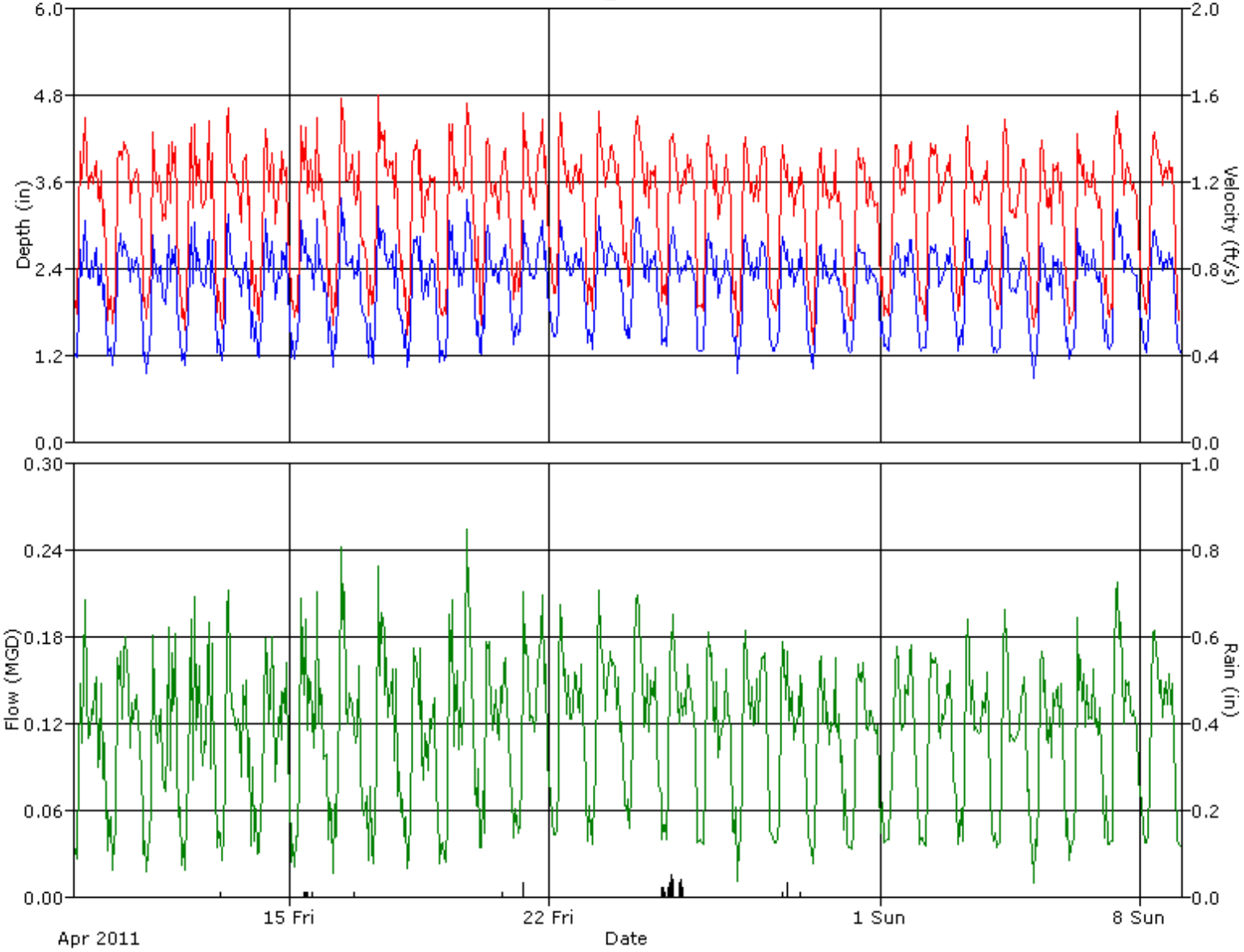


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008521	
Measured Pipe Height (in)	14.5
Nominal Pipe Height (in)	15
Silt Level (in)	0.00

Overview

Monitoring point Bend_008521 was located in the Center of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

During the initial scattergraph data review, it was noted that minimum period velocity dropouts (data points that are invalid usually due to clear and/or shallow flow conditions) and that depth stratification was present. Sensor parameters were adjusted to best suit flow conditions on Friday, April 15, 2011. The depth stratification was addressed by moving the sensors further up the incoming pipe on Wednesday, April 27, 2011. The scattergraph post-adjustments indicates a repeatable data set with reduced minimum period velocity dropouts.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	3.14	1.71	0.218
Minimum	1.31	0.65	0.024
Maximum	4.71	2.43	0.482
Time of Minimum	4/26/2011 4:35 AM	4/16/2011 5:45 AM	4/16/2011 5:45 AM
Time of Maximum	5/4/2011 12:10 PM	4/16/2011 6:05 PM	5/4/2011 12:10 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	98.65
Quantity	98.65

Bend_008521

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008521

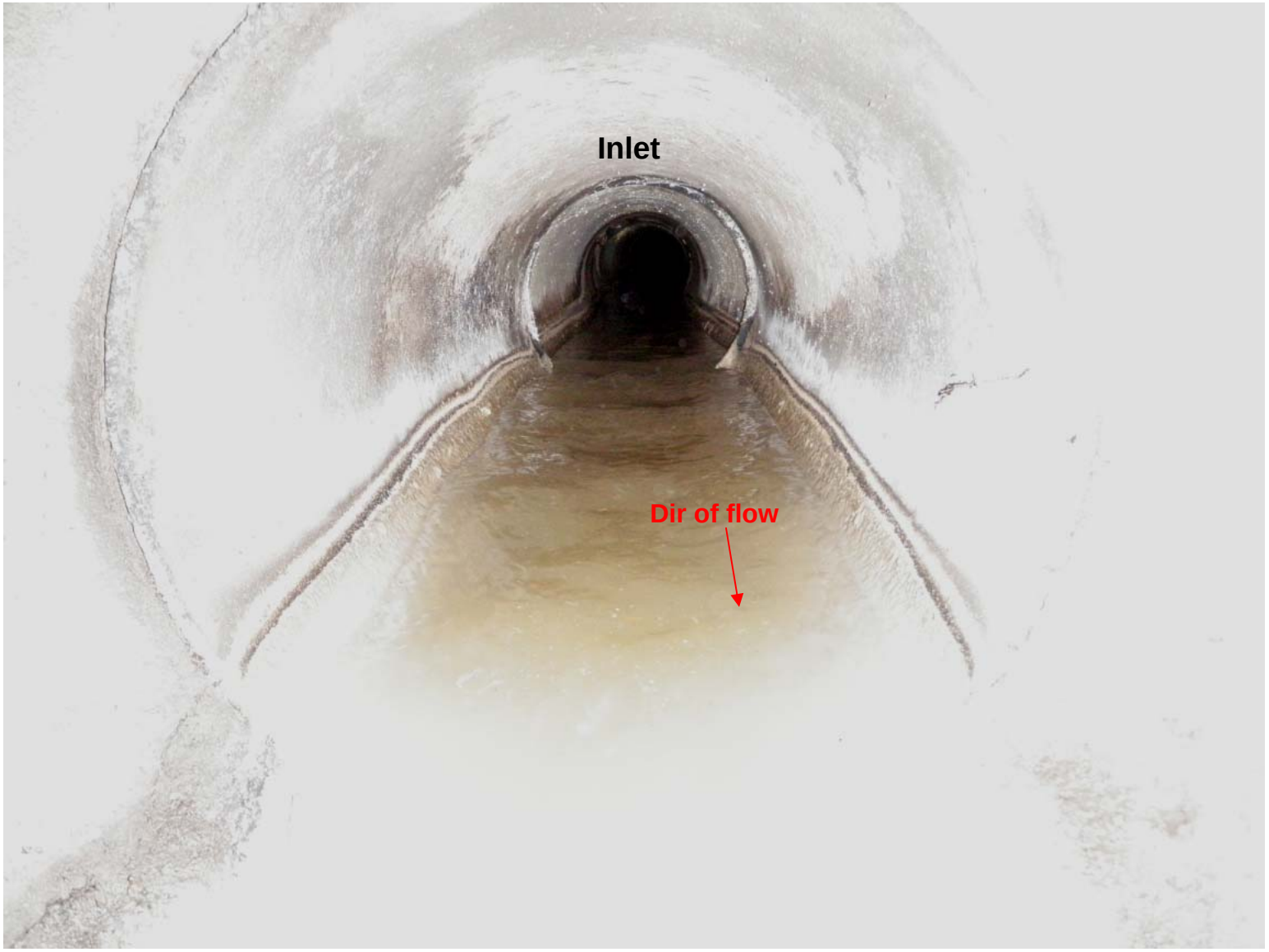
Site set up

ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_008521

Site set up



View of sensor placement and site hydraulics

Bend_008521

Site outlet

To be updated

View of outlet and hydraulics

Bend_008521

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008521

Site set up

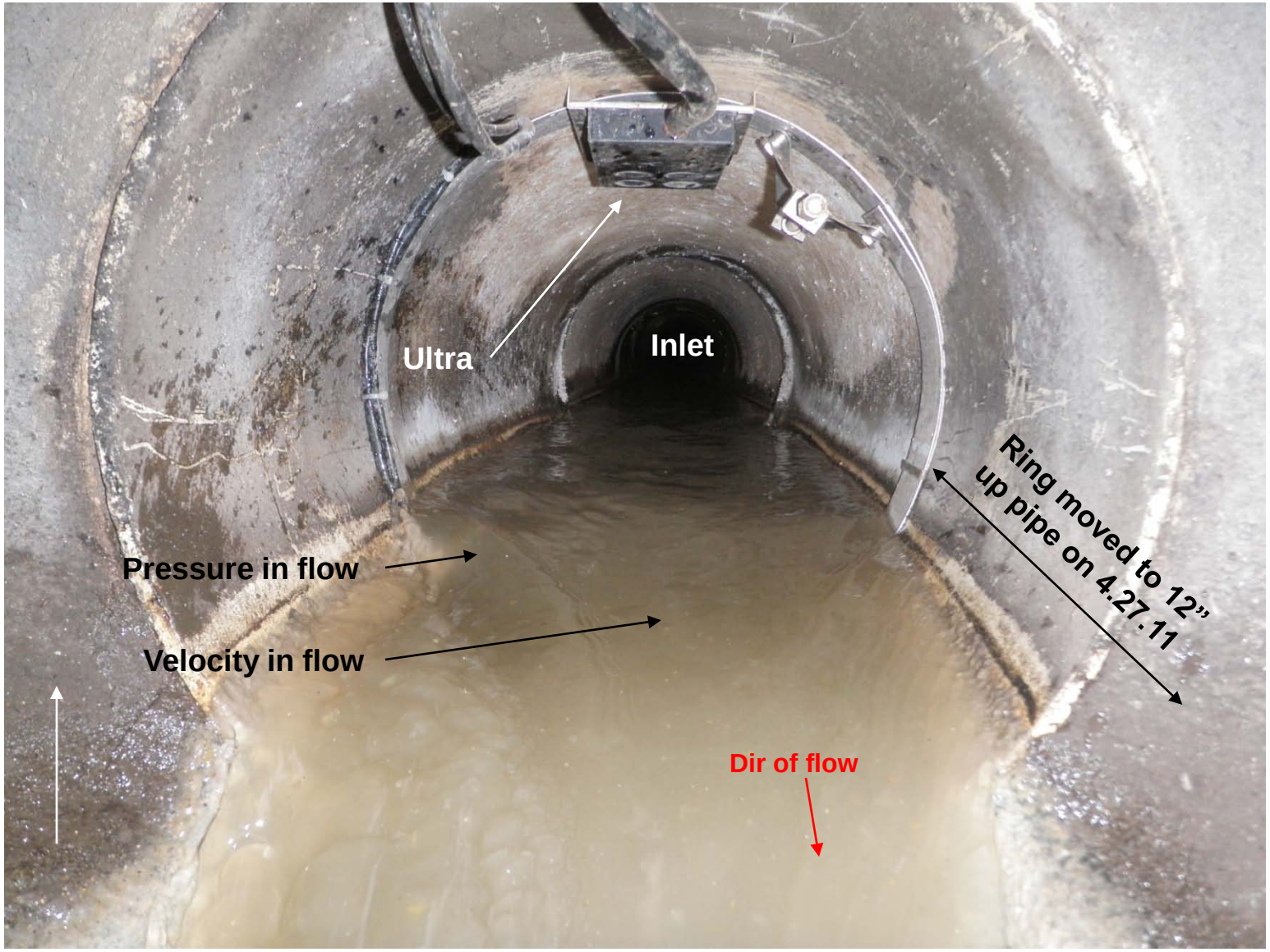
ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_008521

Site set up - Modification

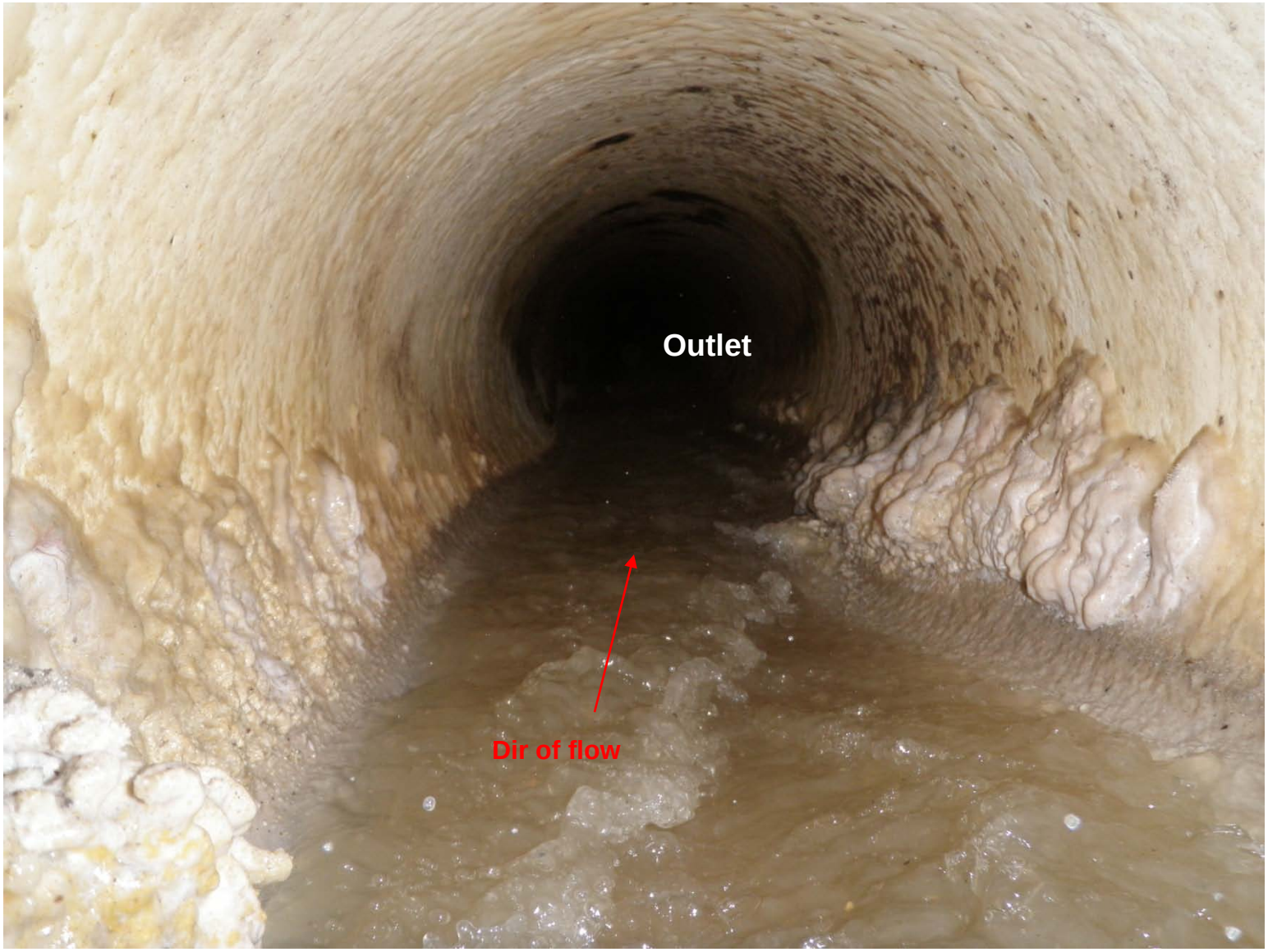
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008521

Site outlet



View of outlet and hydraulics

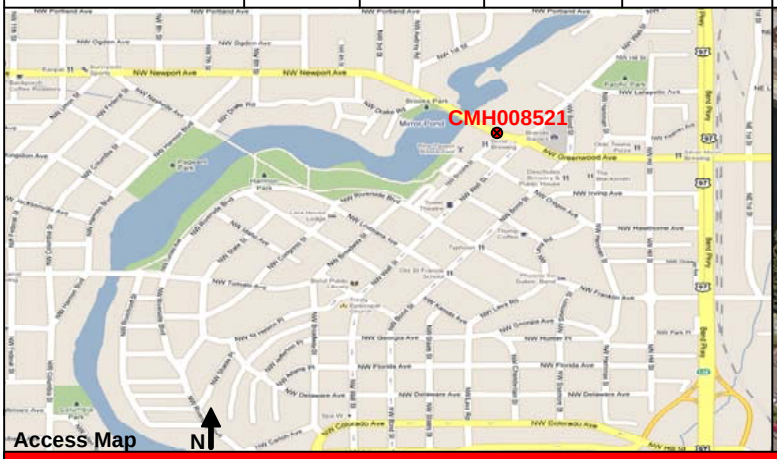
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008521	**Monitor Series:**	5000 AG
Address/Location:	1019 NW Brooks St (Bend Brewing Company)		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21498
Manhole #	CMH008521
Coordinates:	44° 3'37.91"N 121°18'47.97"W
Pipe Height:	14.50"
Pipe Width:	14.38"
IP Address:	166.219.8.149



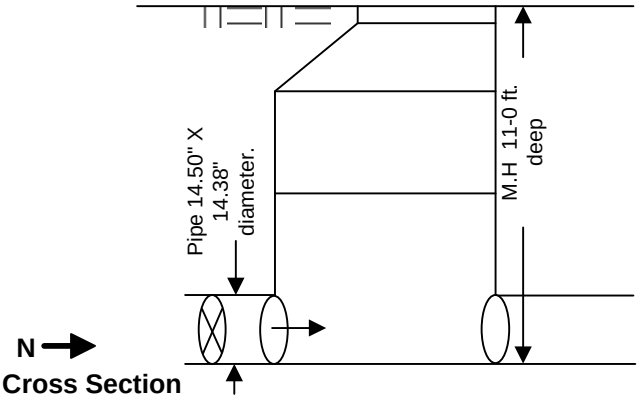
Investigation Information:

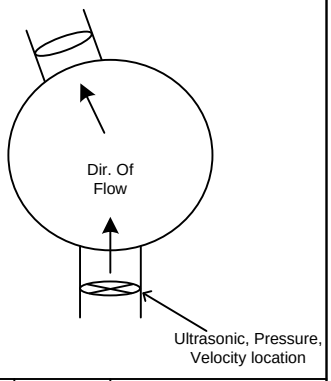
Date/Time of Investigation:	4/04/11 @ 07:05
Site Hydraulics:	Small waves steady flow
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	1 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	3.63" +/- .25"
Range (Air DOF):	10.88" +/- .25"
Peak Velocity:	2.25 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	11'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [ ]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

4/4/11: Ring installed ~6" up pipe initially. 4/27/11: Ring moved to ~12" up pipe.

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	Site ID: Bend_008521	Site Classification: (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

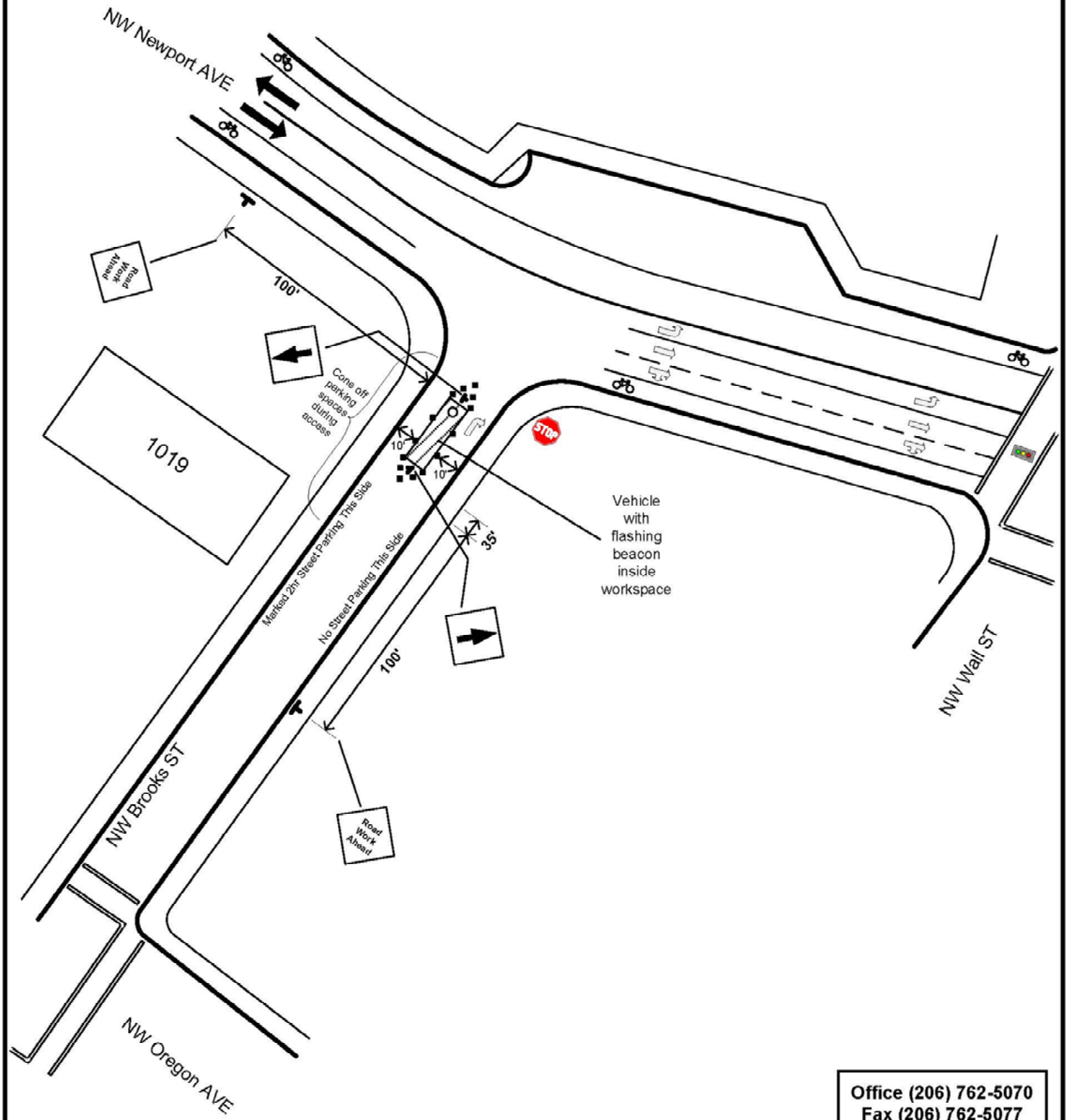
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	Reviewed
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/04/11	Date: 4/04/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008521 MH #: CMH008521	Address: 1019 NW Brooks ST Bend, OR	N	Drawn: 04/01/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



Posted Speed Limit	
NW Newport AVE	NW Brooks ST
SPEED LIMIT 25	SPEED LIMIT 20

Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

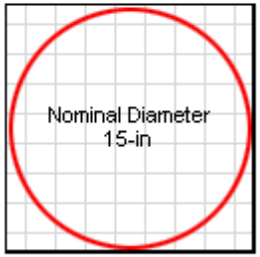
Site Access
4/04/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_008521

Flow Monitor

Bend_008521

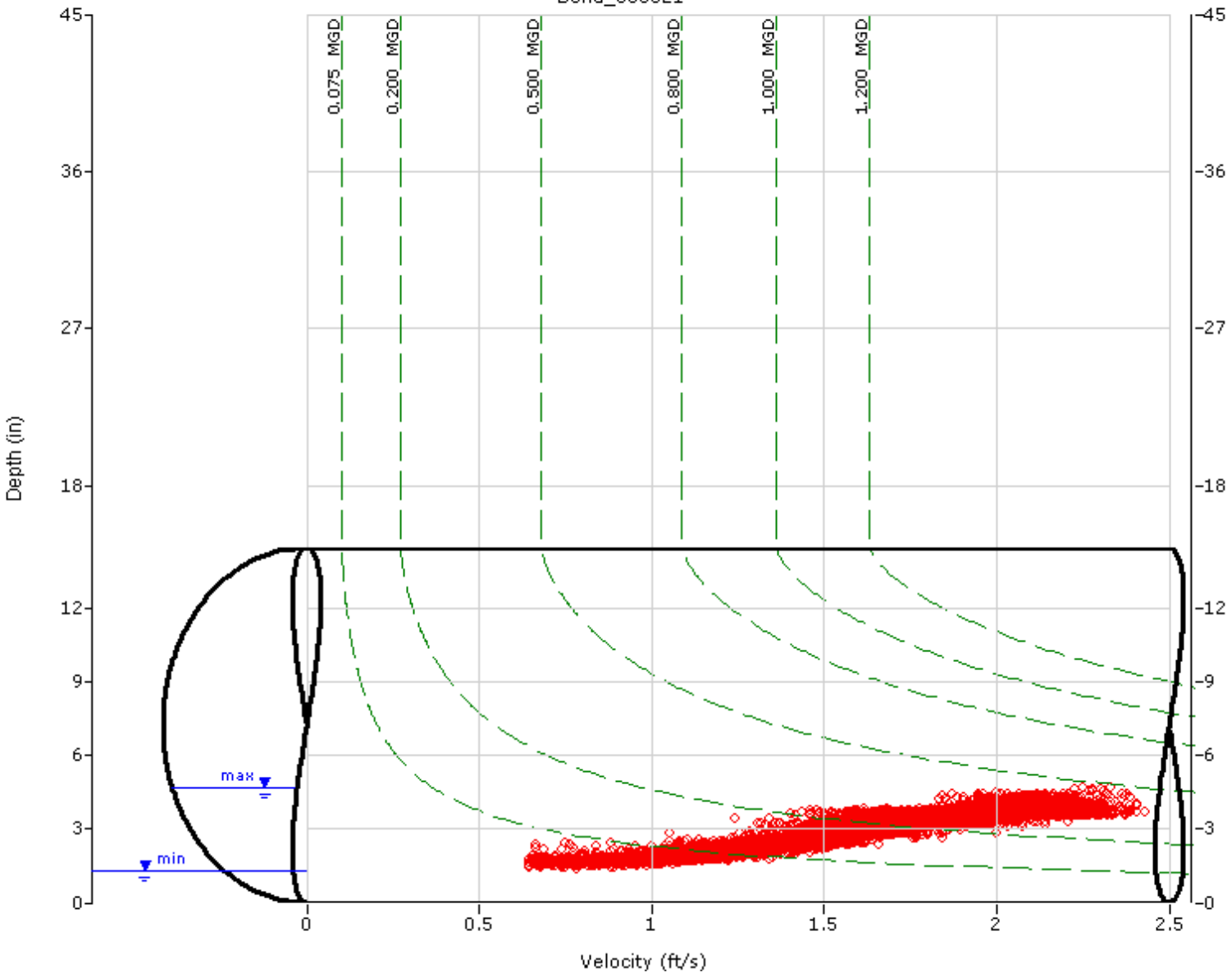


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



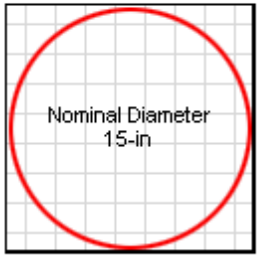
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008521

Flow Monitor

Bend_008521

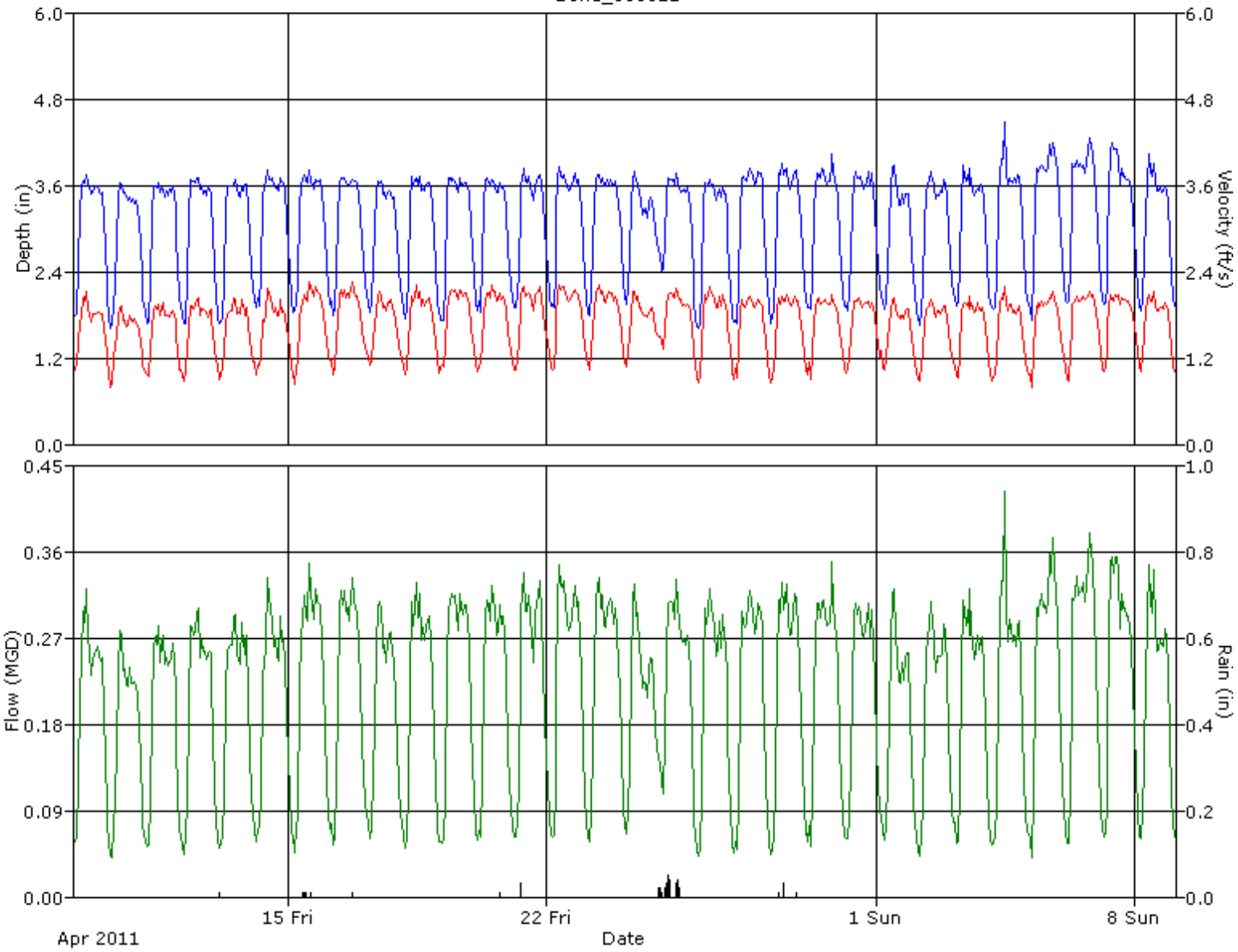


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008568	
Measured Pipe Height (in)	21
Nominal Pipe Height (in)	21
Silt Level (in)	0.00

