SEWER SYSTEM MANAGEMENT PLAN

for the

City of Agoura Hills

in

Los Angeles County, California

FINAL

June 30, 2009

SEWER SYSTEM MANAGEMENT PLAN

for the

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APPENDICES

ABBREVIATIONS/ACRONYMS

ACO	Accumulative Capital Outlay
AHMC	Agoura Hills Municipal Code
APWA	American Public Works Association
BMP	Best Management Practice
CADD	Computer Aided Design & Drafting
CALOSHA	California Occupation, Safety and Health Administration
CIWQS	California Integrated Water Quality System
CCTV	Closed – Circuit Television
CSD	County Sanitation Districts of Los Angeles County
CSMD	Consolidated Sewer Maintenance District
DPW	Department of Public Works
FOG	Fats, Oil, and Grease
FSE	Food Service Establishments
GIS	Geographical Information System
HDPE	High Density Polyethylene Pipe
I/I	Infiltration / Inflow
LACDPW	Los Angeles County Department of Public Works
LACo Code	Los Angeles County Code
LVMWD	Las Virgenes Municipal Water District
MMS	Maintenance Management System
NOI	Notice of Intent
OES	Office of Emergency Service
RWQCB	Regional Water Quality Control Board
SMD	Sewer Maintenance District
SO&M	Sewer Operation and Maintenance
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
SU	Sewage Unit
SWRCB	State Water Resources Control Board
WDR	Statewide General Waste Discharge Requirements

DEFINITIONS

Blockage or Stoppage – A build up of debris in the sewer, which stops the flow of wastewater and allows the water to back up behind the stoppage, sometimes causing an overflow.

Geographical Information System (GIS) – A database linked with mapping, which includes various layers of information used by government officials. Examples of information found on a GIS can include a sewer map; sewer features such as pipe location, diameter, length, material, condition, last date cleaned or repaired. The GIS also typically contains base information such as streets and parcels.

Infiltration/Inflow (I/I) – Infiltration is generally considered to be extraneous water that enters the sewer system over longer periods of time, such as groundwater seepage through cracks in the sewer. Inflow is generally considered to be extraneous water that enters the system as a direct result of a rain event, such as through defects in the sewer. While it is impossible to control all I/I, it is certainly desirable to reduce I/I when cost-effective.

Lateral – The portion of sewer that connects a home or business with the main line in the street.

Wastewater Collection System – All pipelines, pump stations, and other facilities upstream of the headworks of the wastewater treatment plant that transport wastewater from its source to the wastewater treatment plant.

Waters of the United States – All waters which are used, were used or may be used in interstate or foreign commerce; including interstate wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent streams), adjacent wetlands, impoundments of water, etc., the use, degradation or destruction of which could affect interstate or foreign commerce; tributaries of waters so identified; and the territorial seas.

SEWER SYSTEM MANAGEMENT PLAN
FOR THE
CITY OF AGOURA HILLS

INTRODUCTION

On May 2, 2006 the State Water Resources Control Board (SWRCB) adopted Statewide General Waste Discharge Requirements (WDR) and Monitoring and Reporting Program, for sanitary sewer systems by issuing Order No. 2006-0003-DWQ (See Appendix 'A' in the SMD SSMP). The regulations in the Order were in response to growing public concern about the water quality impacts of Sanitary Sewer Overflows (SSO), particularly those that cause beach closures, adverse effects to other bodies of water, or pose serious health and safety or nuisance problems.

Two major components of the WDR require the following:

(1) The owners/operators of publicly owned Sewer Collection Systems, a mile long or greater, must apply for coverage under the WDR; and,
(2) The owners/operators must develop and implement a Sewer System Management Plan (SSMP) specific to the sanitary sewer system.

In compliance with the first component, the City of Agoura Hills (City) filed a Notice of Intent (NOI) application form with the SWRCB on October 18, 2006. The City subsequently received a Username and Password for electronic access to the California Integrated Water Quality System (CIWQS) database. Within the database-reporting program, the City completed a "collection system questionnaire" and will file all subsequent updates and all required SSO reporting.

In compliance with the second component, this document was prepared to meet the objectives contained in the WDR Order. Since the Consolidated Sewer Maintenance District (CSMD) of the Los Angeles County Sewer Maintenance Districts (SMD), provides operation and maintenance services for the City's sewer facilities, some components of the City's SSMP are the same as those of the SMD SSMP. This document is divided into 12 chapters, which closely align with the respective provisions contained in the WDR. Every section or subsection of each chapter addresses one of the key elements of the SSMP directive.

This document, with other existing agency programs referenced herein, constitute the City's SSMP. By implementing procedures contained in this SSMP, the occurrence of SSOs should decrease or possibly be avoided throughout the City's wastewater collection system.

EXECUTIVE SUMMARY

This plan document was prepared in compliance with a formal order issued by the State Water Resources Control Board. The order requires every owner and operator of publicly owned sewer systems to develop and implement a system specific Sewer System Management Plan (SSMP). This plan sets forth goals and actions to be followed, and guidelines for various activities involved in managing, operating, maintaining, repairing, replacing and expanding the sewer system. Chapter 6 describes actions to follow when responding to a Sewer System Overflow (SSO) occurrence within the community, including reporting obligations. There are chapters which describe legal authorities for managing the system, and ministerial actions required in monitoring, auditing, reporting and communicating with the public and regulators. There are specific requirements for accomplishing public involvement and the reporting and modifying (changing) of the plan. These later requirements are intended to raise public awareness of the hazards associated with SSO events and to minimize the occurrence of such events.

- The City's initial plan is to be approved and certified by August 2, 2009
- The plan is to be monitored and updated no less frequent than every five years
- The plan must be periodically audited for effectiveness, a report compiled and kept on file and such audits must occur no less frequent than every two years
- There are reporting timeframes for both emergency and routine reporting events
- The adoption of and any revision to the plan must be accomplished utilizing public notification and public hearing procedures as identified in the plan and order
- Copies of the approved plan must be available for public review, and when requested by the State or Local regulatory agencies copies are to be provided, including any audit reports.

A key element of the plan was the sewer system capacity evaluation utilizing a hydraulic model of the system to evaluate capacity constraints. The model identified nineteen (19) reaches between manholes with pipe flows greater than 64% full (guideline criteria). Those pipe segments equal 4,592 feet (~2% of the total system length) with a probable replacement budget of $1,970,000. However, further engineering evaluation and select flow monitoring should be performed in order to establish a firm capital improvement plan for the identified reaches.

In addition to capacity constrained segments, the city's 2009 partial CCTV investigation revealed four (4) locations with various structural deficiencies and seventy-three (73) locations with various maintenance deficiencies (i.e. roots, grease, intrusions, sags, etc). The structural deficiencies are rated and grouped with the higher priority locations first. There is one (1) high priority location having a probable repair cost of $4,200. The next lower priority also contains one (1) location having a probable repair costs cost of $4,200. The third priority has two (2) locations that should be monitored for further change and scheduled for repair as findings indicate. The probable repair cost is $16,800. Project specific design and repair methods must be considered before proceeding, and more detailed information is included in Appendices 'J' and 'L' of this report. Additionally, the County DPW has scheduled CCTV inspection and evaluation of sewer pipe conditions during (2006, 2010 and 2015) during which further repairs or replacement of any structurally deficient pipe segments should be scheduled.

CHAPTER 1

GOALS AND ACTIONS

The **goals** of this SSMP are as follows:

1. Develop a complete understanding of the sanitary sewer system's available capacity through necessary studies in order to facilitate management for a sustainable infrastructure.

2. Maintain or improve the condition of the collection system infrastructure in order to provide reliable service now and into the future.

3. Minimize the number and impact of sanitary sewer overflows (SSOs) that occur.

4. Improve cooperative effort between agencies implementing the plan.

5. Reduce SSO emergency response time through coordination of a localized first responder program.

6. Meet and exceed the intent of the requirements of WQO

Actions to be taken to satisfy SSMP goals are as follows:

1. Conduct a planned and scheduled maintenance program to minimize the risk and occurrence of SSOs.

2. When an SSO occurs, respond to the incident in a timely manner and undertake feasible remedial actions to contain the overflow, including stopping the flow from reaching a storm drain, if possible.

3. Stop the SSO as soon as possible and limit public access to the overflow area to prevent public contact with any wastewater contamination.

4. Completely recover the overflow sewage, return it to the sewer system, and clean up the contaminated area.

5. Gather and compile all pertinent information regarding the SSO incident, investigate as necessary to determine probable cause, document findings, report the incident to appropriate regulatory agencies in a timely manner, and file the completed report.

6. Condition all development and capital projects to evaluate, design and construct sewer facilities to the City approved standards and criteria.

CHAPTER 2

DESCRIPTION OF THE ORGANIZATION

2.1 Management

The City was incorporated in December 1982 and currently serves an area of 7.86 square miles with a population of approximately 23,350 people. The City's wastewater collection system is managed by the City Department of Public Works (City DPW), and is currently maintained under contract with the Los Angeles County Department of Public Works (LACDPW or County DPW). The total annual budget for system operation, maintenance and administration is approximately $303,500. The wastewater collection system consists of approximately 53.6 miles of gravity sewers, 1,294 manholes, and one pump station. All flows from City sewers discharge into Las Virgenes Municipal Water District trunk sewer facilities for conveyance to the Tapia Water Reclamation Plant in Malibu Canyon.

The City has two (2) positions partially budgeted in Sewer Operations and Maintenance (SO&M) activities. Distribution of the City's personnel is depicted in the organization chart presented in Section 2.4.1 of this plan. The field operation and maintenance services are fulfilled by utilizing services provided through the CSMD. City personnel, in collaboration with County DPW personnel, administer the City's sewer collection system operation, provide engineering evaluation of proposed and existing sewer facilities, administer preventive maintenance and sewer construction programs, and oversee maintenance of the wastewater collection system facilities and related records and plans.

2.2 Authorized Representative

The City Engineer in concert with designated County DPW staff, are the authorized representatives who are responsible for execution of compliance actions required under the WDR. This includes, but is not limited to, execution and certification of all reports and correspondence as required under the Order.

2.3 City's Responsibilities

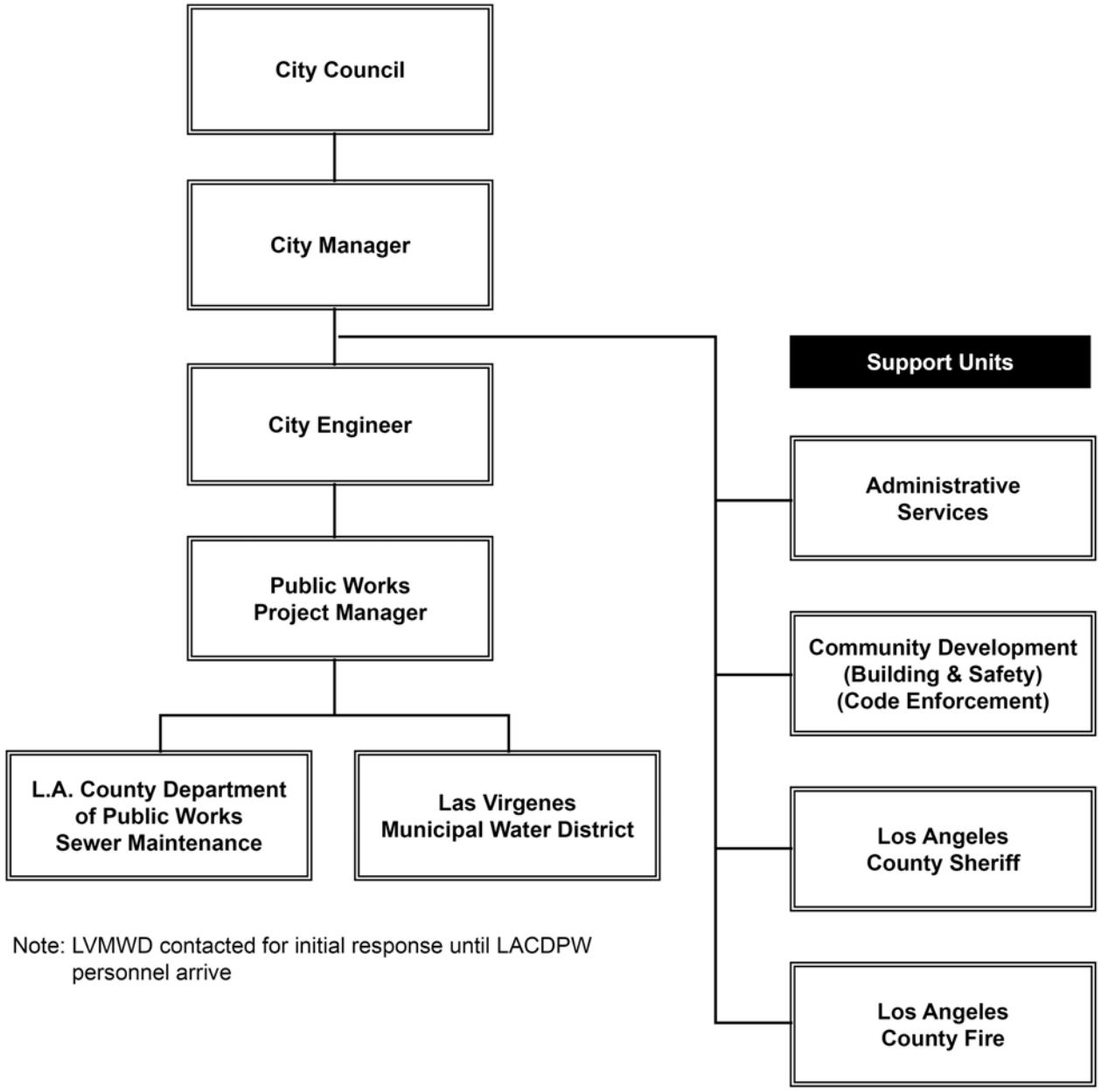
City shall apply for coverage under the WDR for facilities it owns. City shall prepare a comprehensive SSMP, and if it has not yet fully adopted applicable codes, local ordinances or resolutions governing the performance of items stipulated in the WDR, it will promptly undertake actions to adopt the legal means to do so.

City Department's will play significant roles, jointly and separately, towards attaining the goals of this plan. The degree of these collaborative efforts will vary from department to department depending on the degree of SSO related services the County DPW is providing under its agreements with the City.

2.4 Organization Chart and Responsibilities

The organization chart, showing the structure and relationship of City and County DPW administrative, management and field positions relative to SO&M is presented below and the descriptions of responsibilities and support are presented in Sections 2.4.2 and 2.4.3.

2.4.1 Organization Chart for Sanitary Sewer System Management



Note: LVMWD contacted for initial response until LACDPW personnel arrive

2.4.2 Description of Individual Responsibilities - The description of responsibilities or roles of each position especially as related to SSOs are as follows:

- City Council – Responsible for establishing new and amending existing laws governing the implementation of the SSMP and approving all SSMP related contracts and agreements.

- City Manager – Establishes SSMP policy within the scope of the City's' policy and legal requirements, directs its execution, and evaluates work accomplished for the SSMP. Directs the development and enactment of new ordinances

- City Engineer – Responsible for formulating SSMP policies, and procedures. Directs emergency sewer repair activities, special studies, investigations and reports concerning sewer infrastructure, and approves the design and construction of new and rehabilitation of existing sewer systems. Responsible for training of personnel, and for processing of access easement documents and procuring easements for public sewer facilities located in private properties. Assists in investigating SSOs related claims and litigations against the City. Responsible for developing standard plans and preparing plans and specifications for sewer enhancement and reconstruction projects. Reports to the City Manager.

- Public Works Project Manager – Assists in the formulation of SSMP policies and procedures. Direct studies, investigations, and the preparation of reports, budget and contractual agreements with private firms. Responsible for the day-to-day management and operation of the SSMP. Assists in directing engineering and management activities relating to the maintenance of the collection sewer system, and the needed contract services, printing and mailing of public education outreach program materials, and for procuring material and supplies needed for the day-to-day operation and maintenance activities. Reports to the City Engineer.

- Assistant Engineer – Has oversight of intra agency, clerical and field operation and maintenance staff. Responsible for overseeing implementation of the FOG program including point source control, inspection of industrial waste and grease generating facilities, and investigation of cases of illicit discharge of chemicals, debris, etc. into the public sewer. Reports to and can act on behalf of the Senior Engineer.

- Engineering Aide – Assist in the operation of the SSMP. Assists in coordination efforts for tracing, containing, and cleaning up of SSOs that reach storm drain system. Reports to the Senior Engineer.

2.4.3 Key Support Divisions

Other Divisions within the City as well as external agencies are currently and will continue to be responsible for carrying out some of the compliance actions called for by the WDRs for the SMD. The key support divisions and their responsibilities are described below:

- Administrative Services - Responsible for procuring equipment and as needed contract services for emergency sewer repair projects, printing and mailing of public education outreach program materials, and for procuring material and supplies needed for the day to day operation and maintenance activities. Staffing the SO&M function and training of personnel. Also responsible for investigating SSOs related claims and litigations.

- Building and Safety Division – Responsible for issuing permits for sewer connection and for the enforcement of the Plumbing Codes involving proper connection, maintenance of sewer house laterals and illegal discharges into the public sewers. Responsible for subdivision plan checks to ensure compliance with the City standards for construction of new sewer collection systems.

- Las Virgenes Municipal Water District – Currently a non-binding verbal agreement to assist exists between LVMWD and the City to assist in tracing, containing, and cleaning up of SSOs.

- Consolidated Sewer Maintenance District (LACDPW) – Responsible for the sewer collection system operation and maintenance activities, with the exception of pump stations, for the system. Responsible for the oversight of the Sewer Maintenance field maintenance personnel including the construction crews, gravity sewer system operation and maintenance crews etc. Responsible for maintenance activities of the sanitary sewer collection system including response to SSOs, sewer cleaning, construction and other activities as needed. Responsible for the operations and maintenance of pump stations and force mains. Reports to the City Engineer.

- L.A. County Fire Department – Responsible for assisting with protecting the public during an SSO event that expands into high use public travel ways and/or those that reach storm drains or water courses and spread the public risk to health and safety impacts.

- L.A. County Sheriff's Department - Responsible for operating the Emergency Operation Center for the entire City including handling after-hours service calls reporting SSO's, and pump station malfunction calls and forwarding those reports to the DPW.

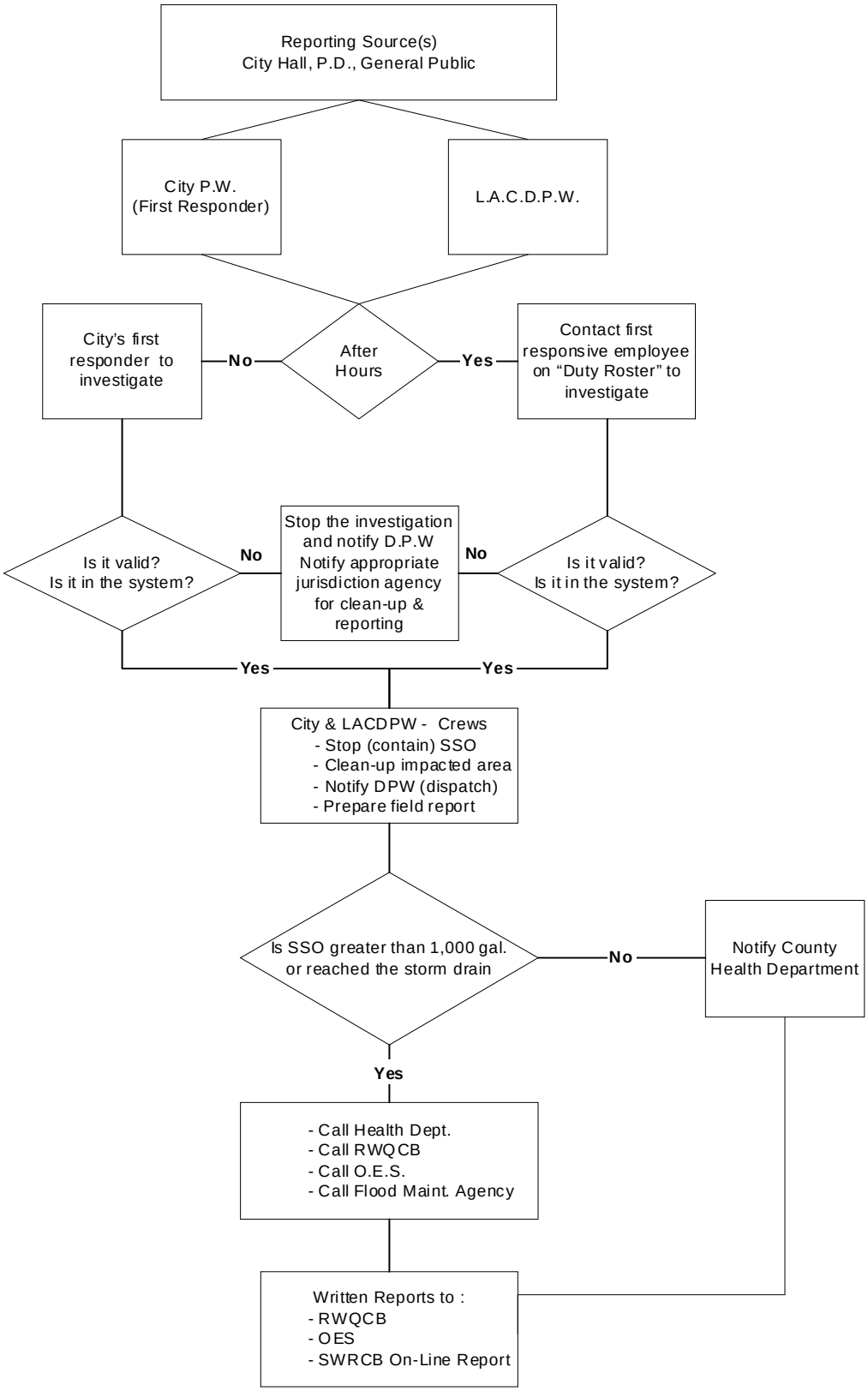
2.4.4 Chain of Communication for SSO Reporting

The chain of communication for reporting SSOs during regular business hours is the responsibility of the Engineering Division; after hours are handled through the County of Los Angeles Hotline (888) Clean-LA. Please see following flow chart for an illustration of the reporting process. The SSMP emergency response plan will be discussed in more detail in Chapter 6 of this document.

The chain of communication for reporting SSOs, from receipt of a complaint or other reliable information source to reporting to the appropriate regulatory agencies, is presented in Section 2.4.5. The city's contact directory for communicating with both internal and external parties

involved in responding and reporting an SSO event is shown in Section 2.4.6. The SSO emergency response plan will be discussed in greater detail in Chapter 6 of this document.

2.4.5 SSO Reporting Procedures Flow Chart



2.4.6 City's Contact Directory for SSO Responding and Reporting

Responsible Party's	Name	Telephone	After Hours Cell Phone
City Manager	Greg Ramirez	818-597-7304	
Director of Public Works		818-597-7322	
Asst. Public Works Director			
City Engineer	Ramiro Adeva	818-597-7329	
Sewer Superintendent		818-597-7338	
Duty "On-Call" Person	'See Roster'	n/a	
Public Works Services Yard	Receptionist		n/a
L.A. County Sheriff	Watch Commander		n/a
L.A. County Fire Dept.	Chief Station 89	323-881-2401	323-881-2401
L.A. Co. Pub Wks. Dept.	24-hour Dispatch	626-458-4357	800-675-4357
Co. Health Department (After Hours)		562-345-6830 323-667-1843	562-345-6830 323-667-1843
Co. Flood Control		626-445-7630	626-458-4357
R.W.Q.C.B. (Region 4)		213-576-6600	213-305-2253
State O.E.S.		800-852-7550	800-852-7550
CSD of LACO		562-699-7411	

CHAPTER 3

LEGAL AUTHORITY

3.1 Statutory Authority

Pursuant to the California Government Code, Sections 37100 and 54350, the City Council, as the local legislative body, may by ordinances and resolutions make and enforce all rules and regulations necessary for the administration of the City's Sewer Operations and Maintenance SO&M plan. Such actions include, but are not limited to: budgeting and the cleaning, repair, construction, reconstruction, rehabilitation, replacement, operation, and maintenance of collection sewers within the City's System. This chapter highlights the City's legal authority in compliance with the WDR,

The City granted the County of Los Angeles the consent and jurisdiction to annex sewered portions of the City into the CSMD. By that action, the City has entrusted the management, operation, and maintenance of its wastewater collection system to the CSMD. The City, however, still maintains full ownership responsibility of the City sewer system.

Consistent with the law, several ordinances have been established by the City Council to govern all aspects of the City's SO&M plan. The legal authorities for specific areas stipulated in the WDR are covered in the Agoura Hills Municipal Code (AHMC). These are found in Article V (Sanitation and Health), Chapter 1 (health Code), Section 5100 which adopted Title 11 of the Los Angeles County Code (LACo Code), entitled "Health and Safety Code"; Article V (Sanitation and Health), Chapter 2 (Sanitary Sewer and Industrial Waste), Section 5200 which adopted Title 20, Utilities, Division 2 of the LACo Code entitled "Sanitary Sewers and Industrial Waste Ordinance"; and Article VIII (Building and Regulations), Chapter 1 (Administration), Section 8100 which adopted the 2007 edition of the California Plumbing Code, published by the International Association of Plumbing and Mechanical Officials; some of which are discussed below:

The LACo Code Section 20.24.080 requires that property owners be responsible for maintenance of their house lateral, including the elimination of cracks, tree roots, and other debris. Similar regulation is also found in LACo Plumbing Code.

3.1.1 Authority to Prevent Illicit Discharges into the sewer system - LACo Code Title 20, Sections 20.36.010 and 20.36.400, prohibits the illegal dumping of offensive or damaging substances such as chemicals, debris, etc. into the sewer system. LACo Code Sections 20.24.020, 20.24.200, 20.32.080, 20.32.650, prohibit various forms of illicit discharges to the sewer. The City, as one of the CSMD cities, benefits from the districts Infiltration/Inflow (I/I) control program, the sewer line cleaning and maintenance program, which includes closed circuit television (CCTV) inspection and other mechanisms to detect I/I. These codes constitute the City's legal authority to prevent illicit discharges into the sewer system.

3.1.2 Authority to require Sewers and Connections be properly designed and constructed - LACo Code Title 20, Sections 20.32.330 and 20.32.340 require that the design of new

main-line sewers and pumping plants respectively, comply with Part 3 (Design Standards) of Chapter 20.32 of the Code. Section 20.32.350 requires that the design of new house laterals also conform to the same design standards unless otherwise covered by the Plumbing Code. Section 20.32.580 requires the construction of a collection sewer system to conform to all of Division 2 of Title 20, the Standard Specifications for Public Works Construction and by the Special Provisions and Standard Plans, all on file in the office of the City Engineer. Inspection of new main-line sewers and pumping plants to ensure proper construction is covered under Section 20.30.590.

3.1.3 Authority to Ensure Access for Maintenance, Inspection, or Repairs - LACo Code, Title 20, Division 2 gives the City the legal right to set requirements to allow unrestricted maintenance access to public sewer infrastructure located in private property. In accordance with Section 20.32.430, the access is secured through City's enforcement of the requirement for legally recorded sewer easements around all public sewer appurtenances located in private properties. Sewer easements are detailed on the sewer construction plans and are thoroughly reviewed by the City and the County for adequacy in size and accuracy of alignment during the subdivision map and plan check process. Such easements must have sufficient access for the movement of equipment and materials for both routine and emergency repair or construction work on the system.

LACo Code, Section 20.24.090 gives the Co. DPW and the City Engineer the legal authority to inspect main-line sewers, sewage pumping plants, interceptors etc., as often as he deems necessary, to ascertain whether such facilities are maintained and operated in accordance with the provisions of Division 2 of Title 20.

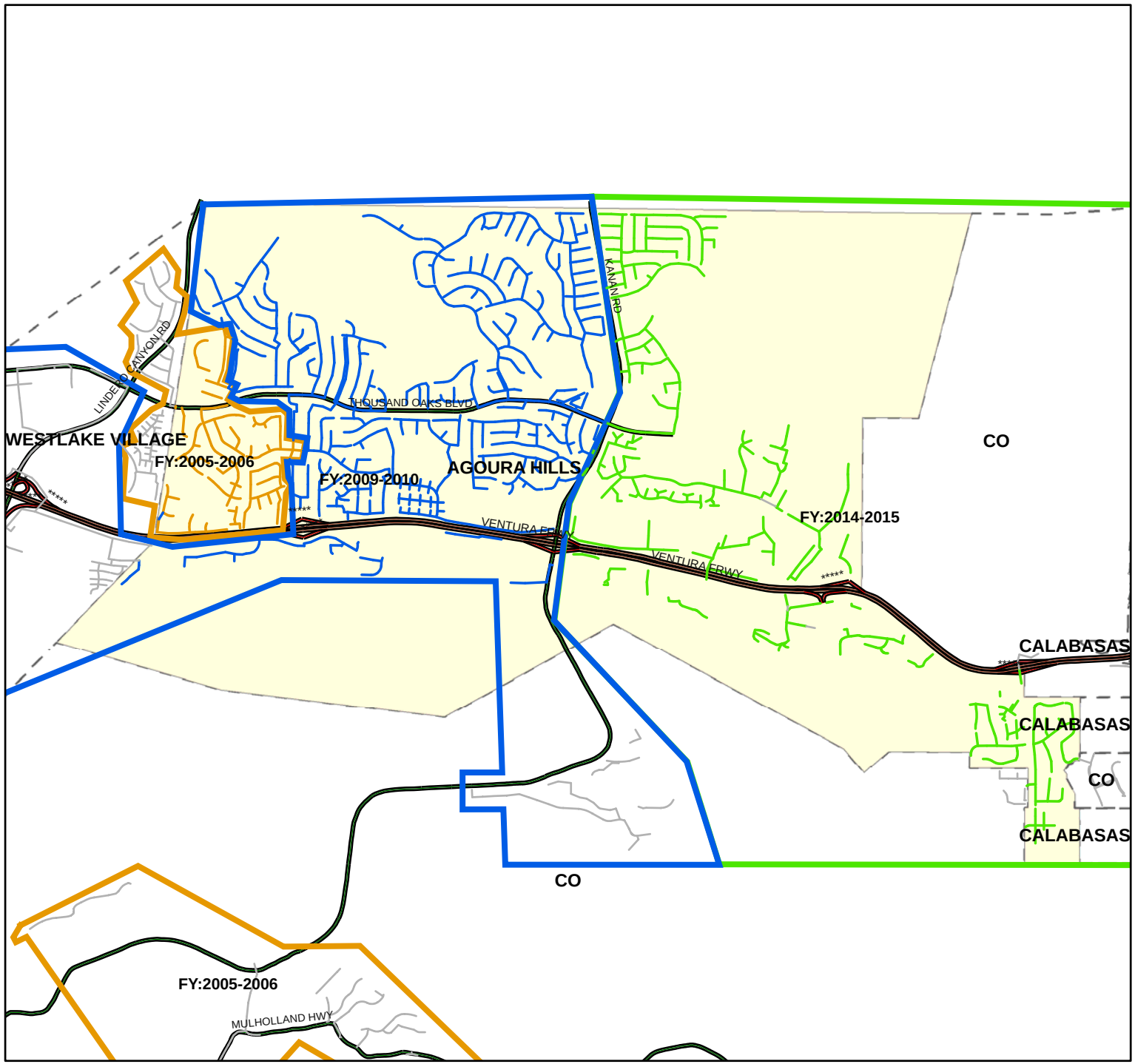
3.1.4 Authority limiting discharge of FOG and other debris that may cause blockage – The Plumbing Code requires the installation of grease interceptors at restaurants and other FSE that generate grease in the City. Section 714.1 of the Plumbing Code prohibits the discharge of FOG and other substances that may, among other things, clog, obstruct, fill, or necessitate frequent repairs, cleaning out or flushing of sewer facilities, in the City's sewer system. This prohibition is also contained in Title 20, Section 20.36.400. Also, Section 20.36.560 gives authority to the County and the City to require the installation of treatment facilities, including grease interceptors, at any facility that generates FOG in the amount that will damage or increase the maintenance costs of the wastewater collection system.

3.1.5 Authority to enforce a violation of sewer ordinances – Under Section 20.24.100 the City Engineer is empowered to enforce all the requirements prescribed in Division 2 of Title 20 and in accordance with Section 20.24.110 may delegate this authority. Section 20.24.160 allows the application of criminal penalties for any violations of the Sewer and Industrial Waste Ordinances.

3.1.6 Authority to fund operations and maintenance of the sewer system - Sections 20.40.040 and 20.40.045 of Title 20 provides for the levy of annual service charge and additional annual service charge, respectively, to fund the maintenance, operation, reconstruction and construction of relief sewers in the CSMD including the City within the limits of the Operations and Maintenance provisions. This provision establishes a

CCTV PROJECT AREAS & SCHEDULE

AS OF JULY 23 2008



N

Legend

CCTV Sewer Segments

- All others Segments

City of AGOURA HILLS

- 2005-2006(Y0TV0506F)
- 2009-2010
- 2014-2015

CCTV Projects Area

- All others Projects Areas

City of AGOURA HILLS

- 2005-2006(Y0TV0506F)
- 2009-2010
- 2014-2015

CITY

- All others Cities
- AGOURA HILLS

CHAPTER 4

OPERATION AND MAINTENANCE PROGRAM

4.1a Preventive Maintenance Program

The City is within the CSMD, and therefore depends totally on the CSMD for the operation and maintenance of its collection sewer system. CSMD's Operation and Maintenance programs applied district-wide and described in details in the SMD SSMP are applicable in the City. The CSMD Santa Clara Sub Yard (See Appendix 'B' in the SMD SSMP) located at 21014 Golden Triangle Road in the City of Santa Clarita provides sewer services to the City. However, personnel from the other four sewer maintenance yards, also shown in Appendix 'B', provide after hour services to the City such as stand-by, callback, and other sewer emergency services. The maintenance equipment utilized within the City is owned by the CSMD. A complete inventory of the CSMD equipment assigned to each County maintenance yard is presented in Appendix 'C' in the SMD SSMP.

The City's maintenance programs are funded through levying of an annual sewer service charge (currently at $32.50 per equivalent single-family dwelling unit otherwise called a sewage unit (s.u.). This is included in the $40.50 per s.u. levied by the CSMD and collected with the annual tax bills of property owners in the City that are within the CSMD. The $8.00 differential is evenly split to fund the accumulative capital outlay and condition assessment programs described in Section 4.2. The total annual revenue generated for the various sewer programs through the $40.5 per s.u. charge is approximately $ 303,500. These funds are managed and administered by the County and reviewed and adjusted annually to raise sufficient revenues for the maintenance programs.

The following is a summary of the CSMD preventive maintenance activities implemented by the district within the City:

4.1.1 **Sewer Line and Manhole Inspection** – The interior and lid cover of manholes are inspected semi-annually for any structural defects, sewage flow condition, presence of vermin or rodents, deleterious industrial waste, odors and any signs of unusual settlement around the manholes and along sewer alignments.

4.1.2 **Gas Trap Manholes and Siphons** – On a monthly basis, these facilities are inspected and cleared of any stoppages or flow restrictions.

4.1.3 **Drop Manholes** – These facilities are inspected and cleared of stoppages and flow restrictions on variable frequencies based on prior inspection records.

4.1.4 **Sewer Line Cleaning** – Sewer lines are cleaned by hydro jet or rodding. Frequency of cleaning is based on inspection records. Sewer lines known to accumulate grease, garbage grinds or sand are put on monthly, quarterly, or semi-annual cleaning schedule and those prone to root growth are periodically rodded or chemically treated.

4.1.5 **Vermin and Rodent Control** – Sewers infested by insects are chemically treated. Those infested by rodents are baited.

4.1.6 **Sewage Pump Stations** – All pump stations are equipped with telemetry/alarm system and are inspected twice a week. Pumps and motors are lubricated, control mechanism and valves are checked and adjusted as necessary, and equipment is repaired or modified as required.

4.1.7 **Work Scheduling** – CSMD work orders within the City are generated and tracked by the LACDPW's Maintenance Management System (MMS). CSMD field crews activities are recorded in various forms such as service requests, cleaning reports, sewer maintenance daily reports, manhole adjustments, overflow report forms etc. and finally stored in the MMS. The reports are made available to the City upon request.

4.1.8 **City Sewer Mapping System** - The City maintains as-built plans of City sewer facilities. Data on these plans, such as location, alignment, pipe material, size, etc. are stored in the drawing file system at City Hall. Information generated on the Computer Aided Design & Drafting (CADD) system, and printed to map sheets, is stored in the City's engineering file server. These maps are also distributed to the City DPW and its street and sewer field crew, for reference, work scheduling and for responding to emergencies and to other assisting agencies. Periodic updates of these maps are scheduled by the City DPW when it is necessary to reflect changes in the system.

Data on the City's as-built sewer plans, such as system location and alignment, pipe material, size etc, are also stored in the CSMD CADD and GIS system. Information generated by CADD is printed on Index Map Sheets stored by LACDPW, Sewer Maintenance Division, located at 1000 South Fremont Avenue, Alhambra, California. The Index Maps are also kept at the CSMD field maintenance yards. The maps are updated, as necessary, to reflect any changes in the system.

4.2 Rehabilitation and Replacement Plan

The City's sewer collection systems are in the CSMD, and the City participates in the District's Accumulative Capital Outlay (ACO) Program and the District's Sewer Condition Assessment Program.

4.2.1 Accumulative Capital Outlay Program of the CSMD – Sewer served properties, within the CSMD, are levied an annual charge of $4.00 per s.u. for sewer collection system rehabilitation and replacements. The $4.00 per s.u. charge is also a component of the total $40.50 per s.u. described previously. The program is managed and administer by the LACDPW.

Under the ACO program, any portion of the sewer system found to be structurally deficient through routine inspection, sewer emergency response or condition assessment program is immediately repaired as an emergency repair project, or documented in a prioritized list of future short and long-term ACO sewer rehabilitation and replacement project (See Appendix 'E' in the SMD SSMP), However, LACDPW would refer those

portions of the system that have capacity related problems, especially hydraulic deficiencies resulting from over development or changes in zoning to the City for appropriate corrective action. A detailed discussion of the CSMD ACO Program is contained in Chapter 4.2.1 of the SMD SSMP.

4.2.2 Condition Assessment Program - Existing City wastewater collection system facilities contained within the County DPW inventory are listed in Appendix 'D'. The existing sewer pipes, range from 8 to 15 inches in diameter (96% are 8-inch diameter) and are predominantly vitrified clay pipe material. The majority of the City's sewer pipes were installed between the 1960's and 2007. This results in a current sewer system age ranging from 2 years to 45 years. Naturally, as these sewer lines age, structural problems such as cracks, joint separation, root intrusion, etc. will develop. To ensure that these problems are properly mitigated, the WDR requires that the City have a program in place to minimize and correct them and that the program is well funded.

The City participates in the CSMD's ACO/Condition Assessment Program. Sewer served property within the CSMD are assessed an annual fee of $4.00 per s.u. for sewer system condition assessment. This charge is part of the current annual sewer service charge of $40.50 per s.u. described previously. Under this program, the entire Sewer Collection System within the City will be inspected by Close Circuit Television (CCTV) to assess the condition of the pipes between 2006 and 2015. The CCTV inspection schedule for the City is presented on page E7 in Appendix 'E' of the SMD SSMP. A map of the CCTV project within the City is provided at the end of this chapter. The County DPW is responsible for the management and administration of the program and funds.

4.3 Equipment Maintenance and Replacement Policy

Equipment utilized in the maintenance of the City's sewer facilities is owned by the CSMD. LACDPW has full responsibility for the maintenance and replacement of these equipment. The LACDPW Equipment Replacement Policy is described in Chapter 4.3 of the SMD SSMP.

The City also has a comprehensive equipment maintenance program. Equipment is regularly checked, adjusted, repaired or replaced as necessary. However, major fixed assets are replaced when they meet or exceed the City's established fixed assets replacement criteria based on the equipment age, mileage, hours of use, repair history, safety, etc. Replacement of or additions to the major assets are done through the annual budget process of the City.

4.4 Training for Field Operations Personnel and Contractors

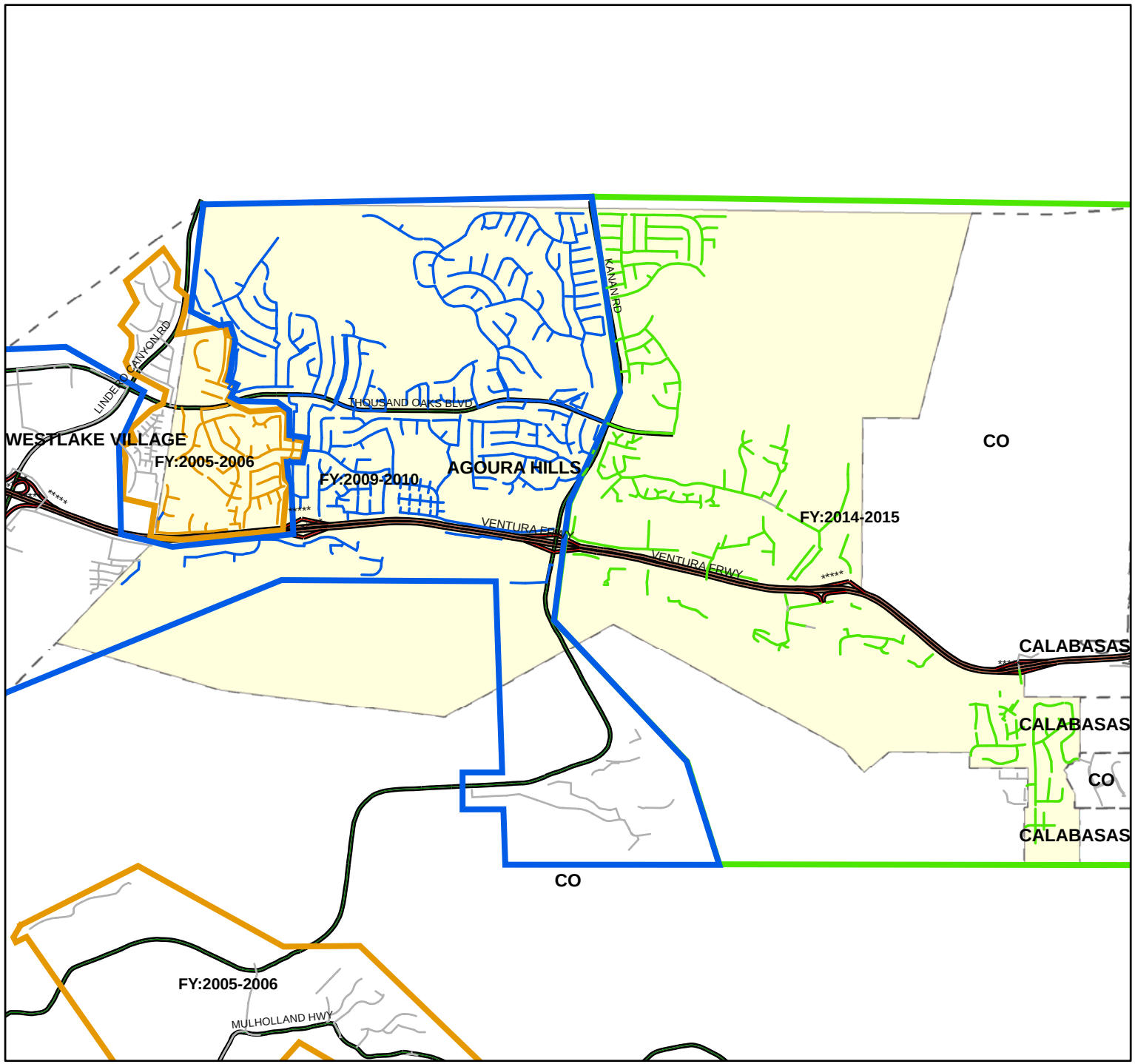
All personnel needed for the operation and maintenance of the City's sewer system are employed by the LACDPW. The training of CSMD personnel is a function of the County and not the City. The training methodologies utilized by the County are contained in Chapter 4.4 of the SMD SSMP. The City does not have any formalized training for contractors doing work within the City. However, City's sewer construction projects are awarded to carefully selected contractors with well trained and qualified personnel for any give project. The designed plans and

specifications for City's sewer construction projects contain detailed instructions, on City's permitting requirements, standards and policies that must be adhered to by contractors doing work within the City.

The City's first response personnel and the City's public works inspectors attend structured collection system training classes or seminars given by other agencies including California Occupational, Safety and Health Administration (CALOSHA), California Water Environment Association (CWEA), County Sanitation Districts' (CSD), etc. This is to keep them abreast with the latest information in the industry on how to safely and efficiently carry out their tasks. The City also utilizes informal training approaches, such as tailgate meetings, monthly safety meetings and apprenticeship training program from higher level staff

CCTV PROJECT AREAS & SCHEDULE

AS OF JULY 23 2008



N

Legend

CCTV Sewer Segments

- All others Segments

City of AGOURA HILLS

- 2005-2006(Y0TV0506F)
- 2009-2010
- 2014-2015

CCTV Projects Area

- All others Projects Areas

City of AGOURA HILLS

- 2005-2006(Y0TV0506F)
- 2009-2010
- 2014-2015

CITY

- All others Cities
- AGOURA HILLS

CHAPTER 5

DESIGN AND PERFORMANCE PROVISION

5.1 Design and Construction Standards and Specifications

The City requires that all sewers be designed in accordance with Los Angeles County standards. The County DPW has Standard Plans and Specifications for Construction of Sanitary Sewers and appurtenances to ensure that sewer lines and connections are properly designed and constructed. The County DPW specifications, by reference, incorporate the Standard Plans and Specifications for Public Works Construction, Special Provisions, and Standard Drawings. In addition County DPW has other publications such as the Private Contract Sanitary Sewer Procedural Manual, Guidelines for the Design of Pump Stations etc. to ensure consistency in the design of wastewater collection systems within unincorporated County areas. The City requires that these publications also be followed in the design of sewer system within the City. To further assure that sewer facilities are properly designed and constructed, City requires that plans are designed by licensed engineers and provides thorough review of plans, by City and SMD, prior to approval for construction and inspection of the actual construction work. The SMD plan review is performed from the stand point of maintenance only.

5.2 Procedures and Standards for Inspection and Testing

The City provides inspection for the installation of new and rehabilitation of deteriorated public sewer facilities within City jurisdiction. Inspectors are well trained in pipeline and pumping station construction, they attend training classes and educational seminars to stay familiar with advancements in the industry. The inspectors are also provided with adequate materials to perform their jobs, including the Standard Specifications for Public Works Construction, the Standard Plans for Public Works Construction, and the Public Works Inspectors' Manual. The City also requires the preparation and submittal of "As-Built" plans of completed projects prior to final approval and acceptance of the project as public infrastructure.

The inspection of sewer rehabilitation projects under the ACO program are conducted by County DPW inspectors.

In compliance with SMD policy, the City also requires that all newly constructed pumping stations be inspected by experienced SMD staff prior to transferring such facilities to SMD for maintenance.

CHAPTER 6

OVERFLOW EMERGENCY RESPONSE PLAN

6.1 Overflow Response Procedure

The City, as a member of the CSMD, relies on the services of SMD for sanitary sewer overflows within the City. Therefore, the SMD Overflow Procedure described in Chapter 6, of the SMD SSMP are utilized by the District in the City. Furthermore, the County DPW 24-hour emergency phone number is readily available to City staff and residents to use in promptly notifying County DPW staff of SSO events in the City.

The City provides 24-hour emergency response services to investigate and act upon notifications received from citizens or from telemetry systems or from other valid sources. Personnel are available 24-hours a day of the year to receive and act on any calls or automated alarms related to problems in the sewer system, including overflows.

6.1.1 Regulatory Agencies Notification and Time Frame - The SMD is responsible for reporting of SSOs' to appropriate regulatory agencies for the City. As discussed in Chapter 2, SSOs that occur in the City are reported to the County by telephone or by telemetry at the pump stations. Upon receipt of such call, County Officials follow the notification guidelines contained in Chapter 6 of the SMD SSMP. A notification and timeframe matrix is attached as 6.1.7.

6.1.2 Procedure to ensure that Staff and Contractors are aware and appropriately trained to follow Emergency Response Plan - This is mainly the function of the County DPW. However, City staff is familiar with the SMD Emergency procedures which are included in Appendix "G" in the SMD SSMP.

When City staff is involved in an SSO response, the overflow response instruction manual (Appendix 'K' in this document) is a procedural and training guide. The crew responding to an overflow emergency is required to stop the overflow, contain it as soon as possible, and ensure that the facility or area is cleaned up and returned to normal operation. The agencies to be notified, method and time frame for notification are presented in Section 6.1.7. The relevant data about the overflow such as location, volume, agencies notified, etc. is recorded in field report forms (see Appendix 'K') and later stored in a computer file. All responding field personnel are trained to be conversant with these procedures and to accurately report all SSO events.

6.1.3 Procedure to Address Emergency Operations - The City does not play a significant role in this function. It is performed by County DPW staff or contractors doing emergency repair SSO related work for the County or the City. The County Fire and County Sheriff departments also play active roles in the control and protection of the general public during emergency SSO operations.

6.1.4 Program to Eliminate or Minimize Discharge of SSO into waters of the United States - This is one of the main functions performed by the County DPW for the City. The roles played by the City are limited to ensuring that the City's collection system has sufficient capacity for all operating conditions and making sure that the County DPW staff are promptly notified of SSO events when they do occur.

6.1.5 Field Response Report Protocol and Forms - Appendix 'K', of this SSO Emergency Response Plan, describes the procedures and reporting activity to be accomplished during an actual overflow event in the physical setting in which it occurs. Corrective actions and reporting guides are described and an investigation and reporting format are included for reference use.

6.1.6 SSO Flow Estimation Tables and Photographs - Example SSO flow estimation templates (guides) follow:

[Courtesy of the California Water Environment Association]

Attachment D - Sample Templates for SSO Volume Estimation

TABLE 'A'

ESTIMATED SSO FLOW OUT OF M/H WITH COVER IN PLACE

24" COVER

Height of spout above M/H rim **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/4	1	0.001	
1/2	3	0.004	
3/4	6	0.008	
1	9	0.013	
1 1/4	12	0.018	
1 1/2	16	0.024	
1 3/4	21	0.030	
2	25	0.037	
2 1/4	31	0.045	
2 1/2	38	0.054	
2 3/4	45	0.065	
3	54	0.077	
3 1/4	64	0.092	
3 1/2	75	0.107	
3 3/4	87	0.125	
4	100	0.145	
4 1/4	115	0.166	
4 1/2	131	0.189	
4 3/4	148	0.214	
5	166	0.240	
5 1/4	185	0.266	
5 1/2	204	0.294	
5 3/4	224	0.322	6"
6	244	0.352	
6 1/4	265	0.382	
6 1/2	286	0.412	
6 3/4	308	0.444	
7	331	0.476	
7 1/4	354	0.509	
7 1/2	377	0.543	
7 3/4	401	0.578	8"
8	426	0.613	
8 1/4	451	0.649	
8 1/2	476	0.686	
8 3/4	502	0.723	
9	529	0.761	

36" COVER

Height of spout above M/H rim **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/4	1	0.002	
1/2	4	0.006	
3/4	8	0.012	
1	13	0.019	
1 1/4	18	0.026	
1 1/2	24	0.035	
1 3/4	31	0.044	
2	37	0.054	
2 1/4	45	0.065	
2 1/2	55	0.079	
2 3/4	66	0.095	
3	78	0.113	
3 1/4	93	0.134	
3 1/2	109	0.157	
3 3/4	127	0.183	
4	147	0.211	
4 1/4	169	0.243	
4 1/2	192	0.276	
4 3/4	217	0.312	6"
5	243	0.350	
5 1/4	270	0.389	
5 1/2	299	0.430	
5 3/4	327	0.471	
6	357	0.514	
6 1/4	387	0.558	8"
6 1/2	419	0.603	
6 3/4	451	0.649	
7	483	0.696	
7 1/4	517	0.744	
7 1/2	551	0.794	
7 3/4	587	0.845	10"
8	622	0.896	
8 1/4	659	0.949	
8 1/2	697	1.003	
8 3/4	734	1.057	
9	773	1.113	

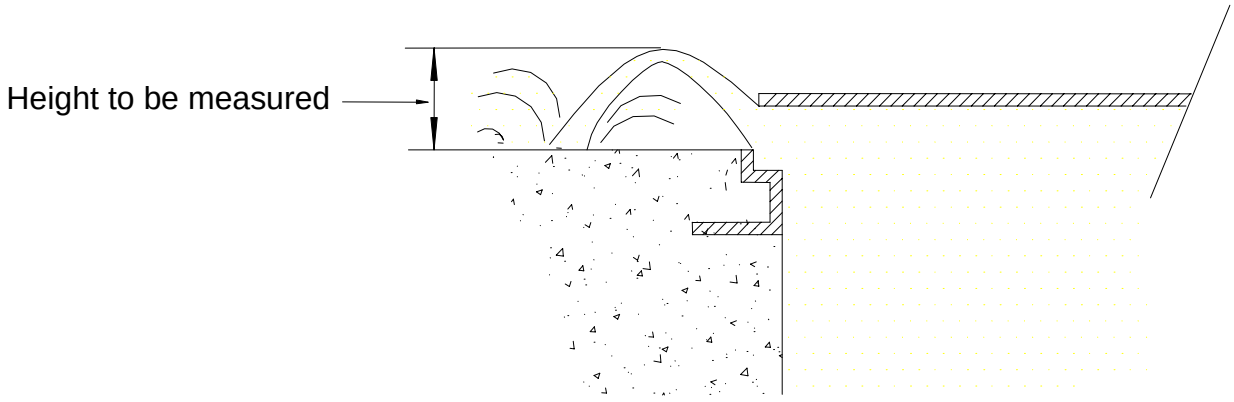
Disclaimer:
This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

The formula used to develop Table A measures the maximum height of the water coming out of the maintenance hole above the rim. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

Example Overflow Estimation:

The maintenance hole cover is unseated and slightly elevated on a 24" casting. The maximum height of the discharge above the rim is 5 ¼ inches. According to Table A, these conditions would yield an SSO of 185 gallons per minute.

FLOW OUT OF M/H WITH COVER IN PLACE



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

Collection System Collaborative Benchmarking Group
Best Practices for Sanitary Sewer Overflow (SSO) Prevention and Response Plan

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TABLE 'B'

ESTIMATED SSO FLOW OUT OF M/H WITH COVER REMOVED

24" FRAME

Water Height above M/H frame **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/8	28	0.04	
1/4	62	0.09	
3/8	111	0.16	
1/2	160	0.23	
5/8	215	0.31	6"
3/4	354	0.51	8"
7/8	569	0.82	10"
1	799	1.15	12"
1 1/8	1,035	1.49	
1 1/4	1,340	1.93	15"
1 3/8	1,660	2.39	
1 1/2	1,986	2.86	
1 5/8	2,396	3.45	18"
1 3/4	2,799	4.03	
1 7/8	3,132	4.51	
2	3,444	4.96	21"
2 1/8	3,750	5.4	
2 1/4	3,986	5.74	
2 3/8	4,215	6.07	
2 1/2	4,437	6.39	
2 5/8	4,569	6.58	24"
2 3/4	4,687	6.75	
2 7/8	4,799	6.91	
3	4,910	7.07	

36" FRAME

Water Height above M/H frame **H** in inches	S S O FLOW **Q** in gpm	in MGD	Min. Sewer size in which these flows are possible
1/8	49	0.07	
1/4	111	0.16	
3/8	187	0.27	6"
1/2	271	0.39	
5/8	361	0.52	8"
3/4	458	0.66	
7/8	556	0.8	10"
1	660	0.95	12"
1 1/8	1,035	1.49	
1 1/4	1,486	2.14	15"
1 3/8	1,951	2.81	
1 1/2	2,424	3.49	18"
1 5/8	2,903	4.18	
1 3/4	3,382	4.87	
1 7/8	3,917	5.64	21"
2	4,458	6.42	
2 1/8	5,000	7.2	24"
2 1/4	5,556	8	
2 3/8	6,118	8.81	
2 1/2	6,764	9.74	
2 5/8	7,403	10.66	
2 3/4	7,972	11.48	30"
2 7/8	8,521	12.27	
3	9,062	13.05	
3 1/8	9,604	13.83	
3 1/4	10,139	14.6	
3 3/8	10,625	15.3	36"
3 1/2	11,097	15.98	
3 5/8	11,569	16.66	
3 3/4	12,035	17.33	
3 7/8	12,486	17.98	
4	12,861	18.52	
4 1/8	13,076	18.83	
4 1/4	13,285	19.13	
4 3/8	13,486	19.42	

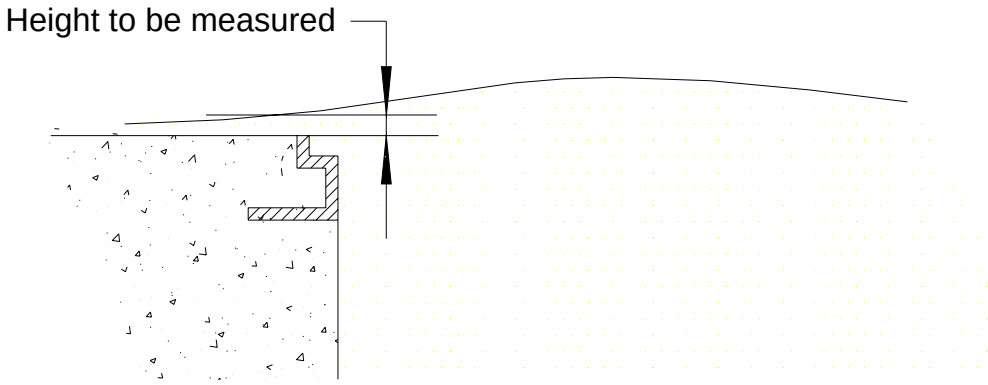
Disclaimer:
This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

The formula used to develop Table B for estimating SSO's out of maintenance holes without covers is based on discharge over curved weir -- bell mouth spillways for 2" to 12" diameter pipes. The formula was taken from hydraulics and its application by A.H. Gibson (Constable & Co. Limited).

Example Overflow Estimation:

The maintenance hole cover is off and the flow coming out of a 36" frame maintenance hole at one inch (1") height will be approximately 660 gallons per minute.

FLOW OUT OF M/H WITH COVER REMOVED (TABLE "B")



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

TABLE 'C'

ESTIMATED SSO FLOW OUT OF M/H PICK HOLE

Height of spout above M/H cover **H** in inches	SSO FLOW **Q** in gpm	Height of spout above M/H cover **H** in inches	SSO FLOW **Q** in gpm	
1/8	1.0	5 1/8	6.2	
1/4	1.4	5 1/4	6.3	
3/8	1.7	5 3/8	6.3	
1/2	1.9	5 1/2	6.4	
5/8	2.2	5 5/8	6.5	
3/4	2.4	5 3/4	6.6	
7/8	2.6	5 7/8	6.6	
1	2.7	6	6.7	
1 1/8	2.9	6 1/8	6.8	
1 1/4	3.1	6 1/4	6.8	
1 3/8	3.2	6 3/8	6.9	
1 1/2	3.4	6 1/2	7.0	Unrestrained M/H cover will start to lift
1 5/8	3.5	6 5/8	7.0	
1 3/4	3.6	6 3/4	7.1	
1 7/8	3.7	6 7/8	7.2	
2	3.9	7	7.2	
2 1/8	4.0	7 1/8	7.3	
2 1/4	4.1	7 1/4	7.4	
2 3/8	4.2	7 3/8	7.4	
2 1/2	4.3	7 1/2	7.5	
2 5/8	4.4	7 5/8	7.6	
2 3/4	4.5	7 3/4	7.6	
2 7/8	4.6	7 7/8	7.7	
3	4.7	8	7.7	
3 1/8	4.8	8 1/8	7.8	
3 1/4	4.9	8 1/4	7.9	
3 3/8	5.0	8 3/8	7.9	
3 1/2	5.1	8 1/2	8.0	
3 5/8	5.2	8 5/8	8.0	
3 3/4	5.3	8 3/4	8.1	
3 7/8	5.4	8 7/8	8.1	
4	5.5	9	8.2	
4 1/8	5.6	9 1/8	8.3	
4 1/4	5.6	9 1/4	8.3	
4 3/8	5.7	9 3/8	8.4	
4 1/2	5.8	9 1/2	8.4	
4 5/8	5.9	9 5/8	8.5	
4 3/4	6.0	9 3/4	8.5	
4 7/8	6.0	9 7/8	8.6	
5	6.1	10	8.7	

Note: This chart is based on a 7/8 inch diameter pick hole

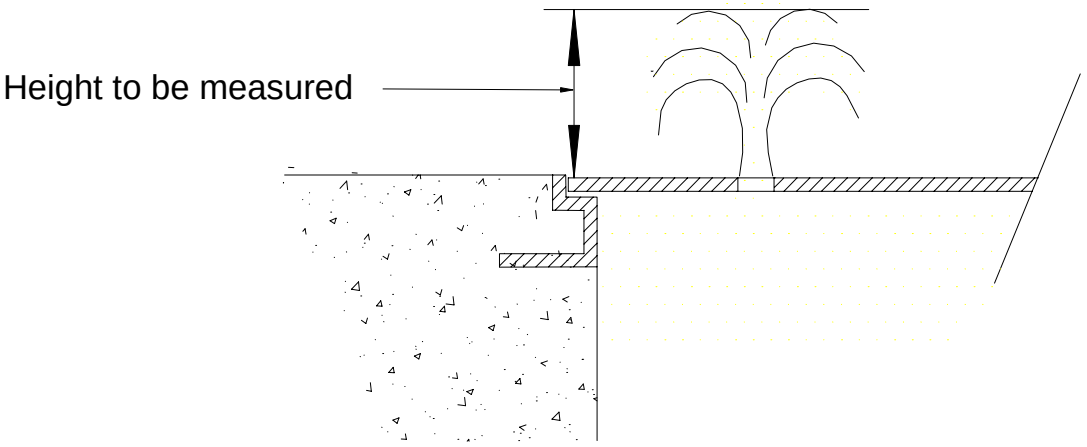
Disclaimer: This sanitary sewer overflow table was developed by Ed Euyen, Civil Engineer, P.E. No. 33955, California, for County Sanitation District 1. This table is provided as an example. Other Agencies may want to develop their own estimating tables.

The formula used to develop Table C is Q=CcVA, where Q is equal to the quantity of the flow in gallons per minute, Cc is equal to the coefficient of contraction (.63), V is equal to the velocity of the overflow, and A is equal to the area of the pick hole.[2] If all units are in feet, the quantity will be calculated in cubic feet per second, which when multiplied by 448.8 will give the answer in gallons per minute. (One cubic foot per second is equal to 448.8 gallons per minute, hence this conversion method).

Example Overflow Estimation:

The maintenance hole cover is in place and the height of water coming out of the pick hole seven-eighths of an inch in diameter (7/8") is 3 inches (3"). This will produce an SSO flow of approximately 4.7 gallons per minute.

FLOW OUT OF VENT OR PICK HOLE (TABLE "C")



This sanitary sewer overflow drawing was developed by Debbie Myers, Principal Engineering Technician, for Ed Euyen, Civil Engineer, P.E. No. 33955, California, of County Sanitation District 1.

[2] Velocity for the purposes of this formula is calculated by using the formula h = v squared / 2G, where h is equal to the height of the overflow, v is equal to velocity, and G is equal to the acceleration of gravity.

Flow Estimation Pictures

6.1.7 Regulatory Agencies Notification and Time Frame

[As noted in Section 6.1.1, the County does all reporting]

SSO Category	Type or Description	Agencies to be Notified	Type of Notification & Time Frame	
			Telephone/Fax *ASAP, but no later than 2 hours after spill awareness*	**Written Report/*Online Database**
1	**A discharge that equals or exceeds 1,000 gallons, or discharges into a drain, channel, surface water and was not captured.**	County Health Department Flood Maintenance Division State Office Emergency Serv. Regional Wtr. Qual. Cntrl. Bd. St. Wtr. Resources Control Bd.	626-430-5420-Bus. Hrs 213-974-1234-Aftr Hrs 562-861-0316-Bus. Hrs 800-852-7550 [24/7] 213-576-6600-Bus. Hrs 213-576-6650-Aftr Hrs N/A	N/A N/A N/A N/A Certify notification was made ASAP, but no later than 24 hrs. On-Line Database-ASAP, but no later than 3 business days after spill awareness. Final report per the WDR schedule.
2	**A discharge that is less than 1,000 gallons, did not discharge into a drain, channel, surface water and was captured.**	County Health Department St. Wtr. Resources Control Bd.	626-430-5420-Bus. Hrs 213-974-1234-Aftr Hrs N/A	N/A N/A On-Line Database-ASAP, but no later than 3 business days after spill awareness
3	**Not applicable at this time.**			
Private Lateral Spill	**A discharge from a privately owned lateral.**	County Health Department St. Wtr. Resources Control Bd.	626-430-5420-Bus. Hrs 213-974-1234-Aftr Hrs N/A	On-Line Database at enrollee's discretion.
N/A	**No SSO in a calendar month**	St. Wtr. Resources Control Bd.	N/A	Online Database Certified – Within 30 days after a calendar month end, file statement that no SSO occurred.

24/7 = 24 hours per day & 7 days per week

CHAPTER 7

FOG CONTROL PROGRAM

7.1 Public Education and Outreach Program

The City currently benefits from the County DPW public education outreach program. Under this program information on proper disposal of Fats, Oils and Grease (FOG) and other SSO prevention measures such as the installation of backwater valves, house lateral maintenance etc. is disseminated to CSMD member city residents through publication of annual reports, brochures and individual notices to property owners. County DPW sewer maintenance and industrial waste management program personnel also assist in passing useful information on SSO prevention and FOG on to home and business owners. County DPW, in addition, has the annual reports posted on its home web page (http://dpw.lacounty.gov/smd/smd/) for easy access to internet users.

To complement County efforts, the City proactively reaches out to users of its sewer system regarding the community's FOG source control program. Information on proper disposal of FOG and other SSO prevention measures, including installation of grease traps, backwater valves, sewer lateral maintenance, etc. is disseminated through publication of brochures, articles in newsletters, and individual notices to property owners, with business license renewals, on a schedule. These notifications provide descriptions of grease control efforts that can be undertaken by homeowners and businesses alike. Additionally, the DPW utilizes personal contacts with home and business owners by its field crews and the code enforcement inspectors as conditions warrant. These methods are usually effective in relaying information on proper disposal of FOG and other SSO prevention methods to the community. Also provided in this chapter are some BMPs for reducing FOG in the wastewater collection system.

Additionally, other effective ways to communicate with the public are being considered. These include use of the City's home web page, use of local radio and cablevision announcements, and the exchange of outreach information between agencies. Other aggressive means will also be considered in the near future.

The bilingual posters developed by the California Restaurant Association (CRA) and CSD for direct distribution to Food Service Establishments (FSE) is an available BMP tool for training and reminding those who work with FOG producing products. The CSD has also developed a training program available to agency personnel on methods to control grease discharges in order to prevent SSO's. For CSD's FOG Training available to local cities contact (562) 699-7411 x 2907, and information, documents and guidelines are available on the Cal FOG website http://calfog.org.

FOG in the local sewer system can be a prime contributor to an SSO and its corresponding health and safety impacts. Related health and safety issues can also result from the discharge of pharmaceuticals and pesticides into the sanitary sewer system. Although not usually a causative factor in sewer overflows, these chemicals can be toxic and have disruptive environmental and biological effects. Discharges of such chemical compounds into the sewers should also be avoided and addressed in the education and outreach program. ("No drugs or household pesticides down the drain" is a compatible health and safety advisory).

7.2 Disposal Methods for FOG Generated within the City Sewer System

This function is performed by the CSMD staff on behalf of the City. The methods used by County DPW are contained in the SMD SSMP.

7.3 Legal Authority to Prohibit Discharges to the System and Identify Measures to Prevent SSOs and Blockages Caused By Fog

Legal authority to prohibit discharges of FOG into the sewer system is discussed in Chapter 3 of this document. Requirements for grease interceptors at food establishments to prevent the discharge of grease to the collection sewer system and educating the public on proper disposal methods for FOG are also discussed elsewhere in this chapter.

Discharges from industrial classification facilities are usually controlled under the terms of an industrial wastewater discharge permit, which is issued and monitored by the local sewering agency.

7.4 Requirement to Install Grease Removal Devices, Design Standards, Maintenance Requirements, BMP Requirements; Record Keeping and Reporting Requirements

The County DPW, under a separate agreement (Appendix 'F' in the SMD SSMP document) with the City, is charged with the responsibility of enforcing the County's Sanitary Sewers and Industrial Waste Ordinance in the City. The Industrial Waste Program of the County is managed by the Environmental Programs Division of County DPW. The design standards for grease removal devices and all requirements imposed on industrial waste facilities that discharge waste or FOG into the City's sewer system are similar to those imposed in the Unincorporated County and as presented in Chapter 7.4 of the SMD SSMP.

The City Building Official is authorized to monitor and enforce the terms of the Plumbing Code and the Public Health Code, relative to domestic waste disposal from residential and commercial facilities within the community.

The County DPW is charged with reviewing, permitting and inspecting existing industrial waste facilities that discharge into the sanitary sewer system in the City. Pretreatment devices are required for industrial waste generating facilities, including restaurants and other FSE. Grease removal devices are required to be designed, approved, installed and operated in a manner to control discharges of FOG into the sanitary sewer system, They are also to ensure that the facilities do not create nuisances, menaces to the public peace, health or safety hazards, or adverse impacts on the public sewerage system, soil, underground and/or surface waters. If there is a FOG related problem associated with an industrial waste permit, City will take enforcement action against the permittee.

If during inspection of the sanitary sewer system, SO&M personnel determine that a FOG related problem exists and is traceable to a domestic sewage source of such character that is not satisfactory, under the PMC, pretreatment could be required or the discharge required to be eliminated. Domestic waste containing FOG can lead to SSOs which are public nuisances, and

California Health and Safety Code Division 5, Part 3, Chapter 6, Article 2 can also be used to impose appropriate domestic sewage discharge requirements.

The effectiveness of any grease removal devices are dependent upon their routine maintenance and monitoring/inspection for conformance with its intended purpose. Regular inspection and maintenance activity logging with quarterly reporting are required.

7.5 Authority to Inspect Grease Producing Facilities, Enforcement Authorities, and Evidence of Adequate Staffing To Inspect and Enforce the FOG Ordinance

LACO Code, Section 20.24.090 gives the County DPW the authority to inspect grease producing facilities for compliance with permit requirements. In accordance with the aforementioned agreement, the County DPW is responsible for issuing the permits and for the inspection of these facilities for compliance with terms of their permit. County DPW in concert with the City Engineer is also responsible for the enforcement of all industrial waste permit and Code violations in the City.

The County DPW has adequate staff to conduct inspections of the few pre-treatment facilities at the permitted FSE connected into the city sewer system. The funding mechanism now in place allows for increases in permit and other services charges to hire additional staff, if necessary.

7.6 Cleaning Schedule for Identified FOG Prone Sewer Segments

This function is performed by the CSMD for the City. The methods used by CSMD staff are described in Section 7.6 of the SMD SSMP.

Experience has shown that FOG contributes to about 50% of the total SSO events that occur in a typical community sewer system. The remaining 50% is usually attributable to root intrusion into the system and other structural causes and Inflow/Infiltration (I/I). FOG prone sections of City's collection system, otherwise called "hot spots," are identified during routine maintenance operations and investigation of stoppages resulting in a SSO event. These "hot spots" are typically cleaned by hydro jetting and rodding or cutting if roots are encountered. Those portions of the system found to have persistent FOG problems are inspected and cleaned more frequently, depending on the magnitude of the problem. Furthermore, segments of the collection system with persistent FOG problems are referred to the DPW for additional evaluation and corrective actions.

7.7 Source Control Measures Developed and Implemented for "Hot Spots"

Each "hot spot" cause and condition is not the same. For each identified problem location, the means of effective maintenance is noted on the respective "hot spots" list for review and regular follow-up action by the sewer maintenance crews. The activities can be amended as needed.

7.8 Some BMPs for Fats, Oil and Grease

Examples of some BMPs for local application are listed on the following pages.

Some Best Management Practices (BMPs) for Fats, Oils, and Grease

Residual fats, oils and grease (FOG) are by-products that food preparation and food service establishments and automotive service facilities and machine shops must constantly manage. Typically, FOG enters a facility's plumbing from wash sinks and floor drains during daily operations. Sanitary sewer systems are not designed or equipped to handle accumulating FOG on the interior of sewer collection system pipes due to unmanaged – unmaintained discharges. Keeping FOG materials out of the plumbing system, by reasonable methods, is an important factor. The following are suggestions for proper FOG management:

Bulk or Dry Clean-Up

- Practice bulk and dry materials clean-up before using wet methods that use water.
- Remove bulk or other solid food and grease laden substances into a suitable container before rinsing or washing the initial containers or surfaces that will drain into the plumbing system.
- Keep drain screens in place and fully serviceable to avoid clogging drains or accumulating FOG or grit on the interiors of pipes.
- Do not pour grease, fats, or oils down the drain nor place food scraps in the drain.
- Use food grade paper to soak up oils and grease and dispose of appropriately.
- Use paper towels to wipe down surfaces and work areas. Cloth towels require washing and thereby introducing FOG back into the drains.
- Success of bulk or dry clean-up is dependent upon the behavior of individuals and their access to tools and materials for use in removing bulk and dry materials before washing.

Spill Prevention

- Preventing spills reduces the amount of waste that will require clean-up.
- A dry surface work place is safer for everyone in avoiding slips, trips and falls.
- Capture bulk or dryer materials and place them into an appropriate container.
- Empty containers before they are full to avoid spills.
- Cover any FOG container before transporting to the rendering storage container.
- Provide employees with proper tools to transport materials without spilling.

Maintenance

- Whatever method(s) are being used to collect, filter and store FOG, ensure that equipment is regularly maintained.
- Employees should be aware of and trained to perform correct and scheduled cleaning procedures.
- A daily and weekly maintenance schedule is highly recommended.
- Contract with a responsible service company to regularly and thoroughly clean larger components and spaces requiring specialized equipment and skills (e.g. large hood filters, hot tanks, floor drain pipes, specialty tools).

- Smaller and less complex elements can be cleaned by hand by the user (e.g. small hood filters, counter/bench tops, sinks, storage areas, daily tools).
- Skim/filter fryer grease daily and test the oil to determine when change is necessary. Build-up of carbon deposits on the bottom of the fryer acts as an insulator that forces the fryer to heat longer, thus causing the oil to break down sooner. This extends the life of both the fryer and the oil.
- Avoid discharging fryer oil into a drain or grease trap, but dispose into a rendering container for transport to a rendering company.
- Cleaning intervals depend upon the type of product being prepared and the typical deposition of materials experienced. The larger the volume produced and deposits incurred, the more frequent the cleaning. This may warrant setting up a system of high use, high deposition work to be done in certain equipment that is cleaned more frequently than others to confine maintenance efforts.