Overview

Monitoring point Bend_008568 was located in the West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	5.72	1.53	0.561
Minimum	2.94	0.77	0.102
Maximum	9.15	2.13	1.343
Time of Minimum	5/7/2011 4:45 AM	5/7/2011 5:20 AM	5/7/2011 5:20 AM
Time of Maximum	4/25/2011 9:10 AM	4/18/2011 8:50 AM	4/18/2011 8:50 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008568

Site location

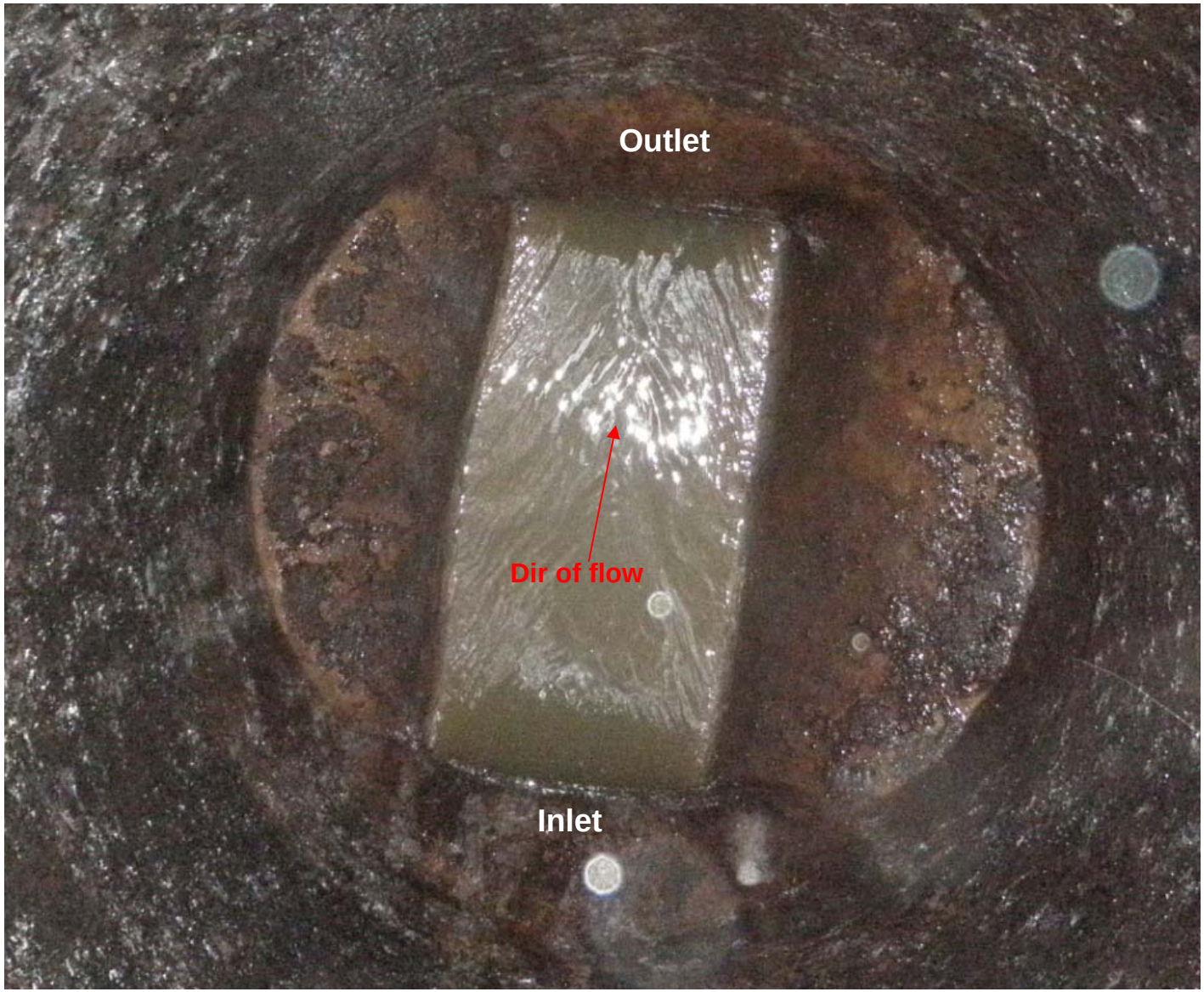
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008568

Site set up

ADS ENVIRONMENTAL SERVICES®

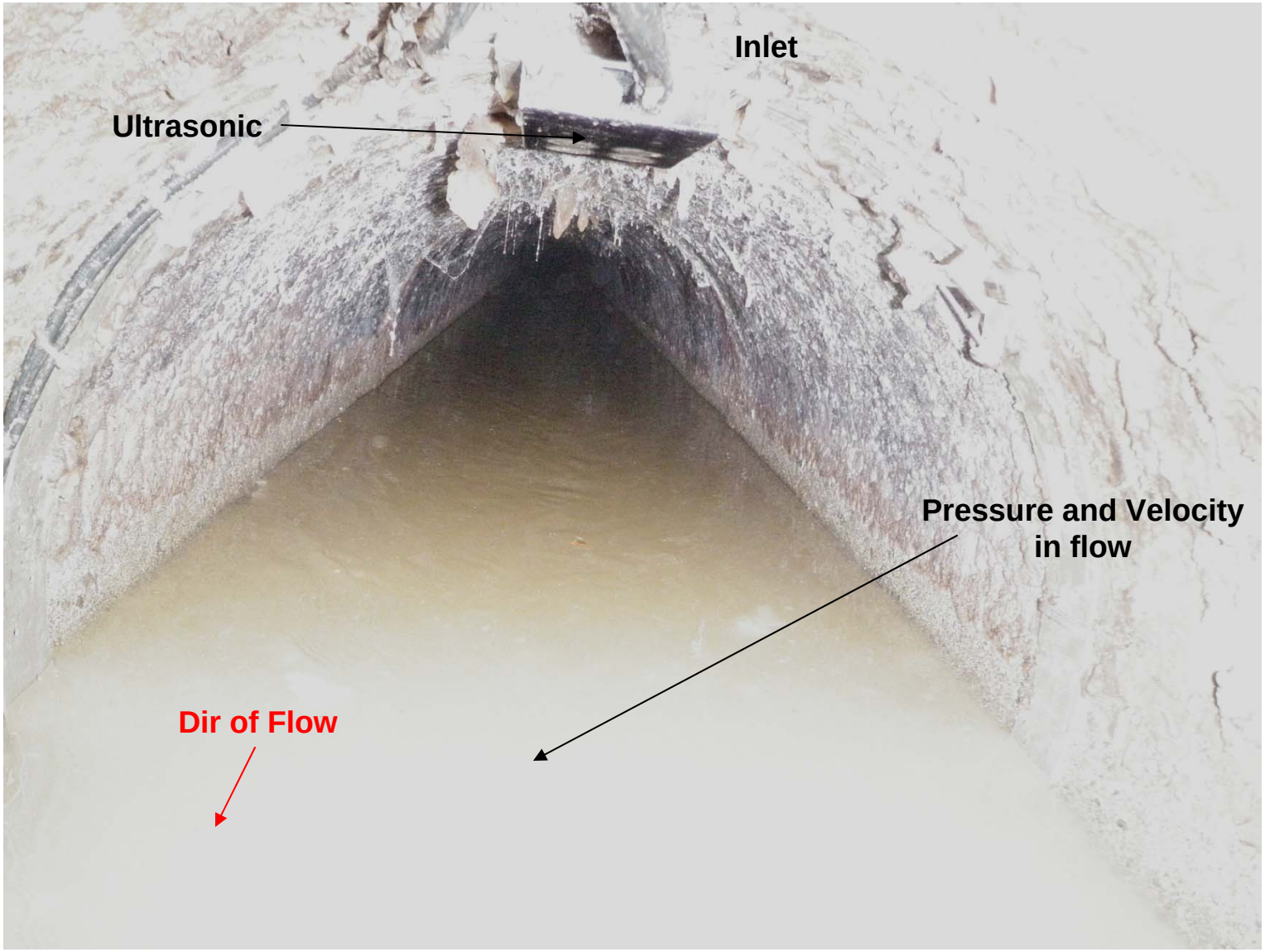


View down manhole facing north

Bend_008568

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008568

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

ADS Site Report

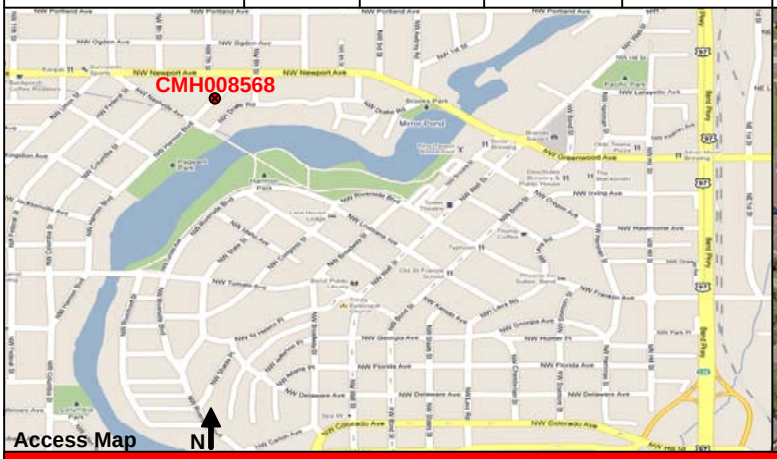
Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008568	**Monitor Series:**	5000 AG
Address/Location:	1452 NW Harmon Blvd		

Access:	Drive	**Type of System:**	Sanitary [X]	Storm [ ] Combined [ ]

Monitor S/N:	21563
Manhole #	CMH008568
Coordinates:	44° 3'41.98"N 121°19'18.08"W
Pipe Height:	21.00"
Pipe Width:	21.00"
IP Address:	166.219.169.177



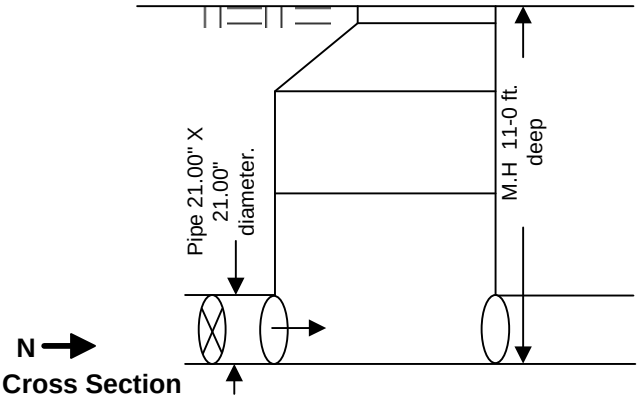
Investigation Information:

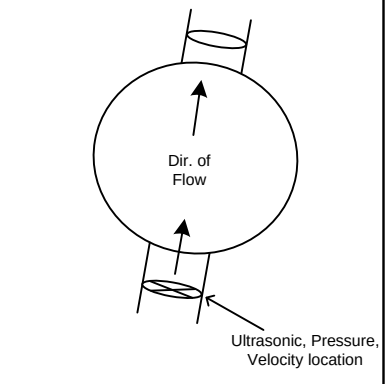
Date/Time of Investigation:	4/4/11 @ 10:45
Site Hydraulics:	Smooth steady flow
Upstream Input: (L/S, P/S)	No influence
Upstream Manhole:	3 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	6.50" +/- .25"
Range (Air DOF):	14.50" +/- .25"
Peak Velocity:	1.70 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	11'				
Manhole Material / Condition	Concrete / Fair				
Pipe Material / Condition:	Concrete / Fair				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008568	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

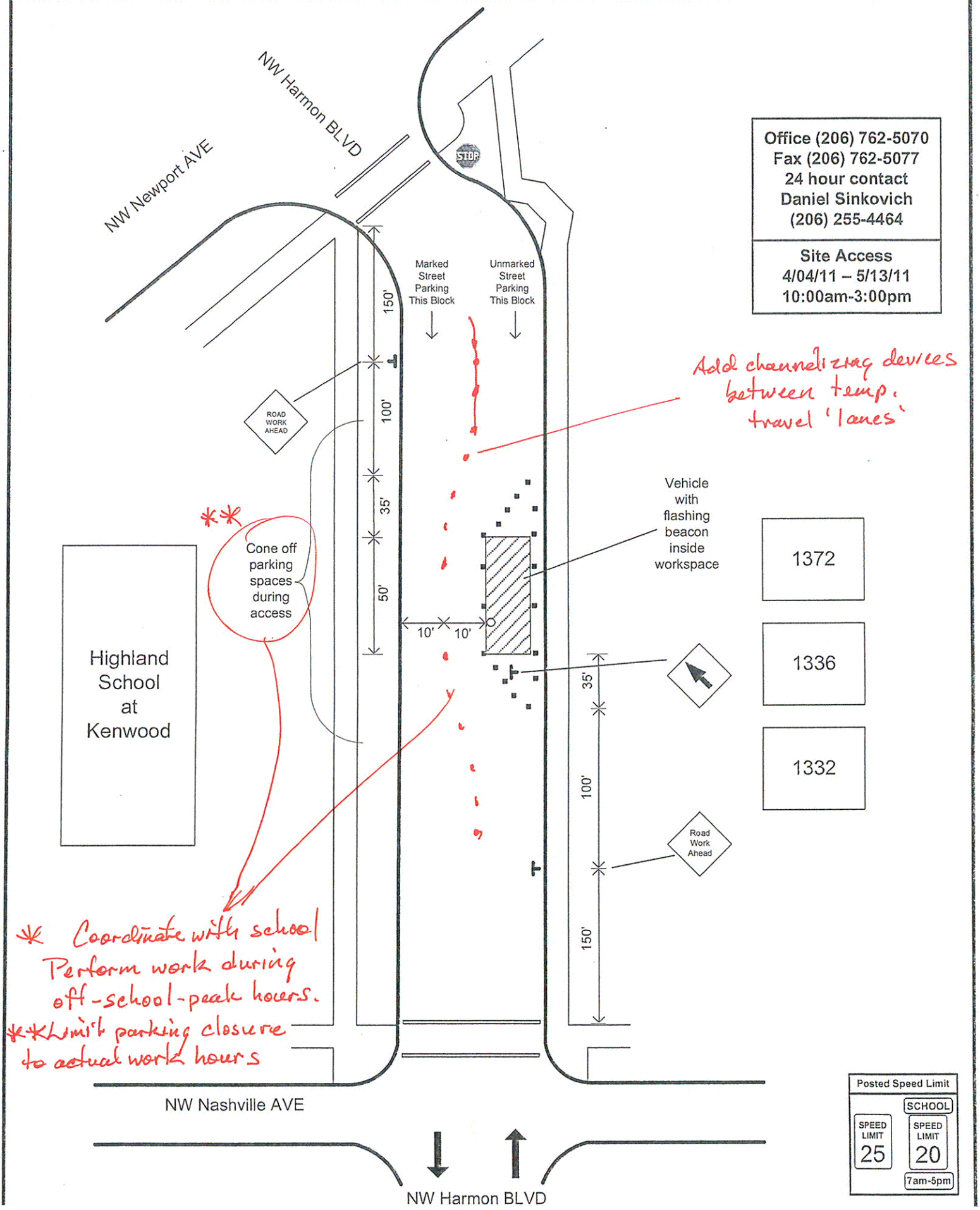
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/04/11	Date: 4/04/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008568 MH #: CMH008568	Address: 1452 NW Harmon BLVD Bend, OR	N	Drawn: 03/31/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



SCATTERGRAPH REPORT

Bend_008568

Flow Monitor

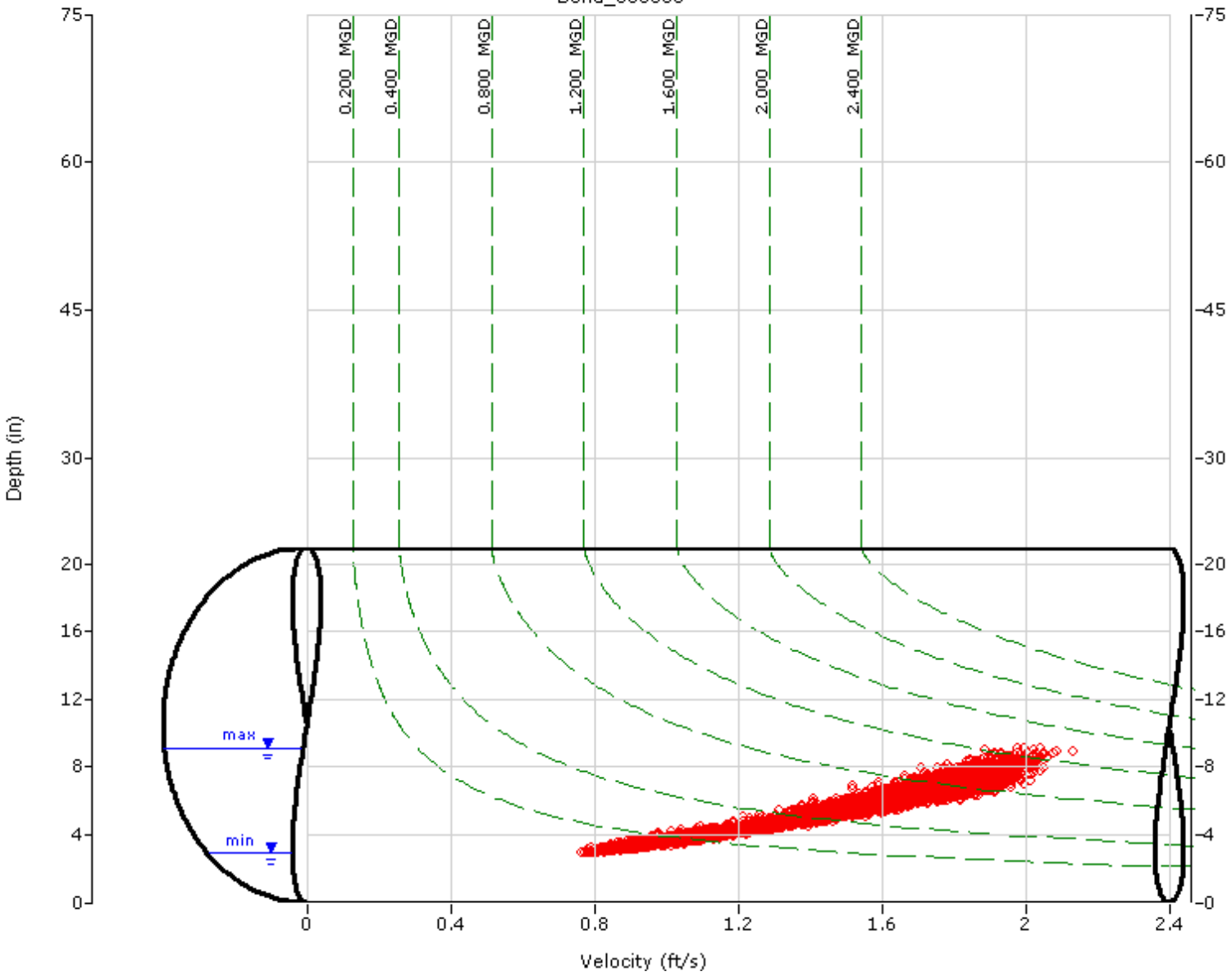
Bend_008568

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008568

Flow Monitor

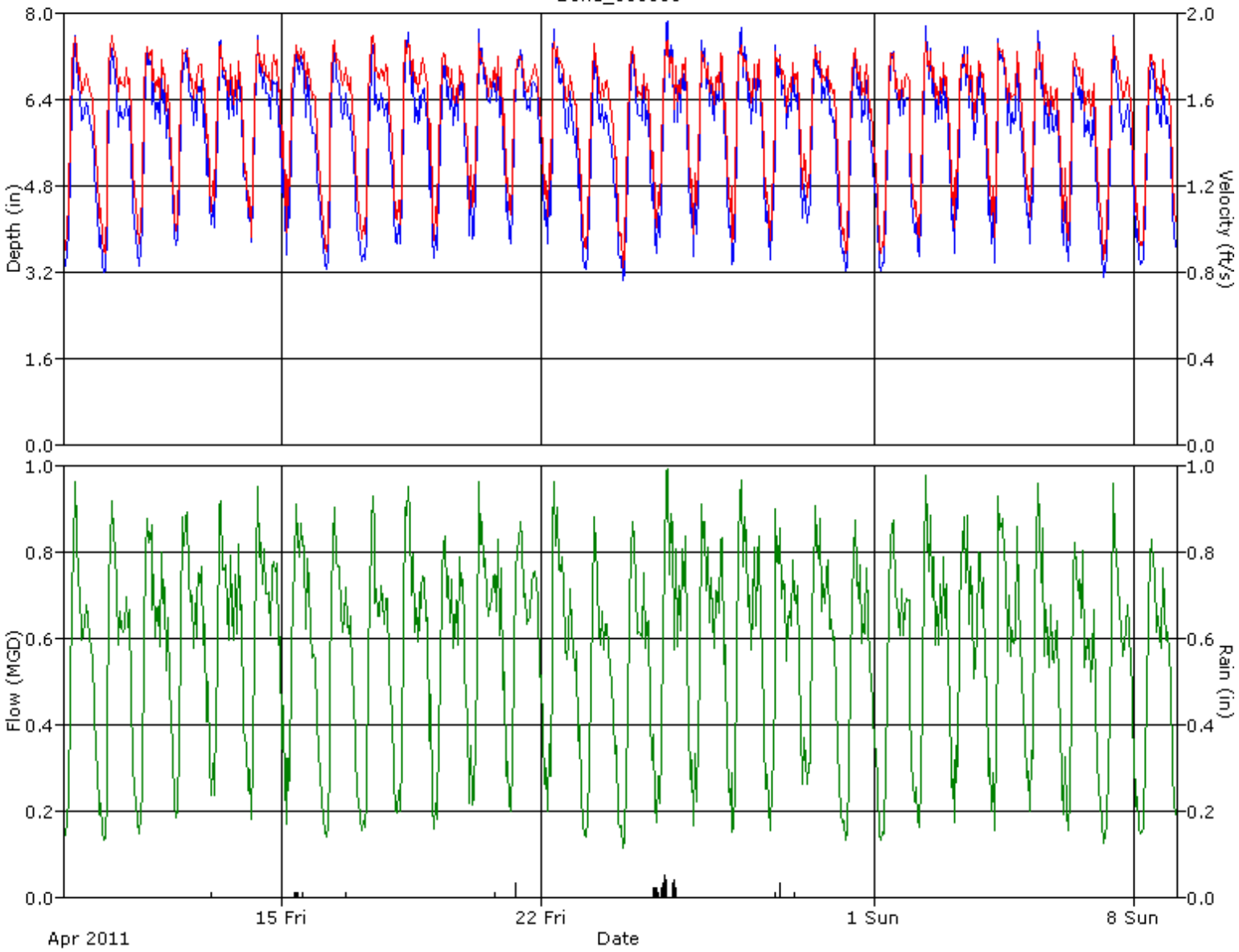
Bend_008568

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008575	
Measured Pipe Height (in)	15.25
Nominal Pipe Height (in)	15
Silt Level (in)	0.00

Overview

Monitoring point Bend_008575 was located in the Southwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.24	3.86	0.135
Minimum	0.57	1.33	0.016
Maximum	2.13	6.61	0.441
Time of Minimum	4/27/2011 4:00 AM	5/1/2011 5:05 AM	5/1/2011 5:05 AM
Time of Maximum	5/6/2011 11:10 AM	4/17/2011 10:45 AM	5/6/2011 11:10 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.93
Quantity	99.93

Bend_008575

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008575

Site set up

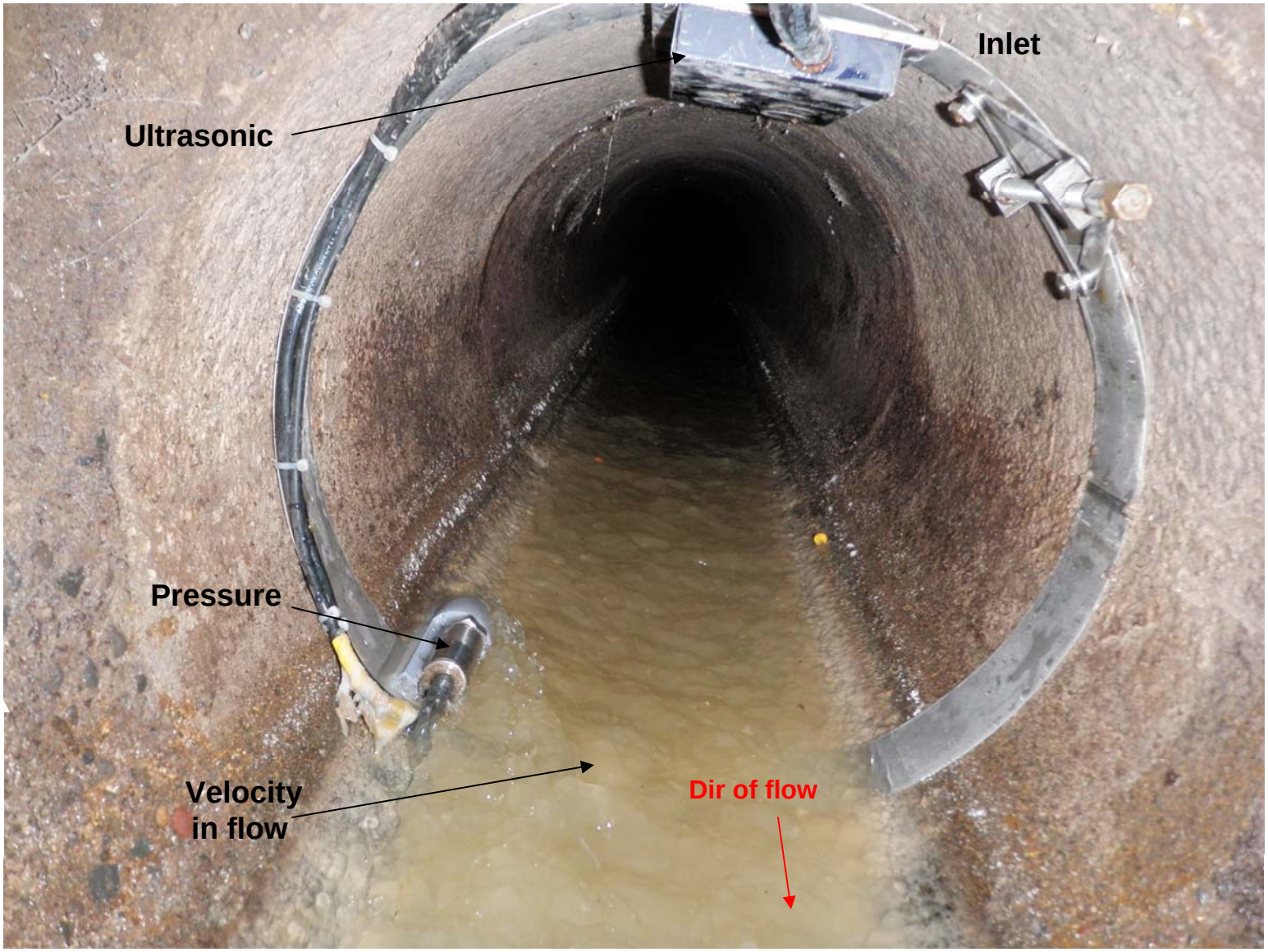
ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_008575

Site set up

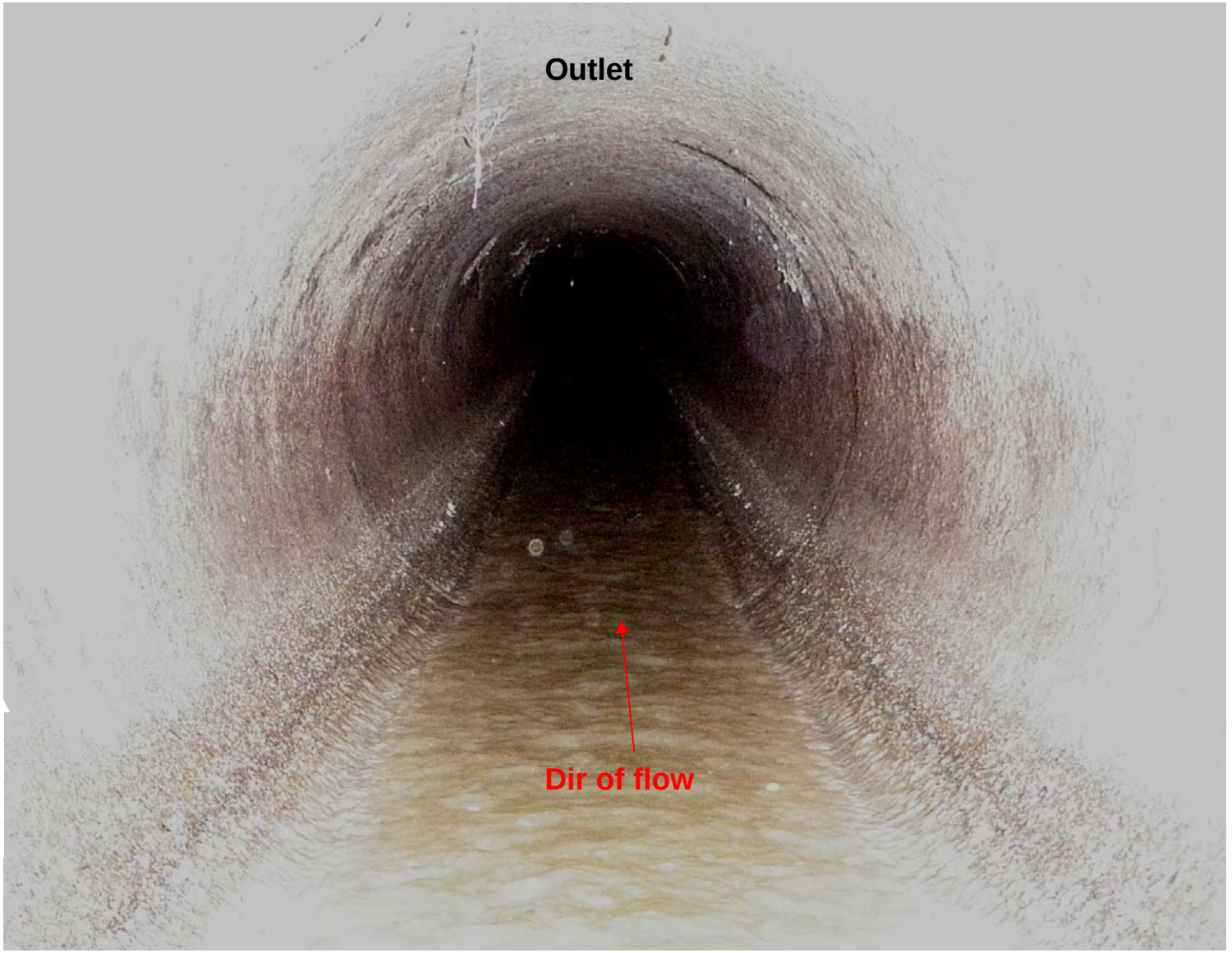
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008575