Grease Traps and Interceptors

- For grease traps and interceptors to be effective, the units must be properly sized, constructed and installed in a location to provide an adequate retention time for settling and accumulation of the FOG.
- For information on properly locating, constructing and sizing grease traps and interceptors, contact the local governmental agency and examine EPA guidance documents and UPC criteria.
- Ensure all grease-bearing drains discharge to the grease trap/interceptor.
- No toilet or shower waste should be plumbed to the trap/interceptor

Oil and Grease Collection/Recycling and Food Donations

- FOG consists of commodities that if handled properly can be treated as a valuable resource.
- Some rendering companies will offer services free-of-charge and other will give a rebate on the materials collected. Contact local rendering representative for specific information and details.
- Use only covered rendering barrels and make sure all drain screens are installed.
- Use a 3-compartment sink for ware washing. Begin with a hot pre-wash, then a scouring detergent wash, then a hot rinse. Each step should be trapped to capture non-emulsified FOG.
- Donations can reduce disposal costs. Ensure that edible food is not washed or flushed down the drain. Edible food waste may be donated to a local food bank. Inedible food waste can be collected by a garbage feeder that will use discards for feeding livestock.

CHAPTER 8

SYSTEM EVALUATION AND CAPACITY ASSURANCE PLAN

8.1 System Evaluation and Capacity Assurance

In 1987 the City received a partial master plan for sewers within the area knows as "Old Agoura" which is north of the SR-101 Freeway near the easterly boundary of the city. However, this report did not address other existing sewer services in the community. The city currently does not have a comprehensive sewer master plan, so a hydraulic model analysis of the community sewer system was performed asnd the resulting report is included as Appendix 'L' in this SSMP report.

8.2 Adequate Capacity and Correct Design

The City is responsible for ensuring that the public sewer infrastructure is correctly designed, adequately sized and reasonably maintainable. The CSMD also provides a supporting role in reviewing all proposed sewer plans for new developments in the City. This is to ensure that sewers conform to County design standards and particularly to ensure that district's requirements for acceptability for maintenance are required.

The City Engineer or hired qualified professional engineer provides thorough review of all sewer plans for proposed development projects in the City to ensure that: 1) they are properly designed with sufficient capacity for current and future base, peak and wet weather flow demands; and 2) any impact of proposed project on existing sewer system is mitigated prior to approval by the City Engineer to receive additional sewage flow. During construction, the projects are continuously inspected by the City Engineer or hired construction inspectors to ensure that the sewer facilities are constructed in accordance with the approved plans and specifications.

8.3 Capacity Enhancement Plan

The collection sewer system capacity enhancement program and prevention of SSOs is a combined effort of City and LACDPW. The City follows its policies for managing available sewer capacity (See Appendix 'M'). While the CSMD utilizes its programs, which include the CCTV program to identify pipe segments needing repairs or with I/I or tree root intrusion problems, sewer cleaning program and the CSMD ACO program to effect repairs or replacement of damaged pipes. The CSMD programs are described in Chapters 3 and 4 of the SMD SSMP. The identified capacity deficient pipe segments and related replacement costs are addressed in Appendix 'L'.

8.4 Financing of Improvements

General

Funding considerations are often the deciding factor in scoping and implementation of a project. There are, of course, numerous methods or mix of methods, which could be used

to finance the implementation of a sewer system capital improvement plan (CIP), and the ongoing operations and maintenance activities. Among these methods are:

1. Pay-as-You-Go Financing (rates, fees and charges based)

2. Redevelopment Agency Funding

3. State Assistance Programs

4. Municipal Securities

5. Improvement Districts

6. Federal Assistance Programs

In discussion that follows, the above funding options are briefly described and their adaptability to specific circumstances of a sewer system CIP are noted. In evaluating specific funding programs, services of financial and legal experts in such issues are recommended.

Methods of Financing

1. Pay-as-You-Go Financing:

   Development of cash reserves or capital improvement funds, from an agency's revenue base, is often referred to as "pay-as-you-go" funding. This method avoids interest payments on other types of debt financing. Under this form of financing, the initial capital cost of a project must be accumulated in advance of construction, which can cause a delay in project implementation. If delay is not a crucial factor, this is a cost effective method due to the absence of debt financing costs. This method has sometimes been used together with various forms of short-term financing to construct needed sewer infrastructure.

2. Redevelopment Agency Funding:

   Funds generated from property tax increment revenue, received by the City's redevelopment agency (RDA), is a possible source for sewer system capital improvements, within or beneficial to the RDA. A sewer system improvement project would have to compete with other agency planned projects, prioritized and an agency funding decision.

3. State Assistance Programs:

   Under the rules and regulations of the Federal Water Pollution Control Act (Clean Water Act or CWA) and the Federal Safe Drinking Water Act (SDWA), the State has enacted the Clean Water State Revolving Fund (CWSRF) and the Drinking Water

Revolving Fund (DWSRF), respectively. These programs are funded by Federal grants, State funds and Revenue bonds. The CWSRF Loan Program provides low-interest loan funding for construction of publicly-owned wastewater treatment facilities, sewers, sewer interceptors, water recycling facilities, as well as implementation of non-point source (NPS) projects or programs. There are different types of funding assistance available under these programs.
www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/

The Department of Water Resources administers the State bond law programs for Water supply/Water quality, Water conservation, Flood management and Regional water management. www.grantsloans.water.ca.gov

The State Water Resources Control Board administers the State revolving fund loans, Water recycling grants & loans, Small community grants, Agricultural drainage loans, Agricultural drainage management loans, Clean beaches initiative grants, Agricultural water quality grants, Areas of special biological significance (ASBS) grants, Storm water grants, and Santa Monica bay restoration commission grants.
www.waterboards.ca.gov

The State Department of Public Health administers the DWSRF, Proposition 84 funding for public water systems, and Proposition 50 for the water security, clean drinking water, coastal and beach protection act of 2002 loans. www.cdph.ca.gov

Various types of infrastructure improvement/construction loans can be arranged through the California Infrastructure and Economic Development Bank (IBank)
www.ibank,ca,gov

Limited amounts of public works grant funds have been available to agencies from the State Office of Economic Development. Use of such grant funds must result in the creation of new, permanent jobs in the private sector. In order to ensure that the funds are ultimately assisting those in most need, projects eligible for consideration must be those in areas designated eligible for HUD Urban Development Action Grants (UDAG), EDA Sudden or Long-term Economic Deterioration, or EDA Designated Special Impact Area.

4. Municipal Securities:

Historically, general obligation bonds (GOB's) had been a prevalent method of financing various public works improvements. They are secured by an agency's total assets and payable from ad valorem taxes levied on all taxable properties within the agency's boundary. However, the Jarvis-Gann Amendment (Proposition 13 of 1978) prohibits the levying of ad valorem property taxes beyond pre-existing authorizations and levels (pre-July 1, 1978). Therefore, authorization and issuance of GOB's is not considered feasible under current law.

An option to GOB's is the issuance of a specific type note or bond form, such as a

revenue anticipation note (RAN) or a tax anticipation note (TAN) or a certificate of participation (COP) or various combinations of available authorities that can be used to fund public infrastructure needs. These types of municipal securities (Munis) are generally tax-exempt and commonly used to fund public works infrastructure and facilities. Many states also exempt their securities from their own taxes, which makes those securities particularly attractive investments for their own residents.

TAN's and RAN's are instruments backed by anticipated taxes or revenues respectively. When these types of notes are considered for funding of needed infrastructure, a specified source of tax or revenue stream is identified and pledged for repayment of the debt. For example, with sewer facilities, all or a portion of the sewer service revenue fees/charges could be used as backing for the debt instrument selected. Then other local revenue sources could be considered for ongoing operations and maintenance (O&M) or some acceptable mix and match of funds specified to secure the debt and accomplish the O&M.

COP's are another form of municipal funding instrument available. These generally require the facility improvement being funded to be named as security for the investment with a lease back of the facility by the municipality. In turn, the municipality pledges some revenue stream(s) that would be used to repay the investor held notes.

When Munis are being considered for funding of improvements, consultation with an experienced and qualified financing consultant and bond counsel are a must.

5. Improvement Districts:

In general, special assessment district procedures have been established by statute to provide for financing of construction and/or acquisition of public works improvements, such as sewer systems, and for assessing the cost of such improvements to the benefiting properties. Under all assessment proceedings, the cost of the work is assessed against properties within the benefited area. The assessments are levied in specific amounts against each individual property on the basis of the benefit each parcel receives. The property owner may pay the assessment in cash during the cash collection period of 30 days. But, if any assessments are not paid in cash during that period, bonds are usually issued to represent the unpaid assessments and the benefited properties are assessed on their annual property tax bill over a usual period of 10 to 20 years.

Commonly used assessment acts are the 1911 and 1913 Acts. The common bond acts are the 1911 and 1915 Acts. These assessment and bond acts are used in varying combinations depending on the particular circumstances for each proposed improvement district.

While an assessment district proceeding may be a reasonable and equitable means for financing sewer system improvements, further evaluation and stakeholder involvement

is a usual practice to determine the viability and practicality of utilizing such financing method.

6. Federal Assistance Programs:

There are, and have been, a series of federal grant and loan programs which may be applicable to public infrastructure projects. However, the qualification criteria for such programs vary from time to time and their funding or continuation is subject to congressional appropriations. Therefore, such programs should not be considered as a likely source of funds unless a funding commitment letter has been received.

Historically, federal programs administered by the Economic Development Administration (EDA) provide financial and technical assistance to aid the economic development of areas with high unemployment or low family income levels. Communities must make long-range plans for economic growth in order to be eligible for EDA financial assistance, in the form of grants and loans for public works and development that generates jobs and economic opportunity. Typical public works projects include construction of roads, water and sewer lines, and public facilities. To determine the status requires timely monitoring.

Under the rules and regulations of the Housing and Community Development Act of 1974, the Community Development Block Grant (CDBG) program can fund housing and community development needs. This includes part or all of improvements necessary to upgrade existing sewer facilities. Those qualifying geographic areas within the City that have the greatest overall deficiency in physical infrastructure receive the highest priority according to CDBG criteria. When the sewer system has a defined deficiency, then it is appropriate to use CDBG funds to meet health and safety standards as well as to encourage up-grading of abutting housing and physical environment.

The primary statutory objective of the CDBG program is to develop viable communities by providing decent housing and a suitable living environment and by expanding economic opportunities, principally for persons of low- and moderate-income. Communities receiving CDBG funds through the State may use the funds for many kinds of community development activities including, but not limited to:

- acquisition of property for public purposes;
- construction or reconstruction of streets, water and sewer facilities, neighborhood centers, recreation facilities, and other public works;
- demolition;
- rehabilitation of public and private buildings;
- public services;
- planning activities;
- assistance to nonprofit entities for community development activities; and
- assistance to private, for profit entities to carry out economic development activities (including assistance to micro-enterprises).
  www.hcd.ca.gov/ca/cdbg/about/html

The United State Department of Agriculture Rural Development Program provides communities with population less than 50,000 a variety of direct-guaranteed-loans and /or grants. These include water and wastewater system improvement funding.

www.rurdev.usa.gov/ca

CHAPTER 9

MONITORING, MEASUREMENT, MODIFICATION PROGRAM

9.1 Monitoring

The City will document all relevant data on SSOs that occur in the City. These will include both the quarterly SSO reports and the Annual Reports published by County DPW for the City (see Appendix 'K' in the SMD SSMP), and any special reports to regulatory agencies etc. The data will be analyzed to evaluate the effectiveness of the City's SSMP.

9.2 SSMP Program Effectiveness Evaluation

Evaluation of the City's SSMP program effectiveness shall be based on such key performance indicators as the total number of overflows, overflow response time, reduction in repeated incidents of SSO at some location, total overflow equal to or greater than 1,000 gallons or reaching the waters of the United States and reduction in number of overflows that are caused by sewer capacity-related problems. (See Appendix 'J' in the SMD SSMP) Form to be customized to fit the City.

9.3 Program Modification

The City will continually update or modify key elements of its SSMP based on the results of the above mentioned monitoring and program effectiveness evaluations. The City shall also make recommendations to the County, as necessary, on elements of the SMD SSMP to be adjusted or revised within the City boundaries to better serve its residents.

9.4 SSO Location Mapping and Trends

All sanitary sewer system agencies in the Los Angeles, Santa Ana, and San Diego Regional Water Quality Board regions including the City of Agoura Hills, which is a sewer system agency within the Los Angeles Regional Water Quality Board region, were required to report all SSOs to their respective Regional Board beginning on January 2, 2007. An annual SSO location map prepared by County DPW for the City will be similar to that in Appendix 'K' in the SMD SSMP, and identifies the cause of each SSO incident. SSO characteristics and locations are used for establishing SSO patterns, identifying hot spots, and scheduling work assignments by County DPW field personnel.

Prior to January 2, 2007 City of Agoura Hills SSO's were recorded by CSMD. CSMD has retained SSO data pertaining to the City dating back to 2004. The characteristic data for each recorded SSO event in the City from January 2004 through January 2009 is shown in Section 9.4.1a.

9.4.1a Reported City SSOs (2004 – 2009)[(a)]

Year	SSO No.	SSO Category 1or 2[(b)]	Date	Location	Estimated Volume (gal)	Estimated Recovered Volume (gal)	SSO Cause
	1	1	2/28/04	6120 Acadia Ave.	300	ND	Heavy Grease
2004	**2**	1	3/12/04	5309 John Dodson Dr.	900	ND	Roots
	3	1	9/5/04	5911 Calmfield Ave	ND	ND	Grease
2005	**1**	1	1/1/05	29102 Hill Dr.	800	ND	Roots
	2	1	6/1/05	I/S Laura La Plante Dr & Lewis Rd.	500	ND	Roots
2006	**1**	2	3/18/06	5672 Middle Crest Dr.	800	ND	Heavy Grease
	2	1	9/18/06	8263 Dorthy	200	ND	Grease
2007	**1**	1	3/4/07	30315 Canwood St.	150	100	Roots
	2	1	4/30/07	6016 Dovetail Dr.	400	0	Roots
2008	**1**	1	4/27/08	28313 Laura La Plante Dr.	120	20	Roots
	2	1	11/29/08	5672 Middle Crest Dr.	ND	ND	ND
2009	**1**	1	1/25/09	6120 Acadia Ave.	ND	ND	ND

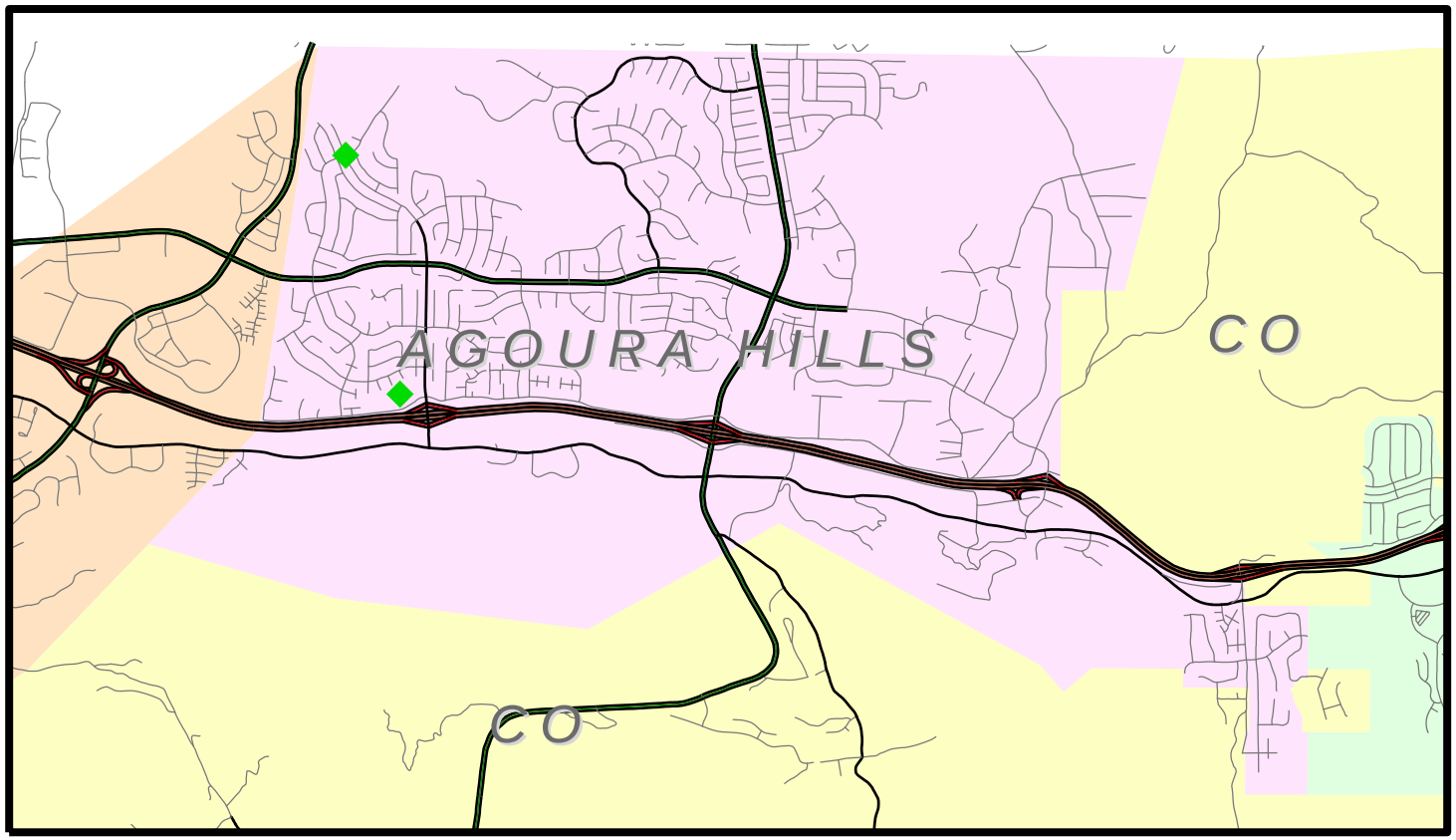
(a) Through January 2009
(b) SSO Category 1: 1) greater than or equal to 1,000 gallons or, 2) results in discharge to drainage channel and/or surface water or 3) discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system. SSO Category 2: All SSOs not meeting the definition of a Category 1
(c) No Data
(d) Not Applicable

9.4.1b Location Map of reported SSOs (2007)

On the following page

.**9.4.2** Graphing and Charting of SSO Frequencies - Monthly tracking of SSOs (charting and graphing) prepared by County DPW for the City of Agoura Hills for 2007 are presented in Appendix 'K1' and 'K2' in the SMD SSMP report. Over time the graphs are used for identifying SSO trends, to evaluate overall program effectiveness, and are used as an indicator of possible problems due to infiltration/inflow.

City of Agoura Hills
Sewer Overflows - 2007



REPORTED SEWER OVERFLOWS - 2007

ID	DATE_	DESCRIPTIO	CAUSE	EST_GA	JUR
1	03/04/2007	30315 Canw ood St	Roots	150	AGH
2	04/30/2007	6016 Covetall	Roots	0	AGH

Legend

Sewer Overflows

- Grease
- Miscellaneous
- Root
- Root & Grease

N W E S

0 0.3 0.6 1.2 1.8 2.4 Miles

CHAPTER 10

SSMP PROGRAM AUDIT AND CERTIFICATION

10.1 SSMP Program Audit

The City shall conduct periodic internal audits and prepare a report at a minimum every two years.

The audit will focus on evaluating the operational and cost effectiveness of the SSMP as well as the city's and SMD's compliance with all elements of the SSMP. This will include:

- Identification of any deficiencies in the SSMP
- Steps taken to correct any identified deficiencies
- Notes of interviews with key responding personnel and any contractors utilized
- Notes of operational observations, especially of each SSO event
- Notes on related equipment inspections
- Findings of all reviews of records

The most recent audit report must be kept on file in the Office of the City Clerk, the City Engineer's office and at the City and field maintenance yards. Copies of the audit report shall also be available upon request by the involved regulators and stakeholders.

10.2 SSMP Certification

The SSMP shall be certified by the City Engineer or authorized representatives to be in compliance with the requirements set forth in the WDR and be presented to the City Council for approval at a public meeting. The City authorized representative must also complete the certification portion in the Online SSO Database Questionnaire at: (http://ciwqs.waterboards.ca.gov/) by checking the appropriate milestone box, printing and signing the automated form and sending the signed form to

State Water Resources Control Board
Division of Water Quality
Attn: SSO Program Manager
P.O. Box 100
Sacramento, CA 95812

10.3 SSMP Modification and Re-certification

The SSMP must be updated every five years to keep it current. When significant amendments are made to any portion or portions of the SSMP, it must be resubmitted to the City Council for approval and re-certification. The re-certification shall be in accordance with the certification process described in Section 10.2 above.

CHAPTER 11

COMMUNICATION AND SSMP AVAILABILITY

11.1 Communication

The City shall provide all stakeholders and interested parties, the general public and other agencies, with status updates on the development, implementation and performance of the SSMP and consider comments received from them [in conformance with the WDR, Section D-13 (xi)]. The CSMD shall utilize various outreach means to communicate issues surrounding the use and operation of the city sewer system, such as letters, newsletters (city and chamber of commerce), brochures, annual reports, notices in newspapers, local cable access programming, and the City's home web page for conveying this information.

11.2 SSMP Availability

Copies of the SSMP will be maintained in the CSMD Office, all CSMD Maintenance Yards, the offices of the City Clerk, the City Engineer, the City Library, and the City Maintenance Yard. The document shall also be made readily available upon request to the Regional Water Quality Control Board (Regions 4) and to the operators of any collection system or treatment facility downstream of the City's system.

APPENDICES

Appendix A in the SMD SSMP	Waste Discharge Requirements
Appendix B in the SMD SSMP	Location Map for SMD Yards & Pump Stations
Appendix C in the SMD SSMP	Inventory of SMD Equipment
Appendix D In the SMD SSMP	County Inventory of City Collection Facilities
Appendix E in the SMD SSMP	Condition Assessment Work Schedule
Appendix F in the SMD SSMP	Industrial Waste Contract With County
Appendix G in the SMD SSMP	Sewer Maintenance Productivity Report
Appendix H in the SMD SSMP	Performance Measure Indicators
Appendix I in the SMD SSMP	SSO Location Maps
Appendix J in the SMD SSMP	SSO Bar Charts & Graphs
Appendix K	SSO Response Plan
Appendix L	Sewer System Capacity Evaluation
Appendix M	Policies for Managing Available Sewer Capacity
Appendix N	CCTV Inspection Report
Appendix O	Location Map – Delivery Points, Maintenance Zones, Flow Monitoring Locations & Hydraulic Identifications

SANITARY SEWER OVERFLOW RESPONSE PLAN

INTRODUCTION

The City of Agoura Hills serves the wastewater disposal needs of approximately 23,350 people in the western Los Angeles County area. The community sewers receive and convey approximately 3.7 million gallons per day of wastewater to the regional LVMWD trunk sewers and wastewater treatment plant.

The primary goal of the City's sewer maintenance program has been and remains the protection of public health, safety and the environment. As a matter of State and Federal regulations, SSOs are prohibited, and moreover, are inconsistent with the City's goal of providing the highest level of sewer service to the public. The City places high priority on capacity assurance, repair and replacement, and proper operation and maintenance of its sewerage system. While the City desires to completely eliminate sanitary sewer overflows, it is also understood that manmade systems do fail. Regardless of the level of scrutiny and control provided, overflows will, on occasion, occur.

The City is responsible for response to, and reporting of, all SSO's caused by problems within the City's sanitary sewer system. Therefore, an effective SSMP has to encompass the response measures necessary to minimize any public health and environmental impact when overflows do occur. To accomplish this, the City operates a two-pronged response to SSO's that directs efforts to stop the overflow simultaneously with efforts to contain and recover the wastewater discharged. These actions are taken in concert with the LACDPW as the sewer maintenance provider under the CSMD membership of the City. Quick response to emergency situations can prevent overflows of wastewater from reaching the water of the United States.

OVERFLOW RESPONSE GOALS

1. The City's goals and actions regarding overflow response are stated in Chapter 1 of the SSMP.

NOTIFICATION, INVESTIGATION AND MOBILIZATION

1. The City's chain of communication and reporting are stated in Chapter 2 of the SSMP.

2. The following occurs upon receiving notification of an overflow:

- The notification is logged on a form (See Attachment K-1) and assigned for follow-up actions in concert with the LACDPW.

- Dispatch of Personnel to Investigate - For overflows reported during the workday, a supervisor or other trained representative is immediately dispatched to investigate;

during non-working hours, an on-duty employee or supervisor is dispatched. Both events are concurrent with the notification of an SSO event reporting to the LACDPW.

- Dispatch of Staff and Equipment - When the initial inspection report indicates that a wastewater overflow has occurred from the City's sewer system, a notification call is placed to both the LVMWD and to the LACDPW for support of personnel and equipment to the overflow site.

- Notification for Outside Support – When the initial investigation determines that additional 'Outside Support' resources and notifications will be necessary to accomplish the containment, clean-up and compliance, the City Engineer is notified and informed of the situation and the perceived needs.

- Notification of Sewer Agencies - When the initial investigation indicates that an overflow has occurred in another agency's sewer or may have resulted from blockage in another agency's sewer, the potentially responsible agency is immediately notified. If the additional on-site investigation indicates that the overflow is the responsibility of the other agency, then the response efforts are turned over to that agency, with assistance from the City, if necessary and if requested. Regardless of cause, once the overflow response has occurred, the primary objective is to minimize the risk to human health and to the environment (i.e. Waters of the United States).

- Notification of Management Personnel - Appropriate management personnel are notified (if they have not already been notified) and any personnel necessary for office support of the field response are mobilized.

RESPONSE

The overflow response is directed in the field by supervisors and/or managers who are trained and experienced in responding to SSO's, with additional operations, maintenance, engineering and agency support staff available as needed for public notification, protection, resource supply, expense authorization and tracking, and coordination of available support resources.

The individual steps involved in the response to a wastewater overflow event include:

1. Corrective Action and Site Control
2. Containment and Recovery
3. Cleanup
4. Sampling
5. Notification and Reporting
6. Post-Cleanup Activities

1. Corrective Action and Site Control

Upon arriving at the overflow location, concurrent actions taken by the various crews are:

- Prevent Public Access - Access to the immediate area of the overflow is restricted to minimize potential impacts to public health by redirecting pedestrian and automobile traffic away from the overflow through the use of traffic cones, plastic tape, barricades, or local law enforcement.

  The extent of the overflow and its potential impacts to the public health are assessed by City's personnel. This process involves determining if any private property owners/residents may be exposed to raw sewage, making direct contact with private property owners/residents who have been or may be directly affected by the overflow, advising private property owners/residents of the potential health hazards associated with contact with raw sewage, and identifying prudent measures to be taken by private property owners/residents, such as vacating the property, to prevent contact with the overflow.

  Simultaneous efforts include determining the path and final destination of the sewage spill and potential exposure to the public. If wastewater from the overflow is ponding in a location that can be isolated, then City personnel set up barricades to prevent public access. Traffic control is set up to prevent vehicles from entering locations where the overflow has contaminated public or private streets. City's personnel are instructed to direct pedestrians and automobile traffic away from the path and final destination of the overflow. All involved personnel cooperate with local law enforcement and public works officials to ensure that public exposure to the overflow is minimized and to ensure spill site security.

- Prevent Wastewater Entry to Storm Drain System - When possible, contain and recover the overflow in the immediate vicinity of the overflow before it enters a storm drain catch basin. Measures to effect such containment include damming the overflow path with sandbags in the street gutter and recovering the impounded water with a vacuum truck or jet vactor, or using sandbags to divert the overflow back into a nearby sewer manhole.

- Stop Overflow - The cause of the overflow is investigated and the necessary corrective action is taken to stop the overflow and/or correct the condition that caused the overflow if the overflow has already stopped.

  Typical corrective actions to stop a sewer overflow include:

  - clearing a pipe blockage with a jet vactor or rodding machine,
  - removing debris from a manhole,
  - upstream flow diversion, and
  - bypass of wastewater around the blockage using vacuum trucks or pumps

o bypass and repair of a damaged force main.

Bypass pumping is typically accomplished by the use of portable pumps and hoses to convey flow around the blocked or damaged sewer, the inoperative pumping plant or the damaged force main. The SO&M team maintains an Overflow Response Trailer, which is equipped with portable pumps and hoses of various sizes, fittings, and tools and is designed to bypass flows of up to 450 gallons per minute. When possible, diversions are used to redirect a portion or all of the wastewater around the affected area in the system. Maintaining accurate and complete sewerage system maps is essential to expeditiously accomplish wastewater diversion during an emergency response.

- Pumping Plants - Emergency Procedure Operating Manuals for pumping plants (Lift Stations) are available in the LACDPW as references for operations, maintenance, engineering, supervisory, and management staff. The manuals provide comprehensive information on the proper response to all types of pumping plant failures, potential overflows and force main leaks and failures. Available information includes proper response to power failure, high wet well level, telemetry system failure, control system failure, procedures to bypass the plant, and emergency overflow information including low manhole location, storage time in the tributary sewer system, containment location and estimated travel time to the containment location.

2. Containment and Recovery

Containment and recovery of the overflow should occur as close as possible to the site of the overflow, preferably in the street curb and gutter, to minimize the length of the storm drain system affected by the wastewater. When a storm drain system is nearby, the overflow may enter the storm drain system prior to arrival of the first responding personnel. In these cases, engineering, supervisory and/or management staff identify the most practical containment location in the storm drain system downstream of the overflow. In the selection of the best containment location, staff must consider many factors, including:

- the time the overflow started,
- the overflow route through the storm drain system,
- the time needed to install a containment dam,
- the travel time for the overflow to reach the containment location,
- safe access to the containment location for personnel and equipment, and
- the availability of a nearby sewer with sufficient capacity into which recovered wastewater can be returned.

Access and safety considerations generally require establishment of containment in open storm drain channels. Containment in buried storm drains pipes upstream of any open channels is preferable when possible. However, the physical difficulty of deploying personnel and materials through a manhole into a buried storm drain pipe to construct a containment dam, the dimensions of the storm drain itself, and/or the safety procedures and authorization needed to enter confined space generally preclude rapid and practical

establishment of containment within a buried storm drain pipe. City staff can usually and safely enter the storm drain system to establish containment during dry weather conditions only. A containment location close to the overflow location is only possible when a containment dam can be deployed very quickly after the start of an overflow.

Once a suitable containment location is identified, the crew responsible for containment:

- deploys a sandbag containment dam or otherwise prevents the movement of the overflow and contaminated street runoff further downstream in the storm drain system, and
- deploys the vacuum trucks or portable pumps and piping necessary to return the contained wastewater, dry weather runoff, and clean up water back to the sewer system.

3. Cleanup

After the overflow has been stopped, the following steps are taken:

- Recover Locally Impounded Wastewater - All locally impounded wastewater is recovered with a vacuum truck or jet vactor and returned to the sewer system
- Collect Wastewater Debris - All visible debris of wastewater origin from the overflow
  location(s), street(s), curb and gutters, and the overflow runoff path is physically removed.
- Flush Affected Area - Overflow location(s), street(s), curb and gutters, and the runoff path are flushed with lightly chlorinated potable water, typically delivered by a vacuum truck or water truck. The flush water is also recovered and returned to the sewer system.
- Flush Storm Drain and Conduct Dye Study - Additional potable water is used to flush the overflow runoff path within the storm drain system. When appropriate, this flush water is marked with a nontoxic, visible dye. Arrival of the dye at the containment location establishes the actual travel time to the containment location. Recovery of the dye confirms completion of spilled wastewater and flush water recovery.
- Complete Cleanup - All sandbags and other containment are removed to complete the cleanup in the storm drain system. If spilled wastewater reaches natural watercourses or other areas accessible to the public, input is solicited from the responsible jurisdiction regarding additional measures which may be necessary or appropriate for a complete cleanup. Additional cleanup measures are completed as directed.

Private properties impacted by overflows or backups from problems within the City's sewer system should be cleaned up by a professional restoration company dispatched by the City. The City may offer residents meals, lodging, and reasonable expenses when they are temporarily displaced by private property restoration operations. Claims for property

damage are handled by the City's Claims and Insurance Coordinator.

4. Receiving Water Sampling

Samples of SSO's should be taken for bacterial testing by the first responder, whenever possible. If it is probable that an overflow may reach receiving waters, samples should also be taken of the receiving waters to evaluate the potential impact on the receiving water quality. Samples should be drawn from the location(s) most likely to be impacted by the overflow and also from a receiving waters location or locations that can be used to establish background water quality. Advance coordination with a certified laboratory for pre-arrangement of sampling supplies, notification protocol for urgent services, and training as may be required, will facilitate emergency sample delivery so that bacterial testing can begin immediately when needed. Delivered samples are analyzed for total coliform, fecal coliform, and enterococcus and other constituents that may be appropriate based on the nature of the receiving water and the spilled wastewater. Because it takes approximately 24 hours for the bacterial analyses, a second round of sampling is conducted within 24 hours of the first unless full containment and recovery of the overflow can be confirmed. If sample results indicate elevated bacterial levels in receiving waters, sampling is continued until results indicate a return to background levels.

5. Notification and Reporting

Sewering entities are required to report to various regulatory agencies, including the appropriate Regional Water Quality Control Board, the County Department of Health Services, and the State Office of Emergency Services, any wastewater overflows greater than 1,000 gallons and, in some cases, overflows less than 1,000 gallons. The reporting requirements vary according to location of the overflow and the amount of wastewater spilled. The City's guideline for *Notification and Reporting Procedures for SSO's,* (included as Attachment K-2), contains an outlined notification and reporting procedures for the two categories of overflows. The SSMP contains a flow chart which is used to determine the notification and reporting procedures that apply to a given overflow incident. The SSMP also contains all of the appropriate contacts for reporting. A City's manager, typically the Sewerage System Manager, makes the notifications. When required, telephone notification should be made as soon as possible without substantially impeding response activities and always within 24 hours of the incident occurrence. The following information shall be provided, if available, when reporting an overflow by telephone:

- name of person reporting,
- name of agency,
- location of overflow,
- whether the overflow has entered or will enter receiving waters (rivers, lakes, storm drains, or ocean) of the State or the United States,
- date and time overflow began and ended,
- estimated volume of overflow,
- cause of overflow,

- corrective actions taken,
- estimated time of repair, and
- agencies involved in repair and clean-up.

All overflows, regardless of quantity, which reach receiving waters, impact groundwater, or endanger public health or the environment require immediate telephone notification of the County Department of Health Services, which is responsible for beach postings and closures and other forms of public notification deemed necessary to protect the public health.

Written notification of the overflow, when required, must be submitted within the required time period to the Regional Water Quality Control Board (RWQCB), typically within 30-days of an overflow and within 3 days if the incident has or may endangered public health or the environment. Written reports should be submitted to the local RWQCB for overflows occurring within their jurisdiction. To satisfy this requirement, the City may chose to submit a brief written confirmation of the reported overflow to the appropriate RWQCB within the time frame required. A follow-up, detailed written report, pursuant to the guideline as contained in Attachment K-2, will meet the statutory provisions of the State Water Code. This detailed report usually requires three to four weeks to complete. Copies of the detailed report is sent to those agencies which were initially noticed, unless otherwise notified.

6. Post-Cleanup Activities

Once clean up of an overflow is complete, the incident must be reviewed and any appropriate measures to prevent recurrence must be implemented. Follow-up CCTV inspection is performed when an overflow was caused by a blockage to verify complete removal of the material causing the blockage. If the overflow was avoidable by preventative maintenance, then maintenance activities are added or adjusted as necessary. An example is to increase the frequency of line cleaning where heavy grease build-up has caused an overflow to occur, while source control efforts are reviewed. If the overflow was caused by factors generally outside the City's control, such as vandalism, steps are still taken to minimize recurrence such as strengthening security by locking down manhole covers, increasing area surveillance, and requesting neighborhood assistance in reporting vandalism and unauthorized dumping.

Regardless of the size or type of overflow, all overflows are investigated thoroughly. Following the investigation, the information as noted on Attachment K-2 is documented and included as part of the City's internal spill records.

Policies and procedures are upgraded as appropriate to prevent recurrence of accidental spills due to procedural errors by City's staff and contractors. As part of their training, all involved employee's must thoroughly familiarize themselves with these emergency procedures. City's personnel administering contract sewer repair, rehabilitation and replacement projects must rigidly enforce contract provisions. Especially important is enforcing contractors'

approved *Emergency Spill Response Plan* requirements (see Attachment K-3 for guidelines) intended to prevent and limit the impact of accidental spills.

An approved *Overflow Action Plan,* which is activated if an overflow from a contract activity enters a storm drain, should be incorporated into the contract documents of all sewer repair, rehabilitation, or replacement contracts involving sewage bypass operations. When successful execution of an *Overflow Action Plan* requires pre-deployment of containment or pumping equipment, City's personnel administering the contract must ensure the necessary pre-deployment measures are taken. Guidelines for the preparation of an *Emergency Spill Response Plan* and an *Overflow Response Plan* are included as Attachment K-3.

EMERGENCY RESPONSE PERSONNEL AND EQUIPMENT

Personnel

The City maintains a listing of emergency services contractors having resources necessary to respond to *almost any* emergency, including *power failure, mechanical and electrical equipment breakdown, sewer blockage, pipe failure, and vandalism.* The urgency and seriousness of any wastewater overflow results in the full commitment and availability of all staff in the city to respond. Additional city personnel are utilized for specialized assistance as needed. Contractors with emergency response capabilities are also used to assist in emergencies as needed.

An emergency contact list is maintained which includes the home phone number of all employees in the city. All supervisors and managers in the city are assigned cell phones and/or pagers and are accessible 24-hours a day. A table of organization for SSO responses and role of each supporting unit/group are included in Chapter 2 of the SSMP.

Emergency Equipment

All emergency response equipment is maintained and provided by the County DPW pursuant to the CSMD contract provisions.

A current listing of emergency equipment available from the Sewerage System maintenance yards is included as Appendix B of the SMD SSMP.

TRAINING

Training of City personnel in the goals and procedures of this SSORP is accomplished in annual emergency response classroom training. A checklist used by staff to check off and record information regarding the various procedures completed during a spill response is utilized during the training process. The checklist is included as Attachment L-4. Secondly, on-the-job training is administered to subordinate staff, by experienced supervisors and lead workers, during and following actual overflow events to further reinforce the annual training and to analyze event specific issues.

NOTIFICATION REPORTING FORM

Time: _____ a.m./p.m. Date: _____ Report taken by: _____

Location of Problem: _____
_____
_____
(Repeat for clear understanding)

Nature and Details of Problem: _____
_____
_____
(Repeat for clear understanding)

Reporting Party: _____ Telephone No. _____

Address: _____

Assigned to: _____ Assigned by: _____ Time assigned: _____

Field Report (for responder use)

Time arrived at site: _____ Time overflow stopped:_____
Duration of overflow: _____ Estimate of overflow volume: _____
U/S MH # _____ D/S MH # _____ Pipe size/length: _____
Findings: _____
_____
_____
_____
_____
_____
Samples taken by: _____ Location of samples taken: _____
_____
Describe cause of overflow:
_____
_____
_____
Describe cleanup method(s):
_____
_____
_____
Describe receiving water affected & location:
_____
_____
_____

Were photographs taken? _____ Yes _____ No

Describe any property damaged and affected area:

_____
_____
_____
_____

Signs posted? _____ Yes _____ No Barricaded? _____ Yes _____ No
Neighbors notified:

_____
_____
_____
_____
_____

Individuals and Regulators Notified & Times:

_____
_____
_____
_____

Follow-up measures:

_____
_____
_____

Detailed sketch of affected area:

My signature indicates responsibility for content and accuracy of above information: _____

NOTIFICATION and REPORTING PROCEDURES for SSO'S

Category 1 - 1,000 Gallons or greater and/or impacting Waters of the State or the United States:

- Initial notifications ASAP per agency procedure described in this chapter (verbal, phone, fax or E-mail)

Letter Reports with attachments

- Confirmation letter of initial notification(s) including recovery results and status of any ongoing investigation report and expected date of completion.
- Final investigation report, including:
  1. Summary
  2. Event Date / Time / Duration:
  3. Description of affected sewer(s)
  4. Events during the Overflow
  5. Cause of the Overflow (specifically)
  6. Overflow quantity and how determined
  7. Discharge route, Containment and Clean-up
  8. Response and Corrective Action(s) taken
  9. Impact(s) of the Overflow
  10. Did overflow result in a beach closure?
  11. Sewerage Management Program in effect
  12. Measures to Prevent Recurrence
  13. Name, Address, Telephone of reporting system owner and specific contact name
  - Cc: to other required reporting agencies
  - System map of offending area, with relevant photographs
  - Overflow route and Containment site, with relevant photographs
  - Containment site and Sampling Locations, with laboratory results
  - Analysis tools and records used in impact evaluation
  - Maintenance management records

Category 2 - Less than 1,000 Gallons to be reported within 30 days of SSO identification:

- Initial notifications per agency procedures in this chapter (verbal, phone, fax or E-mail)

Memorandum report format

- Event Date / Time / Duration:
- Event Location:
- Involved Sewer Data: (include: size, material, year constructed, date last inspected, etc.)
- Estimated Overflow Quantity:
- Cause of Overflow:
- Affected Area:
- Action(s) taken:
- Preparing party signature and date

Private Lateral Sewage Discharge:

Enrollee's discretion in reporting to the Online Data Base. Min. required information for reporting:

- Identify discharge as occurring and caused by a private lateral
- Identify responsible party for the private lateral

Attachment ‘K-3’

EMERGENCY SPILL RESPONSE PLAN and OVERFLOW ACTION PLAN

Outline for a Contractor’s Emergency Spill Response Plan:

- Identification of Project, Sewer owner, Contractor and Location of affected sewer(s)
- Description of Installation criteria, procedures, layout (with diagrams) and operations.
- Description of Spill prevention and protection measures/actions.
- Spill control (discharge) actions/measures, to minimize impacts.
- Remediation (Clean-up) measures.
- Emergency Materials and Equipment Onsite
- Emergency Equipment specifications that meet the potential spill risk
- Emergency Phone Numbers

Outline for a Overflow Action Plan [Where receiving waters are or will be affected]:

- Identification of Project, Sewer owner, Contractor and Location of affected sewer(s)
- Identification of affected drainage course/piping owner, proximity and emergency contacts
- Map of drainage path, access and containment points, with relevant photographs
- Identification of closest sewer to the containment point(s)
- Travel time to the containment point
- Emergency support resources and contacts
- Equipment and Materials necessary for containment and for Clean-up
- Require notification contacts

SSO RESPONSE CHECKLIST				
General Information				
Sewer location:				
Date & time of report:		Caller:		Phone:
Person receiving report				Phone:
Time overflow started:	Where:			Noticed:
SSO response checklist completed by:				
Initial Response	Yes	No	N/A	Comments:
A. Initial on-scene response within 60 min.:(time)				
B. Sanitation District's responsible?				
C. Responsible agency contacted: (name/time)				
D. Manhole still overflowing (approx. flow rate)				
E. Containment to prevent SSO into storm drain				
F. Public excluded from affected area				
Gravity Sewer	Yes	No	N/A	Comments
A. Cause				
B. Corrective action to stop overflow				
Used jetter to remove blockage				
Removed blockage by man entry				
Removed wastewater with vac.trk.(loads)				
Set up pumped bypass system				
C. Time overflow stopped				
Pump STA./Force Main Overflows	Yes	No	N/A	Comments
A. Cause				
B. Corrective action to stop overflow				
Utility power restored (time)				
Portable generator to respond				
Portable/on-site generator operating (time)				
Bypass pumps installed				

SSO RESPONSE CHECKLIST				
Force main bypassed				
C. Time overflow stopped				
Containment	Yes	No	N/A	Comments
A. Containment established in stormdrain				
Location				
Time				
B. Pumping start time				
C. Pumping stop time				
D. Spill contained				
Clean-up	Yes	No	N/A	Comments
A. Area washed down & debris removed				
B. Wash water recovered				
C. Restoration company contacted				
D. Stormdrain flushed				
Time				
Volume of water used				
Dye used				
Sampling	Yes	No	N/A	Comments
A. Overflow sample				
B. U/S D/S receiving water samples				
C. Samples analyzed				
D. Receiving water locations resampled				
Reporting	Yes	No	N/A	Comments
A. Department head notified				
B. Appropriate regulatory agencies notified				

City of Agoura Hills
SEWER SYSTEM CAPACITY EVALUATION
2009

Introduction and Summary

The City owns and operates its local wastewater collection system consisting of approximately 53.6 miles of gravity flow sewer pipelines (8-inch to 15-inch, mostly vitrified clay pipe) and 1,294 manholes. The existing sewer system discharges to trunk sewers that are owned and operated by the Las Virgenes Municipal Water District.

The purpose of this evaluation is to identify capacity deficiencies in the existing sewer mainline system, prioritize the deficient reaches, recommend alternatives to eliminate the deficiencies, and provide the City with a basis on which to build a future infrastructure management system.

The 53.6 miles of local sewer pipes were modeled using HYDRA® 6.4 by PIZER. Of the total miles, approximately 4,592 feet (0.87 miles or 2%) of the existing system were identified as being capacity deficient (Greater than 64% full). The deficient reaches of sewer pipeline are located within SMZ # 17, 20, 23, 26, 29, 30, 31, 35, and 41. Please refer to Appendix 'L-2' for the deficient reach locations. The cost to repair the deficient reaches is described in Appendix 'L-1'.

During four weeks in March and April of 2009, flow monitoring was performed as part of this evaluation effort at nine locations as indicated on the Appendix 'F' map. This was done to confirm the LACDPW design coefficients of flow generation used in the computer model. In general, the results of the flow monitoring indicate that the model flow rates are slightly conservative for most of the nine areas monitored. However, some of the flow monitoring data warrants further discussion with the monitoring subconsultant in order to clarify or rectify some of the calibration analysis conducted with the monitoring data. Of concern are the low flow condition results and a high flow result for one of the higher density residential areas of the city. Depending upon further evaluation findings, obtaining additional flow monitoring for selected developed areas may be recommended, especially during periods of rain to verify or deny any potential inflow and infiltration impact to the sewer system.

In the event of any land use changes to the General Plan, upon which this study has been based, the model should be updated to reflect the consequences of such changes. The model should also be updated to reflect the construction of new relief facilities and/or the construction of new sewer lines.

Study Approach

The following tasks were performed in the preparation of this Sewer System Capacity Evaluation Report.

1. The city provided its current GIS base map with horizontal sewer system features, Willdan obtained city as-built drawing plans from which additional vertical data was added to the GIS file of attributes for the sewer.
2. The City provided the November 2006 General Plan land use map (Appendix 'L-5') for use in creating a land use overlay of the parcels and sewer maintenance zones in the city system.
3. Formulation of a computer model of the City wastewater collection system.
4. Analysis of the existing wastewater collection system capacity and determination of any capacity deficiencies (refer to the deficiency criteria section of this report and see Appendix 'L-2'.
5. Development of recommendations for system improvements to correct deficiencies.
6. Preparation of cost estimates for the recommended improvements (Appendix 'L-1').
7. Preparation of evaluation findings and recommendations to correct identified deficiencies in this Sewer System Capacity Evaluation Report.

System Criteria and Alternatives

In designing or evaluating a wastewater collection system, the engineer must establish certain criteria upon which to base the design. These include such things as available pipe sizes, materials, slope, bury or cover, connections, etc. Such criteria are established to ensure that the wastewater collection system can operate effectively under all flow conditions. Each pipe segment must be capable of carrying the peak flows without surcharging the system. Surcharging the system occurs when the pipe is flowing under pressure. However, many of the initial design assumptions are unnecessary in the analysis of a collection system when the pipe already exists and its features are fixed.

Therefore, in the analysis of an existing sewer system, the Hydra program compares the capacity of each pipe in the system with the peak wastewater flow projected for that particular link or reach of pipe. If the pipe segment is at or below design capacity, the analysis program continues down stream, segment by segment, evaluating successive pipe segments in the system. However, if the existing pipe size is surcharged, the Hydra program reports the surcharge condition and recommends a standard pipe size that will carry the design flow without being surcharged. Minimum criteria utilized is all pipes must be 8 inches or larger in diameter and the in pipe velocity of flow should be 2 feet per second (ft/s) or greater. This velocity will prevent deposition of solids in the sewer and help to re-suspend any materials that may have already settled in the pipe. Table 1 shows the minimum corresponding slopes to maintain 2 ft/s for various pipe sizes.

Table 1
Minimum Pipe Slopes ft/ft

Sewer Size	Slope
8"	0.0028
10"	0.0021
12"	0.0016
15"	0.0012
18"	0.0010

Both design and analysis of gravity sewer pipes is typically based upon the depth of flow to the pipe diameter ratio (d/D). Common design criteria for proposed new sewer design is 0.50 (50% full) for 8 to 15-inch diameter pipes and 0.75 (75% full) for 18-inch and larger pipes. The area above the water surface (residual capacity) helps to keep the sewage aerated, reducing the possibility of septic conditions and odors. Existing wastewater systems are usually allowed to flow with less residual capacity because development and redevelopment has occurred or may be foreseeable in the near future.

This report establishes the hydraulic design criteria for existing sewer pipes by classifying "over capacity" pipes as any with a d/D greater than 0.64. This d/D ratio was arrived at by taking 75 percent of the depth to diameter ratio of a pipe having maximum stable flow capacity, which is at a d/D of 0.85 (75% of 85% is 64%). The area above a d/D of 0.85 is considered hydraulically unstable. This reduction results in approximately 35 percent of the pipe's full flow capacity being reserved for variations in discharges, seasonal variations and minor or temporary obstructions. Again, this residual capacity helps to keep the sewage aerated, reducing the possibility of septic conditions and odors.

The residual capacity allows for the possibility that actual wastewater flows may be slightly higher than anticipated, especially during the hours when instantaneous or intermittent peaks may occur. Such peaks are generally observed between the hours of 6:00 a.m. and 8:00 a.m. Monday thru Friday and between the hours of 9:00 a.m. and 11:00 a.m. Saturday and Sunday. Peak flows may also be observed during rainfall events due to inflow and infiltration conditions.

Appendix 'L-2' shows the pipes that are capacity deficient per the 0.64 criteria and also shows the pipes that are deficient per the 0.50 criteria. Only the pipes that exceed the 0.64 criteria are recommended for correction projects.

The design capacity of a gravity pipeline is the calculated capacity of the pipeline based on the Manning formula:

$Q=1.486\ R^{2/3}\ S^{1/2}\ /n$ where, Q = flow in cubic feet per second
R = hydraulic radius in feet = A/ P
A = cross-sectional area of the pipe in square feet
P = wetted perimeter in feet
S = slope of the pipe in feet of rise per foot of length
n = Manning's friction factor

Sewer system capacity is established using a Manning's fiction factor of 0.013 for vitrified clay pipe.

Alternatives

The following alternatives were considered in developing the recommended schedule of deficiency correction projects.

1. Construction of a parallel sewer facility to carry the excess sewage flow is an obvious solution to most of the deficiencies; however, this solution is not necessarily the most economical or practical approach. In some instances rerouting of tributary areas or the construction of a single relief sewer line can be planned in such a way that it will relieve several main sewer lines thereby avoiding the construction of parallel facilities and the duplicate cost.

2. In other instances the replacement of the existing sewer with a larger size may be the preferred alternative. The replacement or upsizing of the line may include open trench installation or pipe bursting (if surrounding condition are conducive), and the use of temporary bypass pumping. The decision as to which correction alternative to construct is typically made just prior to the design phase after careful consideration of all design constraints such as existing utilities and the costs associated with potential utility relocation to provide additional space for the construction of a replacement sewer line.

The engineer's opinion of cost figures (See Appendix 'L-1') was prepared based on the cost to remove and replace the existing sewer with a larger size, as this is the most conservative cost approach.

It is suggested the where the depth of flow exceeds the design criteria of 0.64 d/D, but does not exceed the maximum stable flow capacity of 0.85 d/D, that consideration be given to allowing these sewers to flow in a slightly overloaded condition in lieu of building a more costly relief facility at this time.. This overloading occurs only during peak flow conditions that are short in duration. The City should frequently monitor these sewers in order to under take a future corrective action if the overloading problem becomes worse.

Analysis of Existing Sewer System

The City's sewer system was modeled using Pizer Hydra Ver. 6.4. The Hydra program is designed to provide analysis of both the existing sewer system and the design of any new sewer lines.

After defining (lying out) the existing sewer system, the network was divided into 56 SMZ's or sewer drainage areas, based upon city sewer records, for input into the computer model. The input data consisted of a numerical designation for each manhole and length of sewer pipe between manholes, the slope of the line, and flow line and rim elevation of each manhole.

Computation of Wastewater Inflows

Once the pipe schematic of the sewer system network was established, data was compiled on each SMZ, General Plan land uses, and related factors that affect the volume of wastewater generated. Next, it was necessary to compute the area of each type of land use; e.g., low-density, medium-density, and high-density residential, commercial, industrial, schools, etc., within each SMZ (drainage) boundary. The LACDPW unit flow coefficients (see Table 2)

were then applied to the computed areas of land use within each SMZ. The results are a calculated peak flow rates for each particular land use category. The wastewater inflows calculated for the various land use categories within the SMZ were then accumulated to provide the calculated peak flow for the entire SMZ. The accumulation of estimated wastewater flow is accomplished totally within the computer program.

Table 2
Unit Flow Coefficients for Peak Flow Rates

Zone	Cu. Ft. per sec. per acre	Gallons per day per acre
R-1	0.004	2585
R2	0.008	5171
R3	0.012	7756
R-P, Commercial	0.015	9695
Manufacturing	0.021	13573
Institutional	0.015	9695

Flow Monitoring

In order to verify and/or calibrate the sewer flow modeling work, nine jointly selected flow-monitoring sites were chosen to represent existing developed area flows. This monitoring work was performed over a four week period from March 24 through April 23, 2009.

Flow monitoring data was provided by V&A Engineering as subconsultant to Ventura Regional Sanitation District, which undertook the CCTV inspection and flow monitoring services as a subconsultant to Willdan Engineering. The V&A flow monitoring report is contained in Appendix 'L-4'. The nine flow monitoring site locations and corresponding findings are presented in the report.

Each sites flow monitoring data was reviewed and compared to the contributing SMZ area. The peak monitored flow rate was compared to the design flow rate and the shape of the outflow curve was compared to the SMZ modeled result. The flow monitoring data was also compared to other data from previous studies in other cities to verify the results. As previously mentioned there was reasonable correlation indicated in most of the zones monitored, but two or three of the nine areas showed some unusual low and high correlation results that must be reviewed and discussed with the subconsultant in order to determine their significance, if any, to the capacity evaluation results. Some difference is expected because the design flow rate includes the maximum flow rate expected from each development type, wet weather inflow/infiltration, and design safety factors.

Recommended Deficiency Correction Projects

Presented in Table 3 is a brief summary of the measures recommended to correct the deficiencies stated above and as shown on Exhibit 2. The criteria for recommending and prioritizing relief facilities are as follows:

Priority 1

Sewers with critical deficiencies of $d/D > 0.85$ are recommended for correction first. The correction can be undertaken immediately if further engineering review discloses such an immediate need. Otherwise replacement within 1 to 4 years is considered reasonable.

Priority 2

Sewers with critical deficiencies of $0.64 < d/D < 0.85$ are recommended for correction second. These corrections can usually be programmed somewhere between 5 to 9 years from the evaluation date depending upon further engineering review findings.

Priority 3

Sewers with a $d/D < 0.64$ are not capacity deficient; therefore, are not ranked here, but it is recommended that such segments be monitored as sewage flows tributary to the locations increase over time.

Sewer System Improvements Costs

The unit prices shown in the engineer's estimate (see Appendix 'L-1') represent the anticipated construction cost only as applicable for mid 2008. Bid prices received on jobs of similar nature in Southern California area were one source of information used to derive the cost figure. In addition, manufacturers, suppliers of material and equipment, and local contractors were consulted on various cost items. An additional 35% of construction cost is added to cover the cost of contingencies, design engineering, contract administration and construction observation.

The Engineer's Estimate does not include an adjustment for inflation. Construction costs can be expected to fluctuate as corresponding changes occur in the national or local economy. One available indicator of these changes is the Engineering News-Record Construction Cost Index for the Los Angeles metropolitan area. This index is compiled from actual construction cost data for materials and labor and is reported in Engineering News-Record magazine. It is suggested that this index be used to update the unit prices presented in Appendix 'L-1' and in adjusting the estimate from the date of the initial estimates.

Financing of Improvements

General

Funding considerations are often the deciding factor in scoping and implementation of a project. There are, of course, numerous methods or mix of methods, which could be used to finance the implementation of a sewer system capital improvement plan (CIP), and the ongoing operations and maintenance activities. Among these methods are:

1. Pay-as-You-Go Financing (rates, fees and charges based)
2. Redevelopment Agency Funding
3. State Assistance Programs
4. Municipal Securities
5. Improvement Districts
6. Federal Assistance Programs

In discussion that follows, the above funding options are briefly described and their adaptability to specific circumstances of a sewer system CIP are noted. In evaluating specific funding programs, services of financial and legal experts in such issues are recommended.

Methods of Financing

1. Pay-as-You-Go Financing:

   Development of cash reserves or capital improvement funds, from an agency's revenue base, is often referred to as "pay-as-you-go" funding. This method avoids interest payments on other types of debt financing. Under this form of financing, the initial capital cost of a project must be accumulated in advance of construction, which can cause a delay in project implementation. If delay is not a crucial factor, this is a cost effective method due to the absence of debt financing costs. This method has sometimes been used together with various forms of short-term financing to construct needed sewer infrastructure.

2. Redevelopment Agency Funding:

   Funds generated from property tax increment revenue, received by the City's redevelopment agency (RDA), is a possible source for sewer system capital improvements, within or beneficial to the RDA. A sewer system improvement project would have to compete with other agency planned projects, prioritized and an agency funding decision.

3. State Assistance Programs:

   Under the rules and regulations of the Federal Water Pollution Control Act (Clean Water Act or CWA) and the Federal Safe Drinking Water Act (SDWA), the State has enacted the Clean Water State Revolving Fund (CWSRF) and the Drinking Water Revolving Fund (DWSRF), respectively. These programs are funded by Federal grants, State funds and Revenue bonds. The CWSRF Loan Program provides low-interest loan funding for

construction of publicly-owned wastewater treatment facilities, sewers, sewer interceptors, water recycling facilities, as well as implementation of non-point source (NPS) projects or programs. There are different types of funding assistance available under these programs.
www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/

The Department of Water Resources administers the State bond law programs for Water supply/Water quality, Water conservation, Flood management and Regional water management. www.grantsloans.water.ca.gov

The State Water Resources Control Board administers the State revolving fund loans, Water recycling grants & loans, Small community grants, Agricultural drainage loans, Agricultural drainage management loans, Clean beaches initiative grants, Agricultural water quality grants, Areas of special biological significance (ASBS) grants, Storm water grants, and Santa Monica bay restoration commission grants. www.waterboards.ca.gov

The State Department of Public Health administers the DWSRF, Proposition 84 funding for public water systems, and Proposition 50 for the water security, clean drinking water, coastal and beach protection act of 2002 loans. www.cdph.ca.gov

Various types of infrastructure improvement/construction loans can be arranged through the California Infrastructure and Economic Development Bank (I Bank)
www.ibank,ca,gov

Limited amounts of public works grant funds have been available to agencies from the State Office of Economic Development. Use of such grant funds must result in the creation of new, permanent jobs in the private sector. In order to ensure that the funds are ultimately assisting those in most need, projects eligible for consideration must be those in areas designated eligible for HUD Urban Development Action Grants (UDAG), EDA Sudden or Long-term Economic Deterioration, or EDA Designated Special Impact Area.

4. Municipal Securities:

Historically, general obligation bonds (GOB's) had been a prevalent method of financing various public works improvements. They are secured by an agency's total assets and payable from ad valorem taxes levied on all taxable properties within the agency's boundary. However, the Jarvis-Gann Amendment (Proposition 13 of 1978) prohibits the levying of ad valorem property taxes beyond pre-existing authorizations and levels (pre-July 1, 1978). Therefore, authorization and issuance of GOB's is not considered feasible under current law.

An option to GOB's is the issuance of a specific type note or bond form, such as a revenue anticipation note (RAN) or a tax anticipation note (TAN) or a certificate of participation (COP) or various combinations of available authorities that can be used to fund public infrastructure needs. These types of municipal securities (Munis) are generally tax-exempt and commonly used to fund public works infrastructure and facilities. Many states also exempt their securities from their own taxes, which makes those securities particularly attractive investments for their own residents.

TAN's and RAN's are instruments backed by anticipated taxes or revenues respectively. When these types of notes are considered for funding of needed infrastructure, a specified source of tax or revenue stream is identified and pledged for repayment of the debt. For example, with sewer facilities, all or a portion of the sewer service revenue fees/charges could be used as backing for the debt instrument selected. Then other local revenue sources could be considered for ongoing operations and maintenance (O&M) or some acceptable mix and match of funds specified to secure the debt and accomplish the O&M.

COP's are another form of municipal funding instrument available. These generally require the facility improvement being funded to be named as security for the investment with a lease back of the facility by the municipality. In turn, the municipality pledges some revenue stream(s) that would be used to repay the investor held notes.

When Munis are being considered for funding of improvements, consultation with an experienced and qualified financing consultant and bond counsel are a must.

5. Improvement Districts:

In general, special assessment district procedures have been established by statute to provide for financing of construction and/or acquisition of public works improvements, such as sewer systems, and for assessing the cost of such improvements to the benefiting properties. Under all assessment proceedings, the cost of the work is assessed against properties within the benefited area. The assessments are levied in specific amounts against each individual property on the basis of the benefit each parcel receives. The property owner may pay the assessment in cash during the cash collection period of 30 days. But, if any assessments are not paid in cash during that period, bonds are usually issued to represent the unpaid assessments and the benefited properties are assessed on their annual property tax bill over a usual period of 10 to 20 years.

Commonly used assessment acts are the 1911 and 1913 Acts. The common bond acts are the 1911 and 1915 Acts. These assessment and bond acts are used in varying combinations depending on the particular circumstances for each proposed improvement district.

While an assessment district proceeding may be a reasonable and equitable means for financing sewer system improvements, further evaluation and stakeholder involvement is a usual practice to determine the viability and practicality of utilizing such financing method.

6. Federal Assistance Programs:

There are, and have been, a series of federal grant and loan programs which may be applicable to public infrastructure projects. However, the qualification criteria for such programs vary from time to time and their funding or continuation is subject to congressional appropriations. Therefore, such programs should not be considered as a likely source of funds unless a funding commitment letter has been received.

Historically, federal programs administered by the Economic Development Administration (EDA) provide financial and technical assistance to aid the economic development of areas with high unemployment or low family income levels. Communities must make long-range plans for economic growth in order to be eligible for EDA financial assistance, in the form of grants and loans for public works and development that generates jobs and economic opportunity. Typical public works projects include construction of roads, water and sewer lines, and public facilities. To determine the status requires timely monitoring.

Under the rules and regulations of the Housing and Community Development Act of 1974, the Community Development Block Grant (CDBG) program can fund housing and community development needs. This includes part or all of improvements necessary to upgrade existing sewer facilities. Those qualifying geographic areas within the City that have the greatest overall deficiency in physical infrastructure receive the highest priority according to CDBG criteria. When the sewer system has a defined deficiency, then it is appropriate to use CDBG funds to meet health and safety standards as well as to encourage up-grading of abutting housing and physical environment.

The primary statutory objective of the CDBG program is to develop viable communities by providing decent housing and a suitable living environment and by expanding economic opportunities, principally for persons of low- and moderate-income. Communities receiving CDBG funds through the State may use the funds for many kinds of community development activities including, but not limited to:

- acquisition of property for public purposes;
- construction or reconstruction of streets, water and sewer facilities, neighborhood centers, recreation facilities, and other public works;
- demolition;
- rehabilitation of public and private buildings;
- public services;
- planning activities;
- assistance to nonprofit entities for community development activities; and
- assistance to private, for profit entities to carry out economic development activities (including assistance to micro-enterprises).

www.hcd.ca.gov/ca/cdbg/about/html

The United State Department of Agriculture Rural Development Program provides communities with population less than 50,000 a variety of direct-guaranteed-loans and /or grants. These include water and wastewater system improvement funding.

www.rurdev.usa.gov/ca

APPENDIX ‘L-1’

Engineer’s Opinion of Cost

CITY OF AGOURA HILLS

SANITARY SEWER IMPROVEMENTS		***Date:***	6/26/2009
ENGINEER'S OPINION OF COST			
PRIORITY #1 AND #2 SUMMARY		***Prepared by:***	J.H.
PROJECT: SEWER SYSTEM MANAGEMENT PLAN		***Checked by:***	R.W.

ITEM NO.	DESCRIPTION	AMOUNT
1	SUB-TOTAL PRIORITY #1 SEWER IMPROVEMENTS	$ 550,000
2	SUB-TOTAL PRIORITY #2 SEWER IMPROVEMENTS	$ 1,420,000
3	**TOTAL[1, 2]**	**$ 1,970,000**

[1]Price taken from actual bid of District 3A Sanitary Sewer Improvement for 325 LF of 10" VCP in the City of La Canada Flintridge plus $83/LF for mobilization, traffic control, and traffic markings.

[2]Since the design professional has no control over the cost of labor, materials, equipment, or over the contractor's method of determining prices, or over competitive bidding or market conditions, his opinions of probable construction costs provided herein are to be made on the basis of his experience and qualifications. These cost opinions represent his best judgment as a design professional familiar with the construction industry. However, the design professional cannot and does not guarantee that proposals, bids, or the construction costs will not vary from opinions of probable cost prepared by him.

CITY OF AGOURA HILLS

SANITARY SEWER IMPROVEMENTS	*Date:*	6/26/2009		
ENGINEER'S OPINION OF COST				
PRIORITY #1	*Prepared by:*	J.H.		
PROJECT: SEWER SYSTEM MANAGEMENT PLAN	*Checked by:*	R.W.		

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
AREA 17					
1	MOBILIZATION (5%)	1	LS	$ 7,438	$ 7,438
2	12" VCP SEWER MAIN	610	LF	$ 175	$ 106,750
3	MANHOLE	6	EA	$ 7,000	$ 42,000
4	SEWER BY-PASS (20%)	1	LS	$ 29,750	$ 29,750
5	TRAFFIC CONTROL (10%)	1	LS	$ 14,875	$ 14,875
				SUBTOTAL CONSTRUCTION:	$ 200,813
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 70,284
				AREA TOTAL:	**$ 271,097**
				SAY	**$ 271,100**
AREA 20					
1	MOBILIZATION (5%)	1	LS	$ 1,014	$ 1,014
2	18" VCP SEWER MAIN	33	LF	$ 190	$ 6,270
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 4,054	$ 4,054
5	TRAFFIC CONTROL (10%)	1	LS	$ 2,027	$ 2,027
				SUBTOTAL CONSTRUCTION:	$ 27,365
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 9,578
				AREA TOTAL:	**$ 36,942**
				SAY	**$ 36,900**
AREA 23					
1	MOBILIZATION (5%)	1	LS	$ 3,596	$ 3,596
2	12" VCP SEWER MAIN	331	LF	$ 175	$ 57,925
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 14,385	$ 14,385
5	TRAFFIC CONTROL (10%)	1	LS	$ 7,193	$ 7,193
				SUBTOTAL CONSTRUCTION:	$ 97,099
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 33,985
				AREA TOTAL:	**$ 131,083**
				SAY	**$ 131,000**

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
AREA 26					
1	MOBILIZATION (5%)	1	LS	$ 3,075	$ 3,075
2	15" VCP SEWER MAIN	250	LF	$ 190	$ 47,500
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 12,300	$ 12,300
5	TRAFFIC CONTROL (10%)	1	LS	$ 6,150	$ 6,150
				SUBTOTAL CONSTRUCTION:	$ 83,025
				(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:	$ 29,059
				AREA TOTAL:	**$ 112,084**
				SAY	**$ 112,100**

SUB-TOTAL PRIORITY #1 SANITARY SEWER IMPROVEMENTS $ 551,100

SAY $ 550,000

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
SANITARY SEWER IMPROVEMENTS		***Date:***	6/26/2009		
ENGINEER'S OPINION OF COST					
PRIORITY #2		***Prepared by:***	J.H.		
PROJECT: SEWER SYSTEM MANAGEMENT PLAN		***Checked by:***	R.W.		
ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
AREA 17					
1	MOBILIZATION (5%)	1	LS	$ 2,548	$ 2,548
2	10" VCP SEWER MAIN	224	LF	$ 165	$ 36,960
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 10,192	$ 10,192
5	TRAFFIC CONTROL (10%)	1	LS	$ 5,096	$ 5,096
				SUBTOTAL CONSTRUCTION:	$ 68,796
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 24,079
				AREA TOTAL:	**$ 92,875**
				SAY	**$ 92,900**
AREA 20					
1	MOBILIZATION (5%)	1	LS	$ 3,550	$ 3,550
2	15" VCP SEWER MAIN	300	LF	$ 190	$ 57,000
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 14,200	$ 14,200
5	TRAFFIC CONTROL (10%)	1	LS	$ 7,100	$ 7,100
				SUBTOTAL CONSTRUCTION:	$ 95,850
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 33,548
				AREA TOTAL:	**$ 129,398**
				SAY	**$ 129,400**
AREA 26					
1	MOBILIZATION (5%)	1	LS	$ 2,548	$ 2,548
2	10" VCP SEWER MAIN	224	LF	$ 165	$ 36,960
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 10,192	$ 10,192
5	TRAFFIC CONTROL (10%)	1	LS	$ 5,096	$ 5,096
				SUBTOTAL CONSTRUCTION:	$ 68,796
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 24,079
				AREA TOTAL:	**$ 92,875**
				SAY	**$ 92,900**

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
AREA 29					
1	MOBILIZATION (5%)	1	LS	$ 14,954	$ 14,954
2	10" VCP SEWER MAIN	225	LF	$ 165	$ 37,125
3	12" VCP SEWER MAIN	326	LF	$ 175	$ 57,050
4	15" VCP SEWER MAIN	710	LF	$ 190	$ 134,900
5	MANHOLE	10	EA	$ 7,000	$ 70,000
6	SEWER BY-PASS (20%)	1	LS	$ 59,815	$ 59,815
7	TRAFFIC CONTROL (10%)	1	LS	$ 29,908	$ 29,908
				SUBTOTAL CONSTRUCTION:	$ 403,751
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 141,313
				AREA TOTAL:	**$ 545,064**
				SAY	**$ 545,000**
AREA 30					
1	MOBILIZATION (5%)	1	LS	$ 2,284	$ 2,284
2	10" VCP SEWER MAIN	192	LF	$ 165	$ 31,680
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 9,136	$ 9,136
5	TRAFFIC CONTROL (10%)	1	LS	$ 4,568	$ 4,568
				SUBTOTAL CONSTRUCTION:	$ 61,668
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 21,584
				AREA TOTAL:	**$ 83,252**
				SAY	**$ 83,300**
AREA 31					
1	MOBILIZATION (5%)	1	LS	$ 3,431	$ 3,431
2	10" VCP SEWER MAIN	331	LF	$ 165	$ 54,615
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 13,723	$ 13,723
5	TRAFFIC CONTROL (10%)	1	LS	$ 6,862	$ 6,862
				SUBTOTAL CONSTRUCTION:	$ 92,630
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 32,421
				AREA TOTAL:	**$ 125,051**
				SAY	**$ 125,100**

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
AREA 35					
1	MOBILIZATION (5%)	1	LS	$ 3,192	$ 3,192
2	10" VCP SEWER MAIN	302	LF	$ 165	$ 49,830
3	MANHOLE	2	EA	$ 7,000	$ 14,000
4	SEWER BY-PASS (20%)	1	LS	$ 12,766	$ 12,766
5	TRAFFIC CONTROL (10%)	1	LS	$ 6,383	$ 6,383
				SUBTOTAL CONSTRUCTION:	$ 86,171
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 30,160
				AREA TOTAL:	**$ 116,330**
				SAY	**$ 116,300**
AREA 41					
1	MOBILIZATION (5%)	1	LS	$ 6,473	$ 6,473
2	15" VCP SEWER MAIN	534	LF	$ 190	$ 101,460
3	MANHOLE	4	EA	$ 7,000	$ 28,000
4	SEWER BY-PASS (20%)	1	LS	$ 25,892	$ 25,892
5	TRAFFIC CONTROL (10%)	1	LS	$ 12,946	$ 12,946
				SUBTOTAL CONSTRUCTION:	$ 174,771
	(35% of Construction) ENGINEERING, CONTRACT ADMIN, INSPECTION, AND CONTINGENCY:				$ 61,170
				AREA TOTAL:	**$ 235,941**
				SAY	**$ 235,900**
				SUB-TOTAL PRIORITY #2 SANITARY SEWER IMPROVEMENTS	**$ 1,420,785**
				SAY	**$ 1,420,000**

Since the design professional has no control over the cost of labor, materials, equipment, or over the contractor's method of determining prices, or over competitive bidding or market conditions, his opinions of probable construction costs provided herein are to be made on the basis of his experience and qualifications. These costs opinions represent his best judgment as a design professional familiar with the construction industry. However, the design professional cannot and does not guarantee that proposals, bids, or the construction costs will not vary from opinions of probable cost prepared by him.

APPENDIX ‘L-2’

Sewer System Capacity Analysis
Deficient Pipes Exhibit

APPENDIX ‘L-3’

Pizer Hydra version 6.4 Hydraulic Calculations

APPENDIX ‘L-4’

Flow Monitoring Report – V&A Engineering
Report dated May 2009

SANITARY SEWER FLOW MONITORING

City of Agoura Hills

May 2009

V&A

City of Agoura Hills

SANITARY SEWER FLOW MONITORING
AND
CAPACITY ANALYSIS

Prepared for:

VENTURA REGIONAL SANITATION DISTRICT
1001 Partridge Drive, Suite 150
Ventura, CA 93003-0704

Prepared by:

V&A
8291 Aero Place, Suite 110
San Diego, CA 92123

May 2009

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TABLES

FIGURES

APPENDIX A – Graphs, Figures and Tables

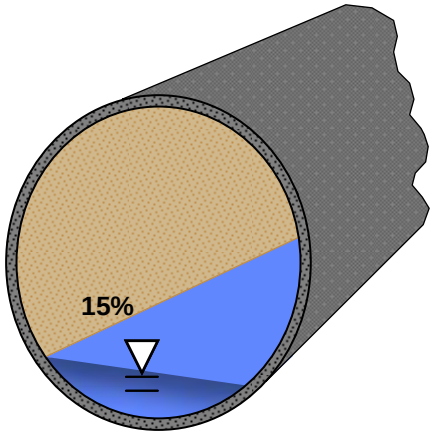
EXECUTIVE SUMMARY

V&A has completed a sanitary sewer flow monitoring and capacity study within the City of Agoura Hills, California. Nine sites were monitored for 4 weeks from March 24, 2009 to April 20, 2009. The purpose of this study was to investigate the existing flow volume through the sanitary sewer pipes at the flow monitoring locations, and identify the potential impacts on the capacity at the flow monitoring location.