Site outlet

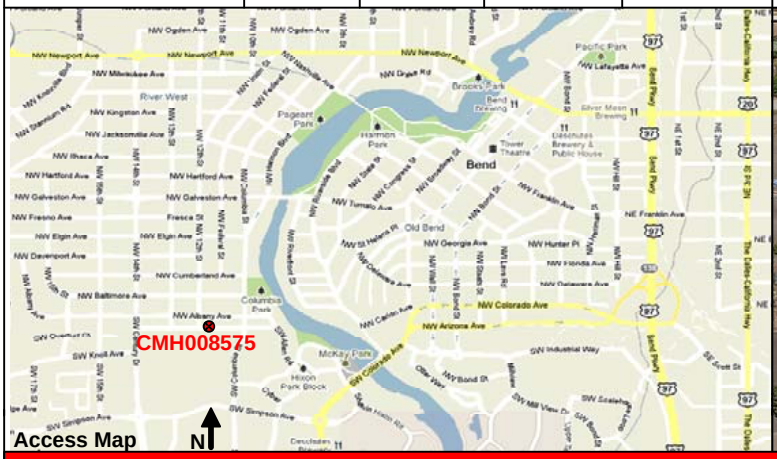


View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW
Site Name:	Bend_008575	**Monitor Series:**	5000 AG	**Monitor S/N:**	21464
Address/Location:	500 SW Commerce Ave.			**Manhole #**	CMH008575
				Coordinates:	44°03'05.05" N, 121°19'41.22" W
				Pipe Height:	15.25"
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]	**Pipe Width:**	15.25"
				IP Address:	166.219.169.167



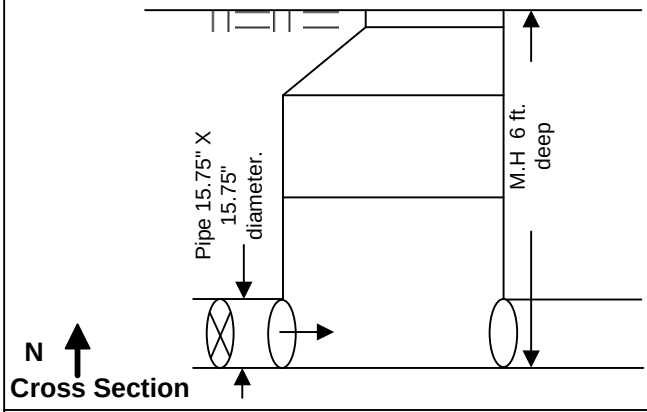
Investigation Information:

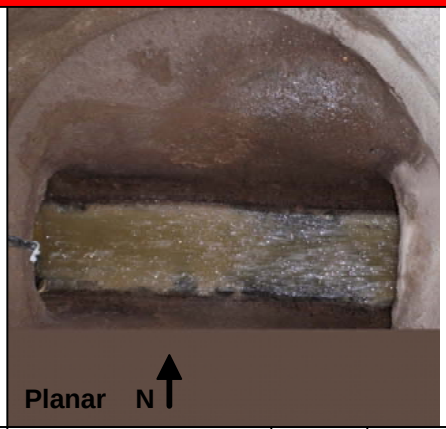
Date/Time of Investigation:	4/04/11 @ 8:55
Site Hydraulics:	Ripples, Fast
Upstream Input: (L/S, P/S)	No influence
	1 inlets / 1 outlet
Downstream Manhole:	3 inlets / 1 outlet
Depth of Flow:	1.50" +/- .25"
Range (Air DOF):	14.25" +/- .25"
Peak Velocity:	5.25 fps
Silt:	0 Inches

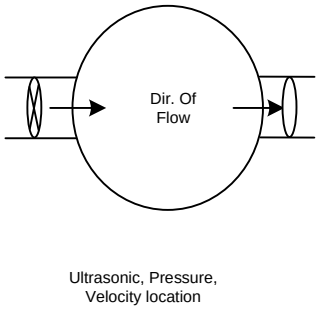
Manhole Information:

Manhole Depth:	6' – 0"				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [X]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk	[ ]	[X]	[ ]	
Sensors Devices:	Ultra, Velocity, Pressure	Lift / Pump Station	[ ]	[X]	[ ]	
Surcharge Height:	None Observed	WWTP	[ ]	[X]	[ ]	
Rain Gauge Zone:	Bend_SGRG	Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

5 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008575	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

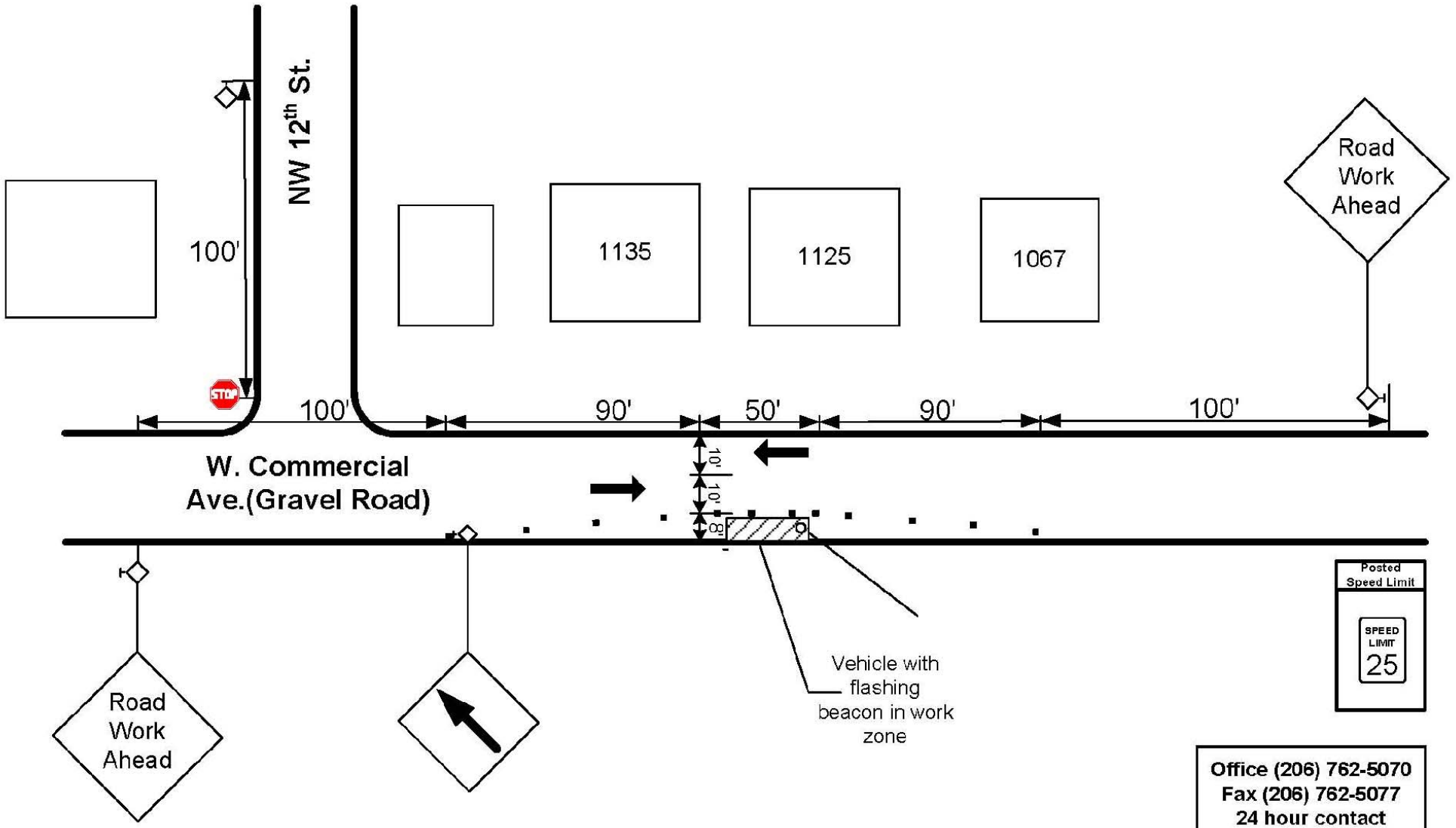
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/04/11	Date: 4/04/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008575 VIH# CMH008575	Address: 1100th Block of W CommercialAve.	N	Drawn: 03/31/11 Submitted: 04/01/11 Approved:	Rev. 0 Pg. 1 of 1 Not to Scale	Bend, OR Temporary Flow Monitoring



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

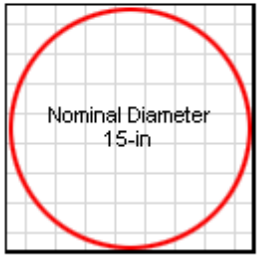
Site Access
3/31/11 – 5/13/11
7:00am-4:00pm

SCATTERGRAPH REPORT

Bend_008575

Flow Monitor

Bend_008575

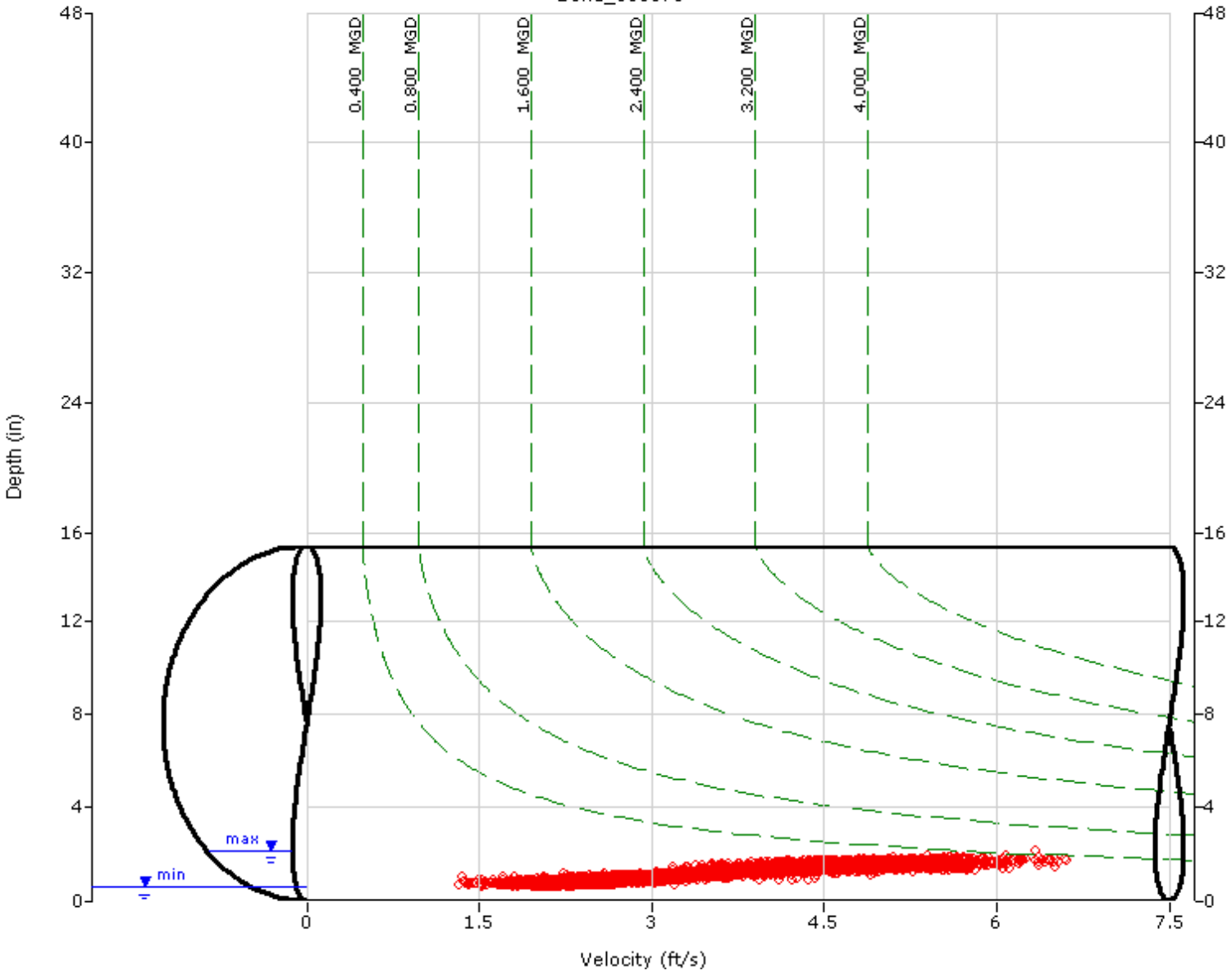


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



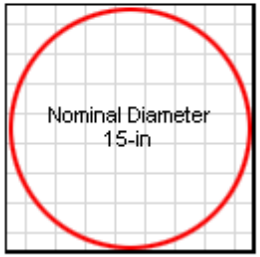
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008575

Flow Monitor

Bend_008575

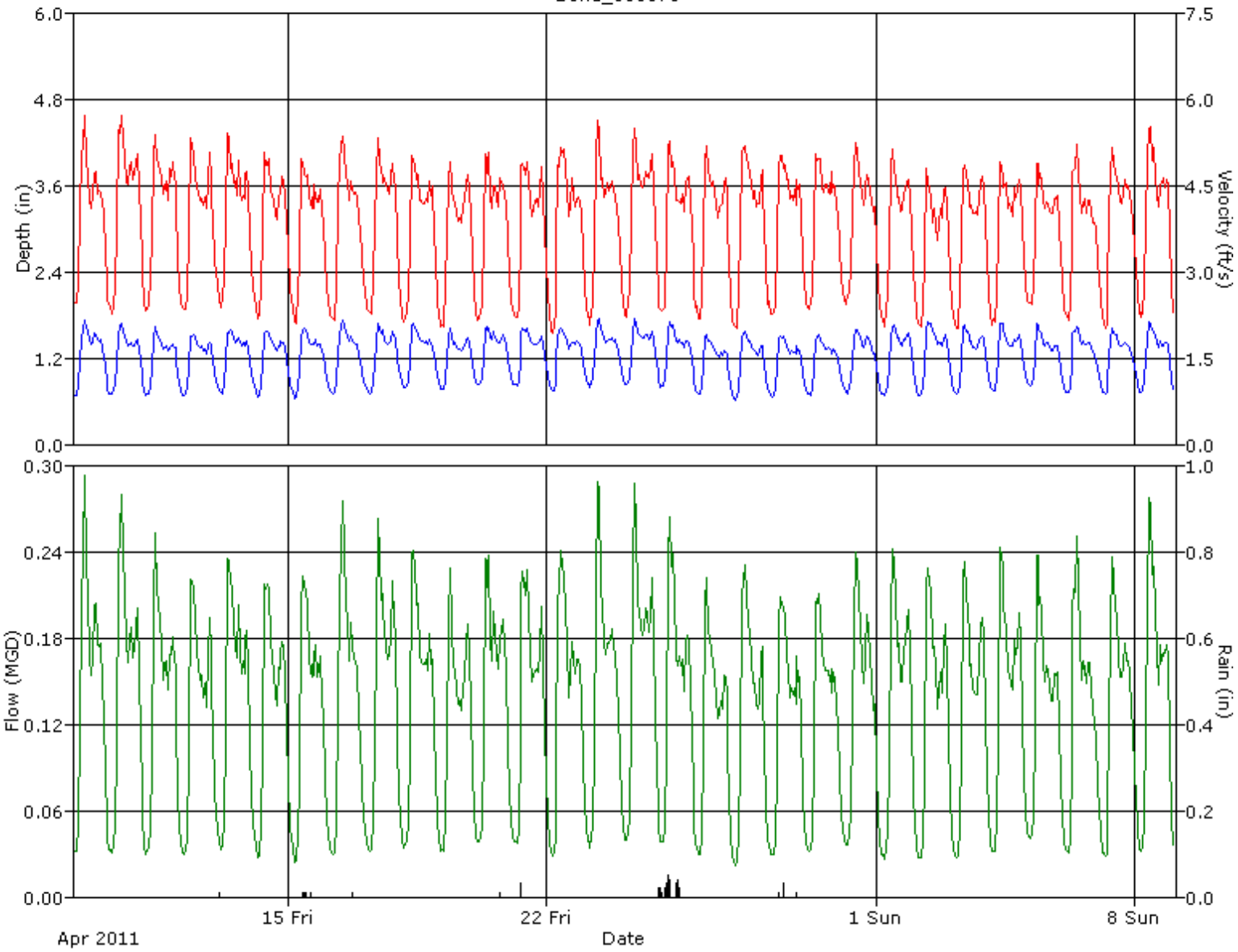


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008731	
Measured Pipe Height (in)	21
Nominal Pipe Height (in)	21
Silt Level (in)	0.00

Overview

Monitoring point Bend_008731 was located in the West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with no unusual hydraulic conditions noted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	5.10	1.75	0.579
Minimum	2.40	0.48	0.053
Maximum	9.15	2.84	1.721
Time of Minimum	5/2/2011 4:20 AM	5/1/2011 3:55 AM	5/2/2011 5:00 AM
Time of Maximum	4/17/2011 11:00 AM	5/4/2011 7:40 AM	5/1/2011 10:20 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008731

Site location

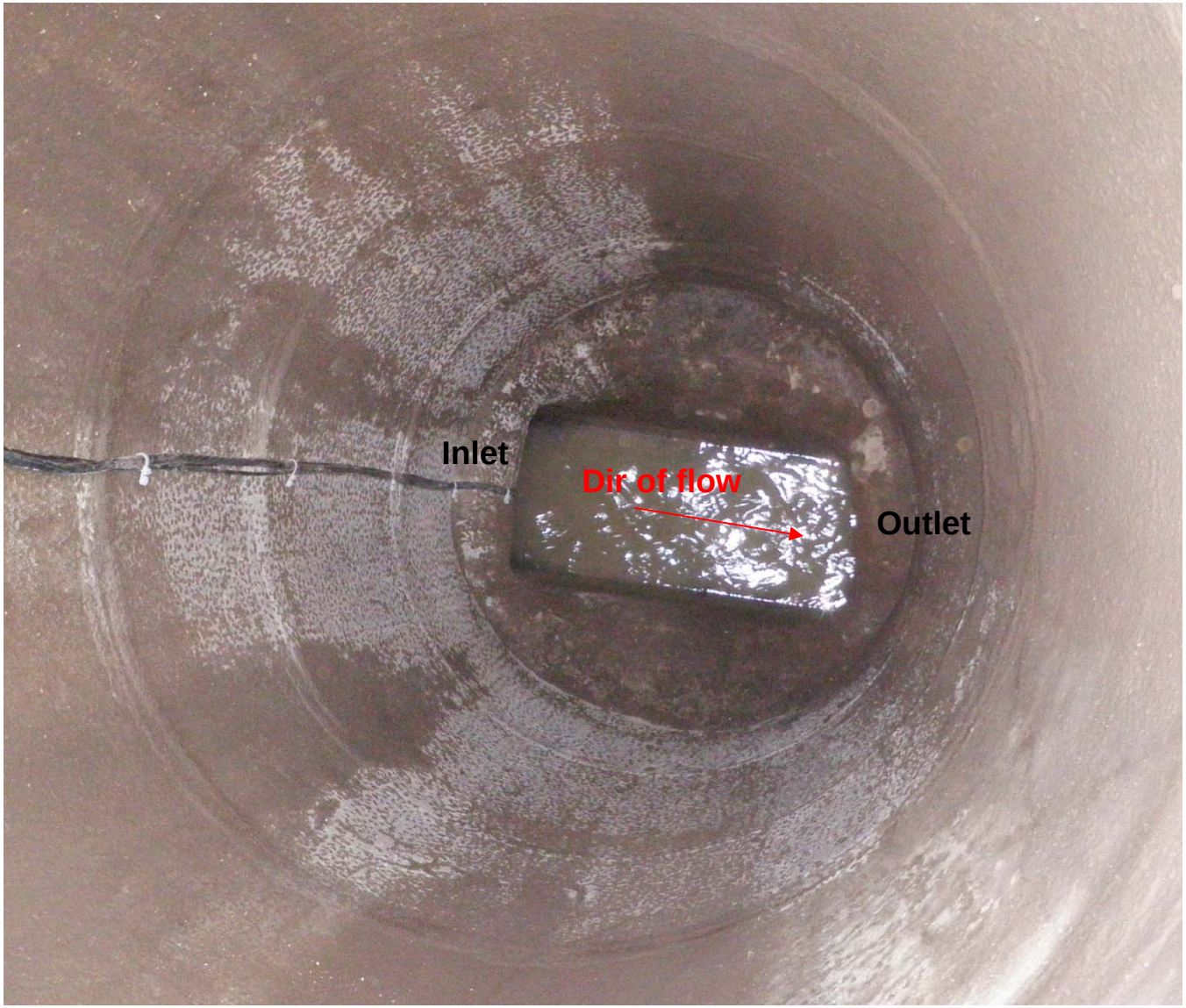
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008731

Site set up

ADS ENVIRONMENTAL SERVICES®

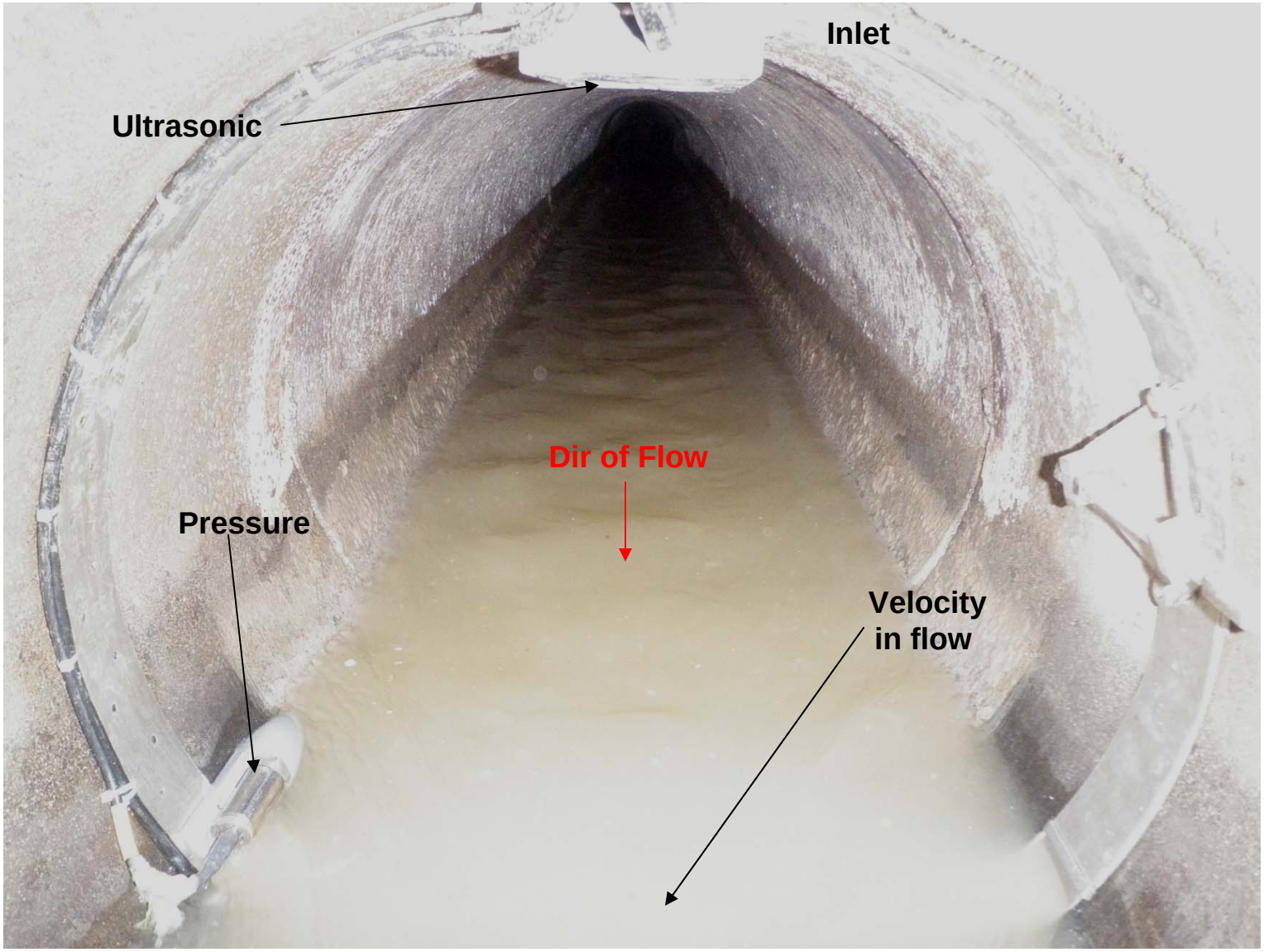


View down manhole facing north

Bend_008731

Site set up

ADS ENVIRONMENTAL SERVICES®

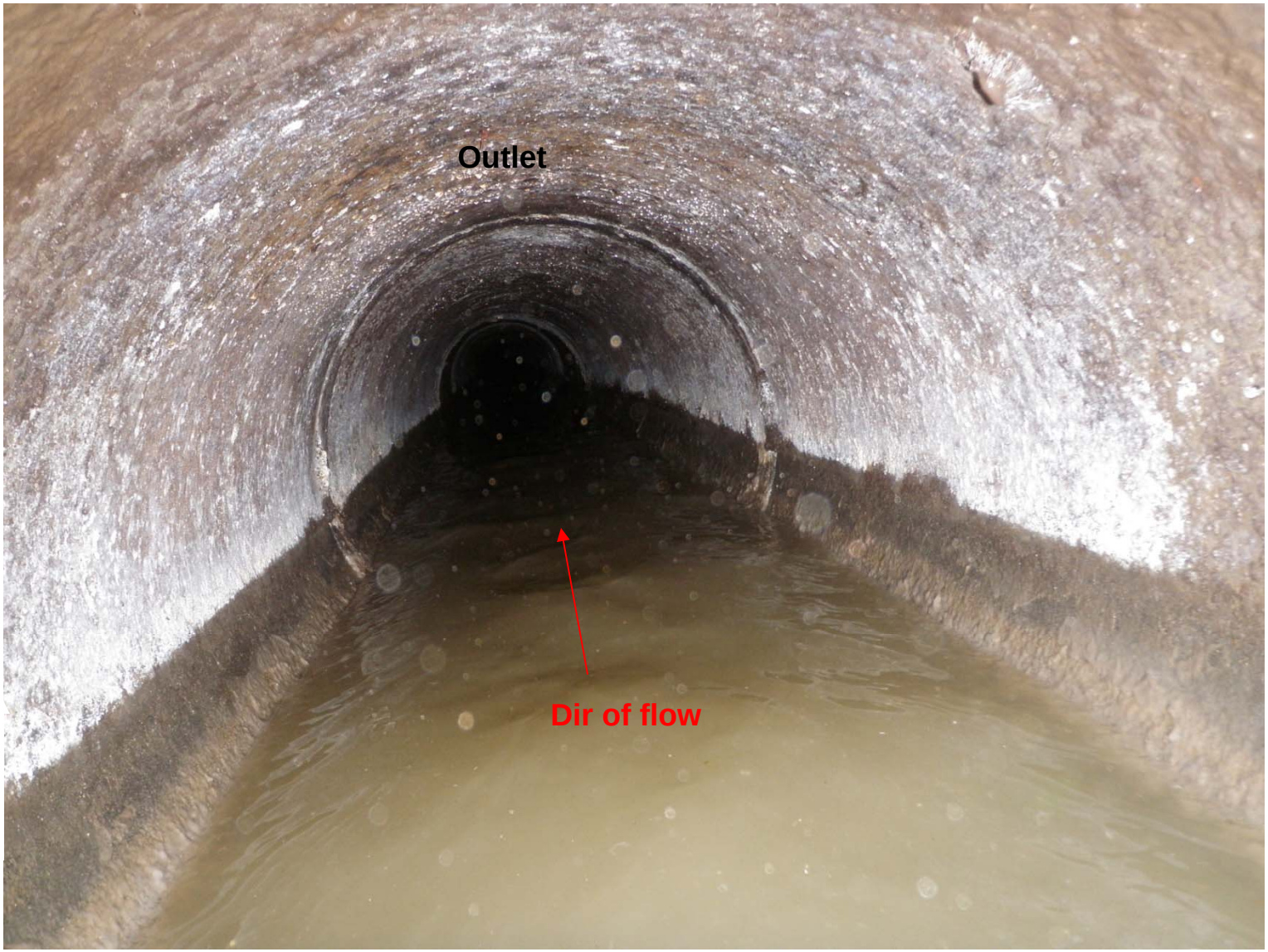


View of sensor placement and site hydraulics

Bend_008731

Site outlet

ADS ENVIRONMENTAL SERVICES®



View of outlet and hydraulics

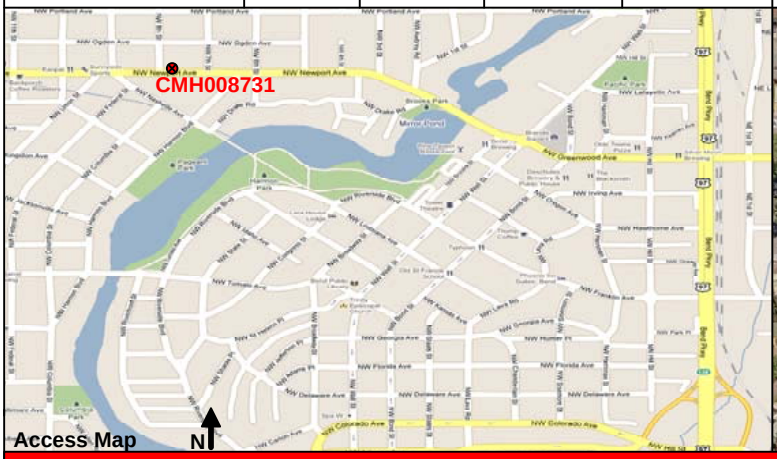
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008731	**Monitor Series:**	5000 AG
Address/Location:	786 NW Newport Ave		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21507
Manhole #	CMH008731
Coordinates:	44° 3'44.62"N 121°19'22.69"W
Pipe Height:	21.00"
Pipe Width:	21.13"
IP Address:	166.219.48.81