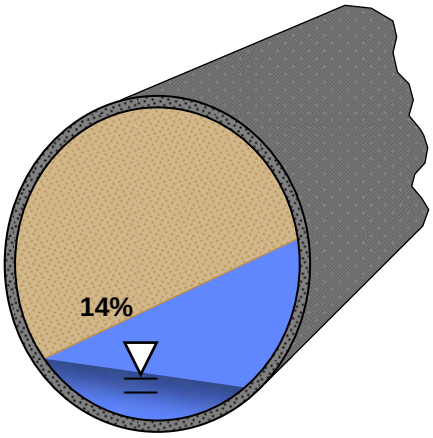
The results of the sanitary sewer flow monitoring are summarized in Table 1. Snapshots of the pipe cross-section during peak measured flows are illustrated in Figure 1. Please refer to Figure 2 for the flow monitoring site locations.

Table 1. Summary of Flow Monitoring Data

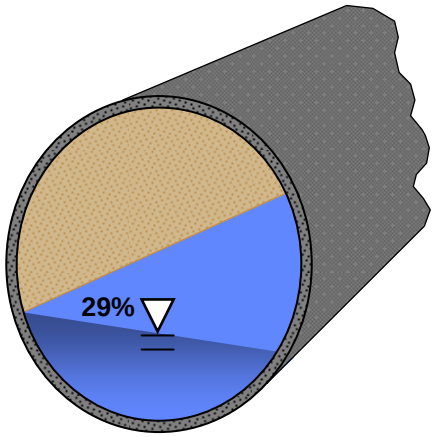
Site	Estimated 100% Capacity of Line (mgd)	ADWF			Peak Measured Flow		
		Total (mgd)	% of Capacity (by Volume)	% of Capacity (by Level)	Total (mgd)	% of Capacity (by Volume)	% of Capacity (by Level)
MH 25	9.00	0.17	1.9%	12.5%	0.26	2.9%	14.7%
MH 29	4.50	0.04	0.9%	6.7%	0.13	2.8%	13.9%
MH 33	1.90	0.09	4.7%	17.2%	0.24	12.4%	28.8%
MH 42	5.00	0.18	3.7%	16.2%	0.41	8.1%	24.0%
MH 84	4.00	0.01	0.2%	4.7%	0.04	1.1%	12.5%
MH 85	0.95	0.06	6.6%	22.5%	0.15	15.4%	33.1%
MH 178	1.10	0.09	8.0%	25.2%	0.27	24.4%	43.4%
MH 203	4.50	0.09	2.0%	11.4%	0.20	4.5%	17.1%
MH 259	1.70	0.14	8.2%	24.6%	0.35	20.7%	41.0%



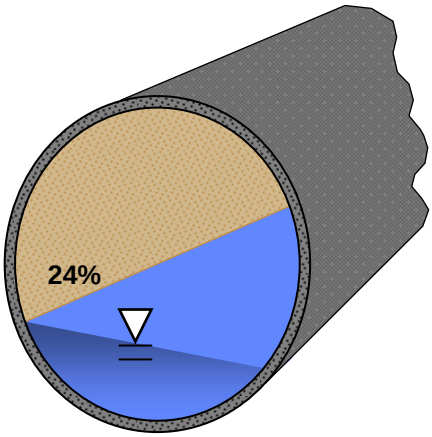
MH 25



MH 29



MH 33



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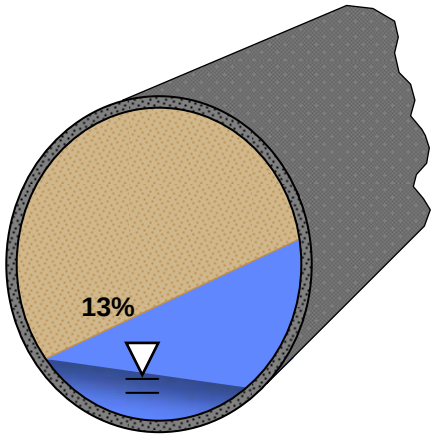

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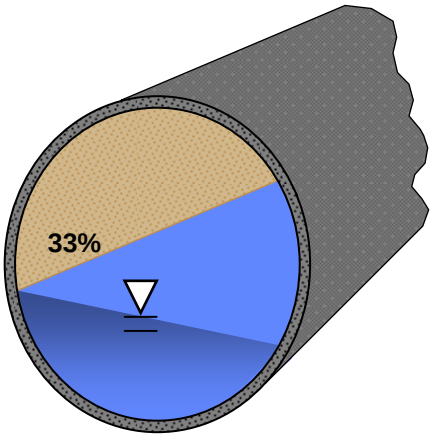

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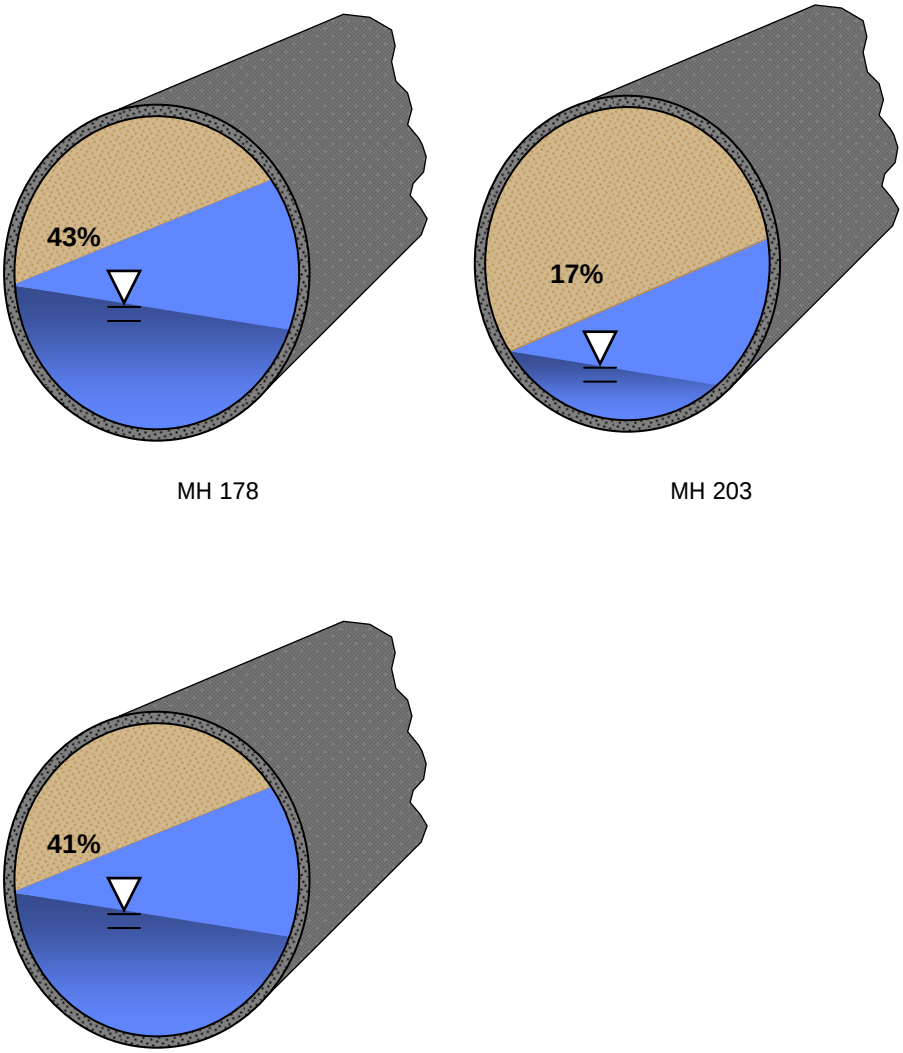


Figure 1. Peak Flow Cross-Sectional View Snapshots

INTRODUCTION

V&A was retained by the Ventura Regional Sanitation District (VRSD) to conduct a sanitary sewer flow monitoring and capacity study at nine locations within the City of Agoura Hills. The purpose of the study was to record and report the existing flow volume through the sanitary sewer pipe, and identify the potential impacts on the capacity at the flow monitoring locations. Flow monitoring was conducted over a 4-week period from March 24, 2009 to April 20, 2009. Figure 2 illustrates the location of the manholes where the flow meters were installed.

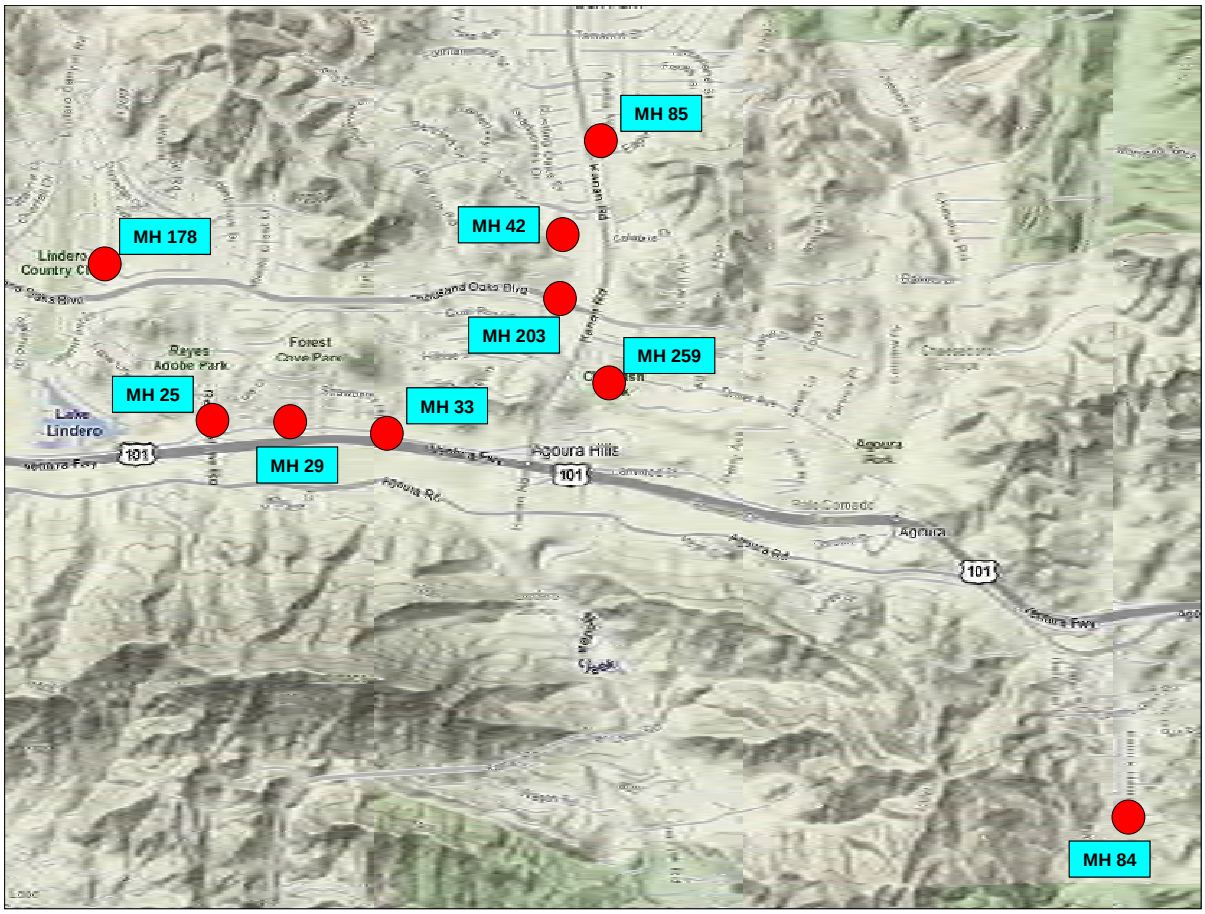


Figure 2. Map of Flow Monitoring Sites

FLOW MONITORING METHODS AND PROCEDURES

Meter Installation

Nine Isco 2150 area-velocity flow meters were installed by V&A in the sewer manholes shown in Figure 2. Isco meters use a pressure transducer to collect depth readings, and ultrasonic Doppler sensors on the probe determine the average fluid velocity. Figure 3 shows a diagram of a typical flow meter installation.

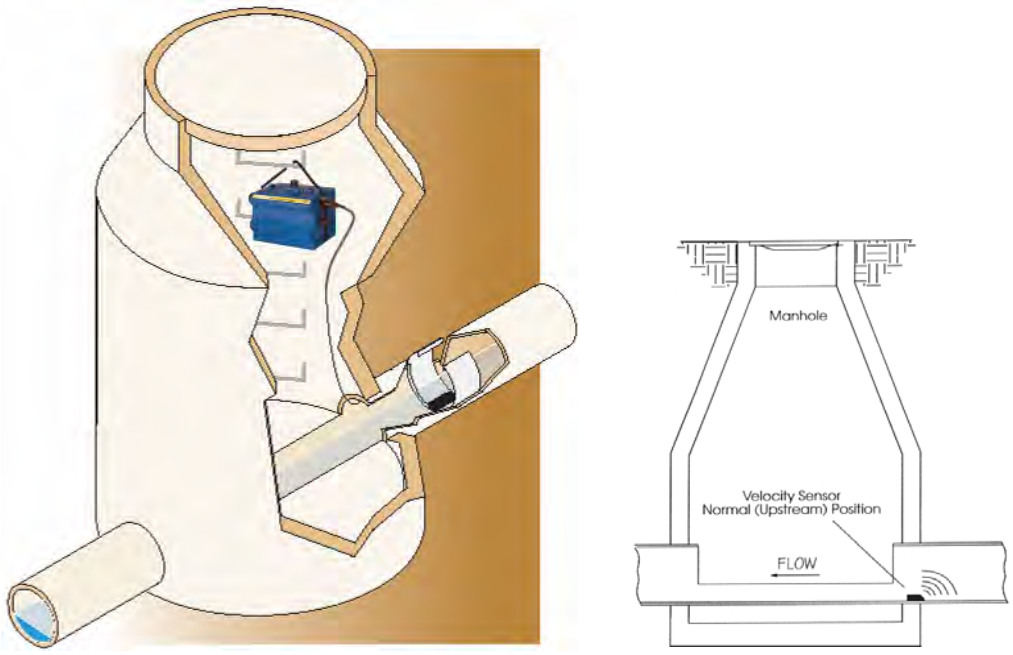


Figure 3. Flow Meter Installation Diagram

Manual level and velocity measurements were taken in the field during the flow meter installation and again when the meters were removed. These manual measurements are compared to the instantaneous level and velocity readings of the flow meters to ensure proper calibration and accuracy. The continuous depth and velocity readings were recorded by the flow meters in 15-minute increments and downloaded into a computer spreadsheet program where the data could be analyzed and made report-ready.

Explanation of Report Graphs and Definition of Terms

Flow versus time graphs are created by plotting the data recorded by the flow meters in 15-minute intervals. The graphs represent the diurnal flow curve recorded over a given monitoring period and represent the data in its rawest form. Figure 4 shows a typical diurnal flow curve and identified on this graph are the hypothetical peak, low, and average flows recorded over an example monitoring period. These graphs are useful in identifying the extreme limits of the flows being monitored, and identifying any trends that might be occurring at a particular site. The graphs for flow, level and velocity versus time for this project are provided in *Appendix A* of this report.

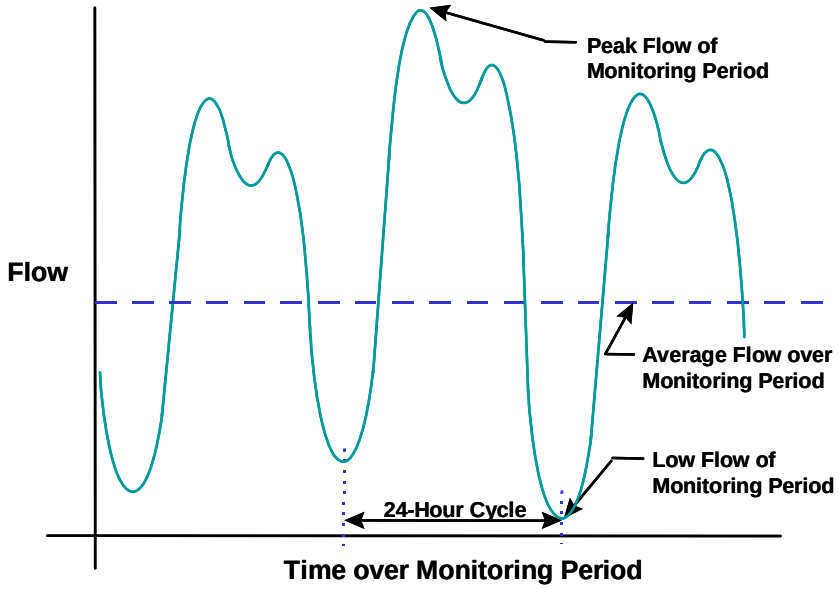


Figure 4. Diagram of Hypothetical Diurnal Flow over Monitoring Period

Dry weather flow is the flow that is caused by actual waste drainage from buildings in the area. Wet weather flow includes rain-dependent infiltration and inflow which may increase the flow through the sewer pipes. The flows recorded during this study were dry weather flows only.

FINDINGS

Flow Monitoring Results

The recorded flows showed diurnal flow patterns with peaks in the early morning and late afternoon hours. Figure 5 plots the average daily weekday and weekend flow for Manhole 33. Table 2 summarizes the flow monitoring data at the monitoring sites during the monitoring period. Additional plots and tables summarizing the flows at the monitoring sites are shown in *Appendix A.*

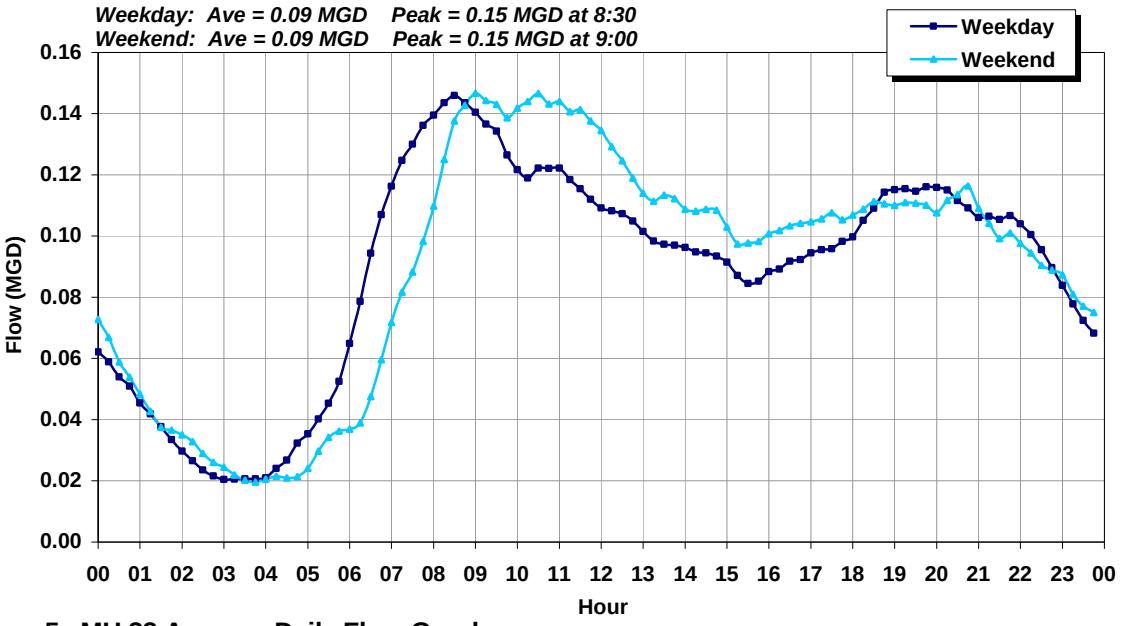


Figure 5. MH 33 Average Daily Flow Graph

Table 2. Flow Monitoring Results

Location	Weekday Average Flow (mgd)	Weekend Average Flow (mgd)	ADWF** (mgd)	Weekend to Weekday Ratio	Peak Measured Flow (mgd)	Peak to ADWF Ratio
MH 25	0.17	0.17	0.17	1.00	0.26	1.51
MH 29	0.04	0.04	0.04	0.89	0.13	3.20
MH 33	0.09	0.09	0.09	1.01	0.24	2.65
MH 42	0.18	0.19	0.18	0.99	0.41	2.20
MH 84	0.01	0.01	0.01	1.06	0.04	7.16
MH 85	0.06	0.06	0.06	0.98	0.15	2.34
MH 178	0.09	0.09	0.09	1.10	0.27	3.05
MH 203	0.09	0.09	0.09	1.01	0.20	2.21
MH 259	0.14	0.14	0.14	1.12	0.35	2.51

**ADWF calculated as (5*weekday+2*weekend)/7

[A] The ADWF graph is generated by averaging each 15-minute period for the weekday/weekend days of this study. The peak flows shown in this graph are not the same as peak measured flow, but a "typical expected" peak flow for an average day.

Pipeline Capacity

The pipeline capacity is estimated based on the measured data from the flow metering sites. The metered flow data is plotted over the Manning's Equation flow curve and extrapolated to a full-flow scenario, as shown in Figure 6 for Manhole 259.

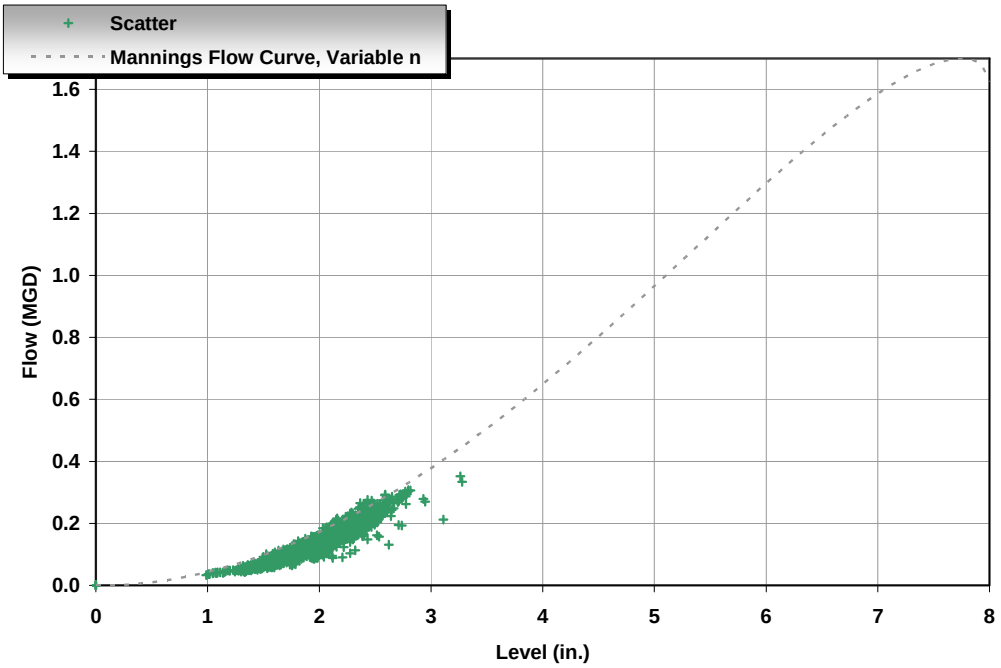


Figure 6. MH 259 Stage Curve

Table 3 summarizes the capacity data including the average dry weather flow and peak measured flow as a percent of the pipe capacity. Figure 7 shows the cross-sectional snapshots of these conditions.

Table 3. Average Dry Weather Flow and Peak Measured Flow as Percent of Capacity

Site	100% Capacity of Line (mgd)	ADWF (mgd)	ADWF as % of Capacity (by Volume)	ADWF as % of Capacity (by Level)	Peak Measured Flow (mgd)	Peak Flow as % of Capacity (by Volume)	Peak Flow as % of Capacity (by Level)
MH 25	9.00	0.17	1.9%	12.5%	0.26	2.9%	14.7%
MH 29	4.50	0.04	0.9%	6.7%	0.13	2.8%	13.9%
MH 33	1.90	0.09	4.7%	17.2%	0.24	12.4%	28.8%
MH 42	5.00	0.18	3.7%	16.2%	0.41	8.1%	24.0%
MH 84	4.00	0.01	0.2%	4.7%	0.04	1.1%	12.5%
MH 85	0.95	0.06	6.6%	22.5%	0.15	15.4%	33.1%
MH 178	1.10	0.09	8.0%	25.2%	0.27	24.4%	43.4%
MH 203	4.50	0.09	2.0%	11.4%	0.20	4.5%	17.1%
MH 259	1.70	0.14	8.2%	24.6%	0.35	20.7%	41.0%

ADWF = Average Dry Weather Flow

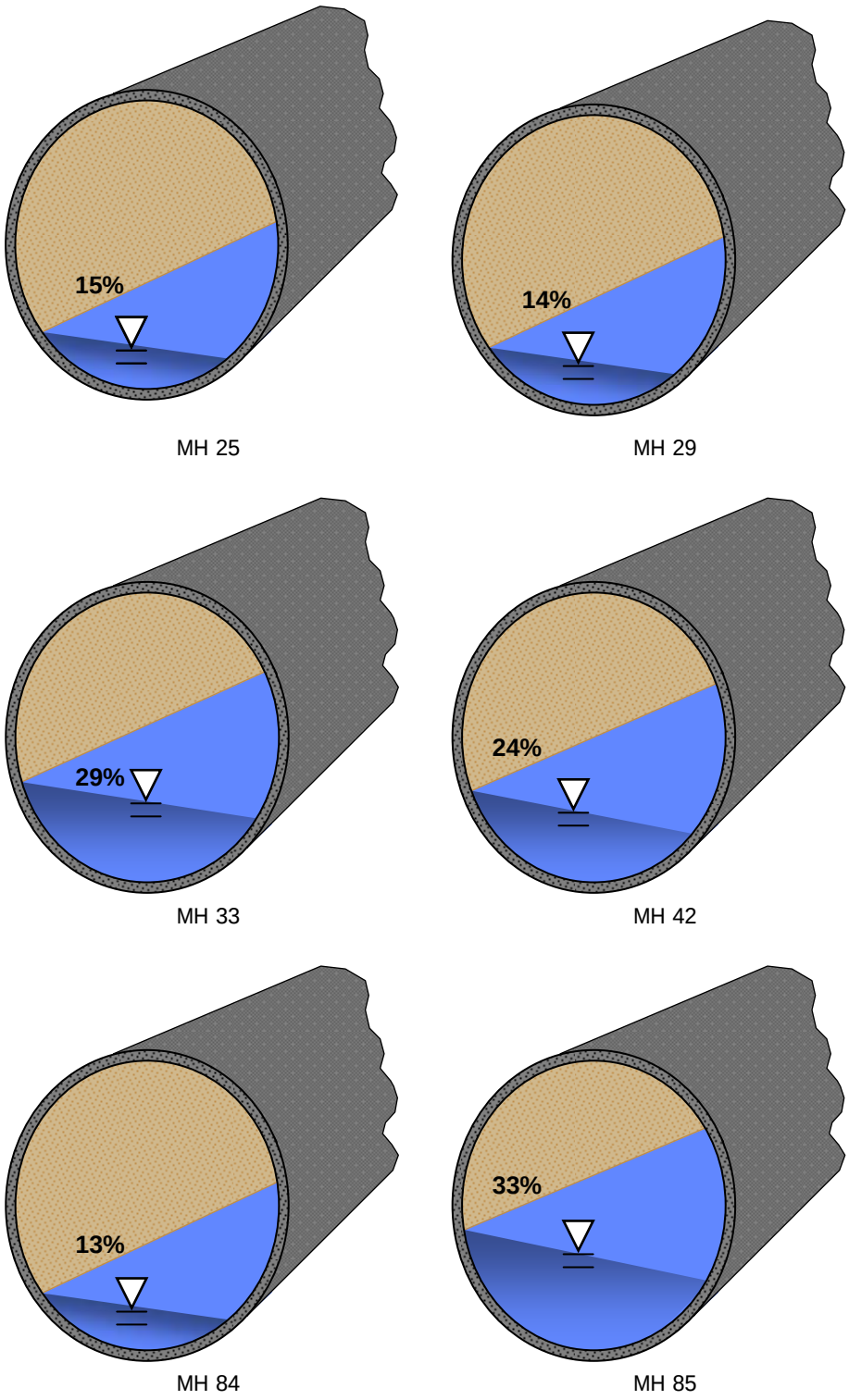


Figure 7. Peak Flow Cross-Sectional View Snapshots

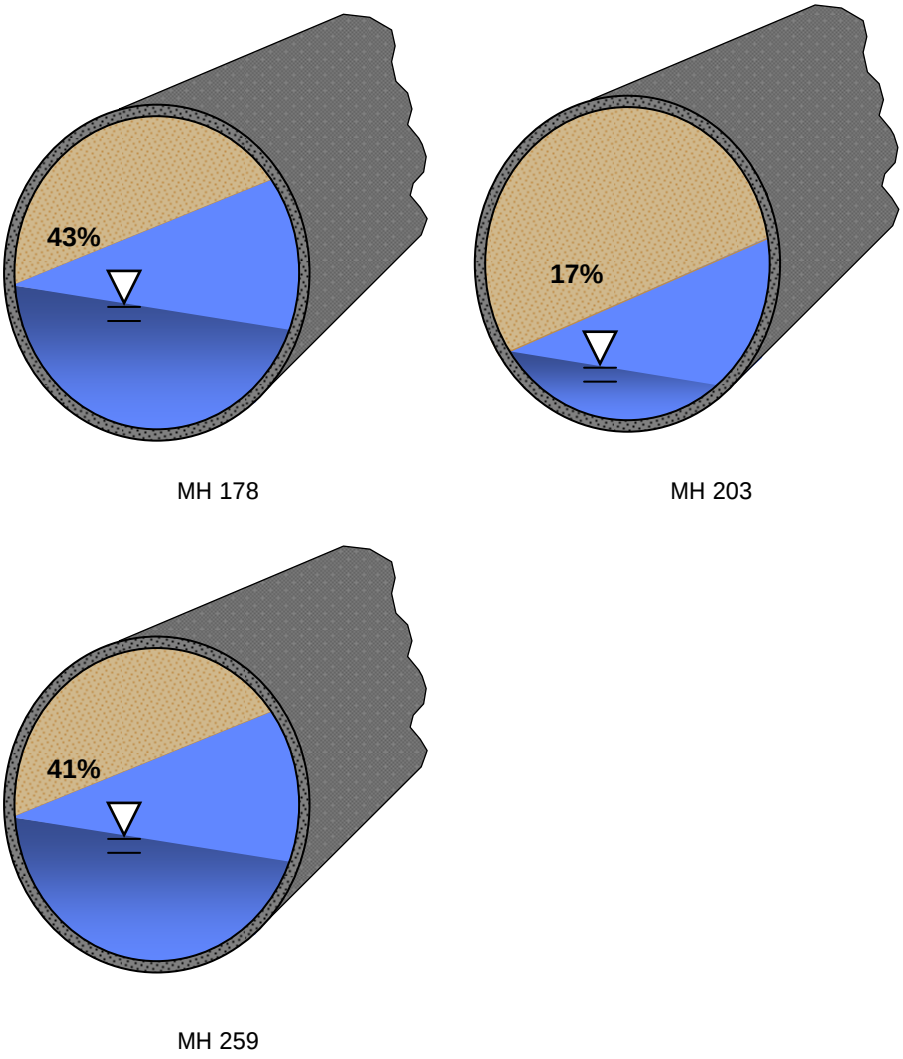


Figure 7. Peak Flow Cross-Sectional View Snapshots (cont.)

APPENDIX A

FLOW MONITORING SITE: GRAPHS, FIGURES & TABLES

Temporary Flow Monitoring Study

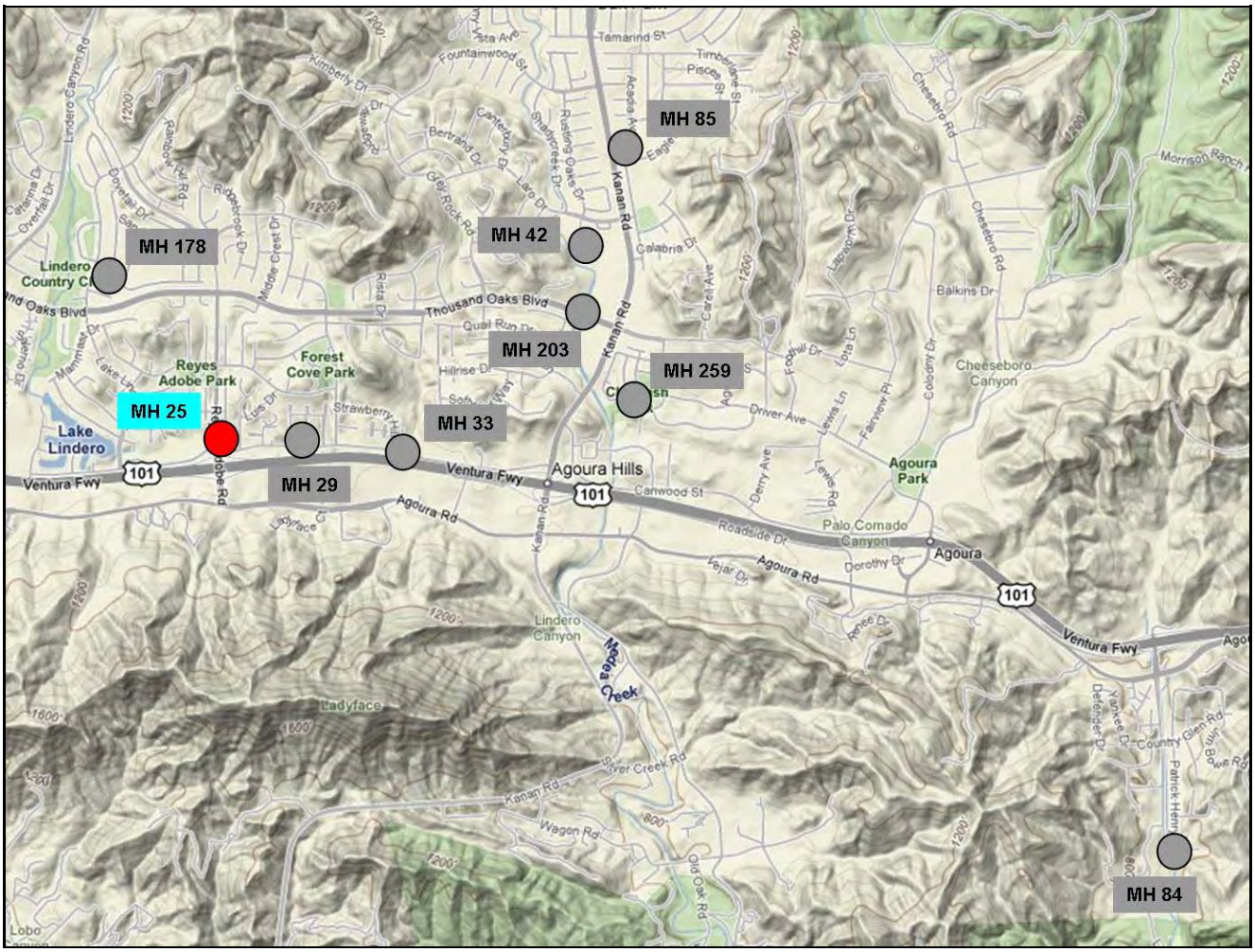
Sanitary Sewer Collection System

Monitoring Site: MH 25

Location: Canwood Street and Reyes Adobe Road

Size / Type Line: 10-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 25

Location: Canwood Street and Reyes Adobe Road

Diameter: 10 inches

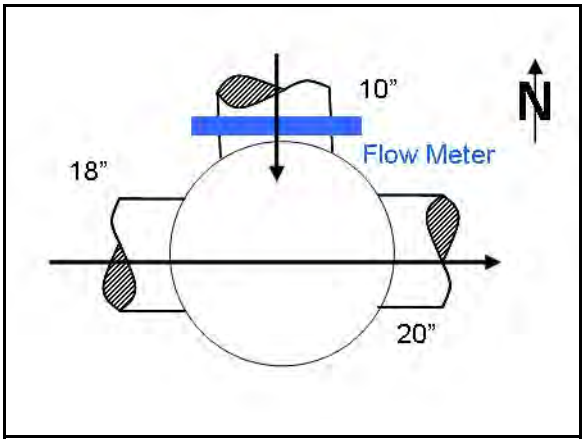
Average Dry Weather Flow: 0.17 *mgd*

Peak Measured Flow: 0.26 *mgd*

Satellite Map

Sanitary Map

Flow Sketch



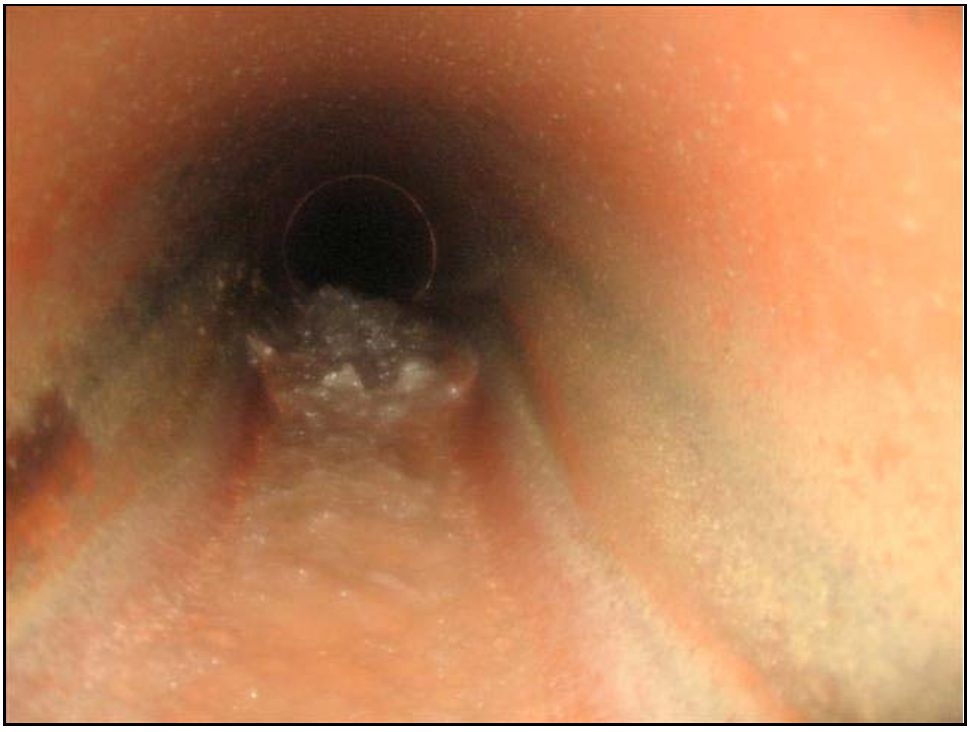
Street View Photo

Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 25

Manhole Lid

East Inlet



	Site Information Report Photos	**Monitoring Site:** MH 25

North Inlet

West Outlet

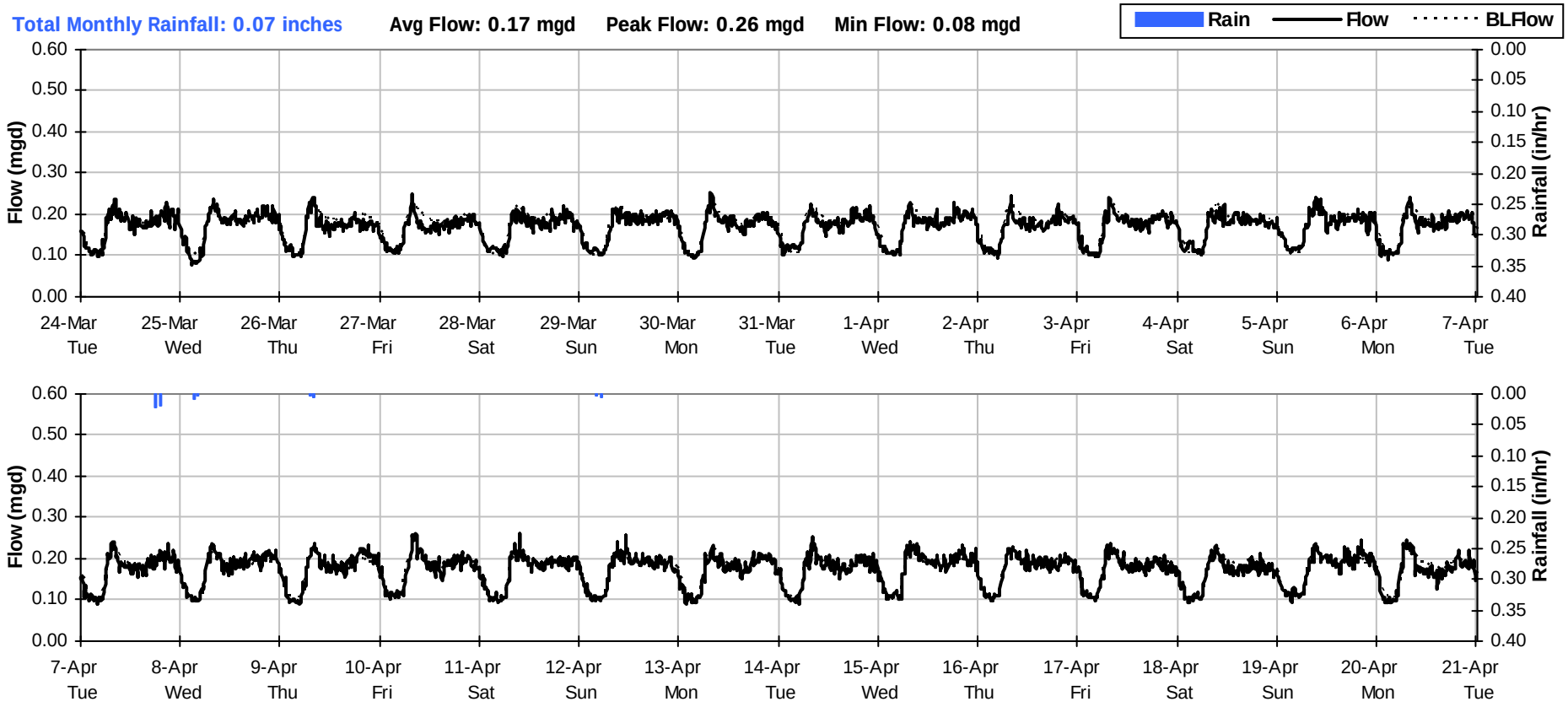
Period Flow Summary

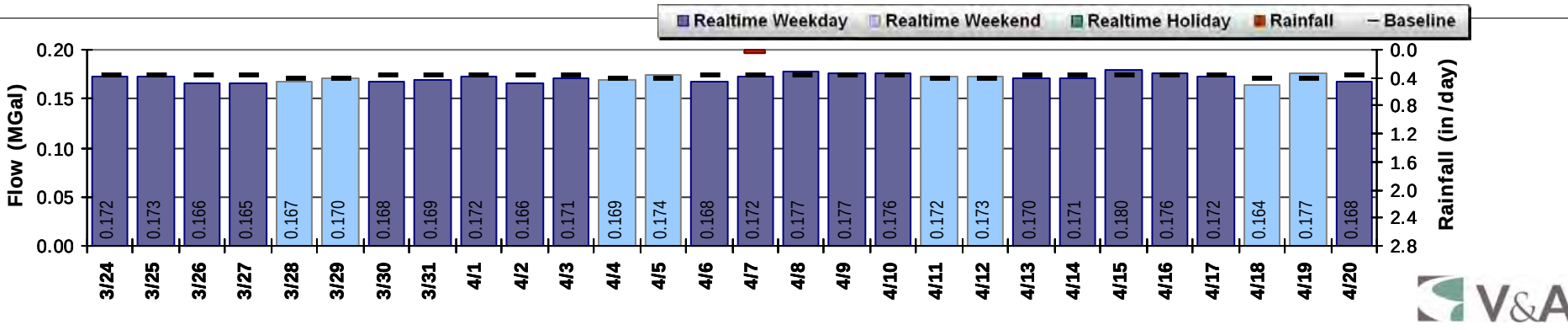
March 24, 2009 to April 21, 2009

Monitoring Site:

MH 25

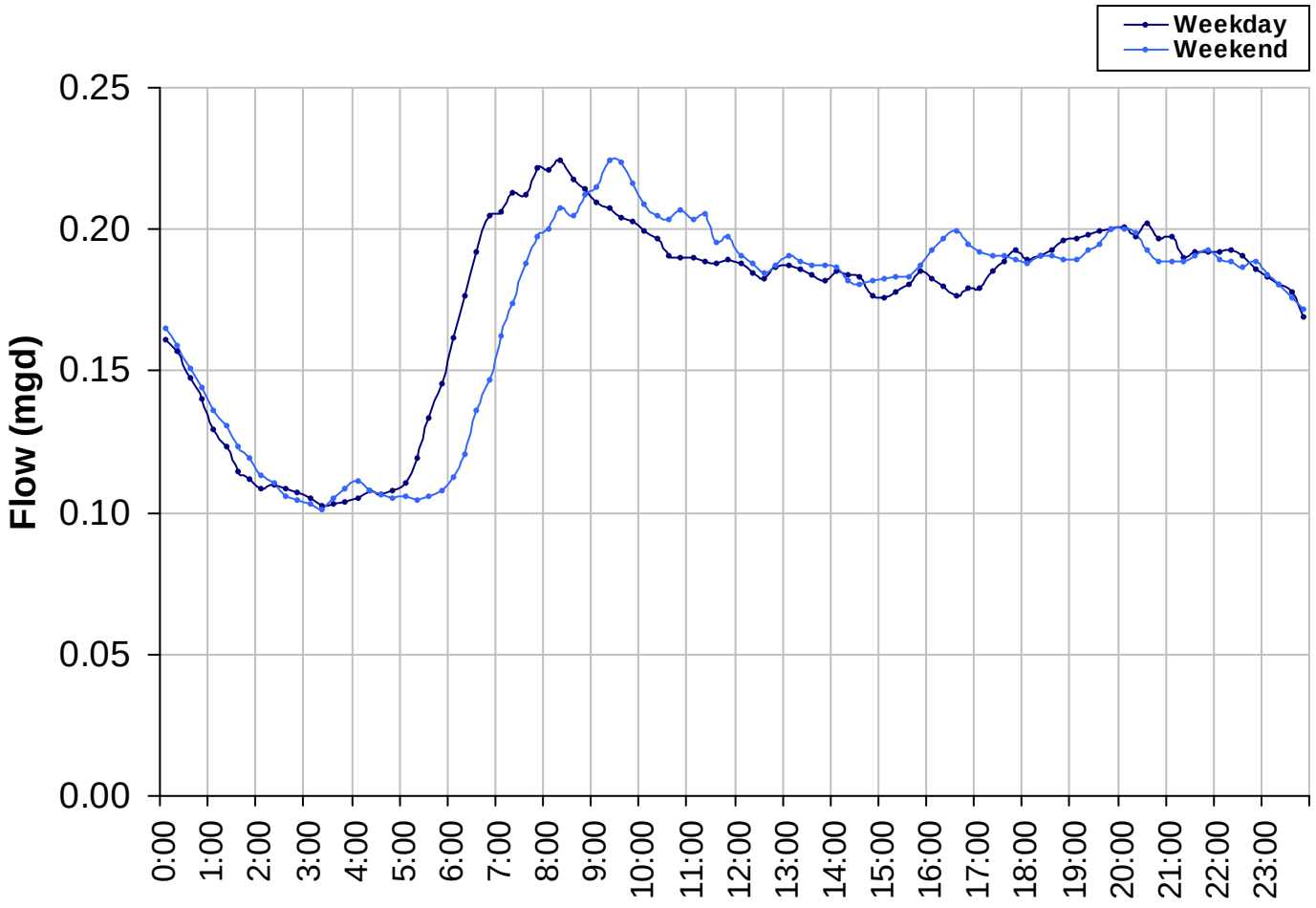
Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.17 mgd** **Peak Flow: 0.26 mgd** **Min Flow: 0.08 mgd**





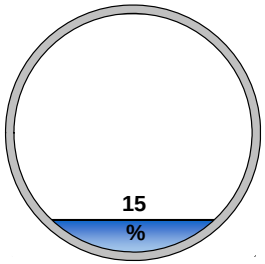
Average Dry Weather Flow

Monitoring Site:
MH 25



Peak Measured Flow:

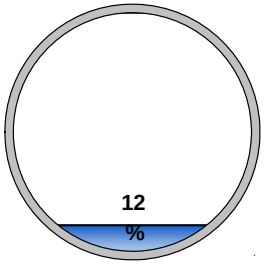
0.26 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.17 *mgd*

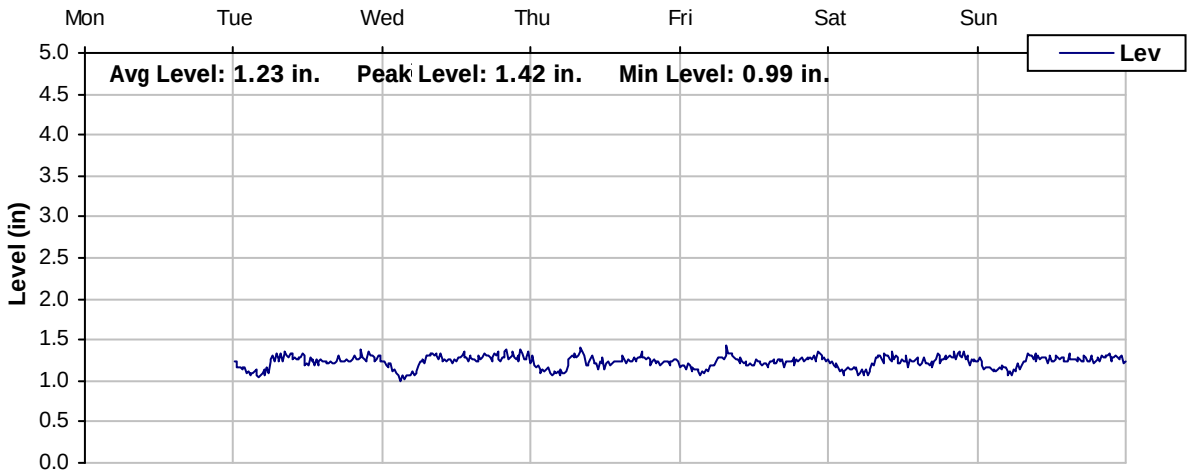


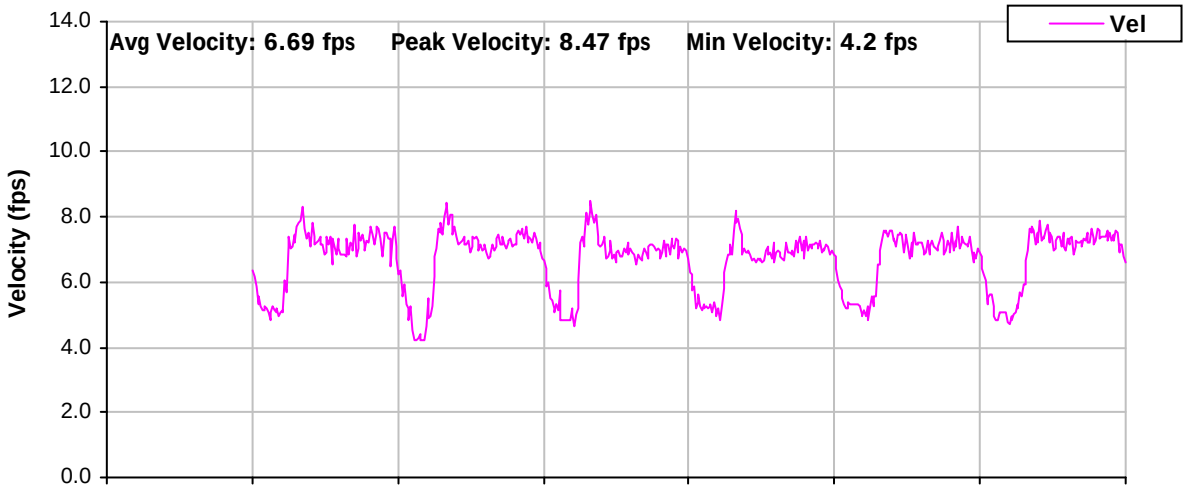
Level, Velocity and Flow

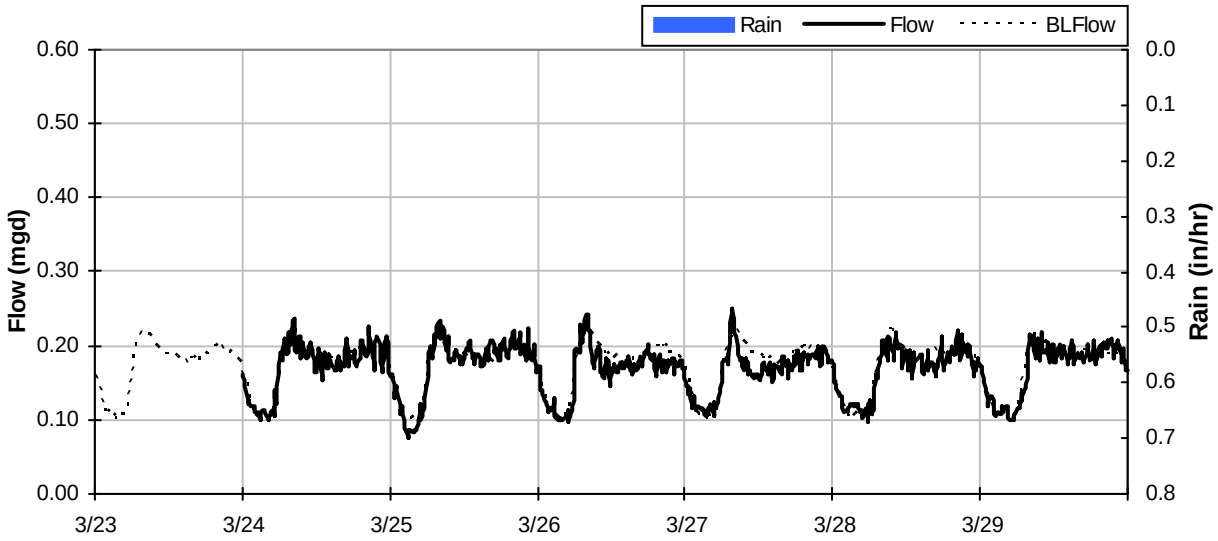
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 25







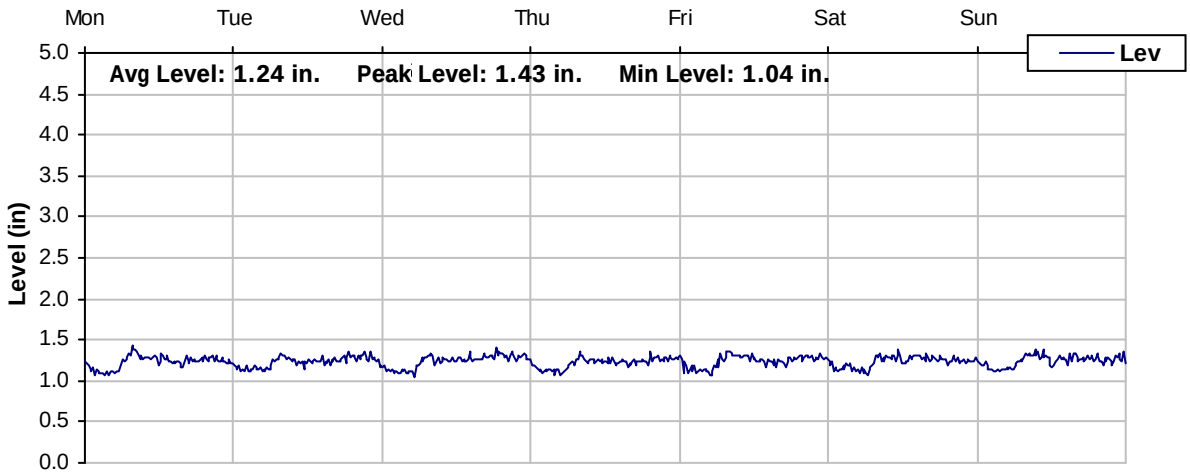
Avg Flow: 0.169 mgd **Peak Flow: 0.25 mgd** **Min Flow: 0.076 mgd**

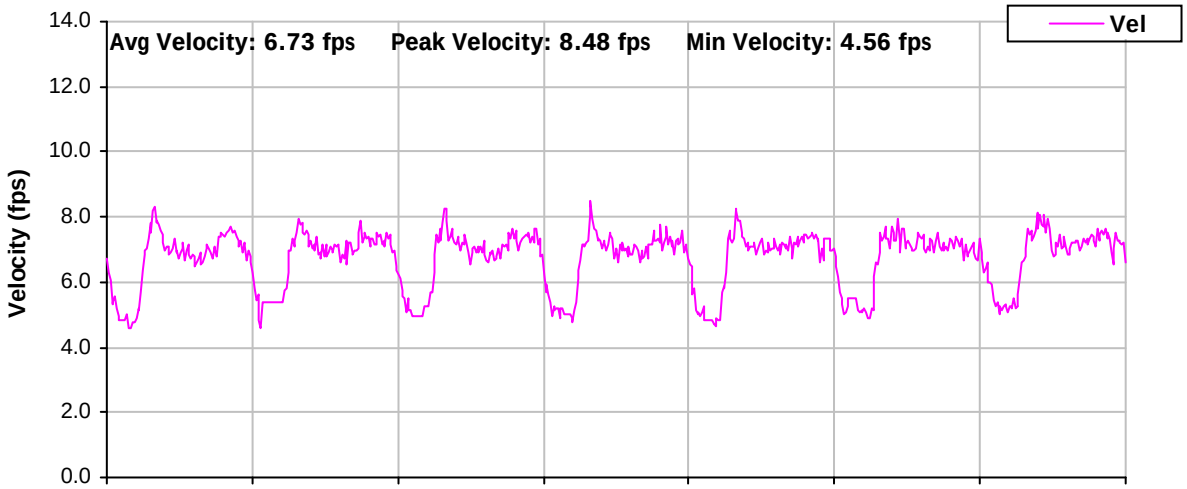
Level, Velocity and Flow

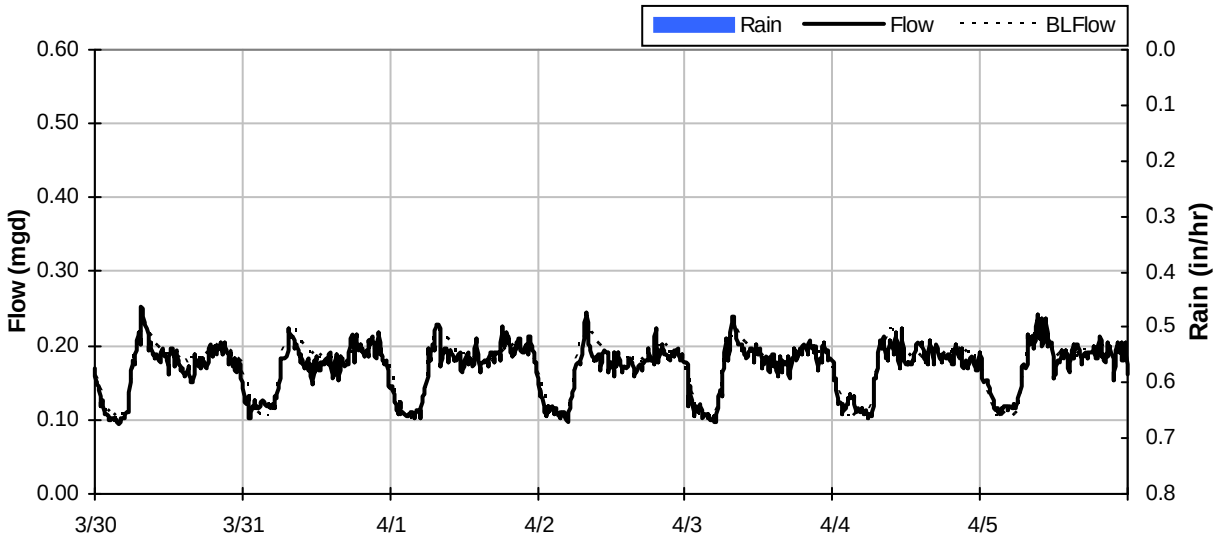
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 25







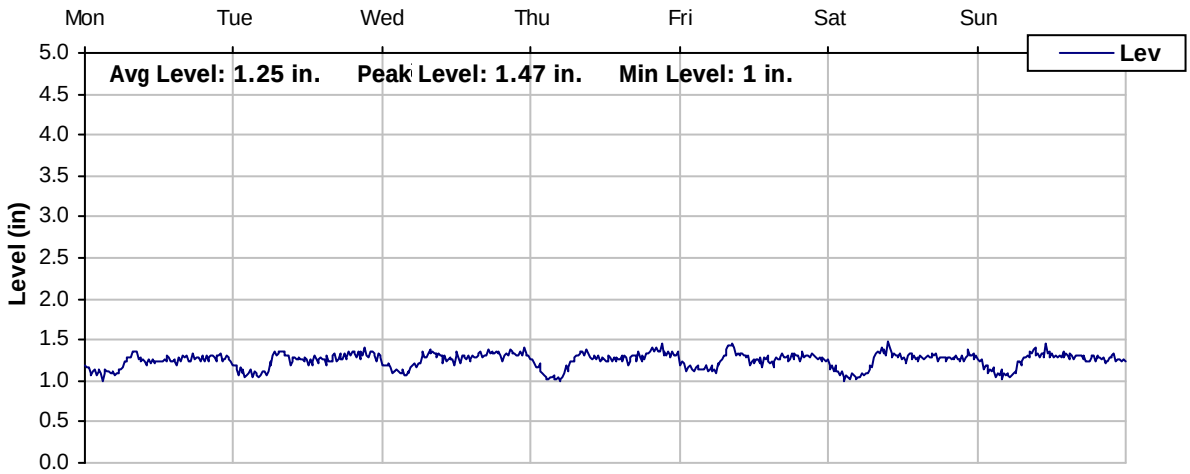
Avg Flow: 0.17 mgd **Peak Flow: 0.253 mgd** **Min Flow: 0.094 mgd**

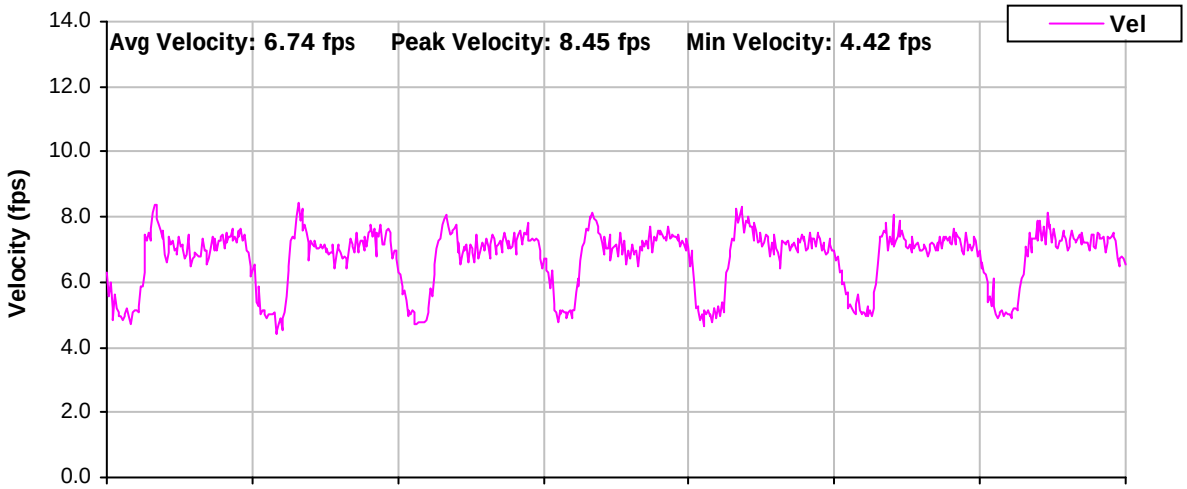
Level, Velocity and Flow

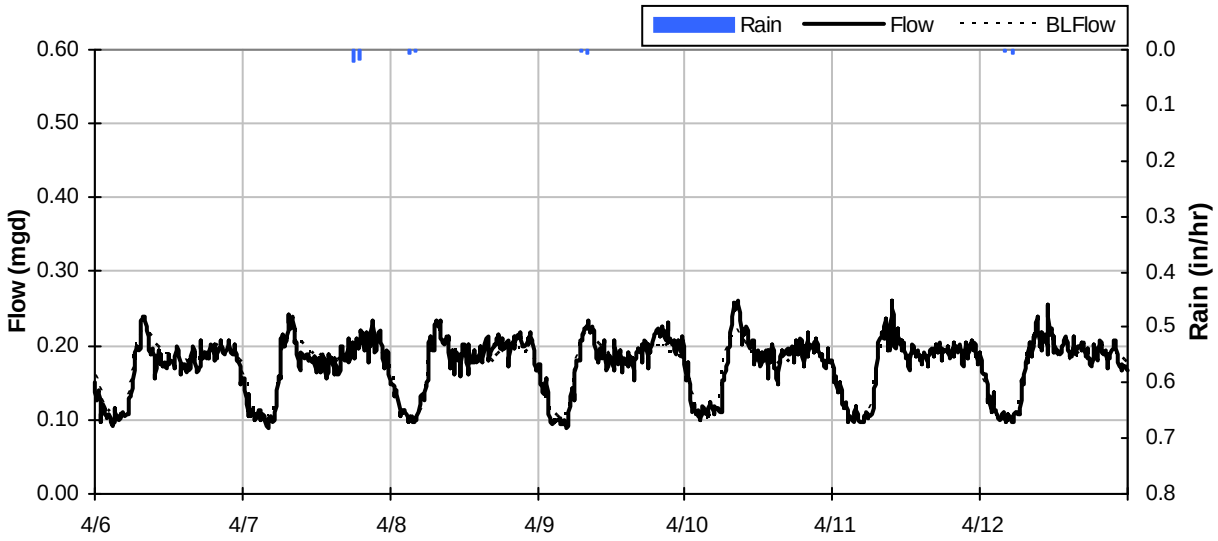
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 25







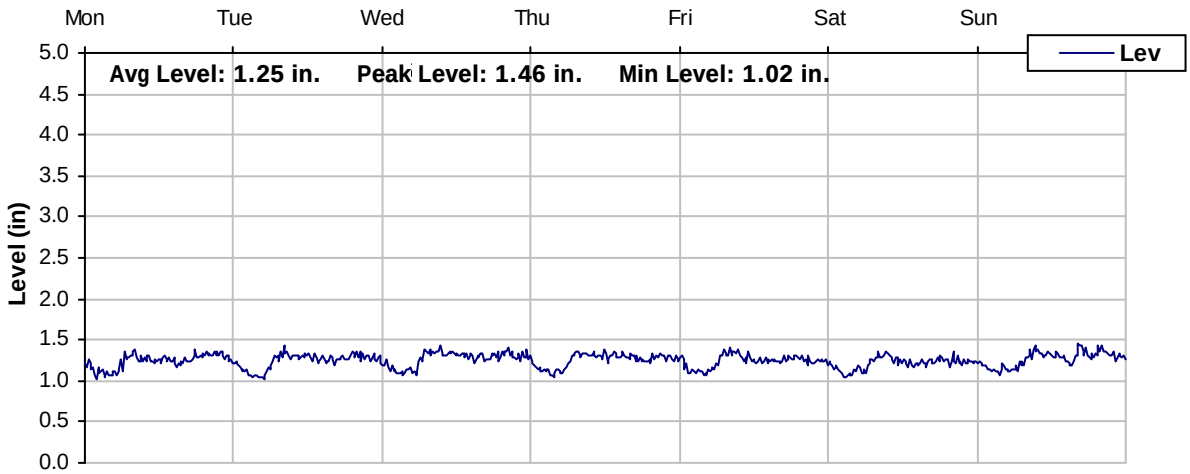
Avg Flow: 0.174 mgd **Peak Flow: 0.261 mgd** **Min Flow: 0.088 mgd**

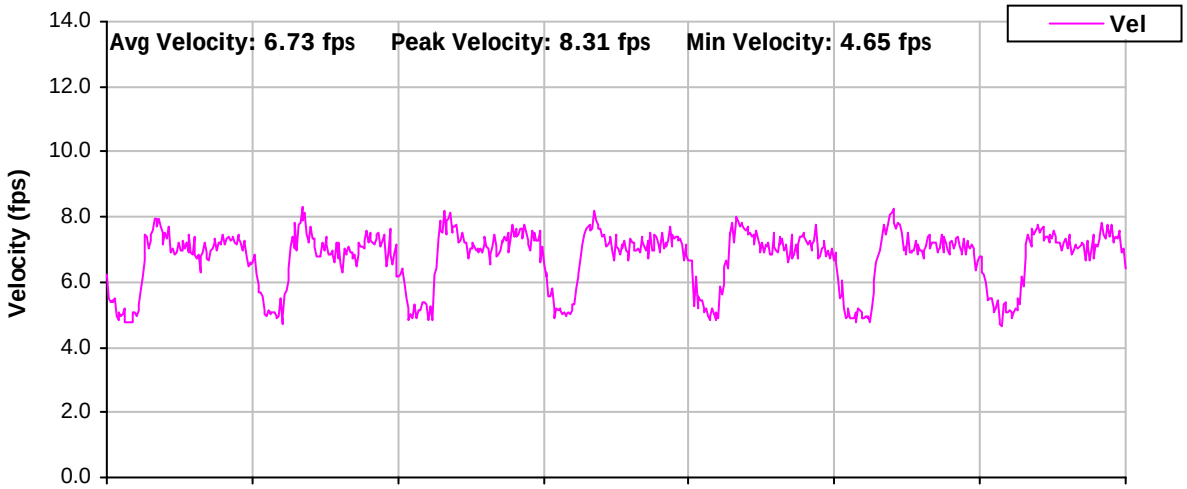
Level, Velocity and Flow

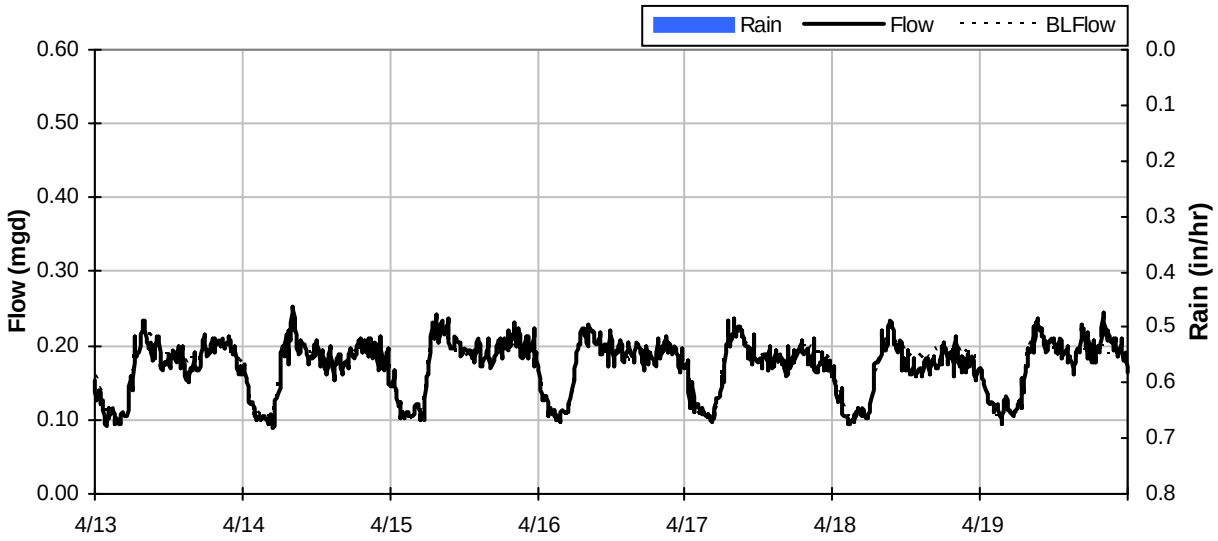
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 25







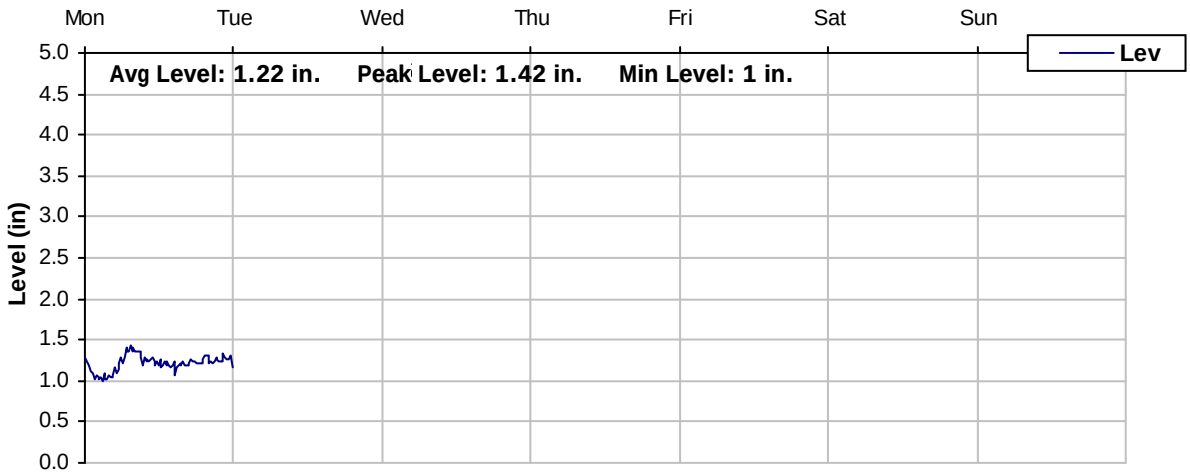
Avg Flow: 0.173 mgd **Peak Flow: 0.253 mgd** **Min Flow: 0.09 mgd**