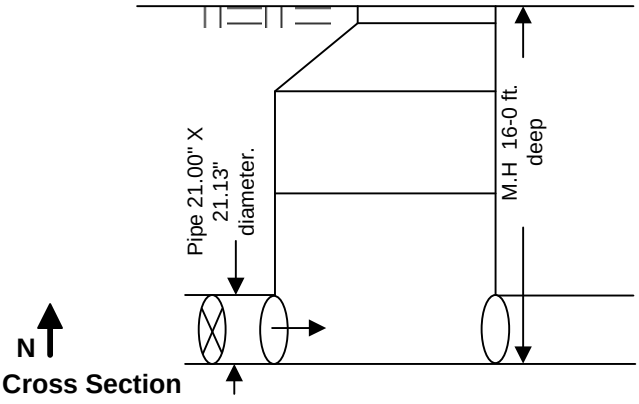
Investigation Information:

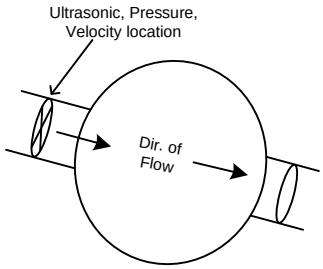
Date/Time of Investigation:	4/6/11 @ 12:05
Site Hydraulics:	Ripples and steady flow, with fluctuation from L/S upstream
Upstream Input: (L/S, P/S)	L/S
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	5.00" +/- .25"
Range (Air DOF):	16.00" +/- .25"
Peak Velocity:	2.30 fps
Silt:	0 Inches

Manhole Information:

Manhole Depth:	16'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_JRRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

15 psi pressure used at this location

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008731	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

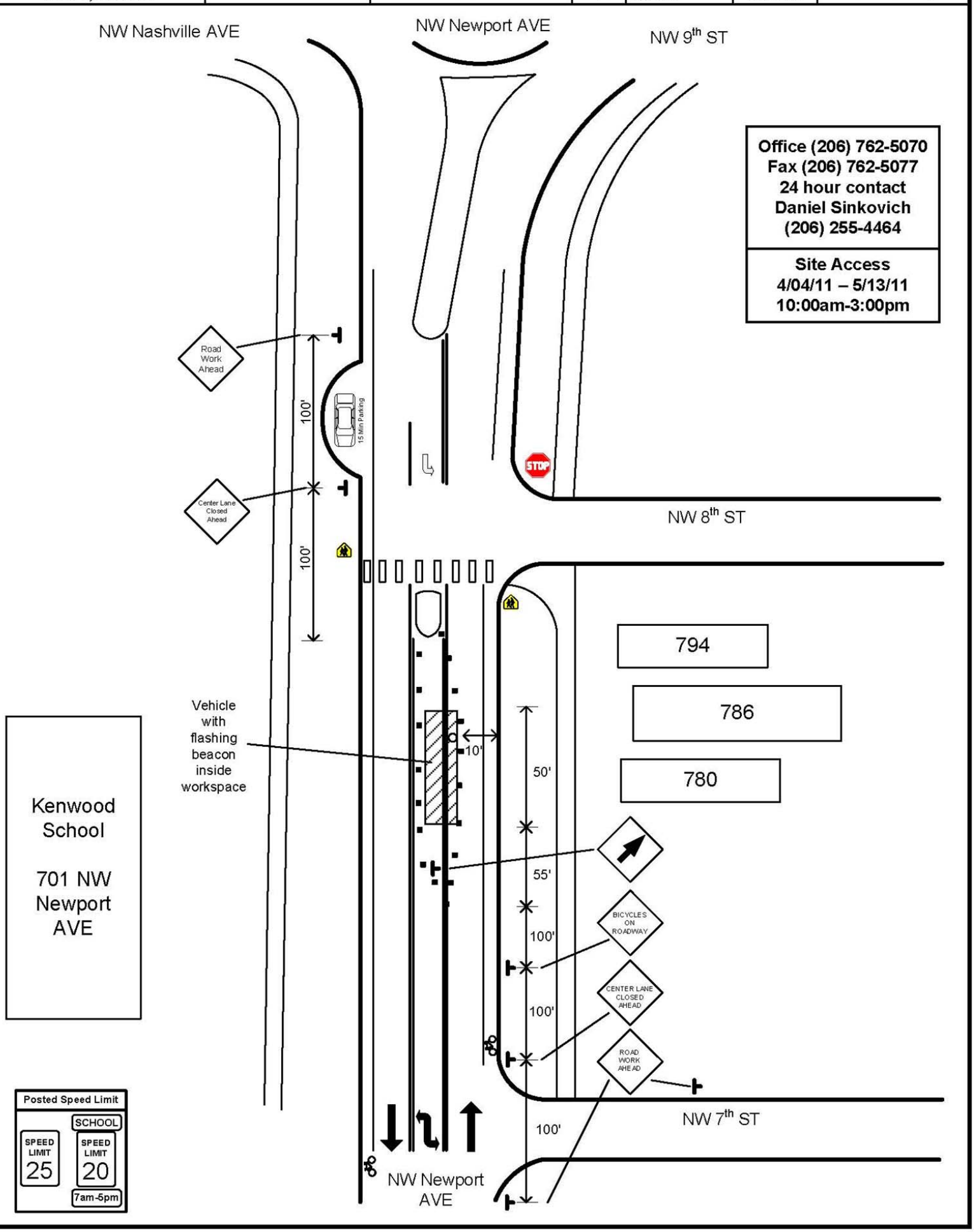
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/06/11	Date: 4/06/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008731	Address: 786 NW Newport AVE Bend, OR	N	Drawn: 03/31/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



SCATTERGRAPH REPORT

Bend_008731

Flow Monitor

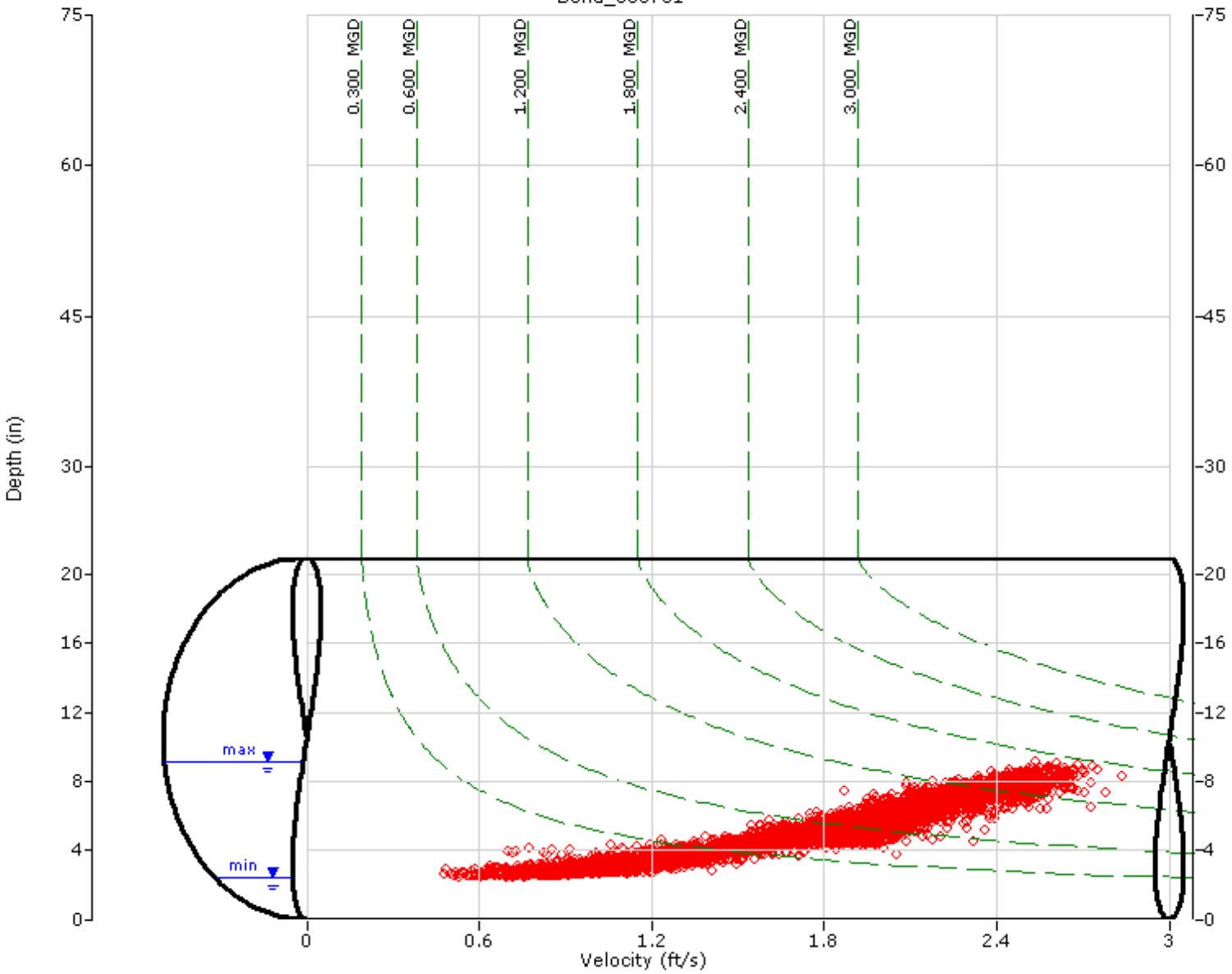
Bend_008731

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008731

Flow Monitor

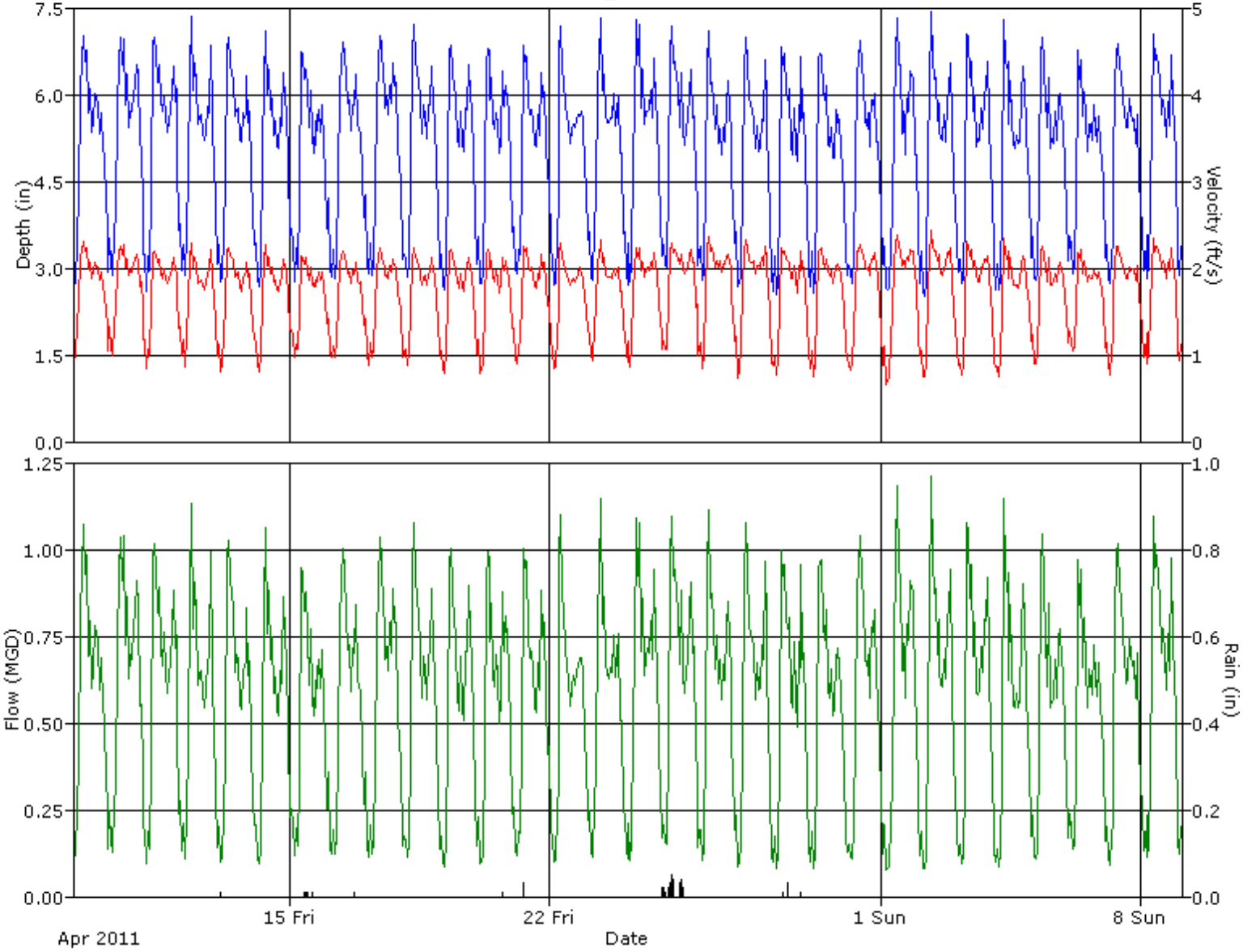
Bend_008731

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008736	
Measured Pipe Height (in)	18.13
Nominal Pipe Height (in)	18
Silt Level (in)	0.00

Overview

Monitoring point Bend_008736 was located in the West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

During the initial scattergraph data review, it was noted that a hydraulic jump was present. It was decided to move the sensor further up the incoming pipe to mitigate this hydraulic condition. This move was completed on Friday, April 22, 2011. The scattergraph post-move indicates a repeatable data set with minimum period velocity dropouts (data points that are invalid usually due to clear and/or shallow flow conditions). Sensor parameters were adjusted to best suit flow conditions on April 21, 2011. On account of the velocity data being affected by a hydraulic jump a depth versus velocity best fit curve was created from the April 22 - May 9, 2011 data set and used to reconstitute velocities below approximately 2.5" depth from April 8 - April 22, 2011. 4% of the velocity data was reconstituted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	2.68	3.63	0.459
Minimum	0.77	0.72	0.012
Maximum	5.60	6.80	1.551
Time of Minimum	4/10/2011 4:45 AM	4/11/2011 3:00 AM	4/11/2011 3:00 AM
Time of Maximum	4/17/2011 10:55 AM	5/1/2011 7:10 PM	4/17/2011 10:55 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008736

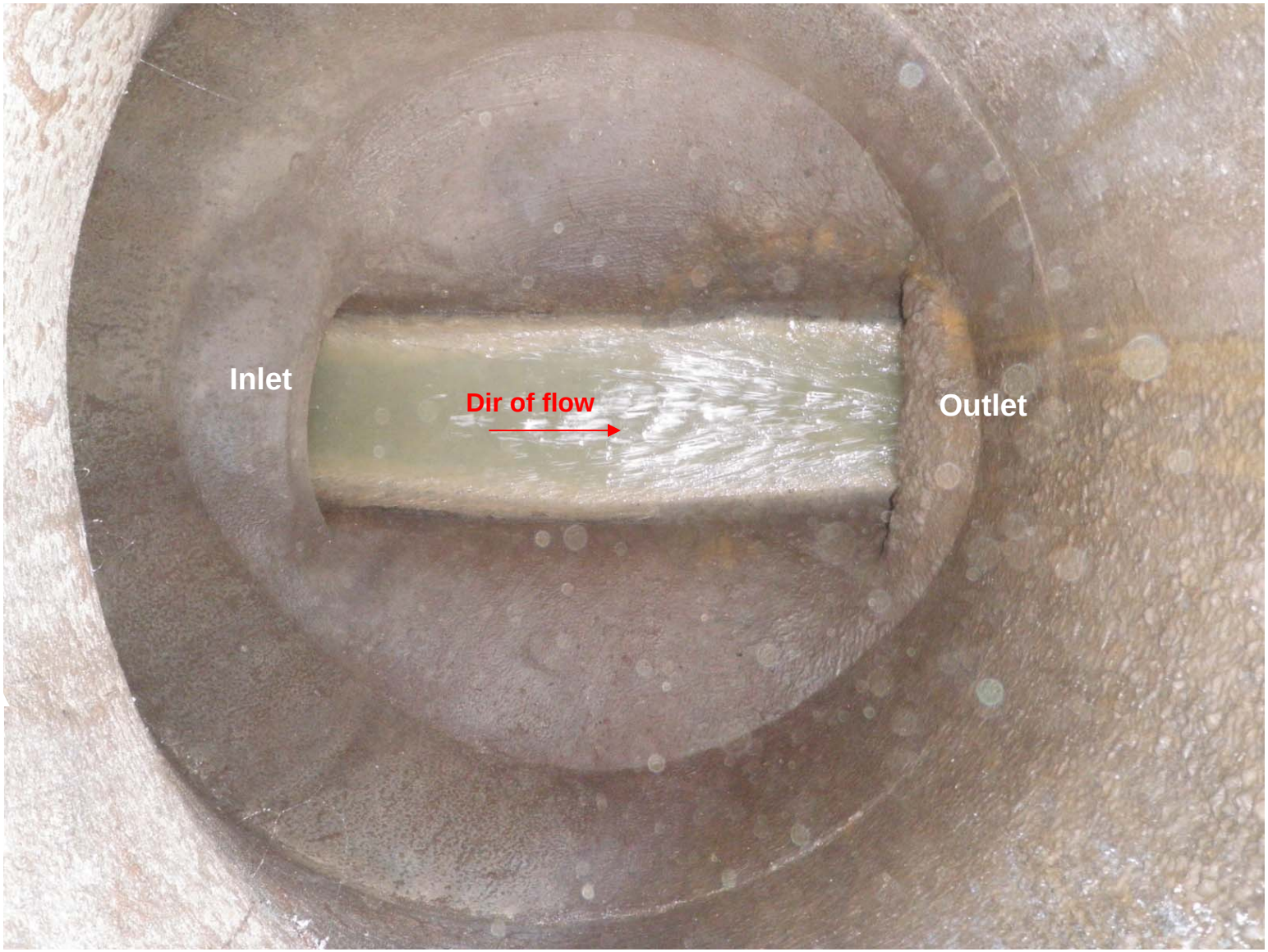
Site location

Site access looking north

Bend_008736

Site set up

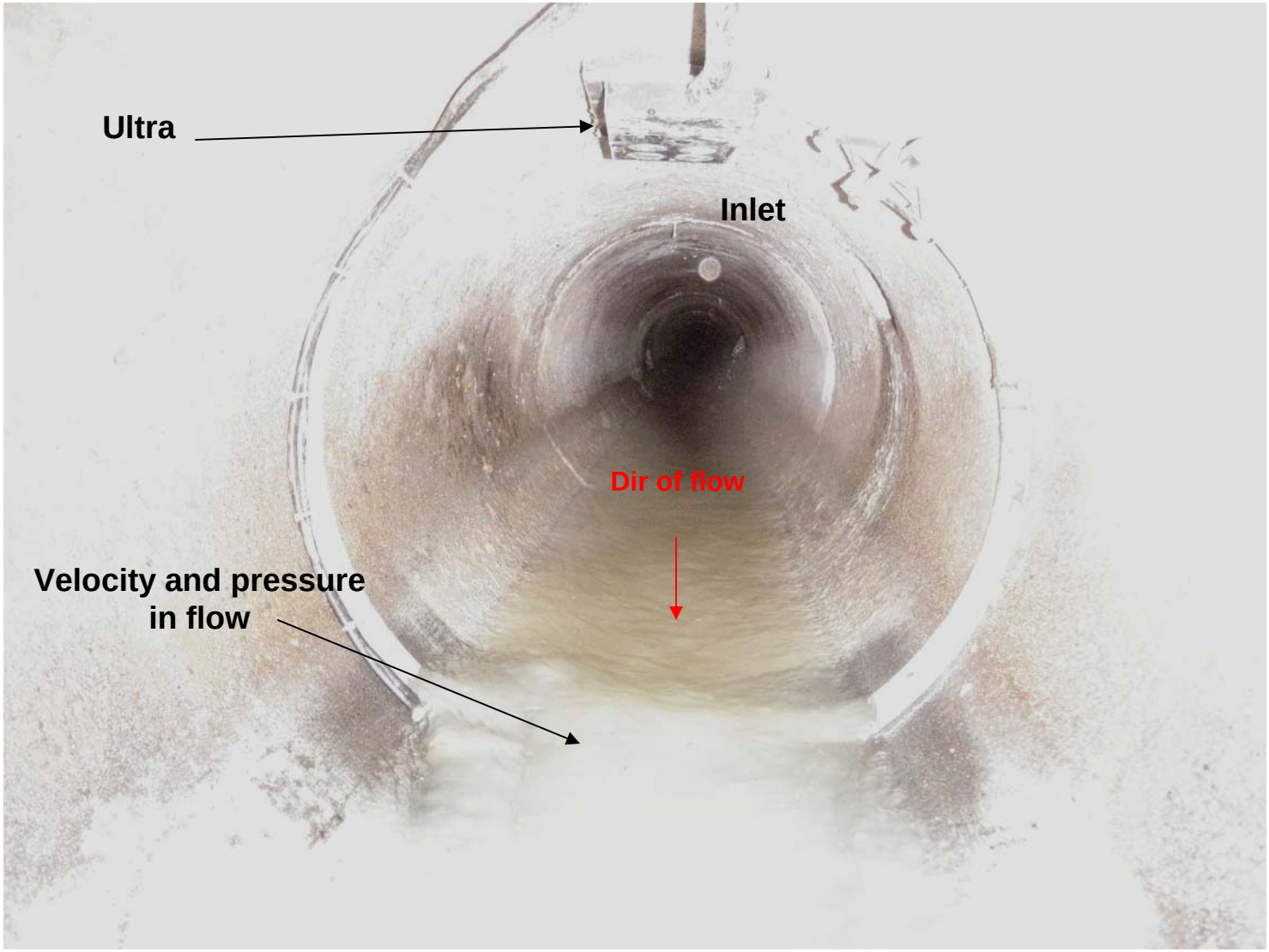
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_008736

Site set up



View of sensor placement and site hydraulics

Bend_008736

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

Bend_008736

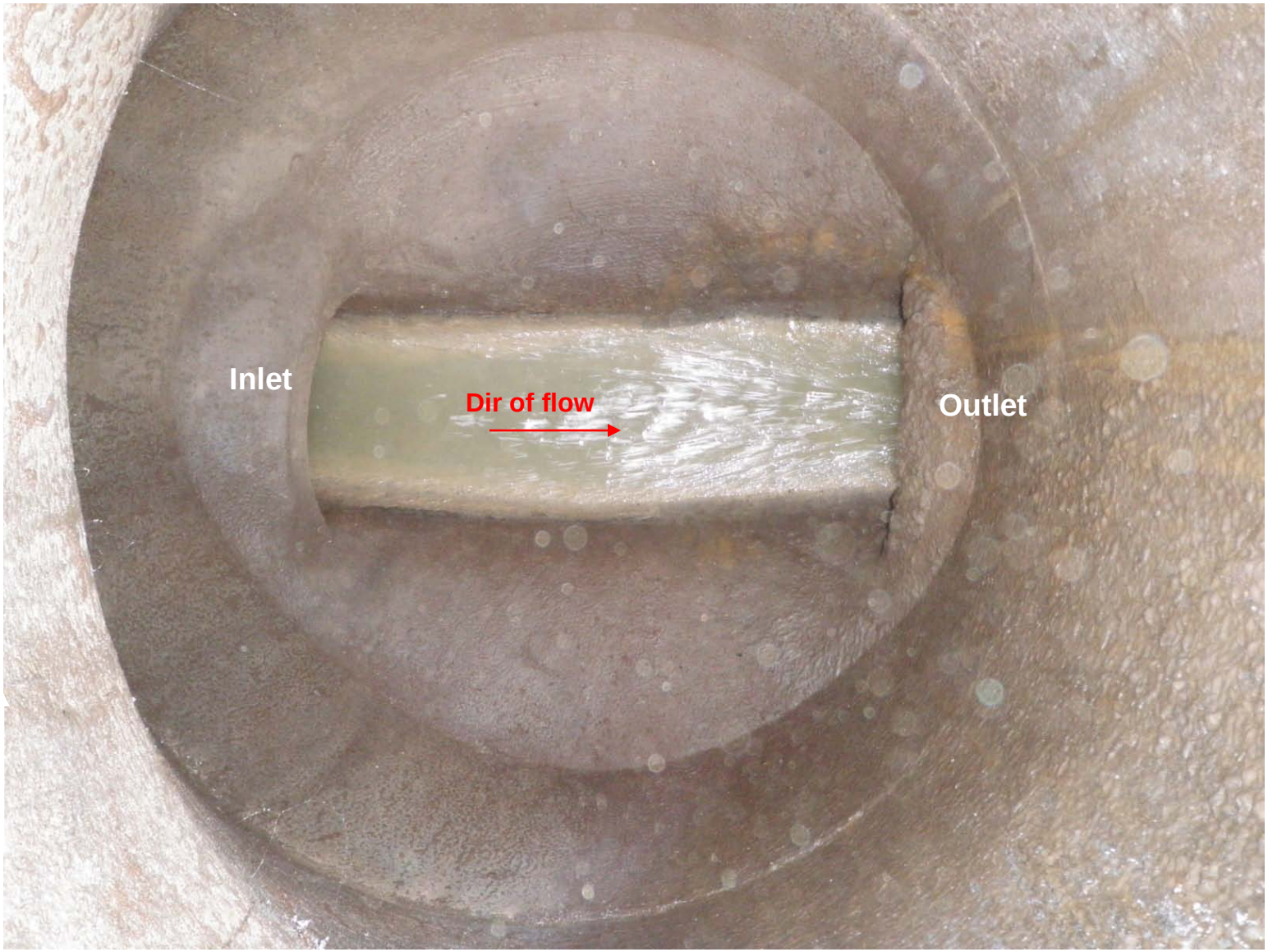
Site location

Site access looking north

Bend_008736

Site set up

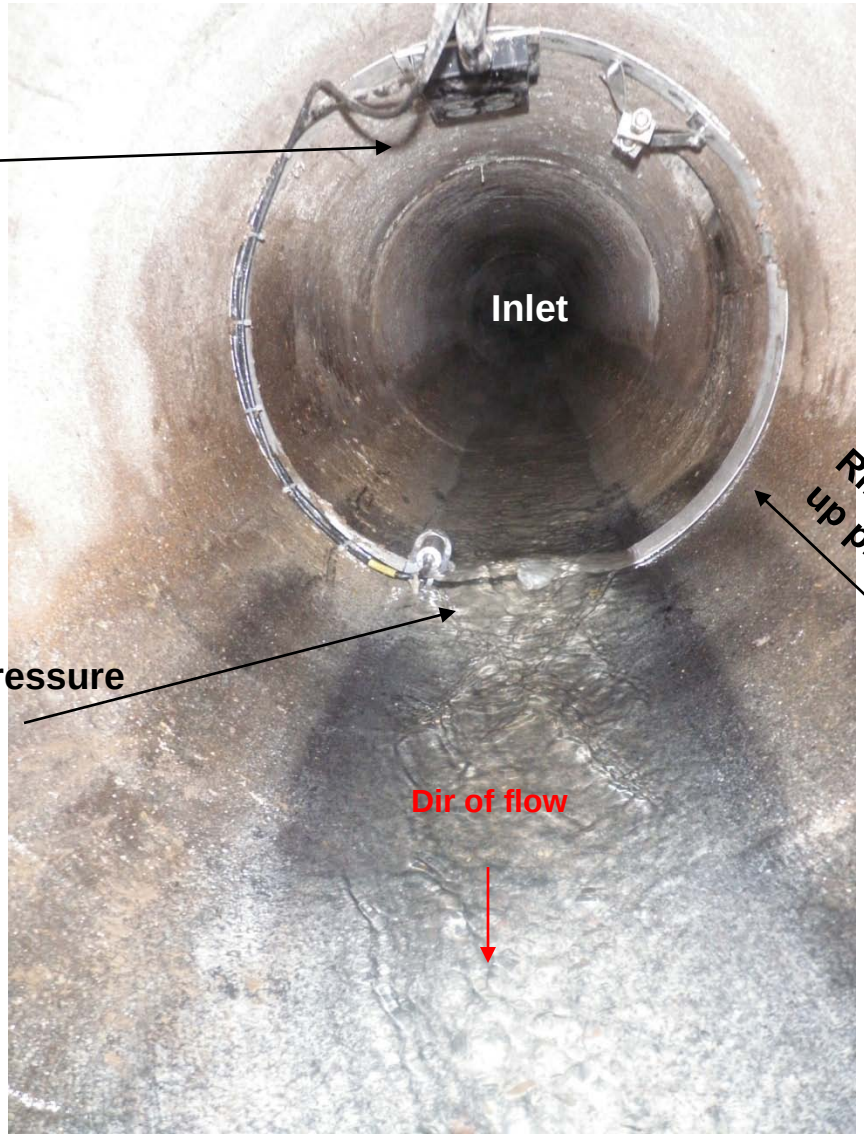
ADS ENVIRONMENTAL SERVICES®



View down manhole facing north

Bend_008736

Site set up - Modification



View of sensor placement and site hydraulics

Bend_008736

Site outlet

ADS ENVIRONMENTAL SERVICES®

View of outlet and hydraulics

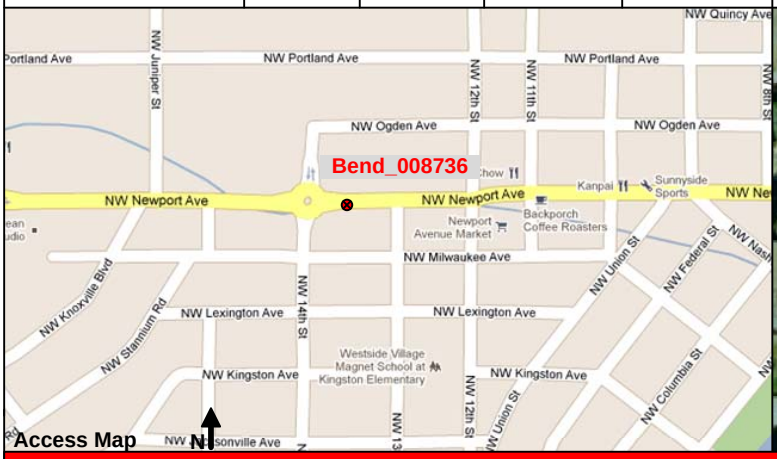
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008736	**Monitor Series:**	5000 AG
Address/Location:	1331 NW Newport Ave Bend, OR		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21704
Manhole #	CMH008736
Coordinates:	44°03' 44.21" N 121°19' 52.50" W
Pipe Height:	18.13"
Pipe Width:	18.13"
IP Address:	166.219.169.166



Access Map

Site Map

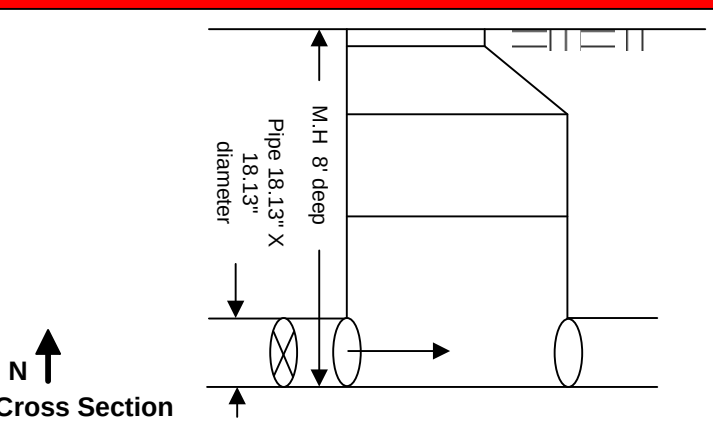
Investigation Information:

Date/Time of Investigation:	4/8/11 @ 10:18
Site Hydraulics:	Wavy, L/S influence
Upstream Input: (L/S, P/S)	No immediate input
Upstream Manhole:	2 inlets / 1 outlet
Downstream Manhole:	1 inlet / 1 outlet
Depth of Flow:	2.13" +/- .25"
Range (Air DOF):	+/- 0.25"
Peak Velocity:	3.99 FPS
Silt:	0 Inches

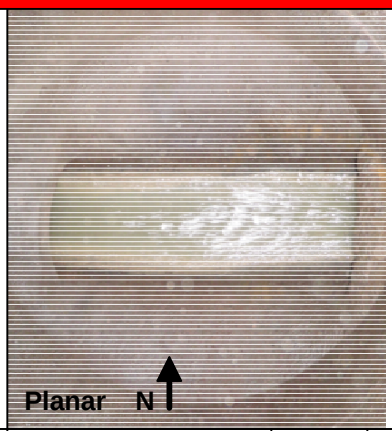
Manhole Information:

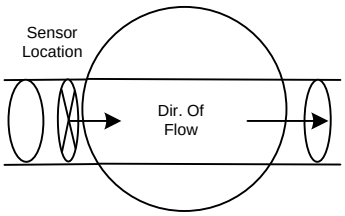
Manhole Depth:	8'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:



Cross Section





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

4/8/11: Ring installed ~5" up pipe initially. 4/22/11: Ring moved to ~16" up pipe.

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008736	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

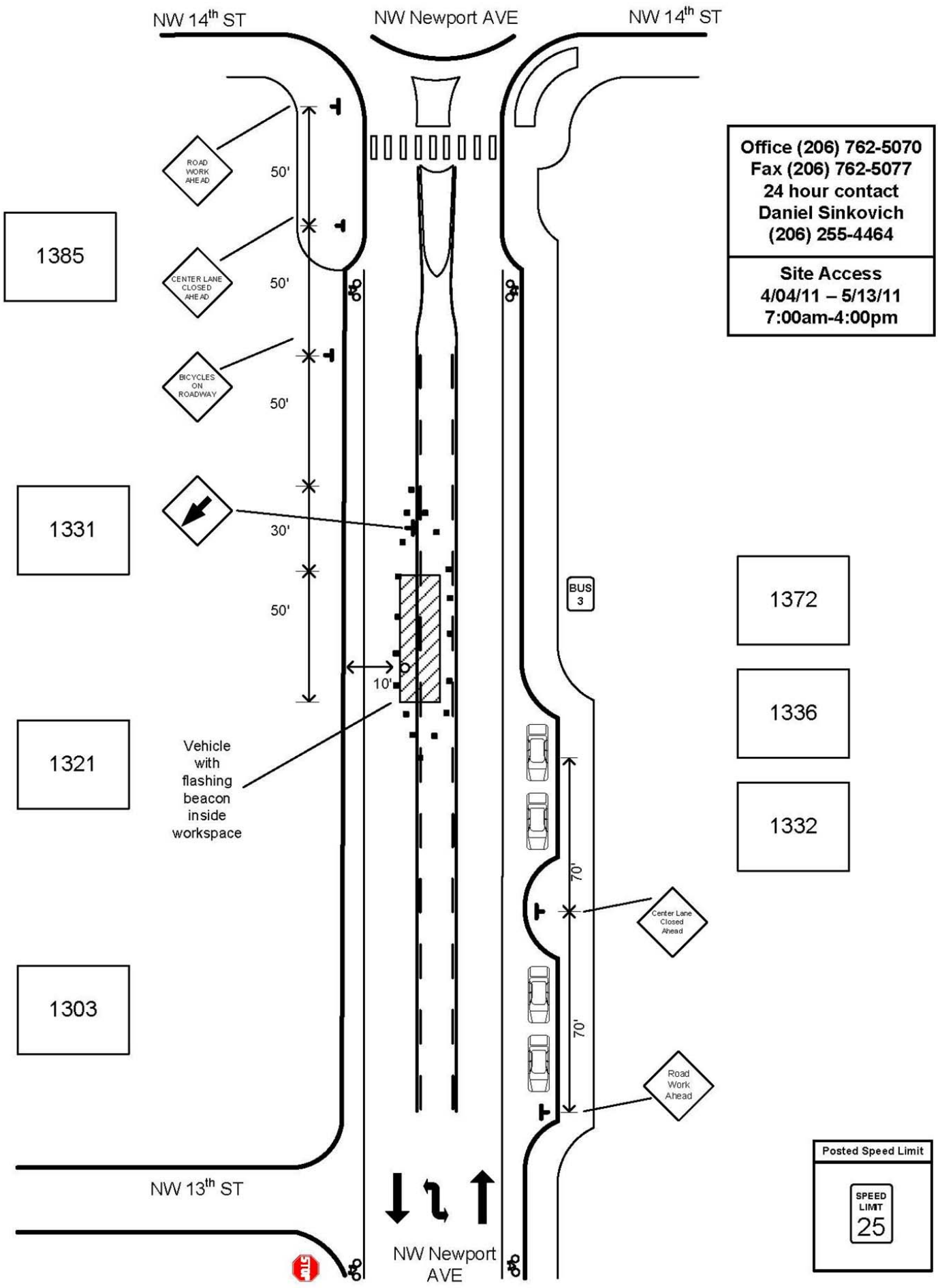
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/8/11	Date: 4/8/11

ADS ENVIRONMENTAL SERVICES® 4455 South 134th Place Tukwila, WA 98168	Site Name: Bend_008736	Address: 1331 NW Newport AVE Bend, OR	N	Drawn: 03/31/11 Submitted: 04/01/11 Approved:	Rev. 0 Not to Scale	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring



SCATTERGRAPH REPORT

Bend_008736

Flow Monitor

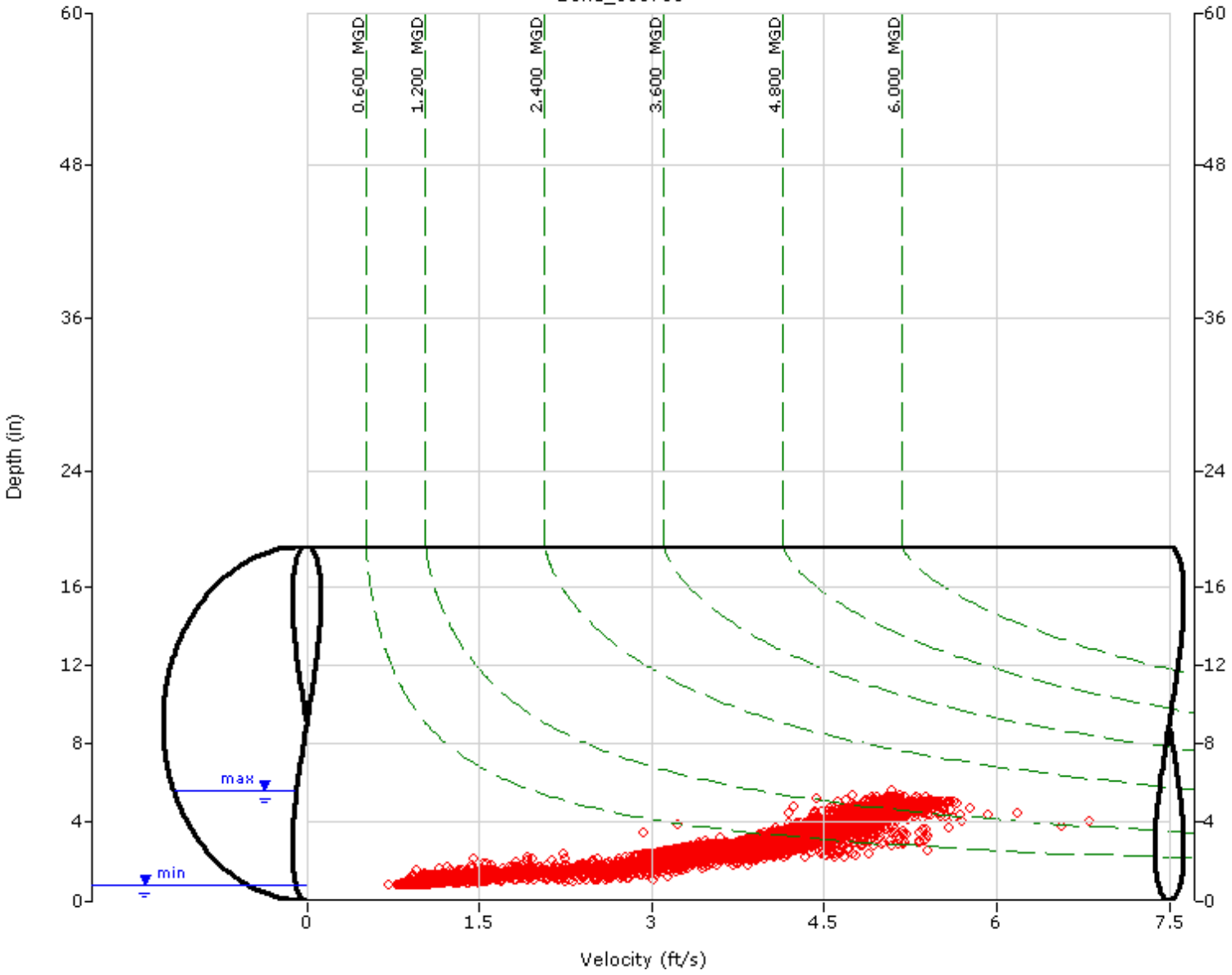
Bend_008736

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008736

Flow Monitor

Bend_008736

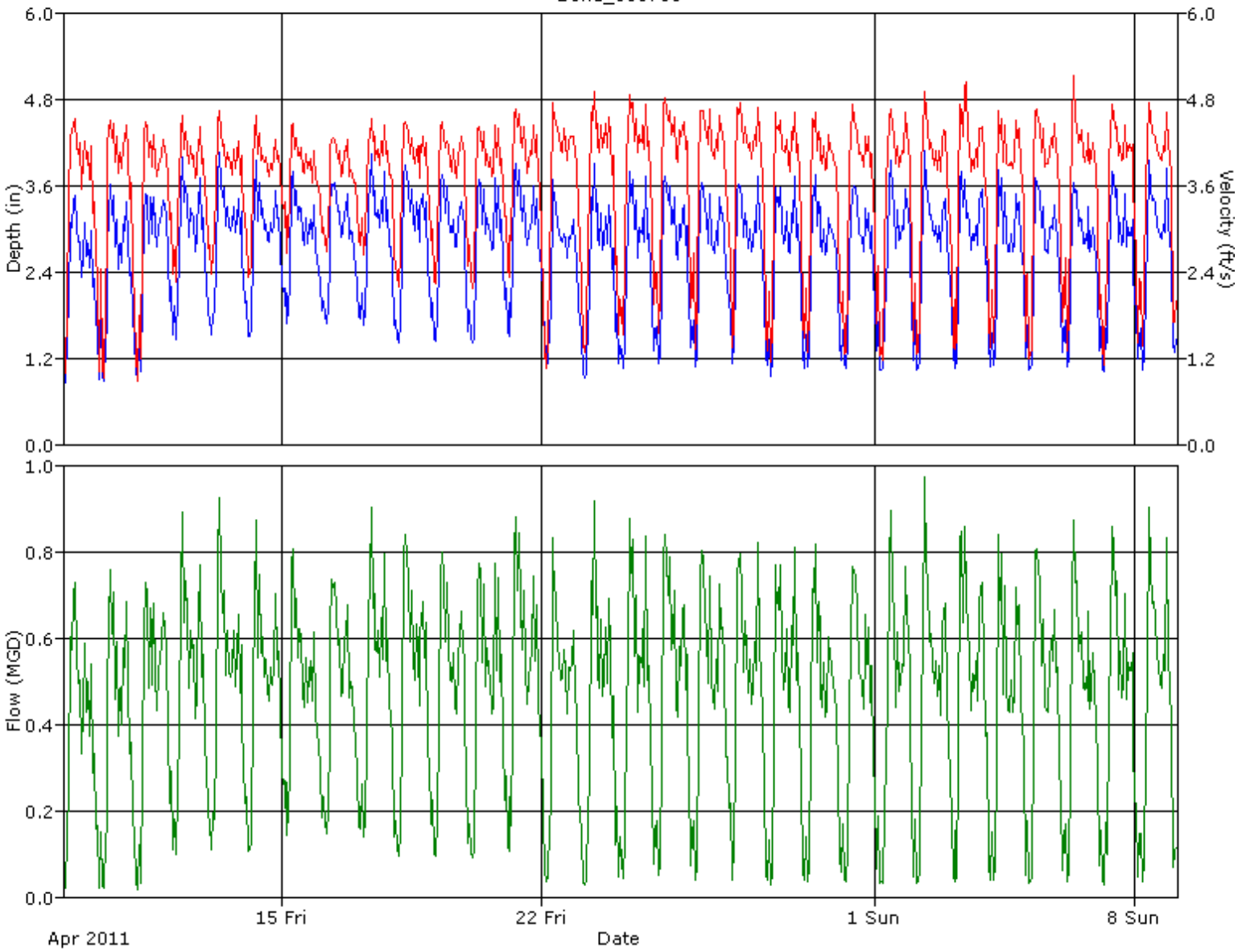
Nominal Diameter
18-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008738	
Measured Pipe Height (in)	30
Nominal Pipe Height (in)	30
Silt Level (in)	0.00

Overview

Monitoring point Bend_008738 was located in West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

During the initial scattergraph data review, it was noted that a hydraulic jump was present. It was decided to move the sensor further up the incoming pipe to mitigate this hydraulic condition. This move was completed on Friday, April 22, 2011. The scattergraph post-move indicates a repeatable data set with minimum period velocity dropouts (data points that are invalid usually due to clear and/or shallow flow conditions). Sensor parameters were adjusted to best suit flow conditions on Friday, April 22, 2011. Even with the sensor move and parameter adjustment upon review of the final flow balance with the upstream locations it appeared the the minimum flow velocity data was being understated. For this reason a best fit Manning's curve was used to reconstitute velocities below depths of approximately 4". 10% of the velocity data was reconstituted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	4.76	3.59	1.258
Minimum	2.09	2.05	0.225
Maximum	10.28	4.46	3.799
Time of Minimum	5/7/2011 5:25 AM	5/5/2011 2:05 AM	5/7/2011 5:25 AM
Time of Maximum	4/29/2011 7:45 AM	4/11/2011 9:00 AM	4/29/2011 7:45 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	99.90
Velocity	94.48
Quantity	94.27

Bend_008738

Site location

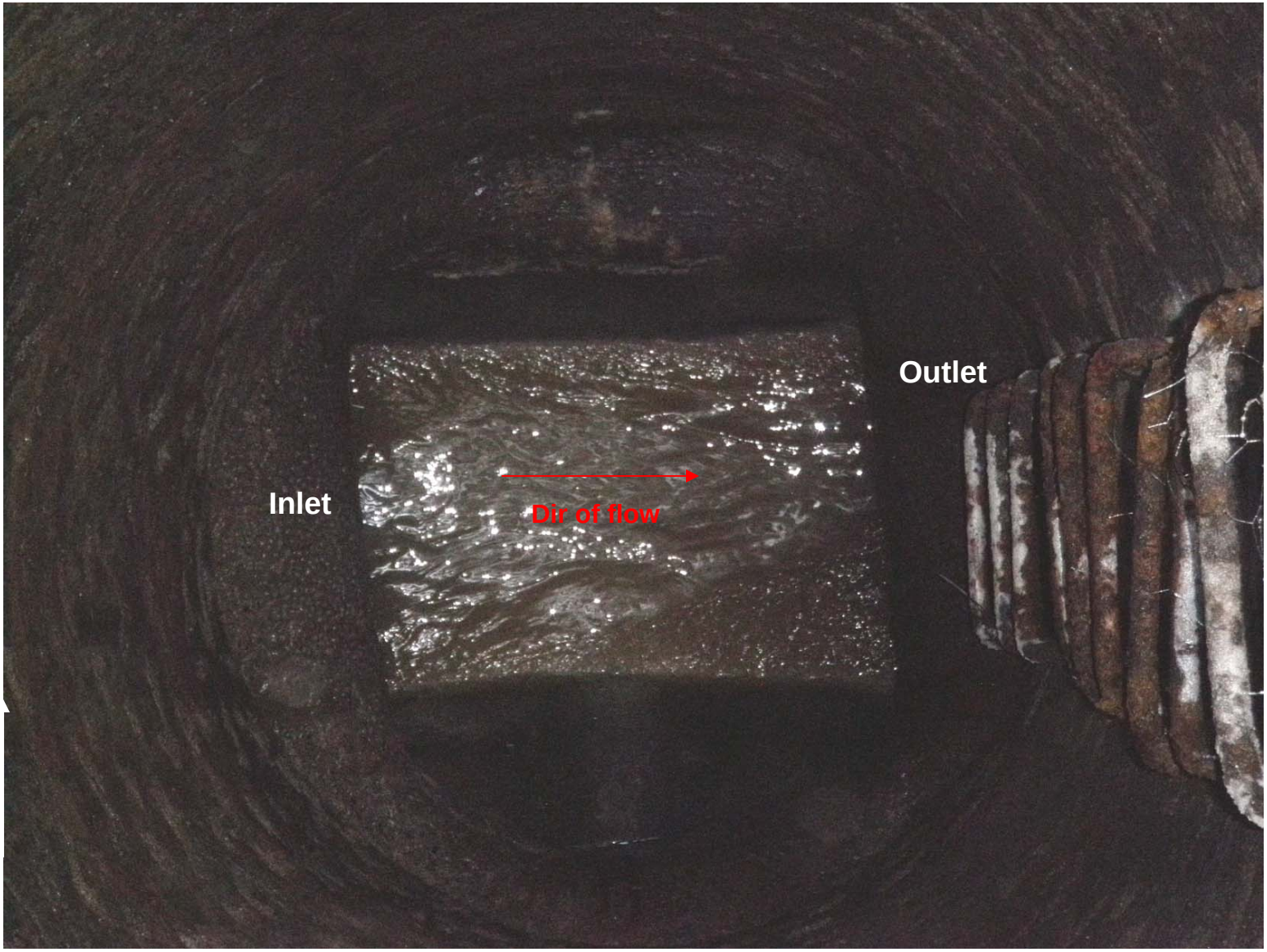
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008521

Site set up

ADS ENVIRONMENTAL SERVICES®

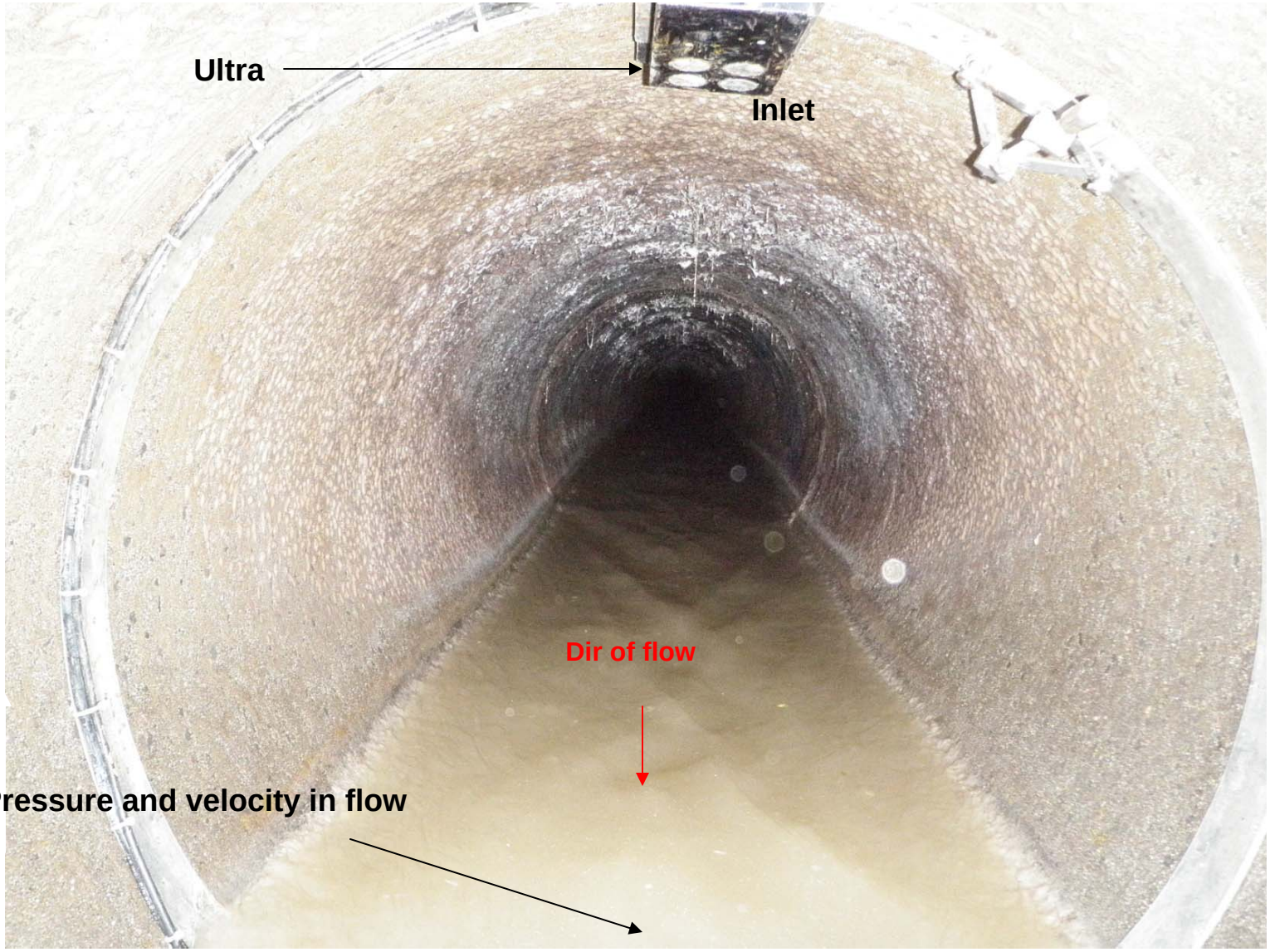


View down manhole facing north

Bend_008738

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008738

Site outlet

To be updated

View of outlet and hydraulics

Bend_008738

Site location

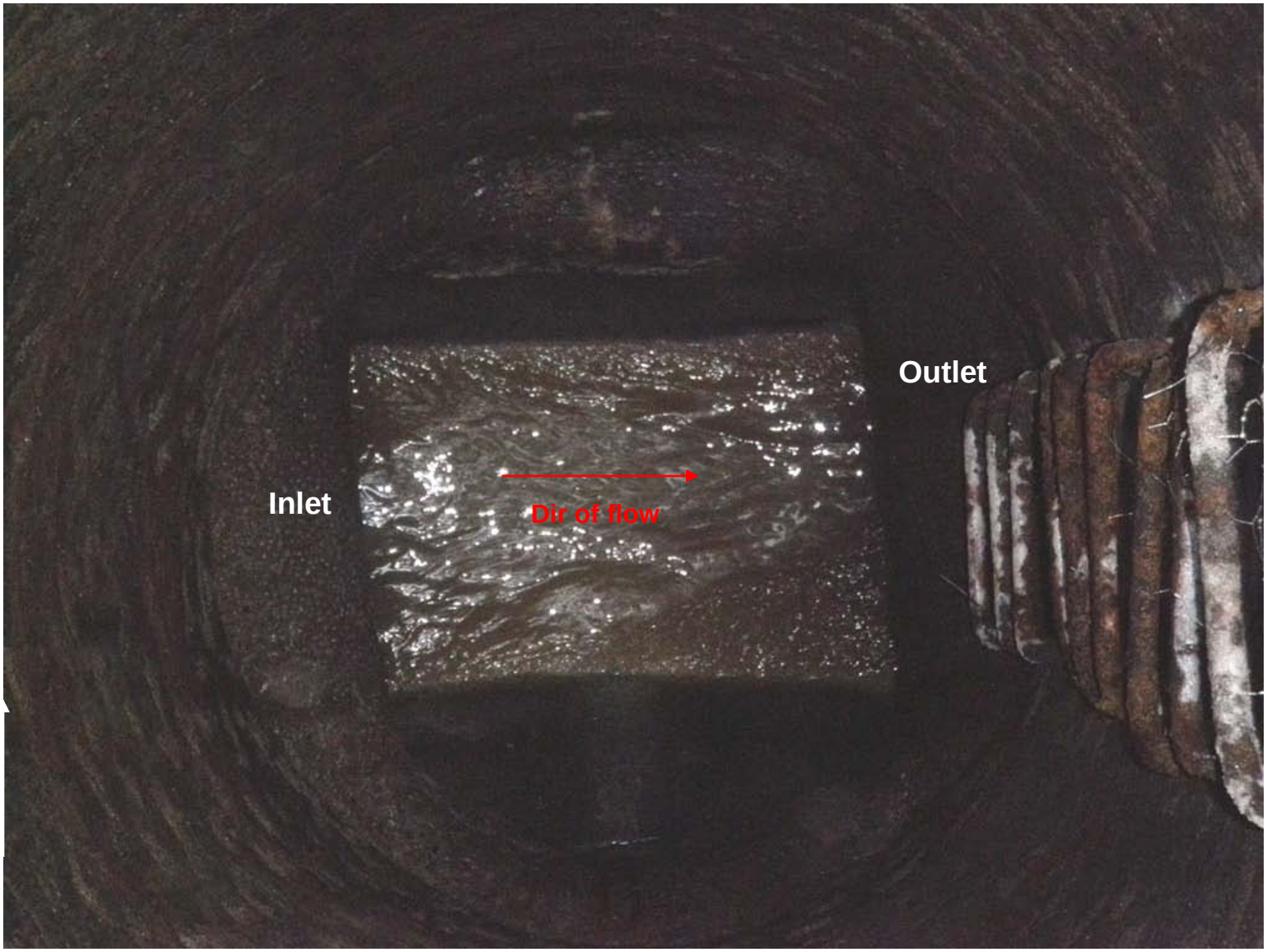
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008738