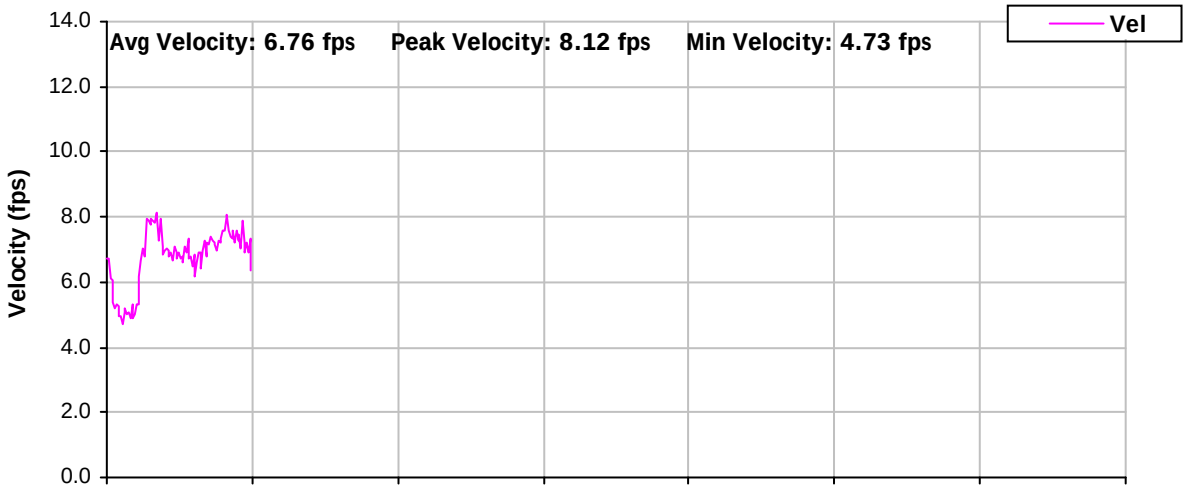
Level, Velocity and Flow

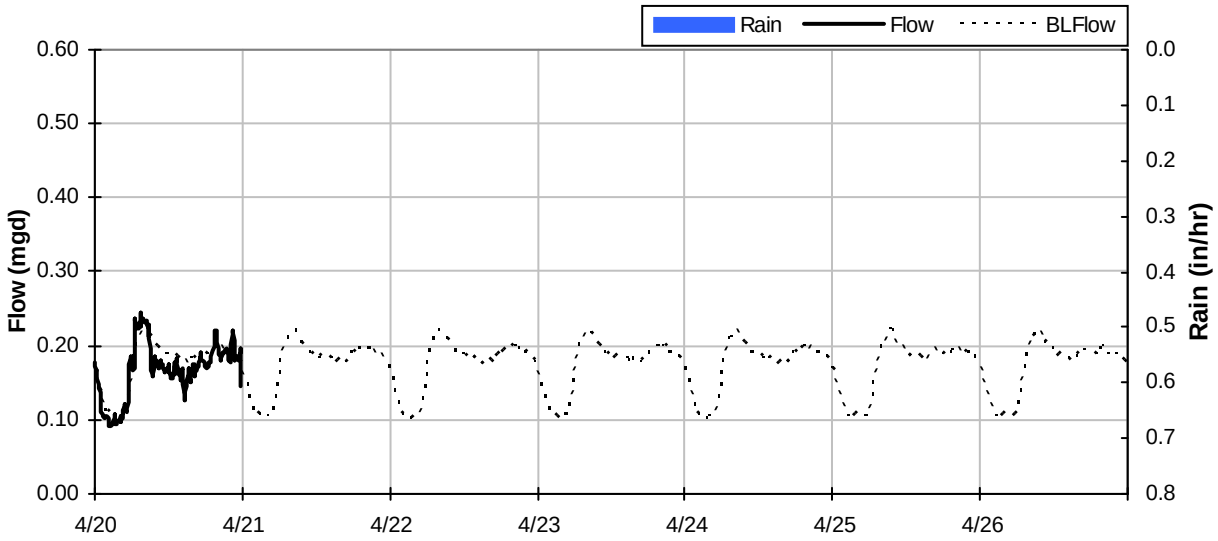
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 25







Avg Flow: 0.168 mgd **Peak Flow: 0.244 mgd** **Min Flow: 0.092 mgd**

Temporary Flow Monitoring Study

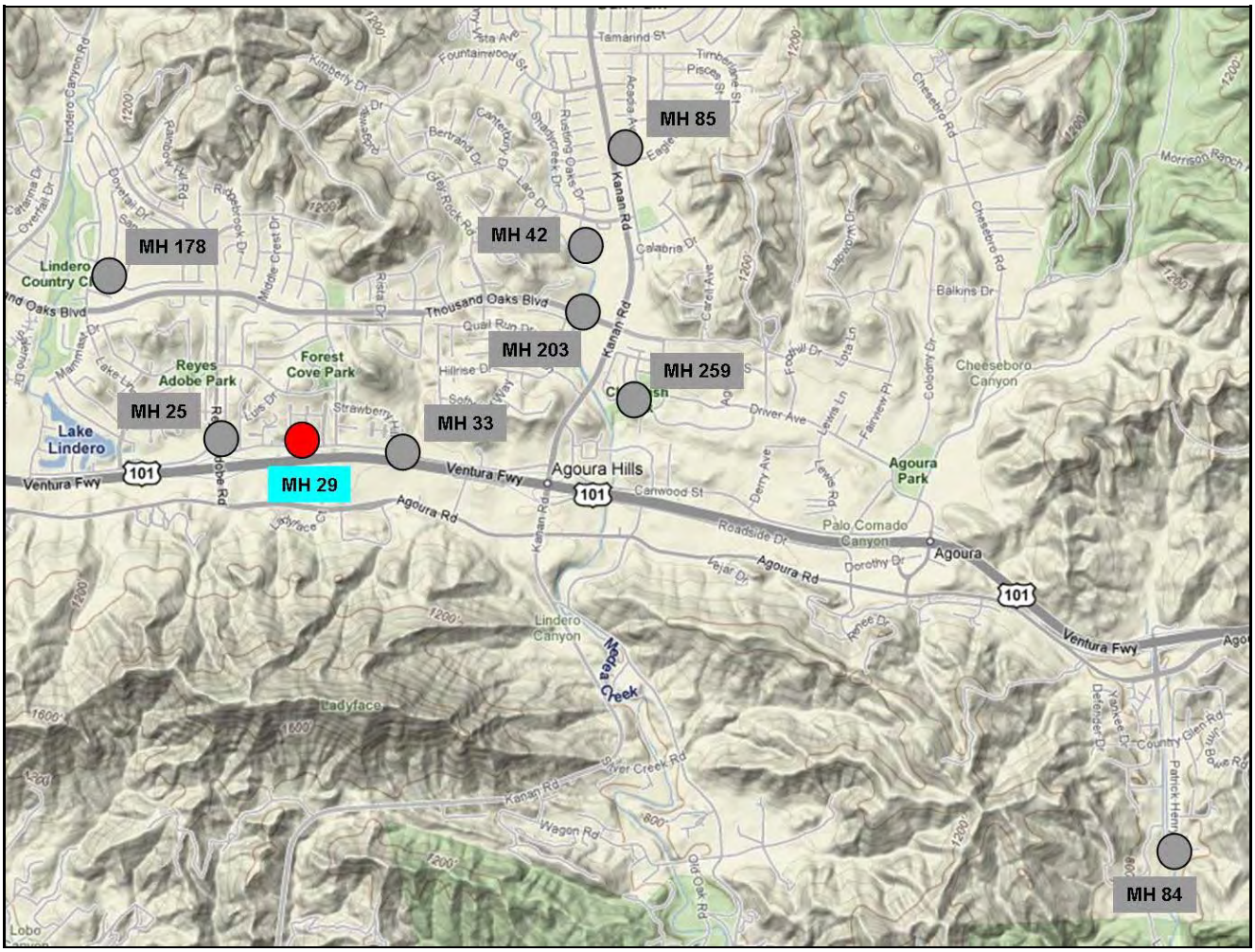
Sanitary Sewer Collection System

Monitoring Site: MH 29

Location: Canwood Street and Christian Court

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 29

Location: Canwood Street and Christian Court

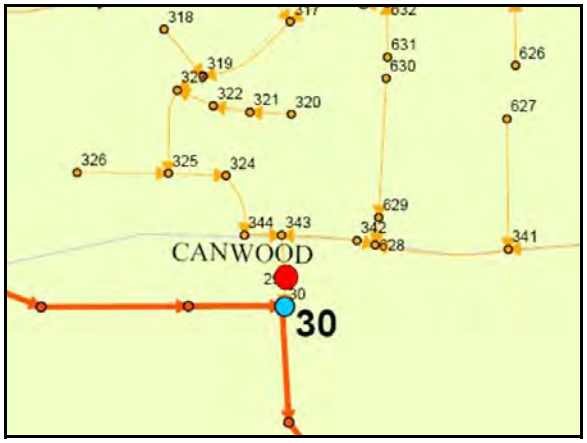
Diameter: 8 inches

Average Dry Weather Flow: 0.04 *mgd*

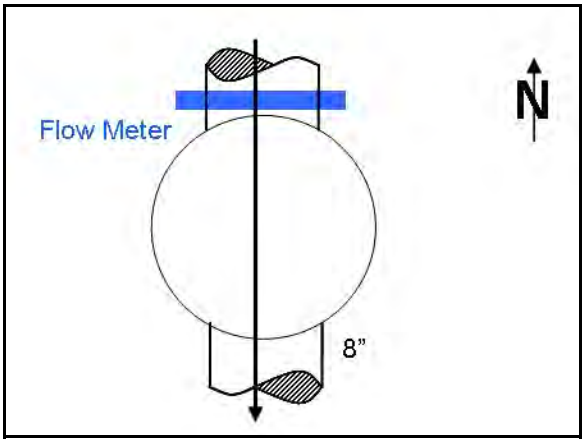
Peak Measured Flow: 0.13 *mgd*

Satellite Map

Sanitary Map



Flow Sketch



Street View Photo

Plan View Photo

V&A

	Site Information Report Photos	**Monitoring Site:** MH 29

North Inlet

North Inlet

	Site Information Report Photos	**Monitoring Site:** MH 29

South Oulet

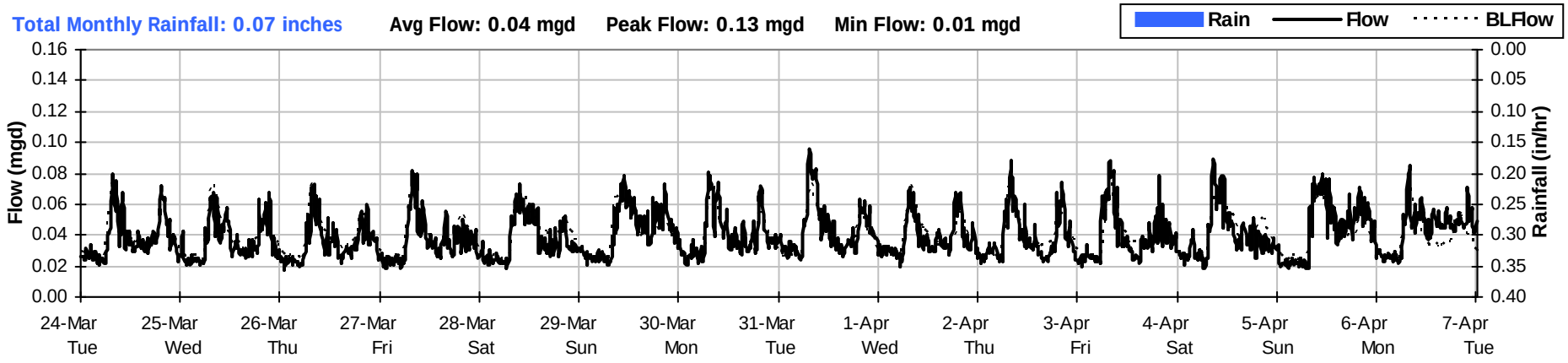
Period Flow Summary

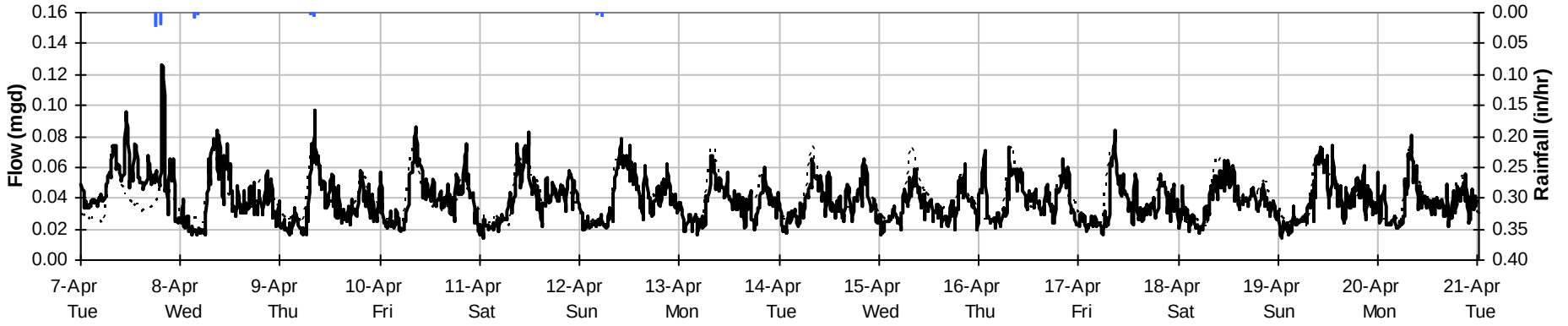
March 24, 2009 to April 21, 2009

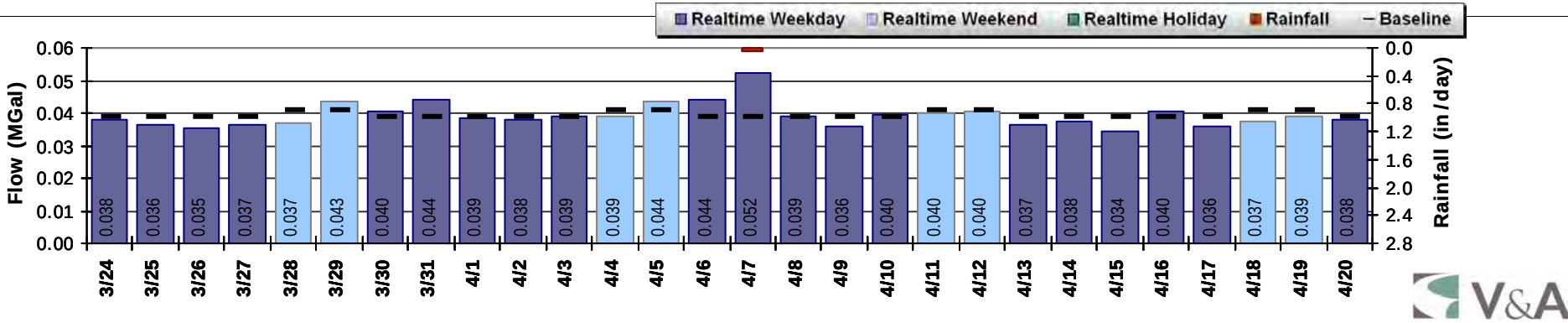
Monitoring Site:

MH 29

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.04 mgd** **Peak Flow: 0.13 mgd** **Min Flow: 0.01 mgd**



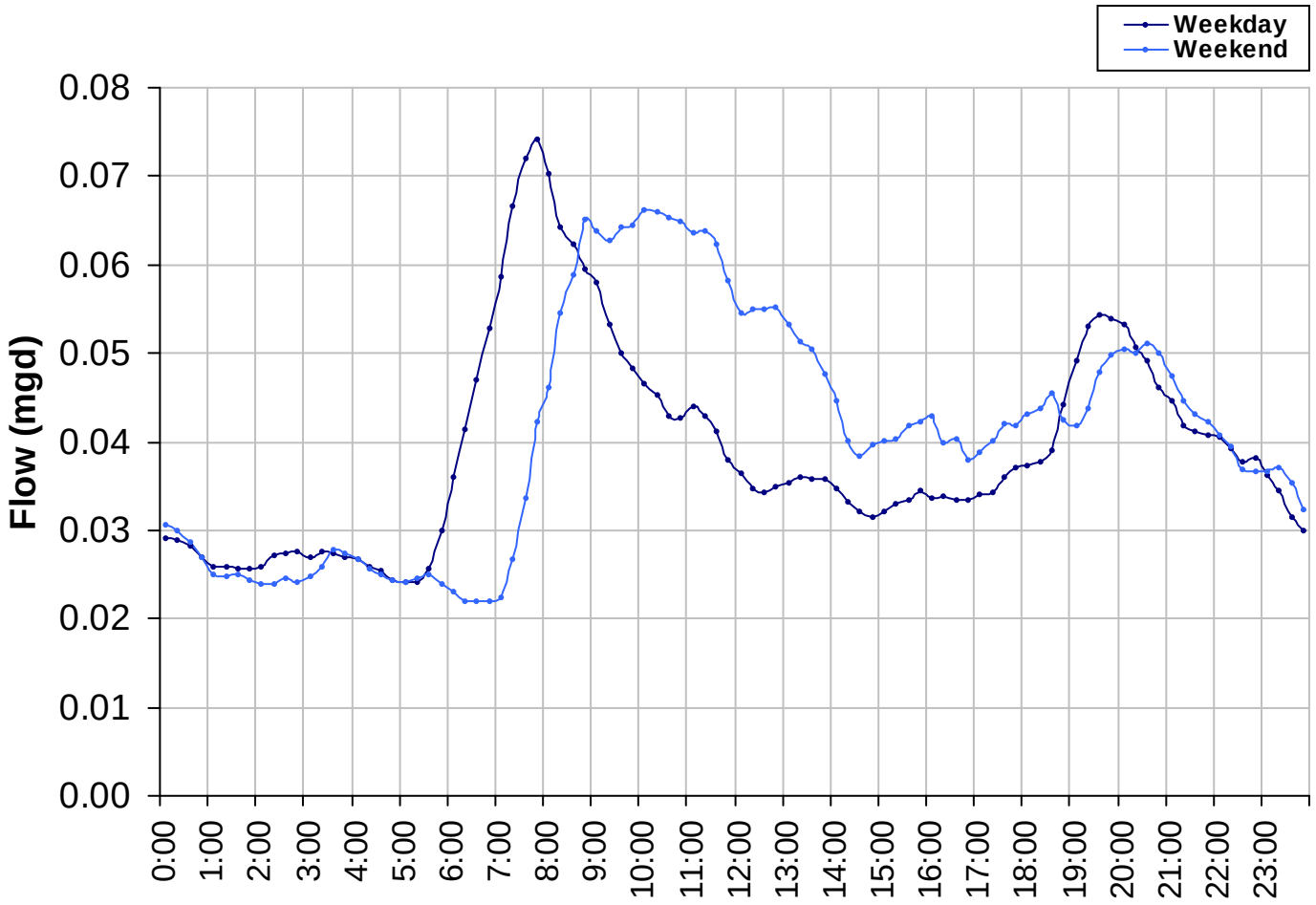




V&A

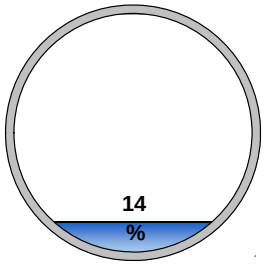
Average Dry Weather Flow

Monitoring Site:
MH 29



Peak Measured Flow:

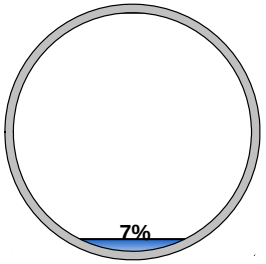
0.13 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.04 *mgd*

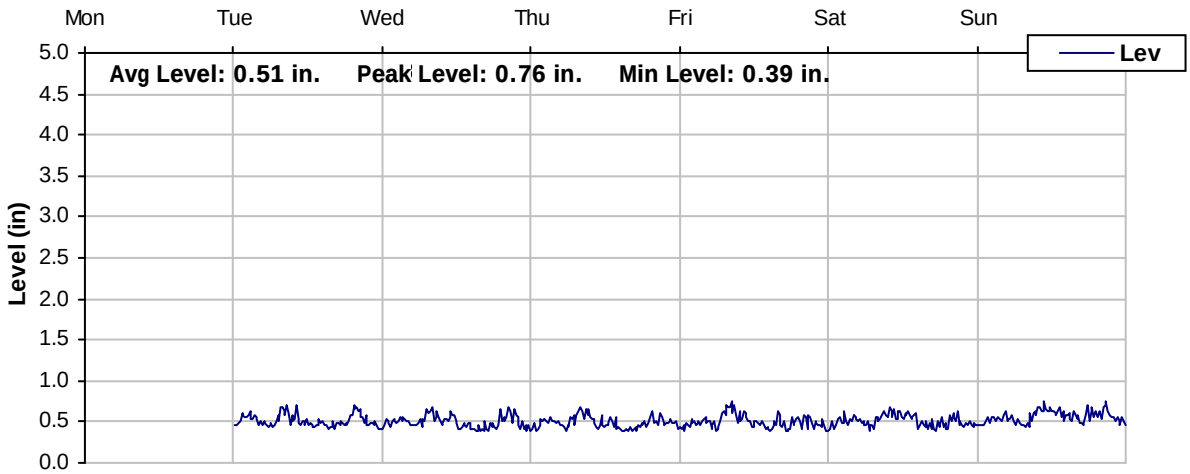


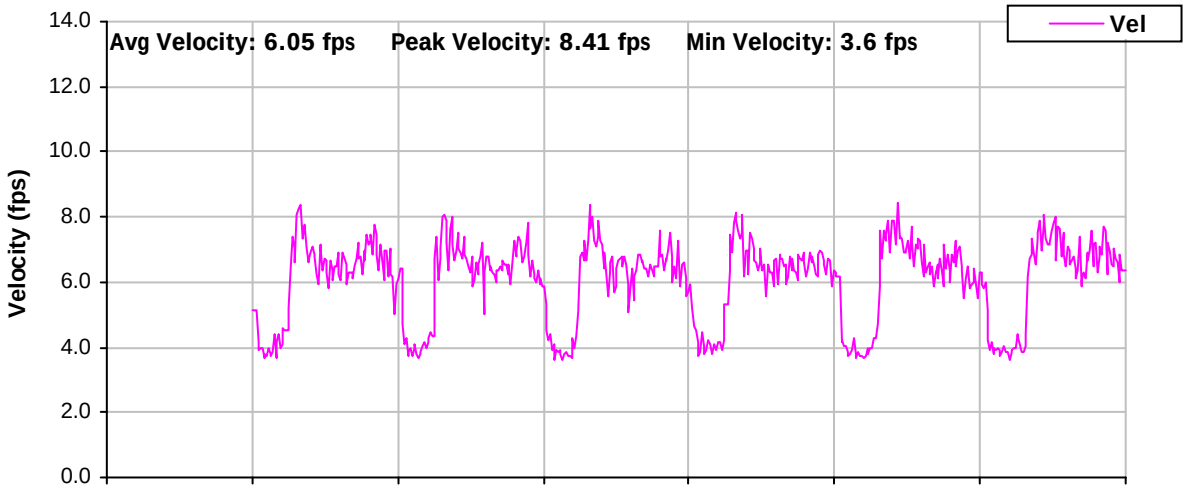
Level, Velocity and Flow

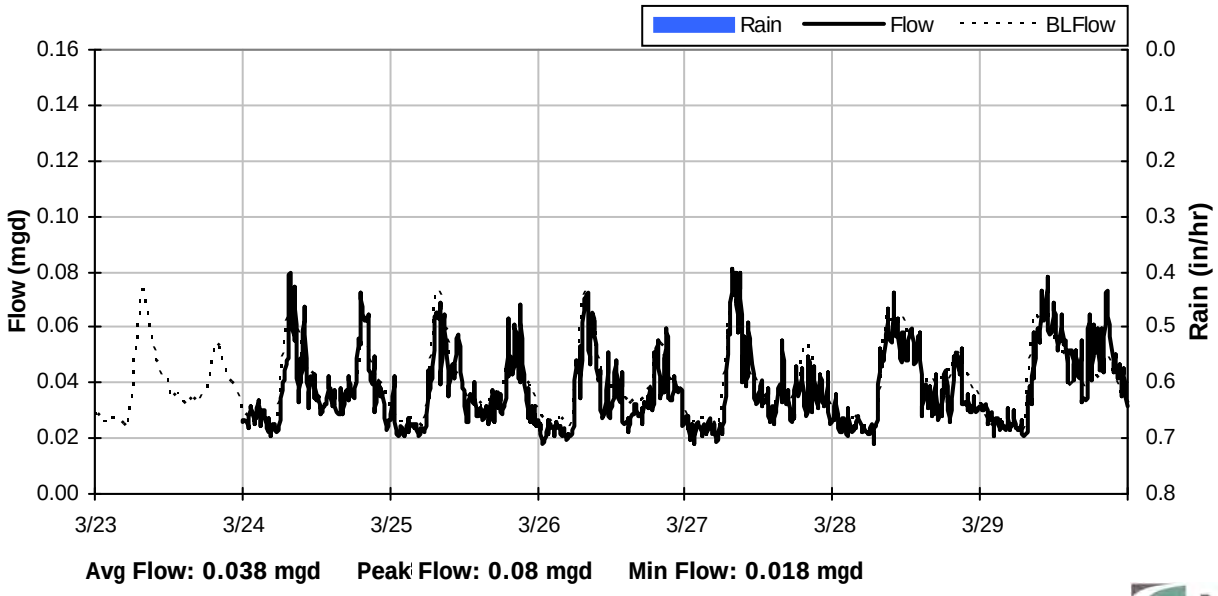
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 29







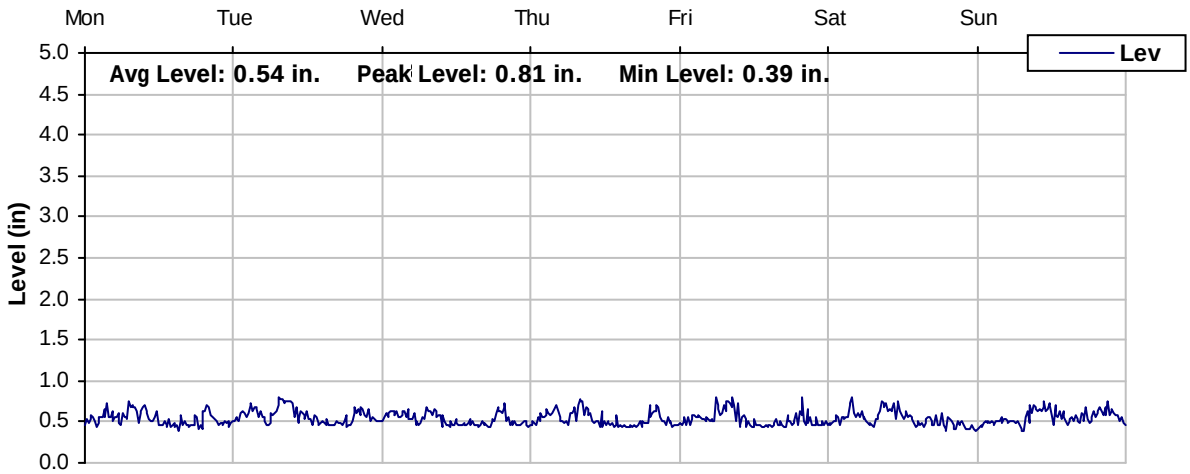
Avg Flow: 0.038 mgd **Peak Flow: 0.08 mgd** **Min Flow: 0.018 mgd**

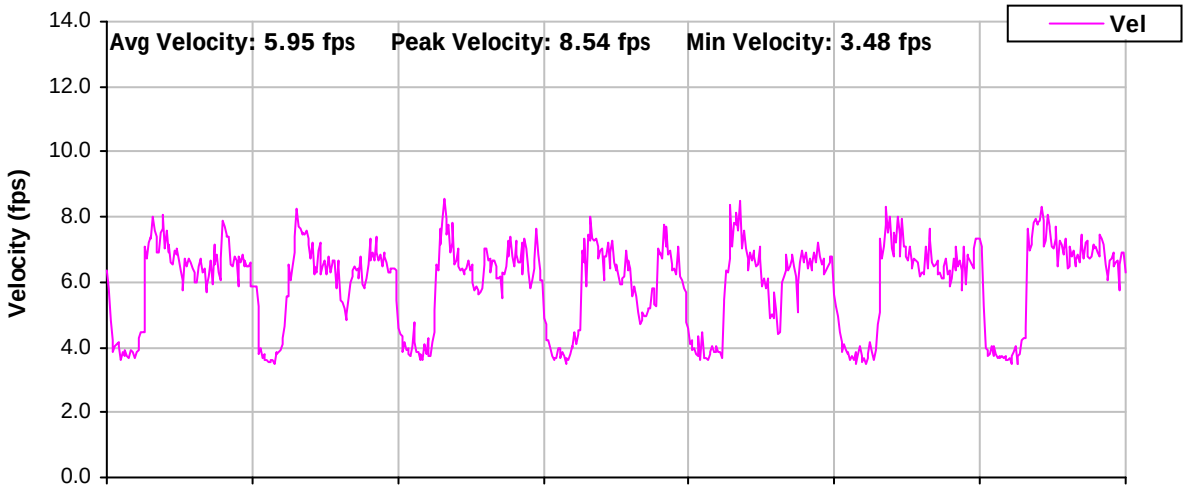
Level, Velocity and Flow

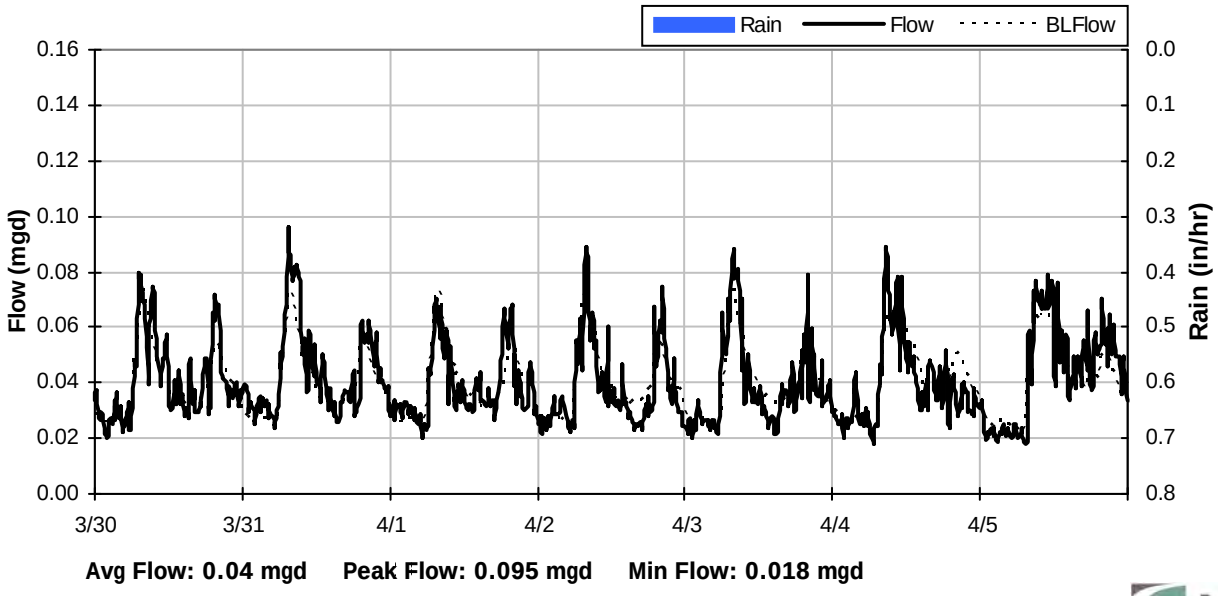
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 29







Avg Flow: 0.04 mgd **Peak Flow: 0.095 mgd** **Min Flow: 0.018 mgd**

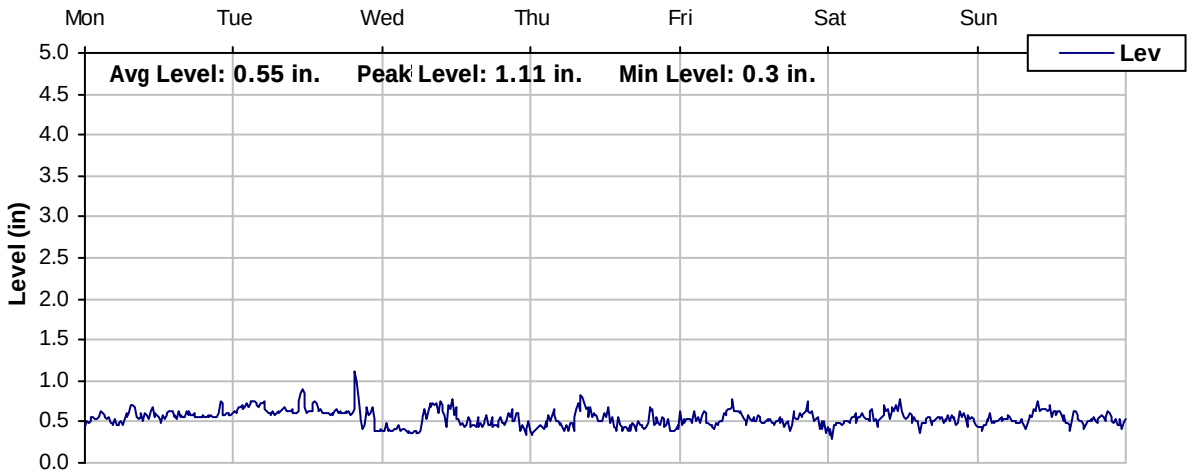
V&A

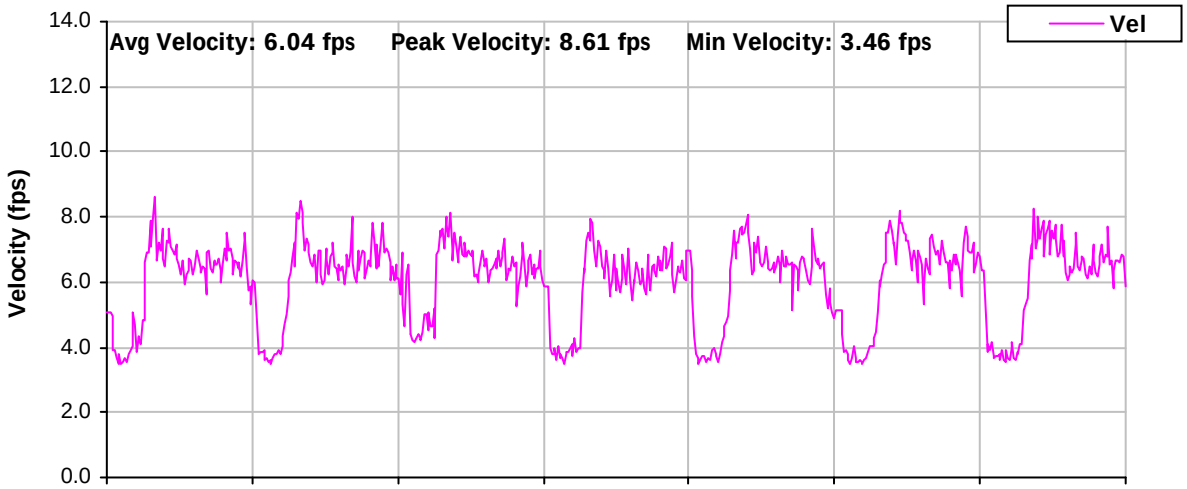
Level, Velocity and Flow

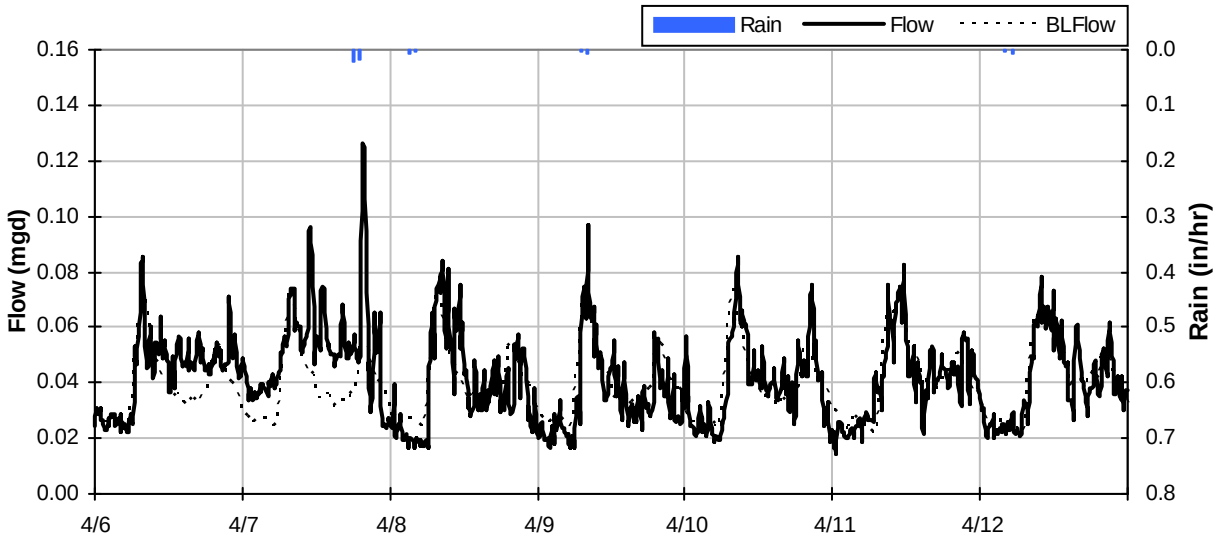
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 29







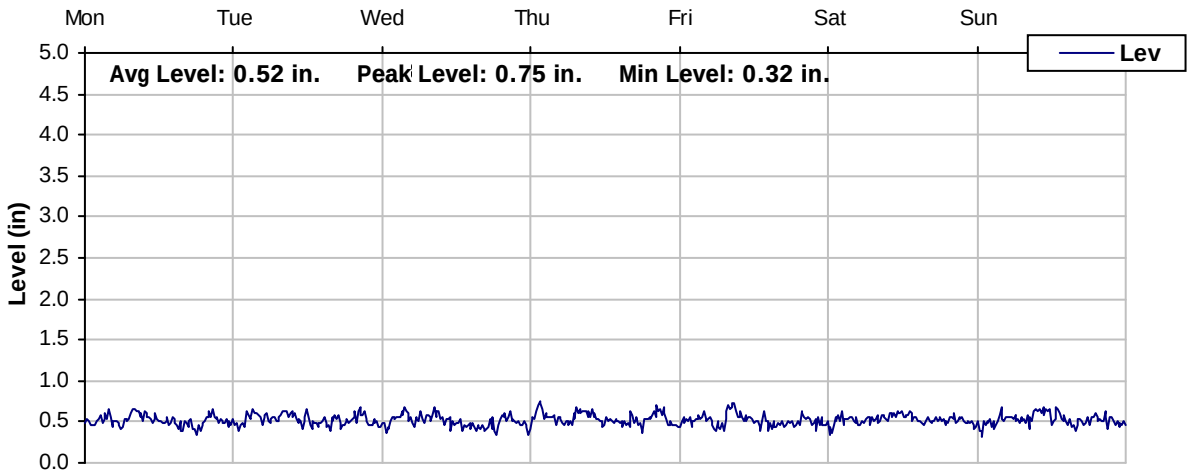
Avg Flow: 0.042 mgd **Peak Flow: 0.127 mgd** **Min Flow: 0.014 mgd**