Site set up

ADS ENVIRONMENTAL SERVICES®

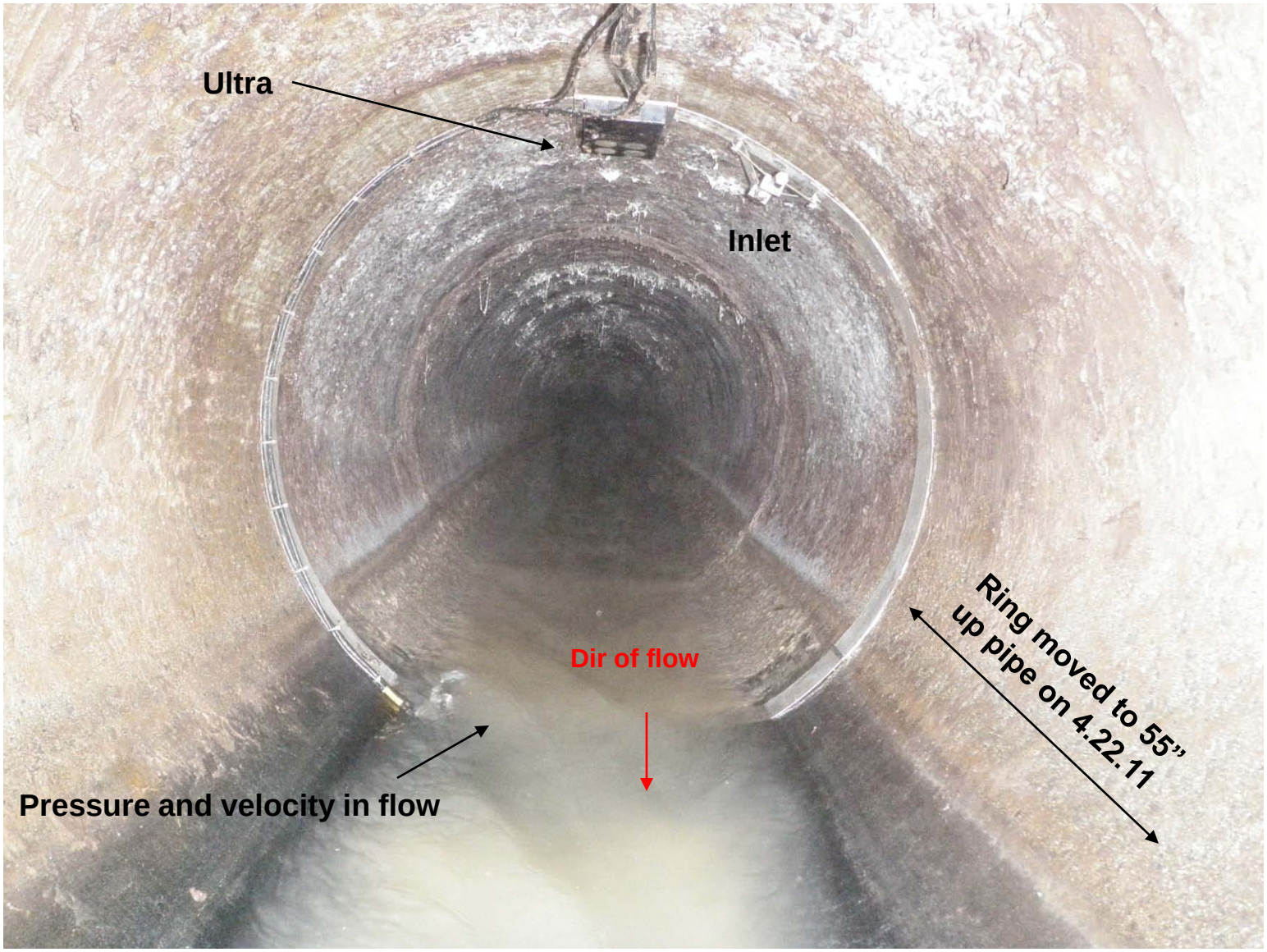


View down manhole facing north

Bend_008738

Site set up – Modification

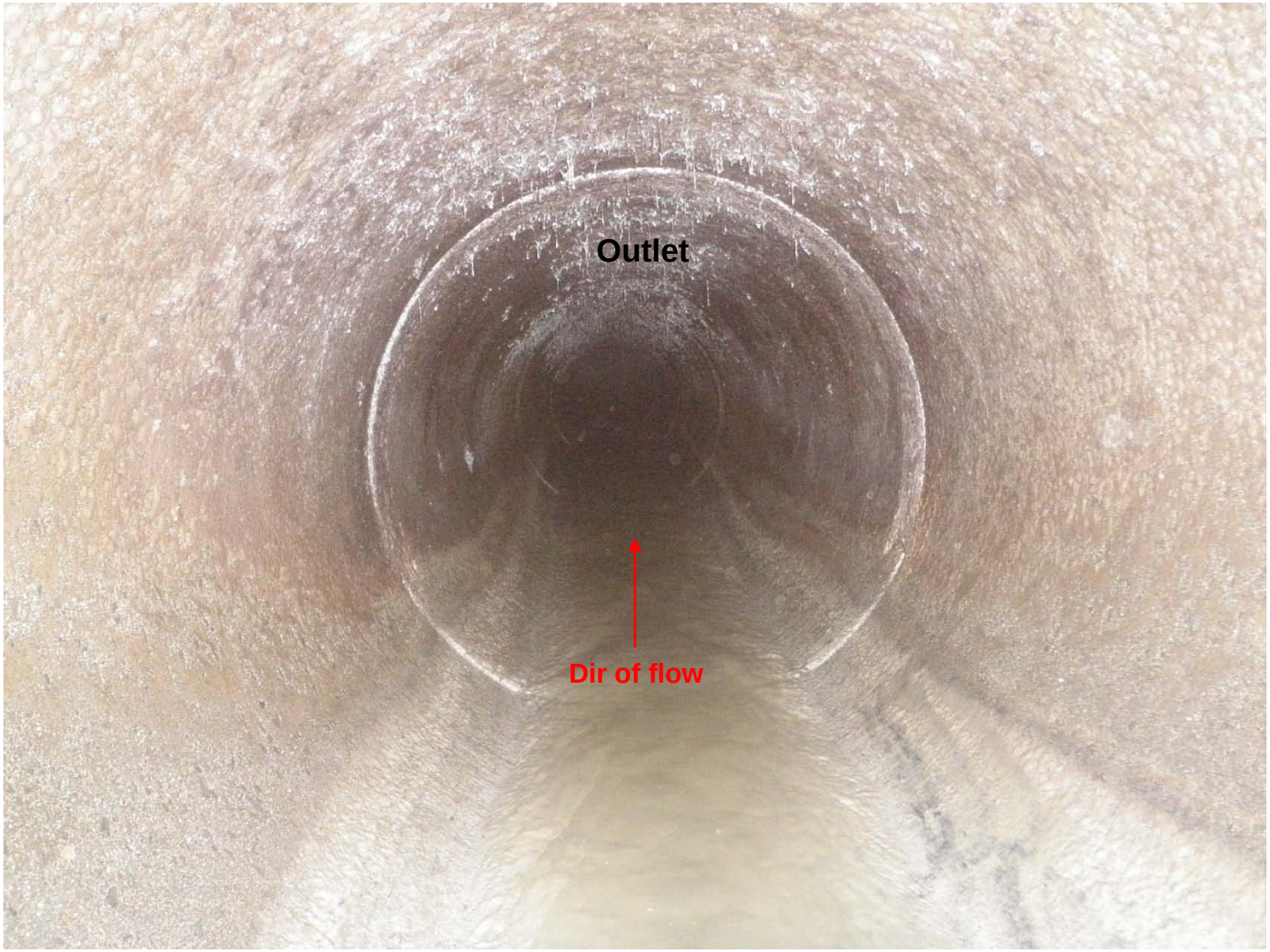
ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

Bend_008738

Site outlet



View of outlet and hydraulics

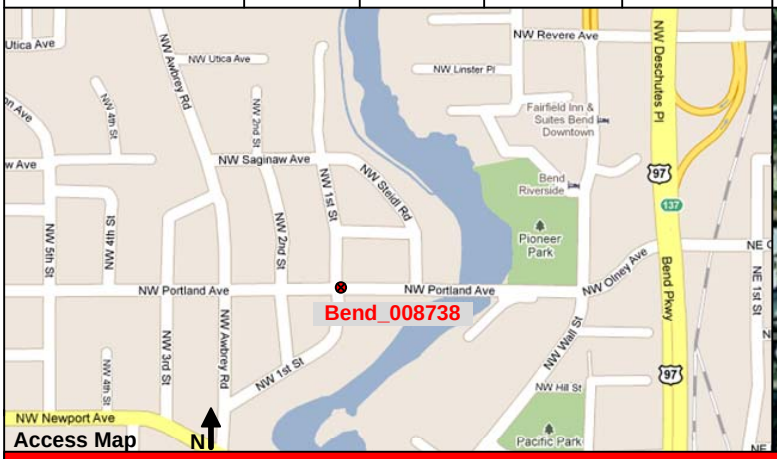
ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name:	Bend_008738	**Monitor Series:**	5000 AG
Address/Location:	94 NW Portland Ave Bend, OR		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21692
Manhole #	CMH008738
Coordinates:	44°03' 51.00" N 121°18' 48.66" W
Pipe Height:	30.00"
Pipe Width:	30.00"
IP Address:	166.219.19.29



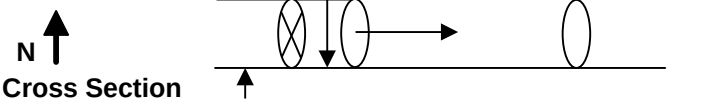
Investigation Information:

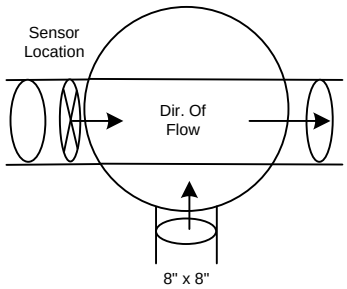
Date/Time of Investigation:	4/8/11 @ 12:16
Site Hydraulics:	Deep, Wavy
Upstream Input: (L/S, P/S)	Gravity Flow
Upstream Manhole:	3 Inlets / 1 Outlet
Downstream Manhole:	1 Inlet / 1 Outlet
Depth of Flow:	5.38" +/- .25"
Range (Air DOF):	+/- 0.25"
Peak Velocity:	4.41 FPS
Silt:	0 Inches

Manhole Information:

Manhole Depth:	22'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	Concrete / Good				
Mini System Character:	Residential [X]	Commercial [X]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:





Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None Observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

4/8/11: Ring installed ~1' up pipe initially. 4/22/11: Ring moved to ~5' up pipe.

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008738	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☐
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

No site specific hazards at this site.

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

Need to contact Cindy Hartman at the City of Bend for scheduling site visit. Chartman@ci.bend.or.us

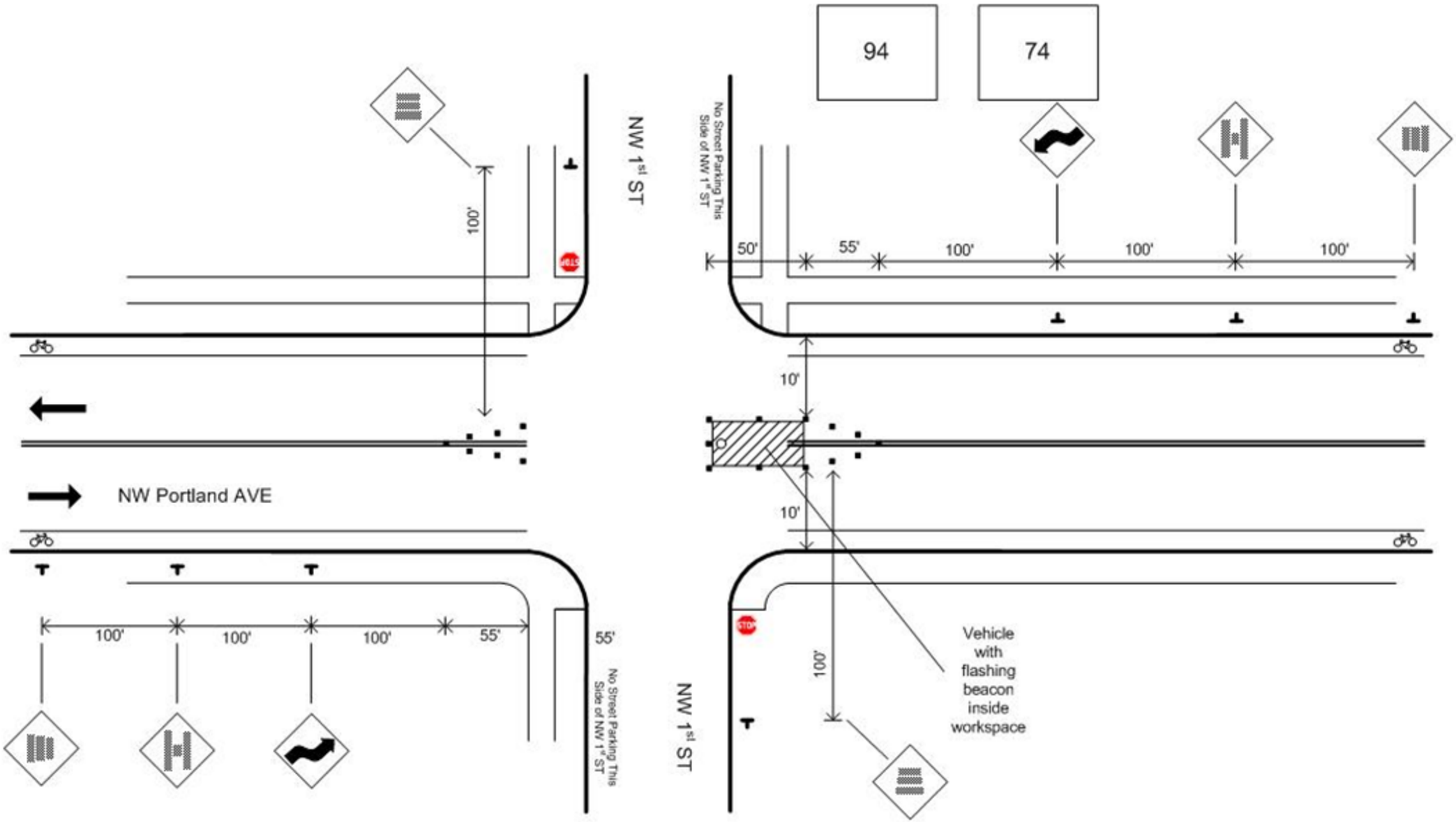
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/8/11	Date: 4/8/11

ADS ENVIRONMENTAL SERVICES®	Site Name: Bend_008738	Address: 94 NW Portland AVE Bend, OR	N	Drawn: 03/31/11	Rev. 0	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring
4455 South 134th Place Tukwila, WA 98168	MH #: CMH008738			Submitted: 04/04/11			
				Approved:	Not to Scale		



Posted Speed Limit

SPEED LIMIT 25

Site Access
4/04/11 – 5/13/11
7:00am-4:00pm

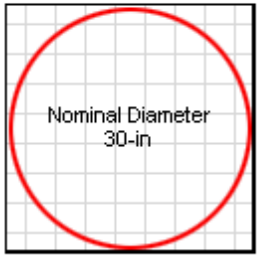
Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

SCATTERGRAPH REPORT

Bend_008738

Flow Monitor

Bend_008738

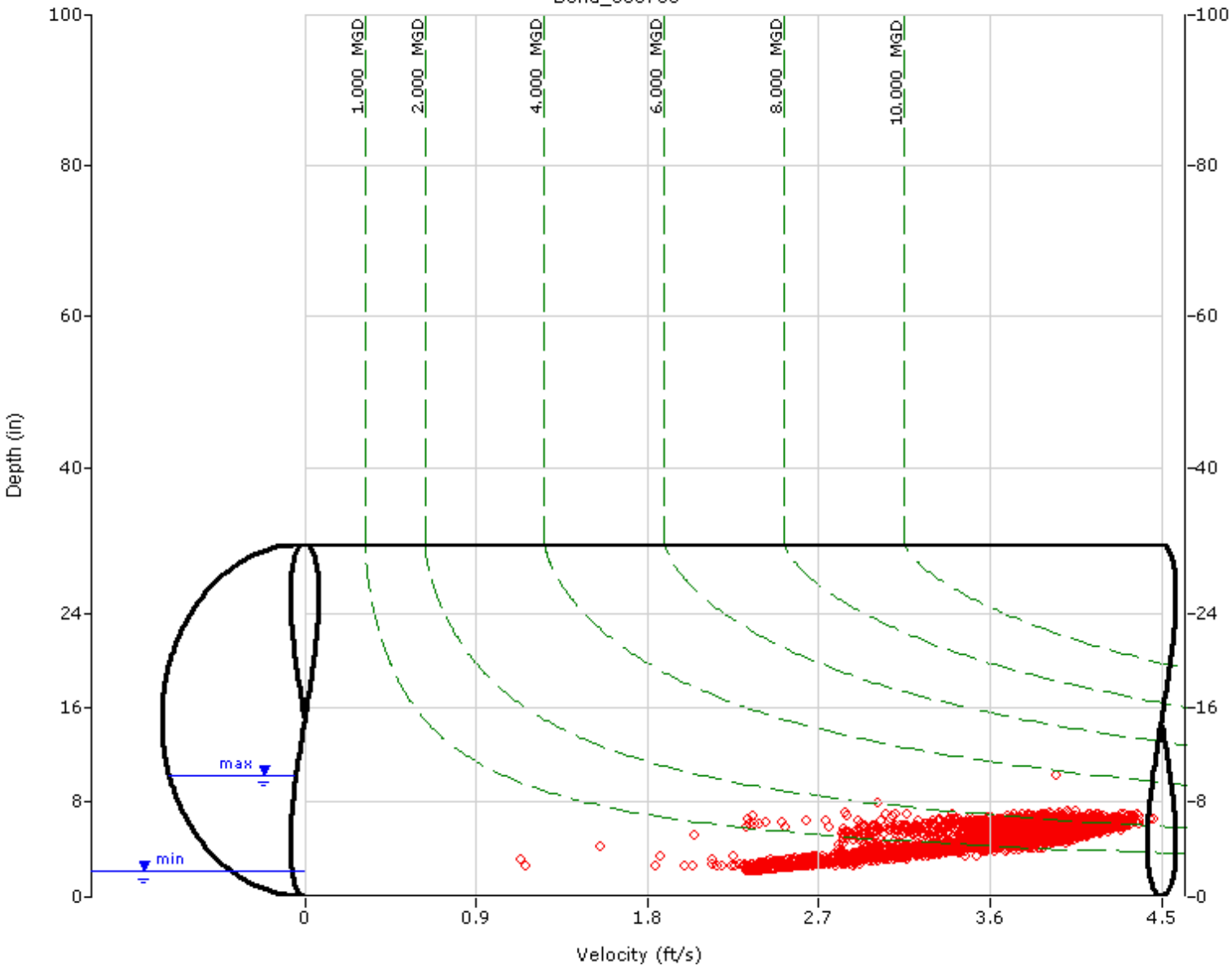


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008738

Flow Monitor

Bend_008738

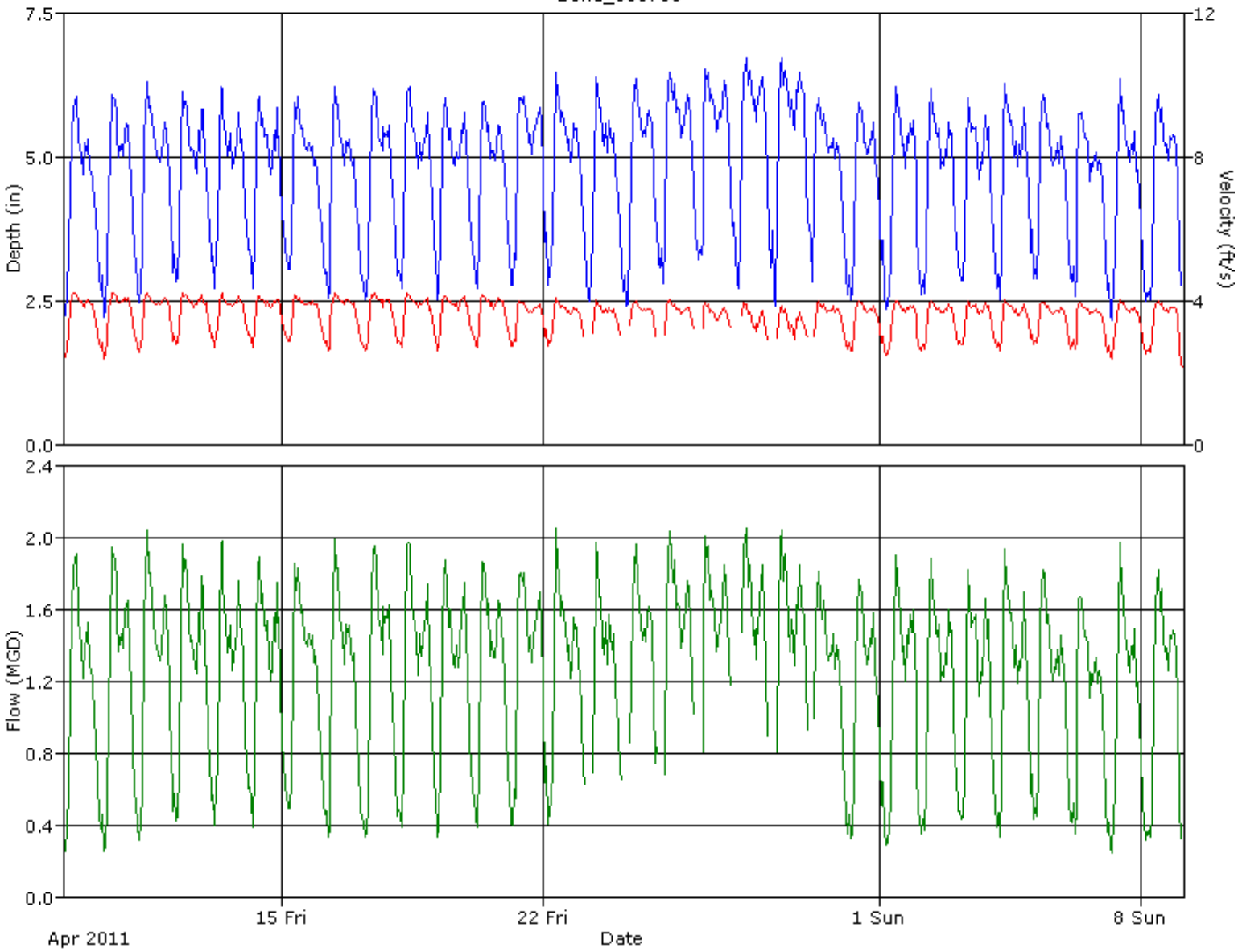
Nominal Diameter
30-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_008986	
Measured Pipe Height (in)	9.88
Nominal Pipe Height (in)	10
Silt Level (in)	0.00

Overview

Monitoring point Bend_008986 was located in the West of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with a slight hydraulic shift, that is most likely due to shifting debris.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	1.77	1.03	0.049
Minimum	0.64	0.14	0.002
Maximum	3.59	1.81	0.202
Time of Minimum	4/20/2011 2:00 AM	4/17/2011 3:55 AM	4/17/2011 3:55 AM
Time of Maximum	5/4/2011 9:20 PM	4/15/2011 8:05 AM	5/4/2011 9:20 PM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	100.00
Quantity	100.00

Bend_008986

Site location

ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_008986

Site set up

ADS ENVIRONMENTAL SERVICES®

View down manhole facing north

Bend_008986

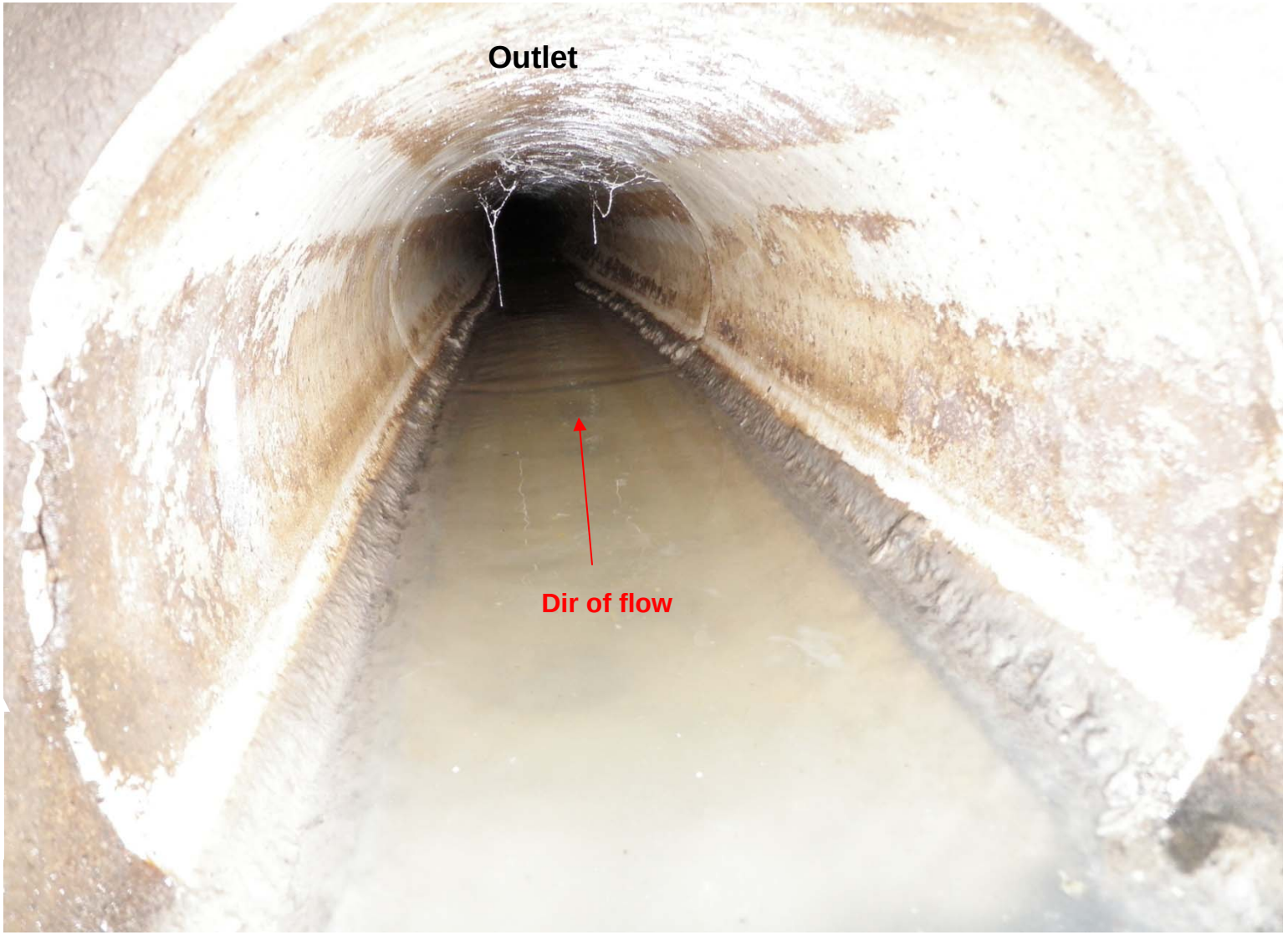
Site set up

ADS ENVIRONMENTAL SERVICES®

View of sensor placement and site hydraulics

Bend_008986

Site outlet



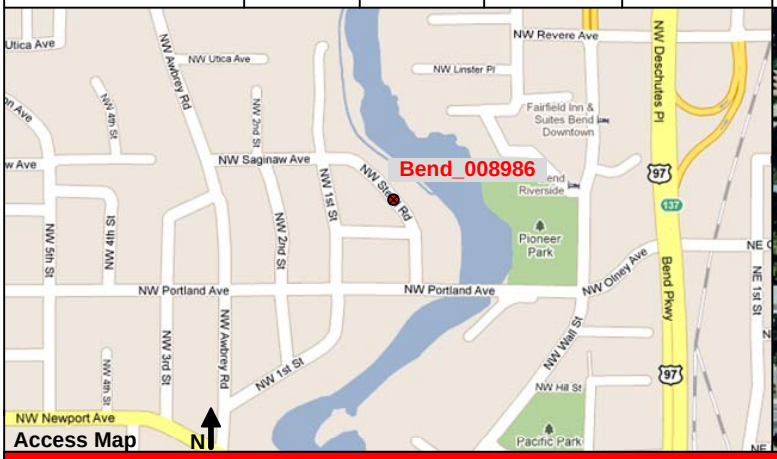
View of outlet and hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW

Site Name: Bend_008986	**Monitor Series:** 5000 AG	**Monitor S/N:**	20093
Address/Location:	1715 NW Steidl Rd Bend, OR	**Manhole #**	CMH008986
		Coordinates:	44° 03' 54.59" N 121° 18' 44.02" W
		Pipe Height:	9.88"
Access: Drive	**Type of System:** Sanitary [X] Storm [ ] Combined [ ]	**Pipe Width:**	9.88"
		IP Address:	166.219.48.52



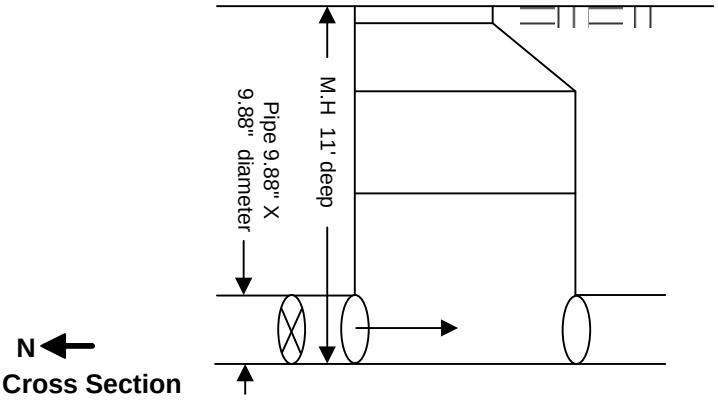
Investigation Information:

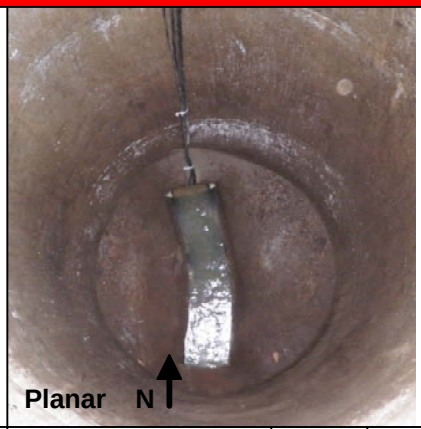
Date/Time of Investigation:	4/4/11 @ 11:27
Site Hydraulics:	Low, Slow, Wavy
Upstream Input: (L/S, P/S)	Gravity Flow
Upstream Manhole:	1 Input / 1 Output
Downstream Manhole:	1 Input / 1 Output
Depth of Flow:	2.00" +/- .25"
Range (Air DOF):	+/- 0.25"
Peak Velocity:	1.18 FPS
Silt:	0 Inches

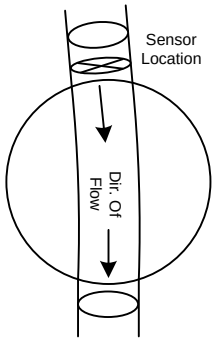
Manhole Information:

Manhole Depth:	11'				
Manhole Material / Condition	Concrete / Good				
Pipe Material / Condition:	PVC / Good				
Mini System Character:	Residential [X]	Commercial [ ]	Industrial [ ]	Trunk [ ]	
Telephone Information:	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:







Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Standard	Trunk	[ ]	[X]	[ ]	
Sensors Devices:	Ultra, Velocity, Pressure	Lift / Pump Station	[ ]	[X]	[ ]	
Surcharge Height:	Feet	WWTP	[ ]	[X]	[ ]	
Rain Gauge Zone:	Bend_SGRG	Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_008986	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

Site has no usable rungs. Manhole access by tripod only.

*** Site Classification**

	Class	Description
☐	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☒	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

One lane road requiring special scheduling with flaggers.

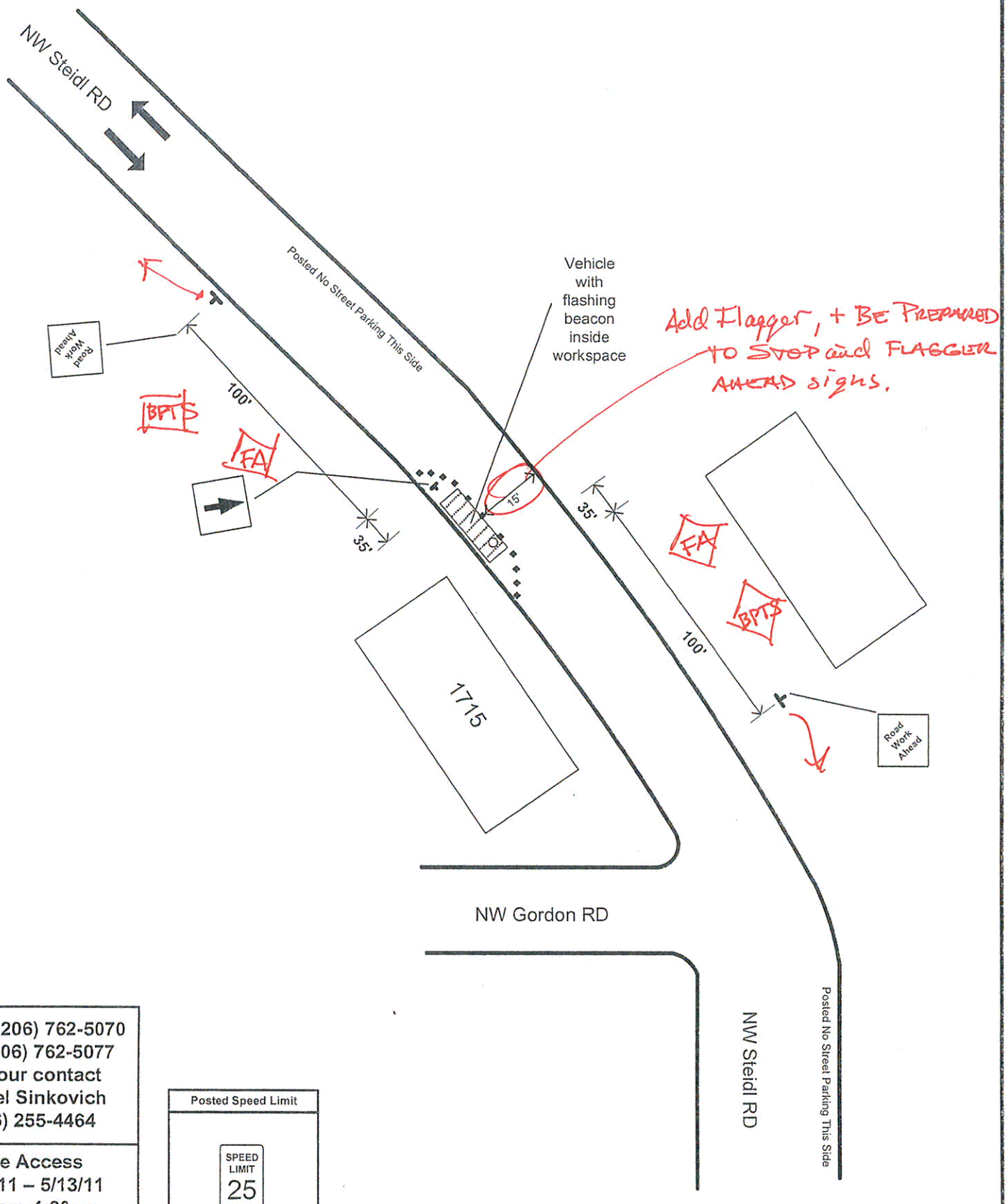
Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☐ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☒ This site requires a special Traffic Control Plan which is attached

Approved	**Reviewed**
Field Mgr Name: Sean Winder	Project Mgr Name: Mike Pina
Signature: Signed copy can be obtained from ADS	Signature: Signed copy can be obtained from ADS
Date: 4/4/11	Date: 4/4/11

ABS ENVIRONMENTAL SERVICES	Site Name: Bend_008986	Address: 1715 NW Steidl RD Bend, OR	N	Drawn: 04/01/11	Rev. 0	Pg. 1 of 1	Bend, OR Temporary Flow Monitoring
4455 South 134th Place Tukwila, WA 98168	MH #: CMH008986			Submitted: 04/01/11			
				Approved:	Not to Scale		



Office (206) 762-5070
Fax (206) 762-5077
24 hour contact
Daniel Sinkovich
(206) 255-4464

Site Access
4/04/11 – 5/13/11
7:00am-4:00pm

Posted Speed Limit

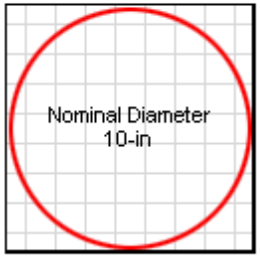
SPEED LIMIT 25

SCATTERGRAPH REPORT

Bend_008986

Flow Monitor

Bend_008986

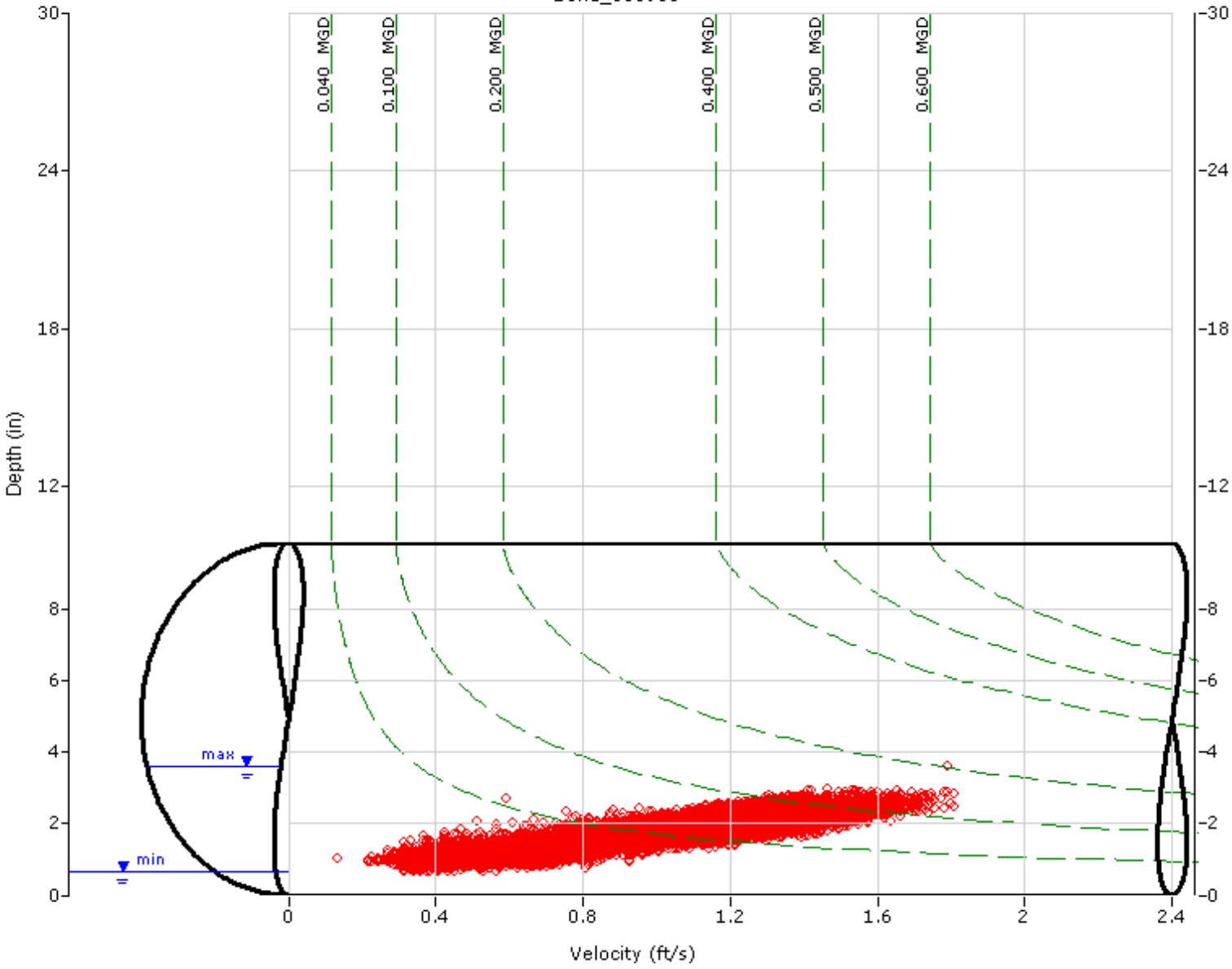


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



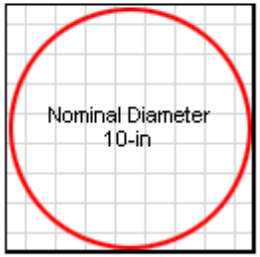
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_008986

Flow Monitor

Bend_008986

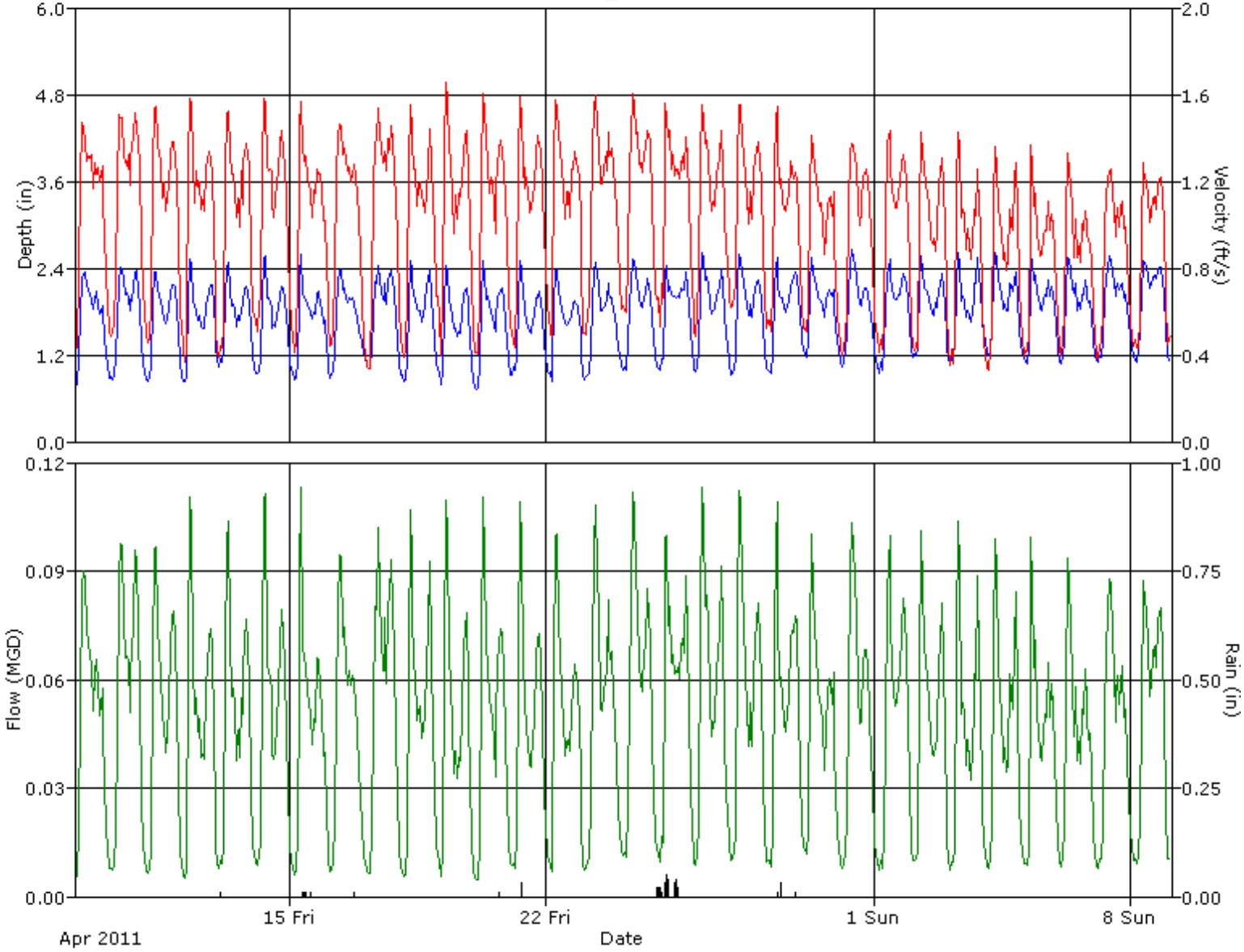


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_009216	
Measured Pipe Height (in)	8
Nominal Pipe Height (in)	8
Silt Level (in)	0.00

Overview

Monitoring point Bend_009216 was located in the Southwest of Bend (see attached site report for details).

The hydrograph indicates a residential diurnal flow pattern with lift station influence during the period Saturday, April 09, 2011 to Sunday, May 08, 2011 .

The scattergraph for this location indicates a repeatable data set with regular velocity dropouts due to clear and/or shallow flow conditions. Sensor parameters were adjusted to best suit flow conditions on Wednesday, April 27, 2011 and returned to their original settings on Monday, May 02, 2001 after sensor readings did not improve. A depth versus velocity best fit curve was created from the April 9 - April 22, 2011 data set and used to reconstitute the zero velocities down to an approximate depth of 0.4", the remainder were flagged. 11% of the velocity data was reconstituted.

The depth and velocity measurements recorded by the flow monitor are consistent with field confirmations conducted to date and support the relative accuracy of the flow monitor at this location.

Observations

The average flow depth, velocity, and quantity data values recorded during Saturday, April 09, 2011 to Sunday, May 08, 2011 , along with the recorded minimum and maximum data values, are provided in the following table. The minimum and maximum values recorded in the tables are based on a 5-minute sample rate.

Observed Flow Conditions			
Item	Depth (in)	Velocity (ft/s)	Quantity (MGD)
Average	0.69	5.94	0.074
Minimum	0.09	1.30	0.001
Maximum	1.76	11.63	0.342
Time of Minimum	5/2/2011 2:15 AM	4/27/2011 5:05 AM	5/2/2011 2:15 AM
Time of Maximum	4/9/2011 11:45 AM	5/1/2011 11:55 PM	4/9/2011 11:45 AM

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage. Based upon the quality and consistency of the recorded flow depth and velocity data, the Continuity equation was used to calculate the flow rate.

Percent Uptime (%)	
Depth	100.00
Velocity	99.79
Quantity	99.79

Bend_009216

Site location

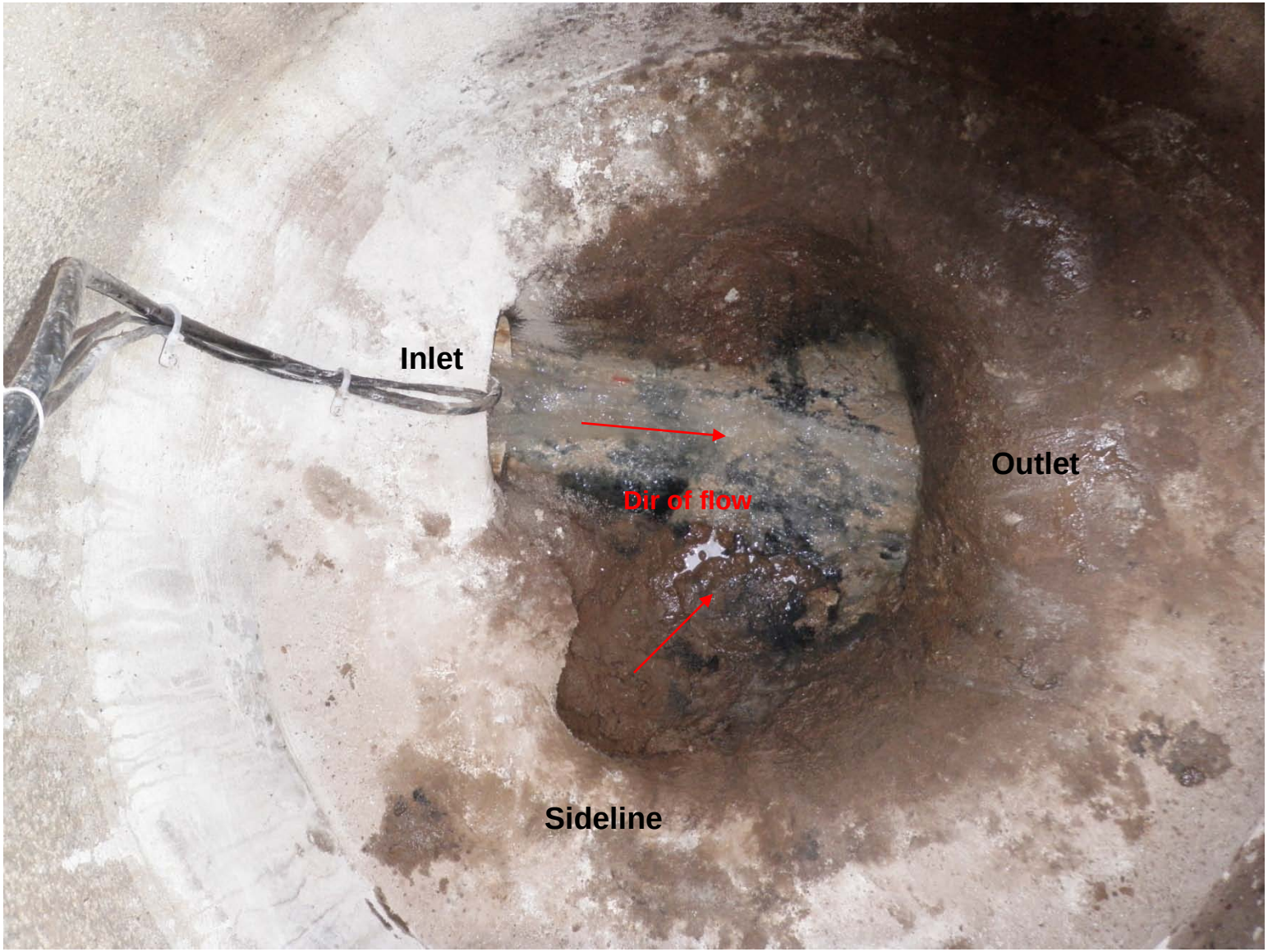
ADS ENVIRONMENTAL SERVICES®

Site access looking north

Bend_009216

Site set up

ADS ENVIRONMENTAL SERVICES®

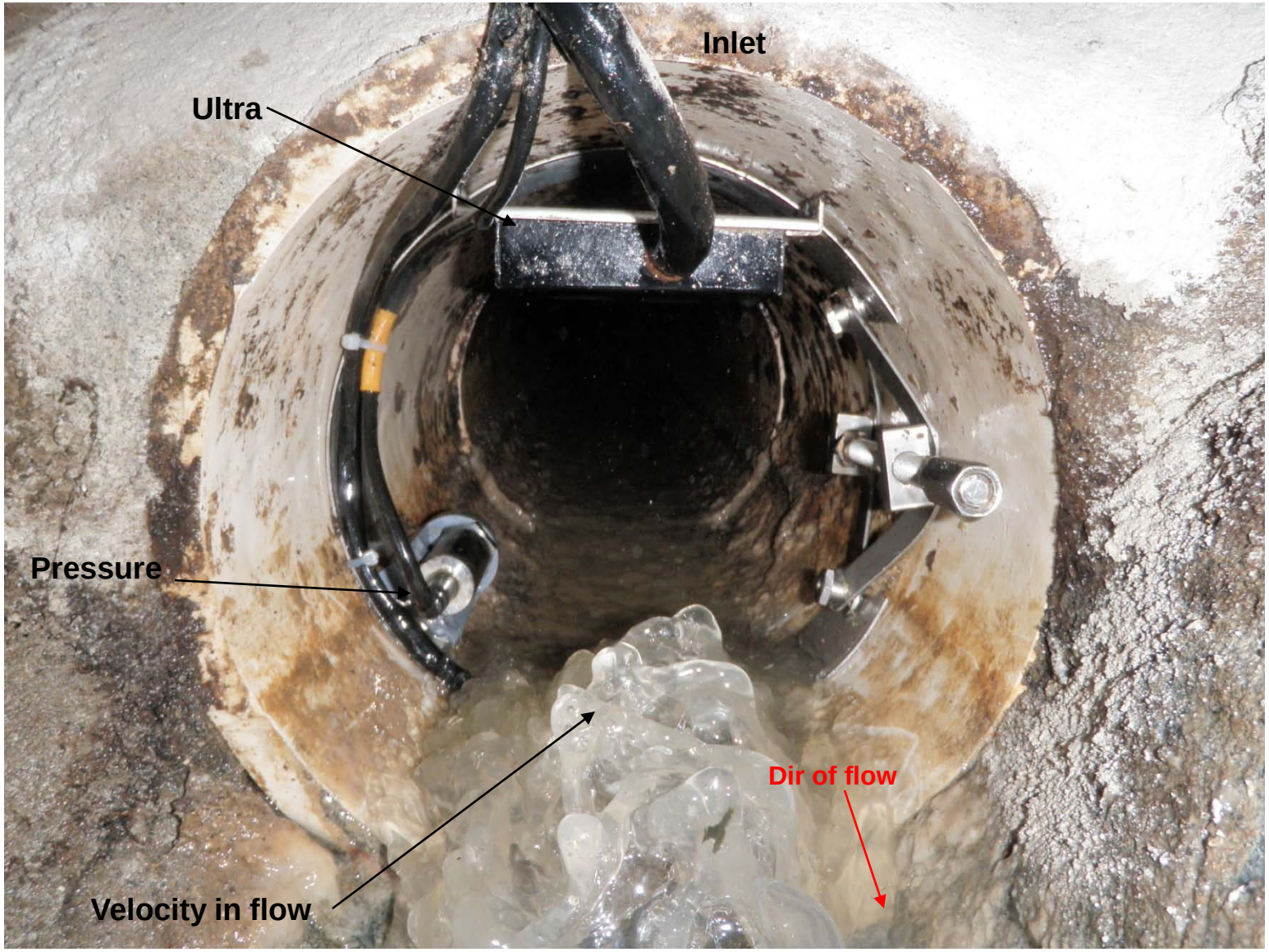


View down manhole facing north

Bend_009216

Site set up

ADS ENVIRONMENTAL SERVICES®



View of sensor placement and site hydraulics

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		

Site Name:	Bend_009216	**Monitor Series:**	5000 AG
Address/Location:	SW Century Dr. In ravine due West of play ground in Mt Bachelor Village.		
Access:	Drive	**Type of System:**	Sanitary [X] Storm [ ] Combined [ ]

Monitor S/N:	21766
Manhole #	CMH009216
Coordinates	44° 1'59.16"N 121°20'16.42"W
Pipe Height:	8.00"
Pipe Width:	7.88"
IP Address:	166.219.51.175

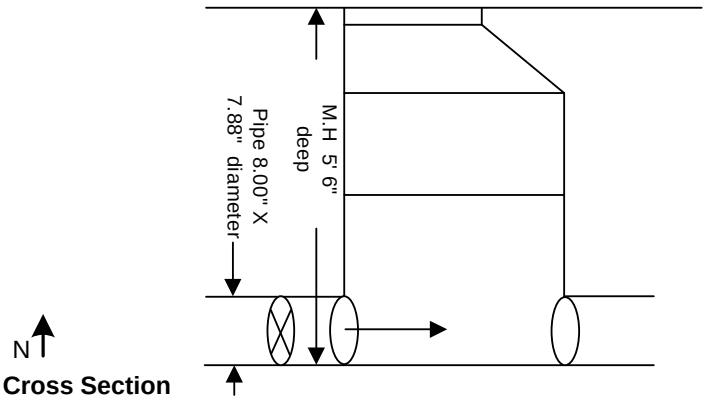
Investigation Information:

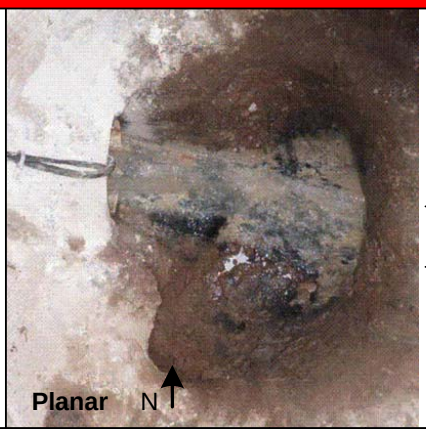
Date/Time of Investigation:	3/24/11 @ 15:48
Site Hydraulics:	Low, Fast, Ripples
Upstream Input: (L/S, P/S)	L/S (within 50' U/S)
Upstream Manhole:	Force main
Downstream Manhole:	2 inlets / 1 outlet
Depth of Flow:	.75" +/- .25"
Range (Air DOF):	+/- 0.25"
Peak Velocity:	~ 8.0 FPS
Silt:	0 Inches

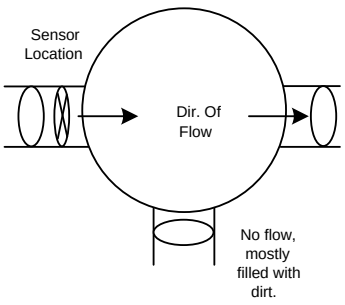
Manhole Information:

Manhole Depth:	5' 6"
Manhole Material / Condition	Concrete / Good
Pipe Material / Condition:	PVC / Good
Mini System Character:	Residential [X] Commercial [ ] Industrial [ ] Trunk [ ]
Telephone Information:	Doesn't apply
Access Pole #:	Doesn't apply
Distance From Manhole:	Doesn't apply Feet
Road Cut Length:	Doesn't apply Feet
Trench Length:	Doesn't apply Feet

Other Information:







Installation Information	
Installation Type:	Standard
Sensors Devices:	Ultra, Velocity, Pressure
Surcharge Height:	None observed
Rain Gauge Zone:	Bend_SGRG

Backup	Yes	No	?	Distance
Trunk	[ ]	[X]	[ ]	
Lift / Pump Station	[ ]	[X]	[ ]	
WWTP	[ ]	[X]	[ ]	
Other	[ ]	[X]	[ ]	

Additional Site Information / Comments:

First MH downstream of L/S force main input.
5psi Pressure used.

Flow Monitoring Site Safety Plan

Project Name:	Bend Oregon TFM	Site ID:	Bend_009216	Site Classification:	(see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

* Hazards found at this site (Discuss checked items below)

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☒
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

* Hazards found at this site (Discuss checked items below)

Site doesn't have any rungs access in and out of manhole must be performed by tripod only

* Site Classification

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. Must be approved by Corporate Safety Manager

* Site Specific Safety Requirements. Must Complete for any site Class 2 & Above

No site specific safety requirements found at this site.

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan is to be used at this work site
☐ This site requires a special Traffic Control Plan which is attached

Approved		Reviewed	
Field Mgr Name:	Sean Winder	Project Mgr Name:	Mike Pina
Signature:	Signed copy can be obtained from ADS	Signature:	Signed copy can be obtained from ADS
Date:	3/24/11	Date:	3/24/11

SCATTERGRAPH REPORT

Bend_009216

Flow Monitor

Bend_009216

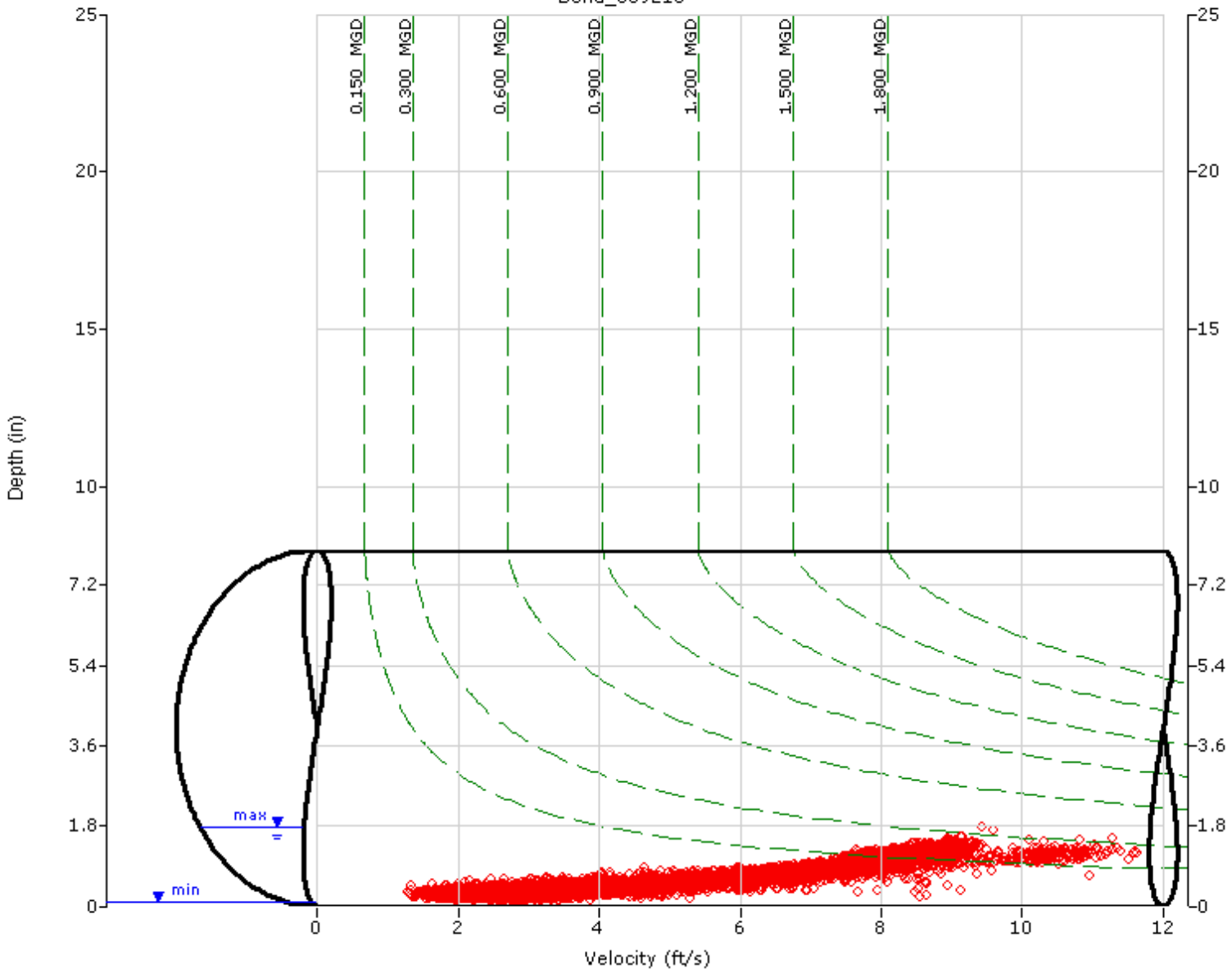
Nominal Diameter
8-in

Report Period

4/9/2011
To
5/9/2011

Legend

- Depth - Velocity
- Iso-Q™
- Silt
- Min-Max Depth



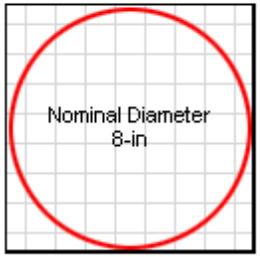
ADS ENVIRONMENTAL SERVICES

HYDROGRAPH REPORT

Bend_009216

Flow Monitor

Bend_009216

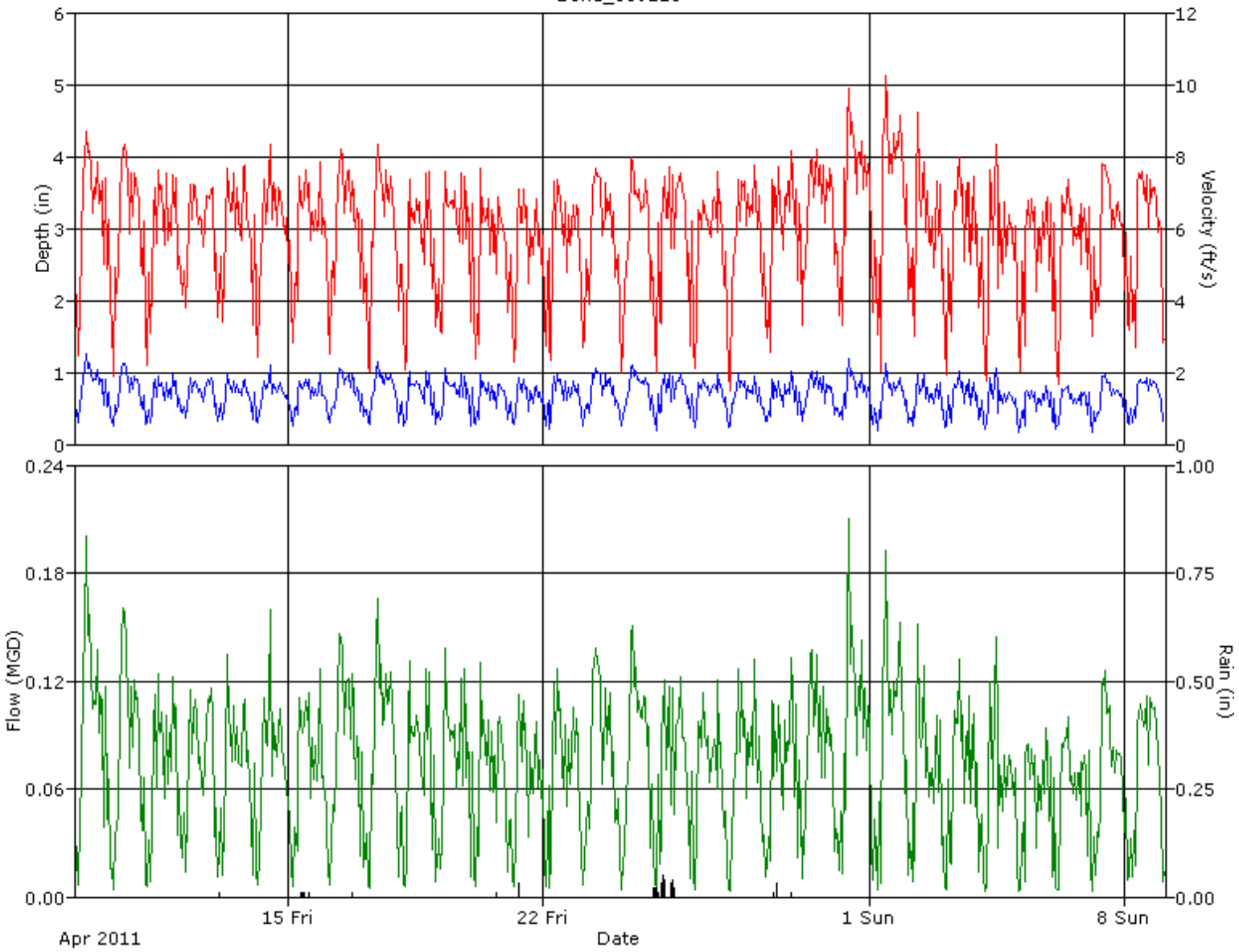


Report Period

4/9/2011
To
5/9/2011

Legend

- Depth
- Velocity
- Quantity
- Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_JRRG

Overview

Rain gauge Bend_JRRG was located in the North of Bend (see attached site report for details).

Observations

The total rainfall recorded from Saturday, April 09, 2011 to Sunday, May 08, 2011 , is provided in the following table. The majority of this rain fell on April 25, 2011.

Observed Rainfall	
Item	Rainfall (in)
Total	0.22

Data Quality

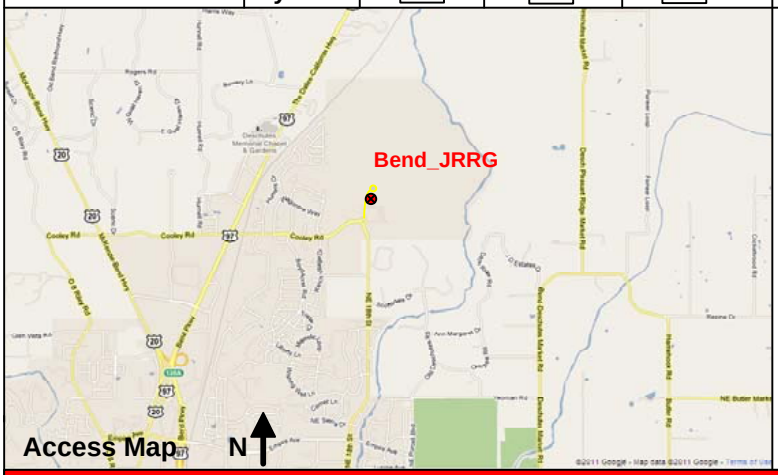
The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage.

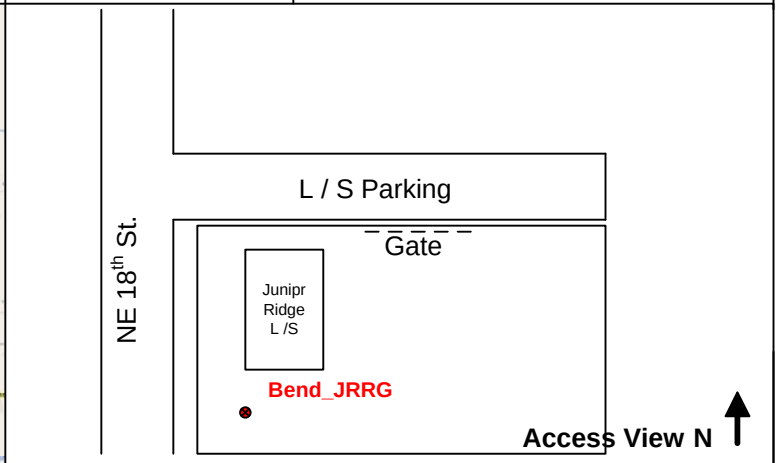
Percent Uptime (%)	
Rain	100

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW
Site Name:	Bend_JRRG	**Monitor Series:**	FS 5000 AG	**Monitor S/N:**	21551
Address/Location:	North of Cooley Rd. on NE 18th St			**Rain Gauge S/N:**	
				Thomas Bros Map Page:	N / A
				Pipe Height:	N / A
Access:	Drive	**Type of System:**	Sanitary ☐ Storm ☐ Combined ☐	**Pipe Width:**	8.00" diameter bucket
				Phone Number:	166.219.169.178





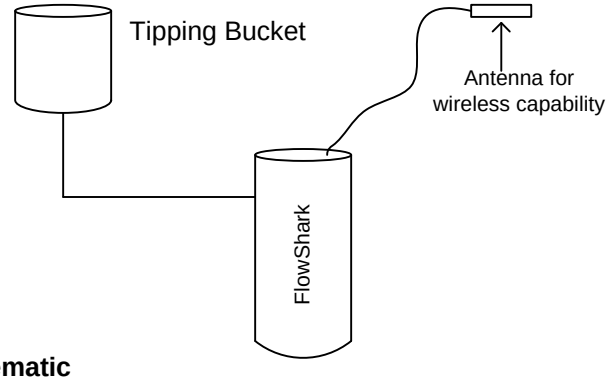
Investigation Information:

Activation Date and Time:	3/29/11	**Initial Confirmation Date and Time:**	3/29/11
GPS Lat / Long coordinates:			
Upstream Input: (L/S, P/S)	Doesn't apply		
Upstream Manhole:	Doesn't apply		
Downstream Manhole:	Doesn't apply		
Depth of Flow:	Doesn't apply		
Range (Air DOF):	Doesn't apply		
Peak Velocity:	Doesn't apply		
Silt:	Doesn't apply		

Manhole Information:

Manhole Depth:	Doesn't apply				
Manhole Material / Condition	Doesn't apply				
Pipe Material / Condition:	Doesn't apply				
Mini System Character:	Residential ☐	Commercial ☐	Industrial ☐	Trunk ☐	
	Doesn't apply				
Access Pole #:	Doesn't apply				
Distance From Manhole:	Doesn't apply	Feet			
Road Cut Length:	Doesn't apply	Feet			
Trench Length:	Doesn't apply	Feet			

Other Information:



Schematic

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Wireless	Trunk	☐	X	☐	
Sensors Devices:	Tipping bucket	Lift / Pump Station	☐	X	☐	
Surcharge Height:	Doesn't apply	WWTP	☐	X	☐	
Rain Guage Zone:	North Bend	Other	☐	X	☐	

Additional Site Information / Comments:

Flow Monitoring Site Safety Plan

Project Name:	Site ID:	Site Classification: (see below)
Bend Oregon TFM	Bend_JRRG	

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☐
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

No Hazards found

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

No Site Specific Safety Requirements

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan
☐ Standard Traffic Control Plan TA-18 is to be used at this work site
☐ This site requires a special Traffic Control Plan which is attached

Approved		Reviewed	
Field Mgr Name:	Sean Winder	Project Mgr Name:	Mike Pina
Signature:	Signed copy can be obtained from ADS	Signature:	Signed copy can be obtained from ADS
Date:	03/29/11	Date:	03/29/11

HYDROGRAPH REPORT

Bend_JRRG

Flow Monitor

Bend_JRRG

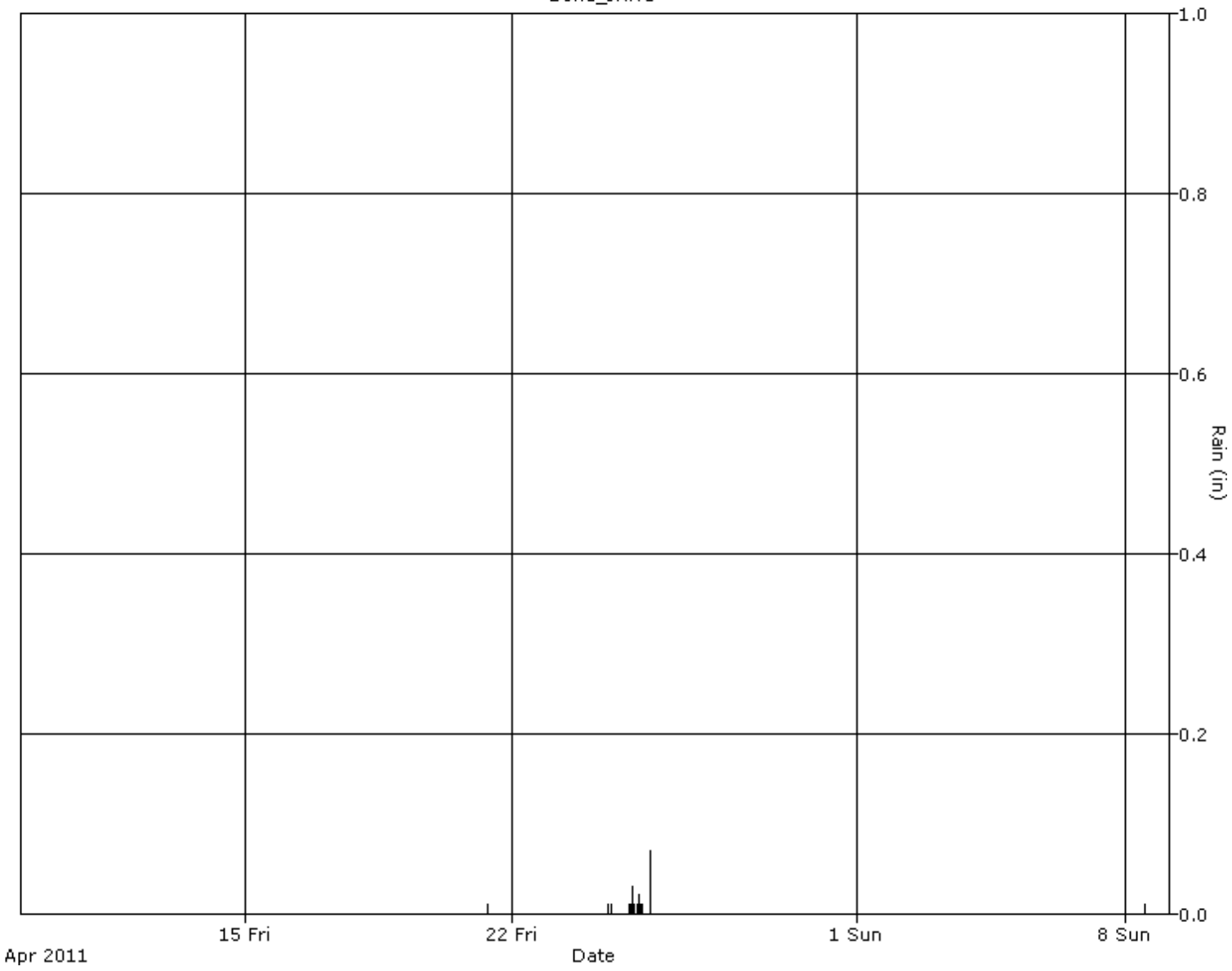
Nominal Diameter
10-in.

Report Period

4/9/2011
To
5/9/2011

Legend

Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_RWRG

Overview

Rain gauge Bend_RWRG was located in the East of Bend (see attached site report for details). The data for this location was provided to ADS by the City.

Observations

The total rainfall recorded from Saturday, April 09, 2011 to Sunday, May 08, 2011 , is provided in the following table. The majority of this rain fell on April 25, 2011.

Observed Rainfall	
Item	Rainfall (in)
Total	0.37

Data Quality

The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage.

Percent Uptime (%)	
Rain	100

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR
FM Initials:	SW		
Site Name:	Bend_RWRG	**Monitor Series:**	N/A
Address/Location:	313 SW Shevlin Hixon Dr (In grass behind Art Station)		
Access:	Drive	**Type of System:**	Sanitary ☐ Storm ☐ Combined ☐

Monitor S/N:	N/A
Rain Gauge S/N:	N/A
Coordinates:	44° 02'51"N 121°19'13"W
Pipe Height:	N/A
Pipe Width:	N/A
Phone Number:	166.219.169.178

Access Map

Access View N

Investigation Information:

Activation Date and Time:	N/A	**Initial Confirmation Date and Time:**	N/A
GPS Lat / Long coordinates:			
Upstream Input: (L/S, P/S)	N/A		
Upstream Manhole:	N/A		
Downstream Manhole:	N/A		
Depth of Flow:	N/A		
Range (Air DOF):	N/A		
Peak Velocity:	N/A		
Silt:	N/A		

Manhole Information:

Manhole Depth:	N/A				
Manhole Material / Condition	N/A				
Pipe Material / Condition:	N/A				
Mini System Character:	Residential ☐	Commercial ☐	Industrial ☐	Trunk ☐	
Telephone Information:	N/A				
Access Pole #:	N/A				
Distance From Manhole:	N/A	Feet			
Road Cut Length:	N/A	Feet			
Trench Length:	N/A	Feet			

Other Information:

Schematic

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	N/A	Trunk	☐	X	☐	
Sensors Devices:	Tipping bucket	Lift / Pump Station	☐	X	☐	
Surcharge Height:	N/A	WWTP	☐	X	☐	
Rain Guage Zone:	Central Bend	Other	☐	X	☐	

Additional Site Information / Comments:

This is the “Bend, Oregon AgriMet Station (BEWO)” weather station’s rain gauge and tipping bucket (http://www.usbr.gov/pn/agrimet/agrimetmap/bewoda.html). Also know as the River Wells weather station.

Flow Monitoring Site Safety Plan

Project Name: Bend Oregon TFM	**Site ID:** Bend_RWRG	**Site Classification:** (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

*** Hazards found at this site (Discuss checked items below)**

Type	#	Special Hazard	
Communications	1	The site is in a communications "Dead-Zone"	☐
Traffic	2	The site is located in or adjacent to an intersection	☐
	3	The site is located on hill, curve, or where motorists visibility of the site or other vehicles is reduced	☐
	4	The site is located ina high speed (>45MPH) or high density roadway roadway	☐
	5	Site traffic is congested at peak hours	☐
Access	6	Site has access obstacles (rough terrain, fences, deep easement, etc.)	☐
Worksite	7	Worksite contains hazards (terrain, slope, obstructions, etc.)	☐
	8	Elevated work requiring a ladder / work near an unguarded edge. Raised manhole (indicate height below)	☐
	9	Pedestrian control necessary as the site is located in or near a walkway, school, playground, etc.	☐
	10	Work may be performed during darkness; requiring additional site lighting	☐
	11	Site is located in a high crime area (check with client & local authorities if unsure)	☐
Confined Space	12	Confined Space does not have useable rungs	☐
	13	Confined Space depth is greater than 50 feet	☐
	14	Confined Space has internal platforms, weirs or other obstructions that interfere with or prevent unobstructed vertical retrieval	☐
	15	Work requires lateral movement that would interfere with or prevent unobstructed vertical retrieval	☐
	16	Flow is hazardous due to depth, velocity, pipe diameter, or is industrial process flow	☐
	17	Confined Space subject to surcharge during / after a rain event	☐
	18	CO, H2S, low O2 or other toxic / flammable gases present or anticipated	☐
	19	Confined Space has active drop connections	☐

*** Hazards found at this site (Discuss checked items below)**

No Hazards found

*** Site Classification**

	Class	Description
☒	1	2-person crew. Standard procedures and equipment. No special requirements
☐	2	Worksite (non-traffic) with access obstacles and or worksite hazards
☐	3	Traffic site requiring special scheduling, additional personnel and / or traffic control equipment, or outsourcing
☐	4	Confined Space Entry requiring special scheduling, additional personnel and / or safety equipment
☐	5	Special Operation requiring a separate safety plan. *Must be approved by Corporate Safety Manager*

*** Site Specific Safety Requirements. Must Complete for any site Class 2 & Above**

No Site Specific Safety Requirements

Traffic Control Plan

Note: All worksites located in a roadway or immediately adjacent to a roadway, where the operation may impede the normal flow of traffic, are required to have a Traffic Control Plan. Standard Traffic Control Plans are to be carried in the vehicle and referred to when setting up the worksite. Special Traffic Control Plans are to be are to be developed when required by clients or regulating agencies or when a standard Traffic Control Plan is not sufficient to control traffic at the worksite.

☒ This worksite does NOT require a traffic control Plan

☐ Standard Traffic Control Plan TA-18 is to be used at this work site

☐ This site requires a special Traffic Control Plan which is attached

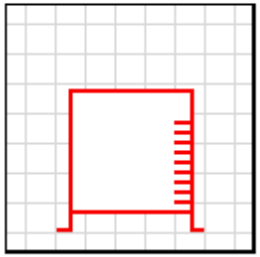
Approved		**Reviewed**	
Field Mgr Name:	Sean Winder	Project Mgr Name:	Mike Pina
Signature:	Signed copy can be obtained from ADS	Signature:	Signed copy can be obtained from ADS
Date:	03/29/11	Date:	03/29/11

HYDROGRAPH REPORT

Bend_RWRG

Flow Monitor

Bend_RWRG

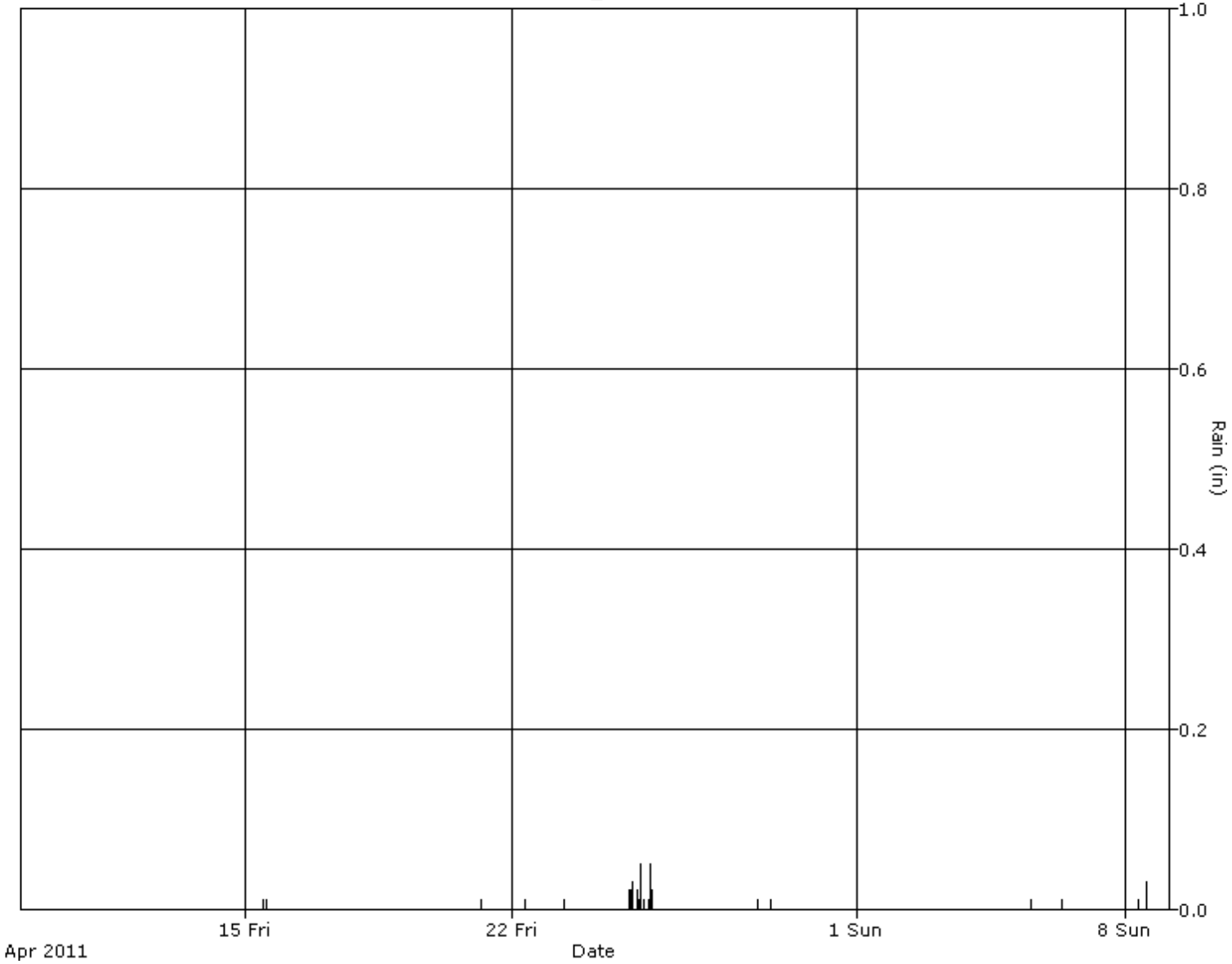


Report Period

4/9/2011
To
5/9/2011

Legend

Rain



ADS ENVIRONMENTAL SERVICES

Site Commentary

Site Information

Bend_SGRG

Overview

Rain gauge Bend_SGRG was located in the South of Bend (see attached site report for details).

Observations

The total rainfall recorded from Saturday, April 09, 2011 to Sunday, May 08, 2011 , is provided in the following table. The majority of this rain fell on April 25, 2011.

Observed Rainfall	
Item	Rainfall (in)
Total	0.47

Data Quality

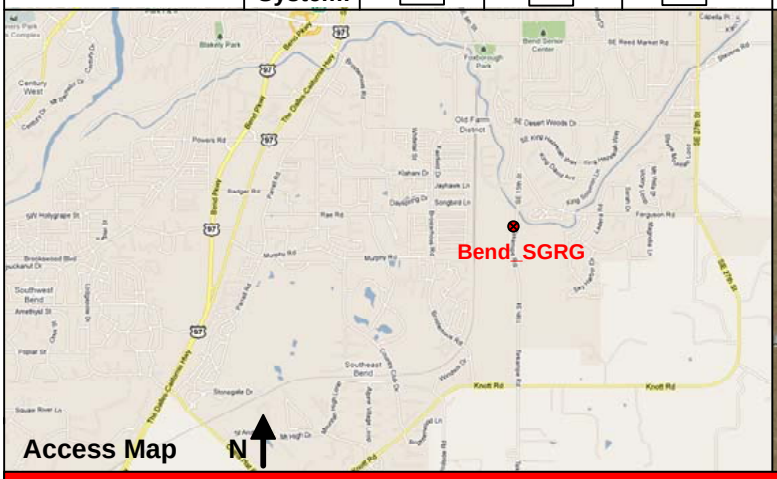
The data uptime for the Saturday, April 09, 2011 to Sunday, May 08, 2011 monitoring period is provided in the table below. Data uptime is defined as the number of 5-minute data points divided by the total number of 5-minute data points available for the monitoring period and provided as a percentage.

Percent Uptime (%)	
Rain	100

ADS Site Report

Quality Form

Project Name:	Bend Oregon TFM	**City / State:**	Bend, OR	**FM Initials:**	SW
Site Name:	Bend_SGRG	**Monitor Series:**	FS 5000 AG	**Monitor S/N:**	21539
Address/Location:	South of Chloe Ln. on SE 15 St.			**Rain Gauge S/N:**	
				Thomas Bros Map Page:	N / A
				Pipe Height:	N / A
Access:	Drive	**Type of System:**	Sanitary ☐ Storm ☐ Combined ☐	**Pipe Width:**	8.00" diameter bucket
				Phone Number:	166.219.169.182



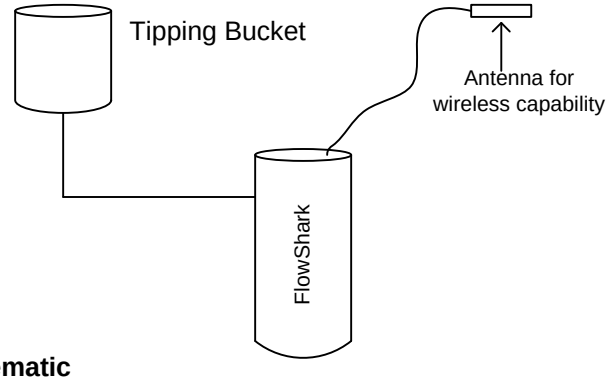
Investigation Information:

Activation Date and Time:	3/30/11	**Initial Confirmation Date and Time:**	3/30/11
GPS Lat / Long coordinates:	44°01'16.48" N° 121 02'02.82" W		
Upstream Input: (L/S, P/S)	Doesn't apply		
Upstream Manhole:	Doesn't apply		
Downstream Manhole:	Doesn't apply		
Depth of Flow:	Doesn't apply		
Range (Air DOF):	Doesn't apply		
Peak Velocity:	Doesn't apply		
Silt:	Doesn't apply		

Manhole Information:

Manhole Depth:	Doesn't apply					
Manhole Material / Condition	Doesn't apply					
Pipe Material / Condition:	Doesn't apply					
Mini System Character:	Residential ☐	Commercial ☐	Industrial ☐	Trunk ☐		
	Doesn't apply					
Access Pole #:	Doesn't apply					
Distance From Manhole:	Doesn't apply	Feet				
Road Cut Length:	Doesn't apply	Feet				
Trench Length:	Doesn't apply	Feet				

Other Information:



Schematic

Installation Information		Backup	Yes	No	?	Distance
Installation Type:	Wireless	Trunk	☐	X	☐	
Sensors Devices:	Tipping bucket	Lift / Pump Station	☐	X	☐	
Surcharge Height:	Doesn't apply	WWTP	☐	X	☐	
Rain Guage Zone:	North Bend	Other	☐	X	☐	

Additional Site Information / Comments:

Flow Monitoring Site Safety Plan

Project Name:	Bend Oregon TFM	Site ID:	Bend_SGRG	Site Classification: (see below)

Note: Class 5 Site Safety Plans must be approved by the Corporate Safety Manager

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Approved		Reviewed	
Field Mgr Name:	Sean Winder	Project Mgr Name:	Mike Pina
Signature:	Signed copy can be obtained from ADS	Signature:	Signed copy can be obtained from ADS
Date:	03/30/11	Date:	03/30/11

HYDROGRAPH REPORT

Bend_SGRG

Flow Monitor

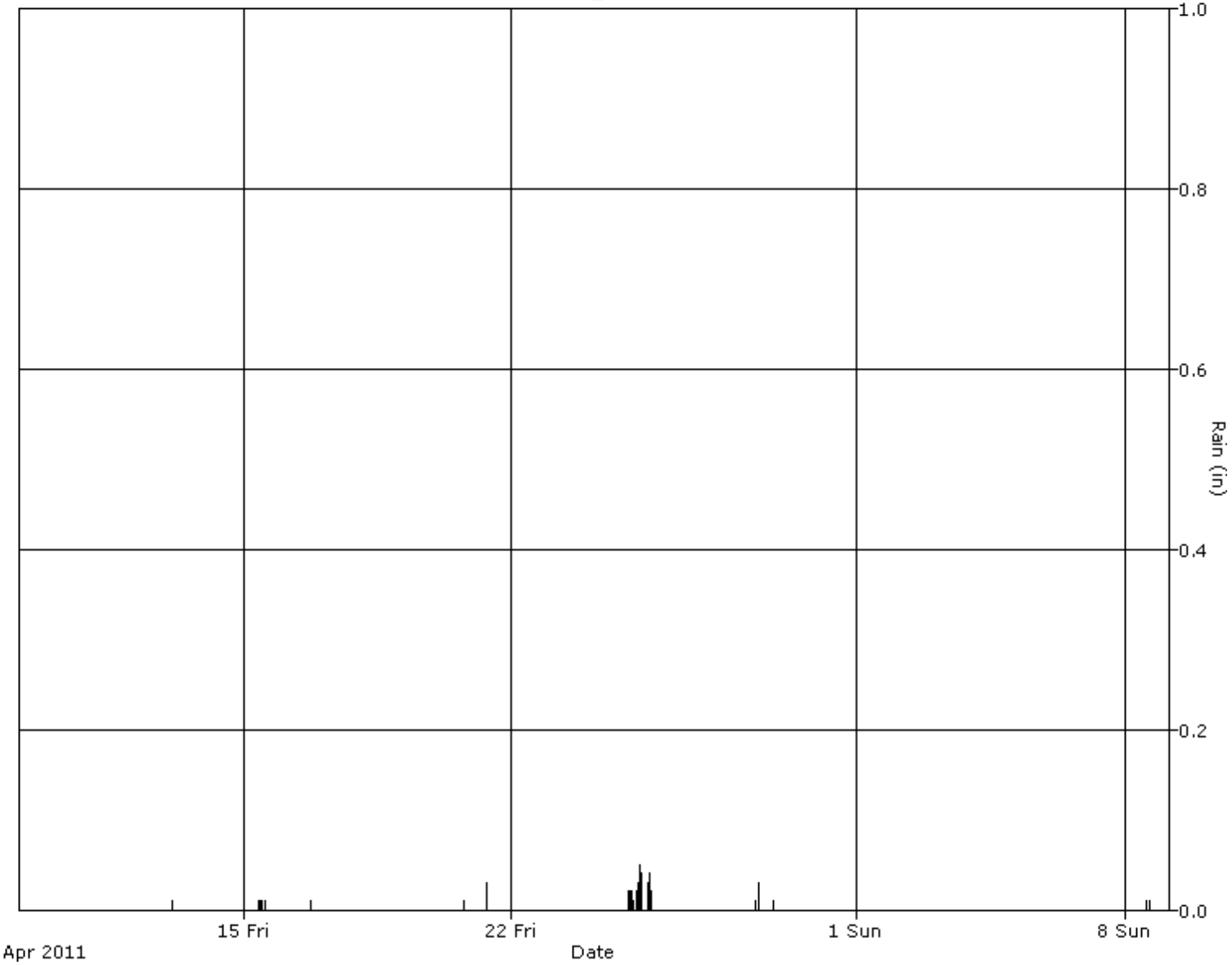
Bend_SGRG

Report Period

4/9/2011
To
5/9/2011

Legend

Rain



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4455 South 134th Place
Tukwila, WA 98168

Bend TFM Project Schematic

Drawing: 06/14/11

Rev. 2 | Pg. 1 of 1

Not to Scale

Bend, OR Temporary Flow Monitoring