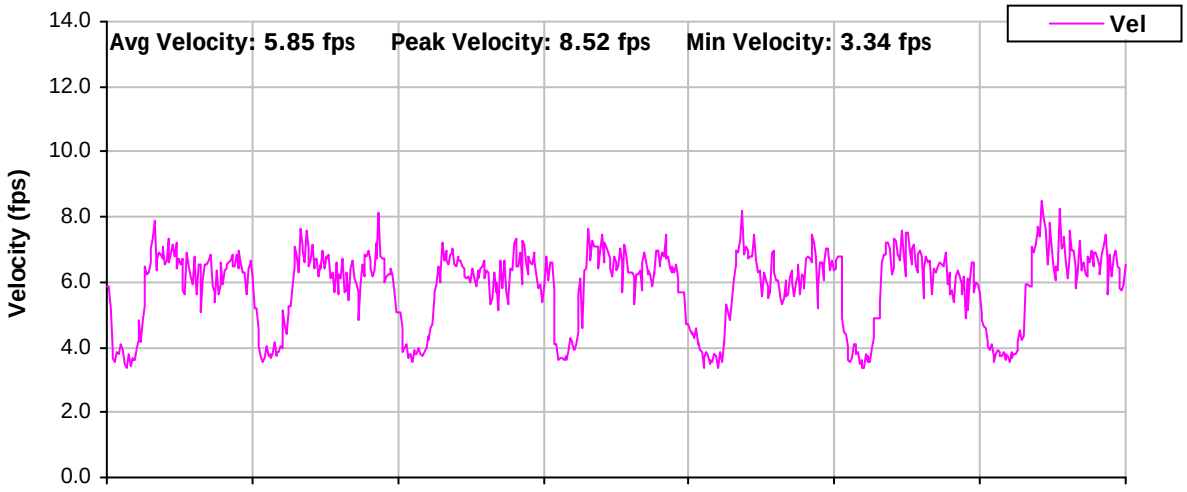
Level, Velocity and Flow

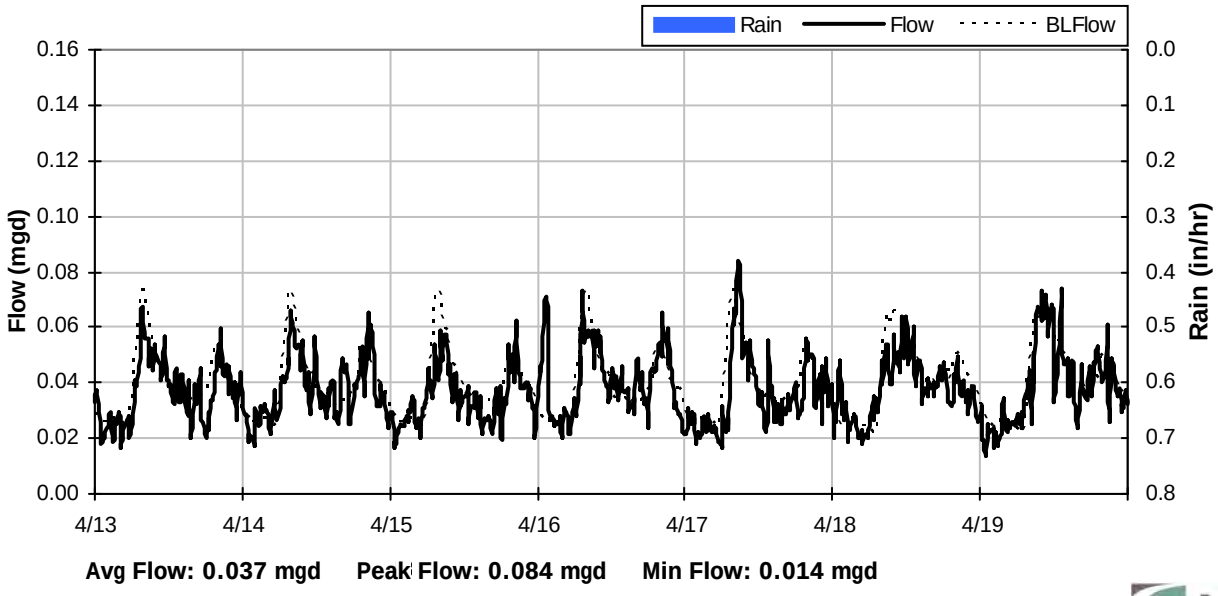
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 29







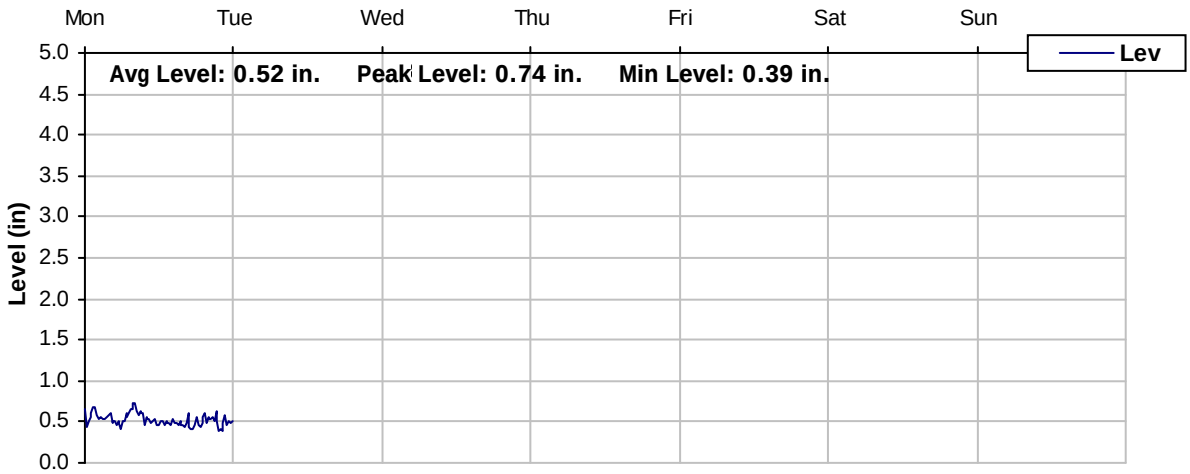
Avg Flow: 0.037 mgd **Peak Flow: 0.084 mgd** **Min Flow: 0.014 mgd**

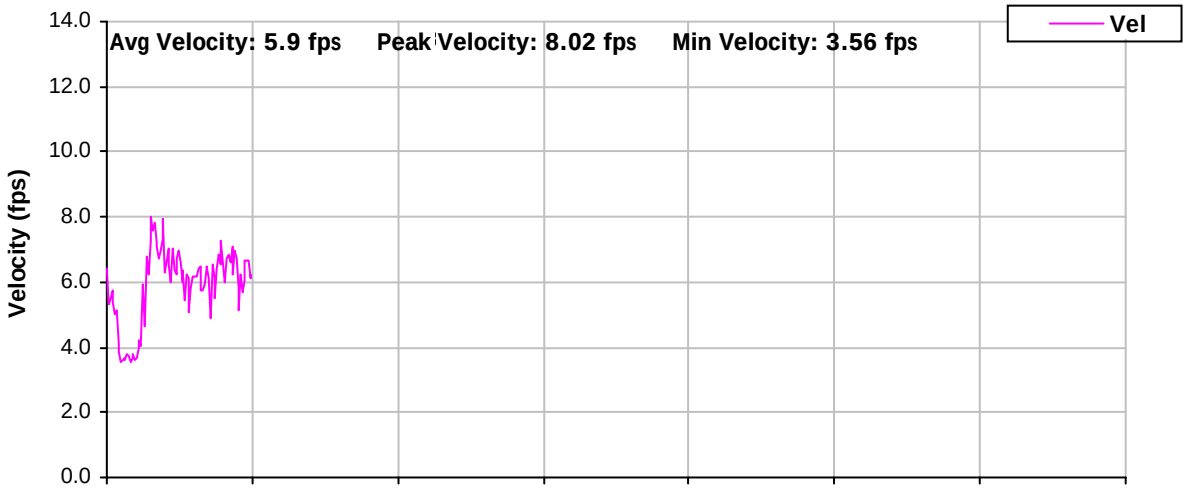
Level, Velocity and Flow

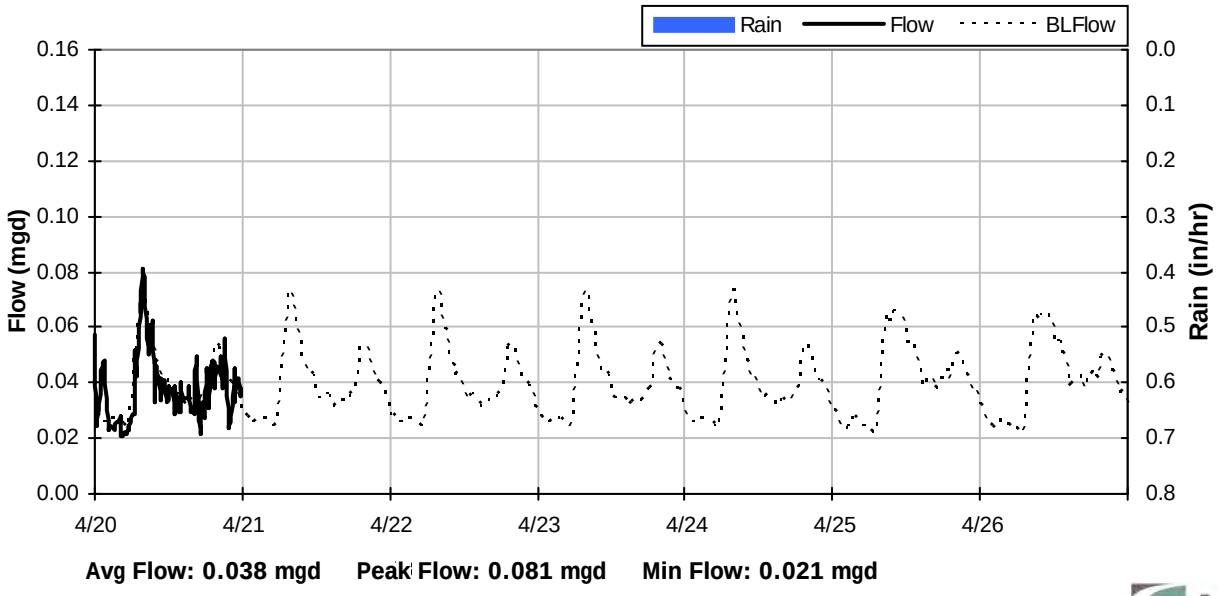
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 29







Avg Flow: 0.038 mgd **Peak Flow: 0.081 mgd** **Min Flow: 0.021 mgd**

Temporary Flow Monitoring Study

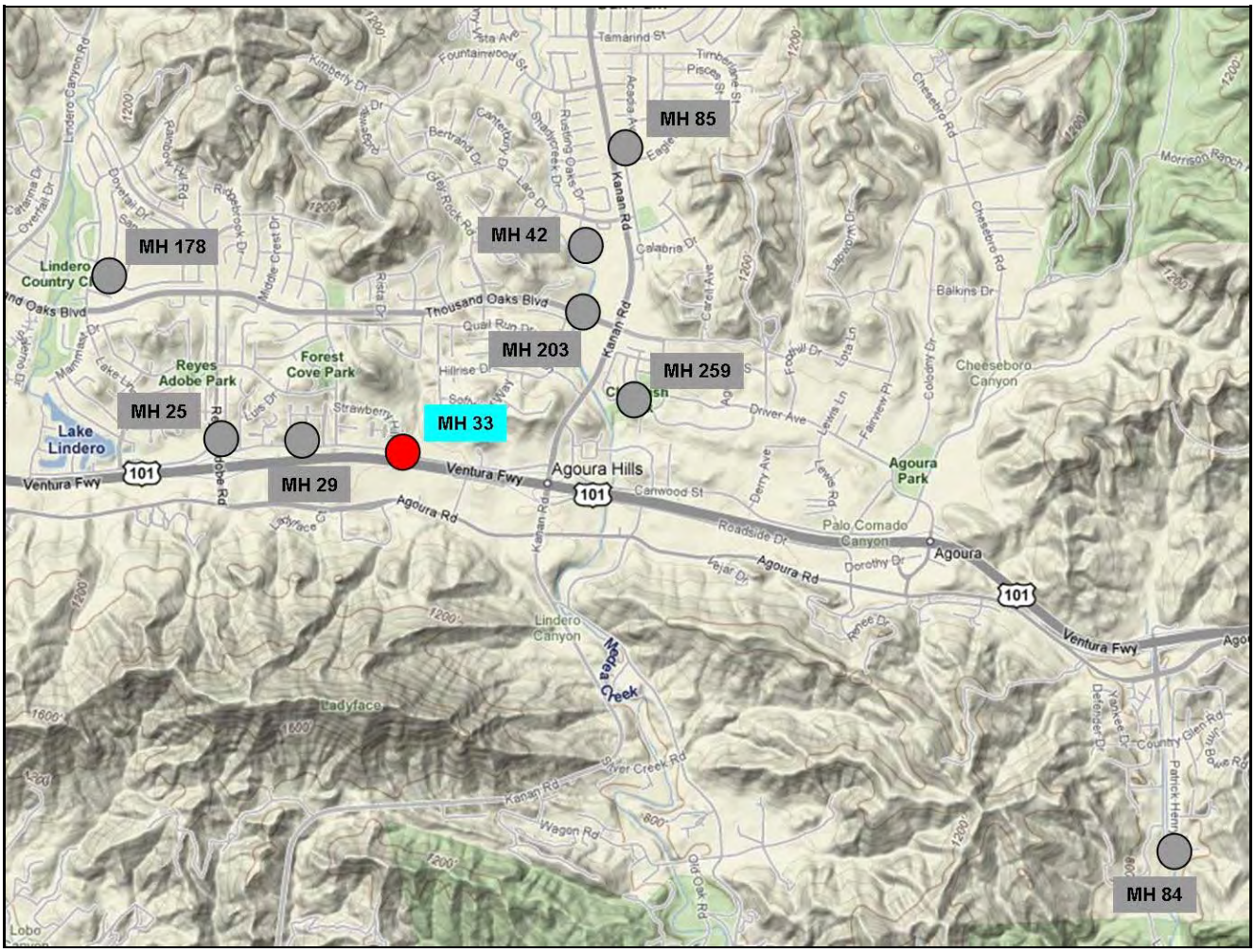
Sanitary Sewer Collection System

Monitoring Site: MH 33

Location: Canwwod Street, east of Strawberry Hill Drive

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 33

Location: Canwwod Street, east of Strawberry Hill Drive

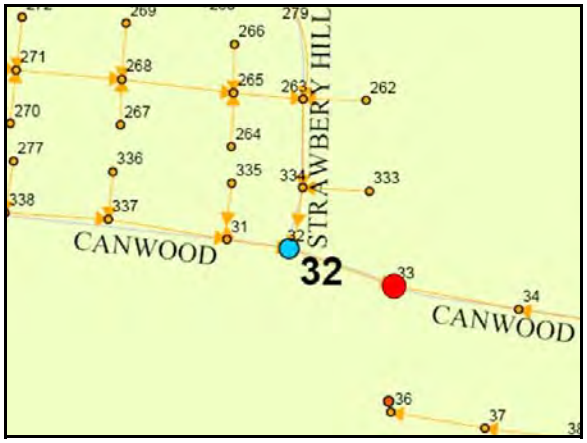
Diameter: 8 inches

Average Dry Weather Flow: 0.09 *mgd*

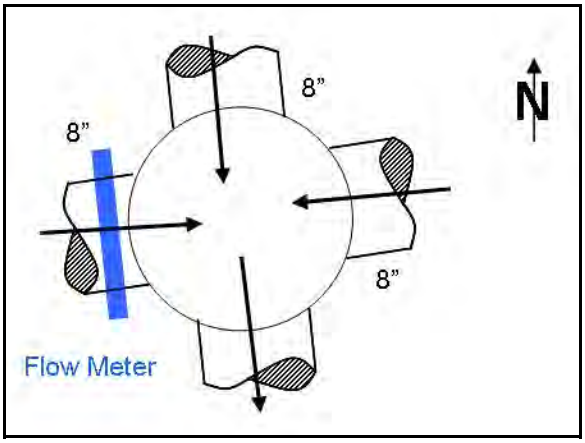
Peak Measured Flow: 0.24 *mgd*

Satellite Map

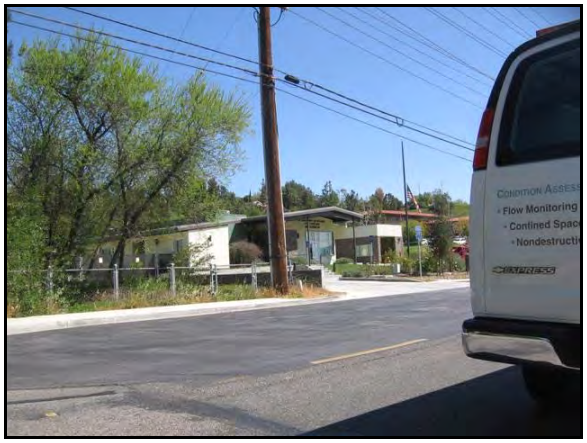
Sanitary Map



Flow Sketch



Street View Photo



Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 33

Manhole Lid

East Inlet

	Site Information Report Photos	**Monitoring Site:** MH 33

North Inlet

West Inlet

	Site Information Report Photos	**Monitoring Site:** MH 33

South Outlet

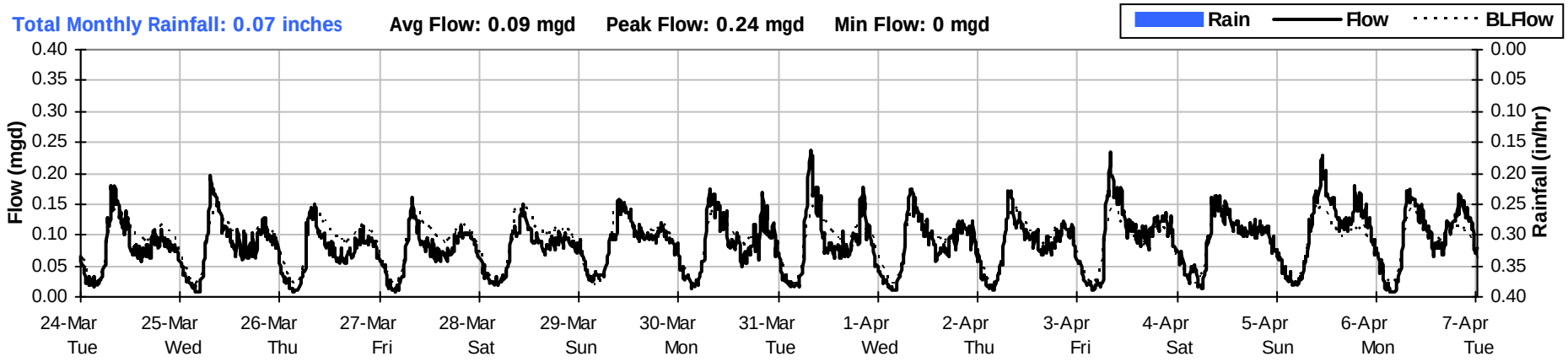
Period Flow Summary

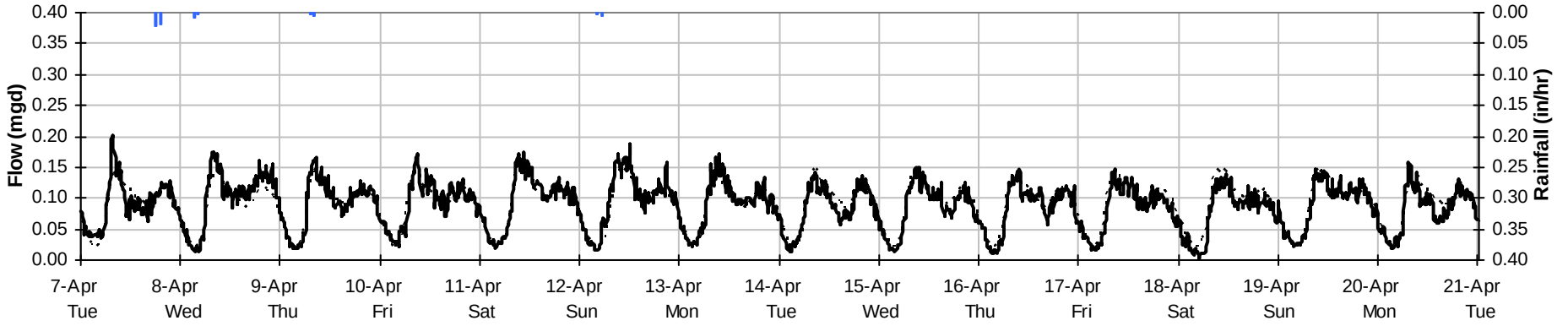
March 24, 2009 to April 21, 2009

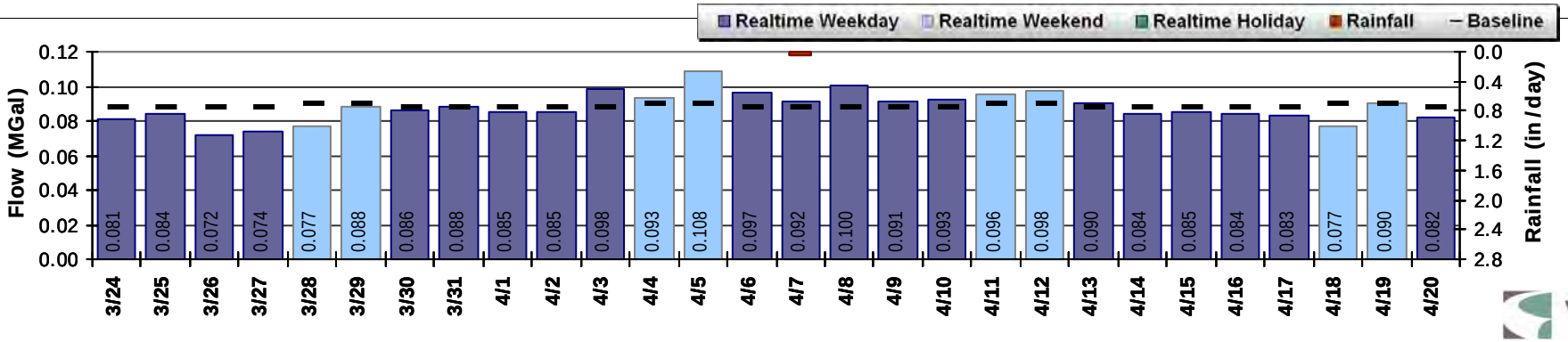
Monitoring Site:

MH 33

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.09 mgd** **Peak Flow: 0.24 mgd** **Min Flow: 0 mgd**

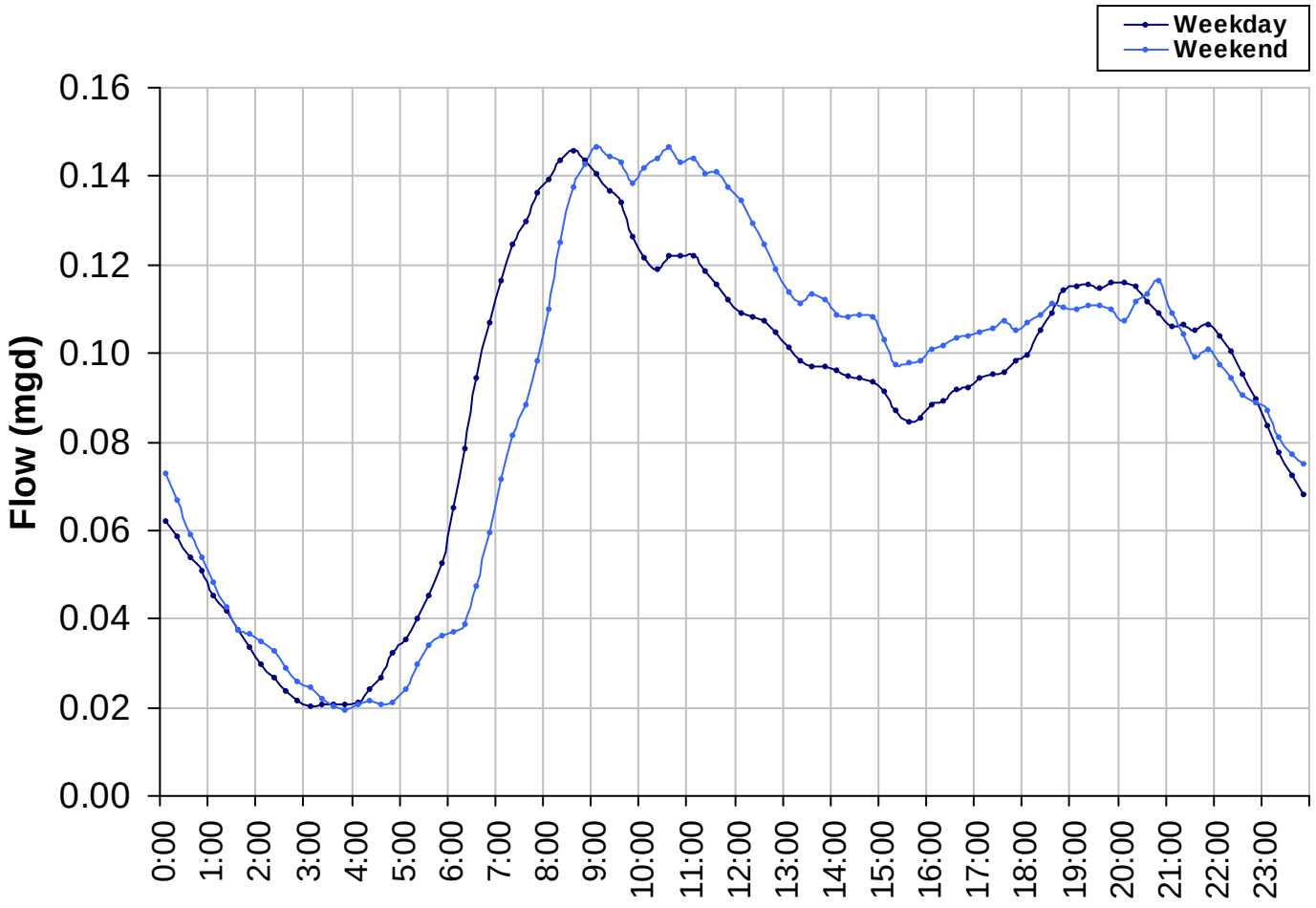






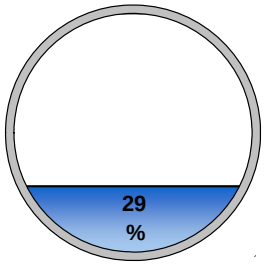
Average Dry Weather Flow

Monitoring Site:
MH 33



Peak Measured Flow:

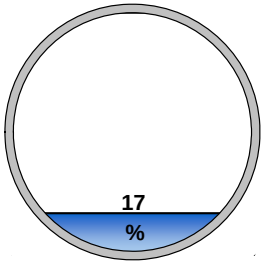
0.24 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.09 *mgd*

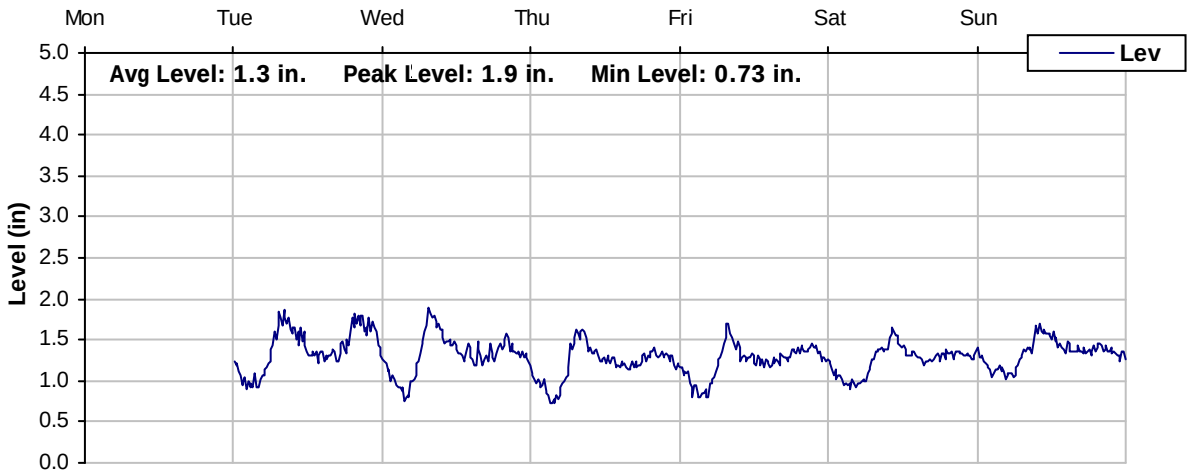


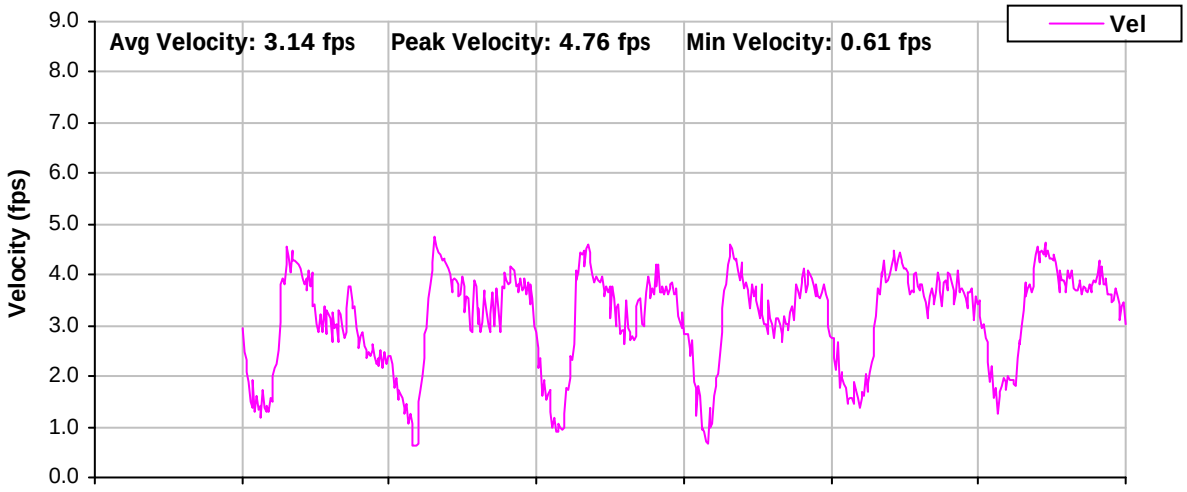
Level, Velocity and Flow

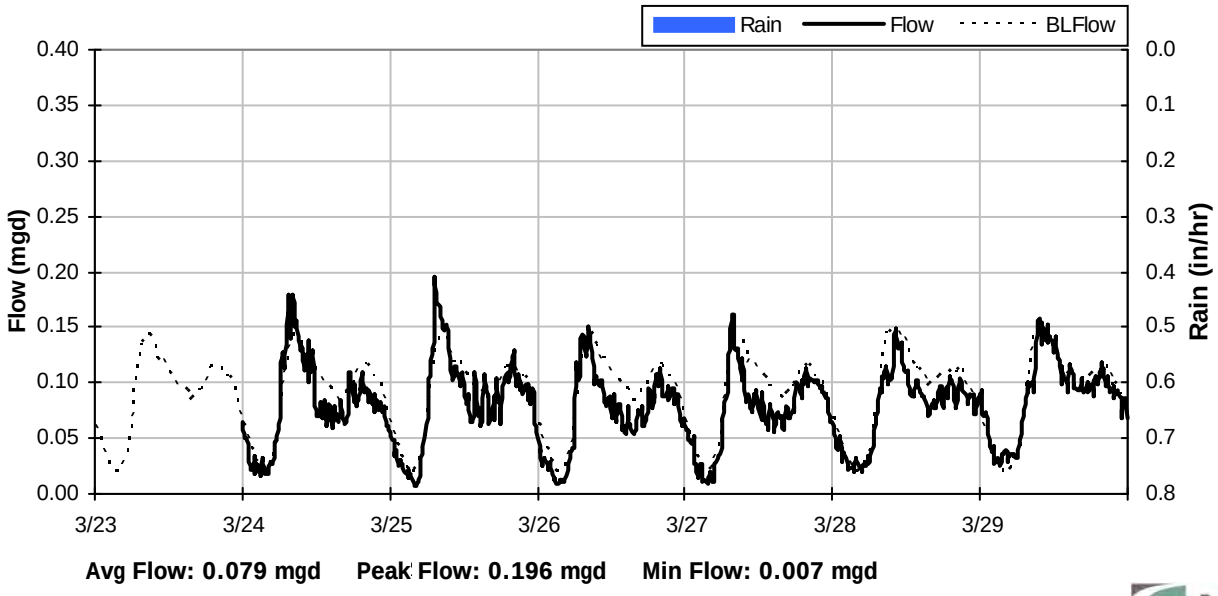
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 33







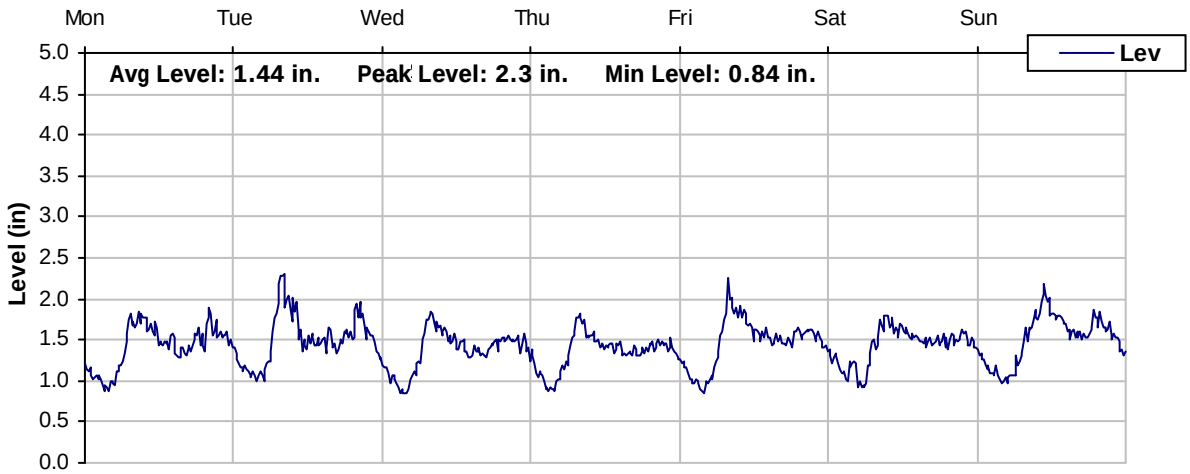
Avg Flow: 0.079 mgd **Peak Flow: 0.196 mgd** **Min Flow: 0.007 mgd**

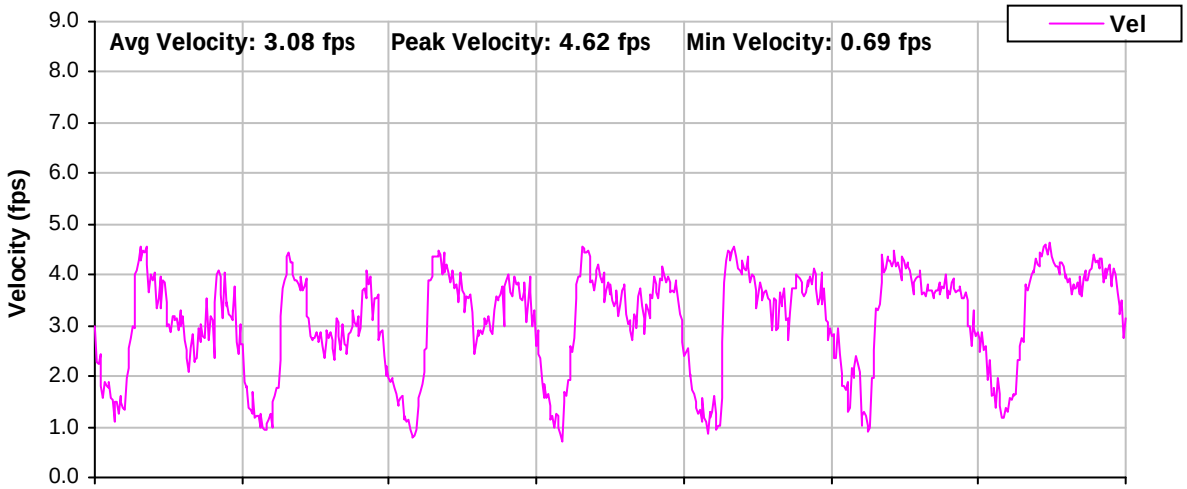
Level, Velocity and Flow

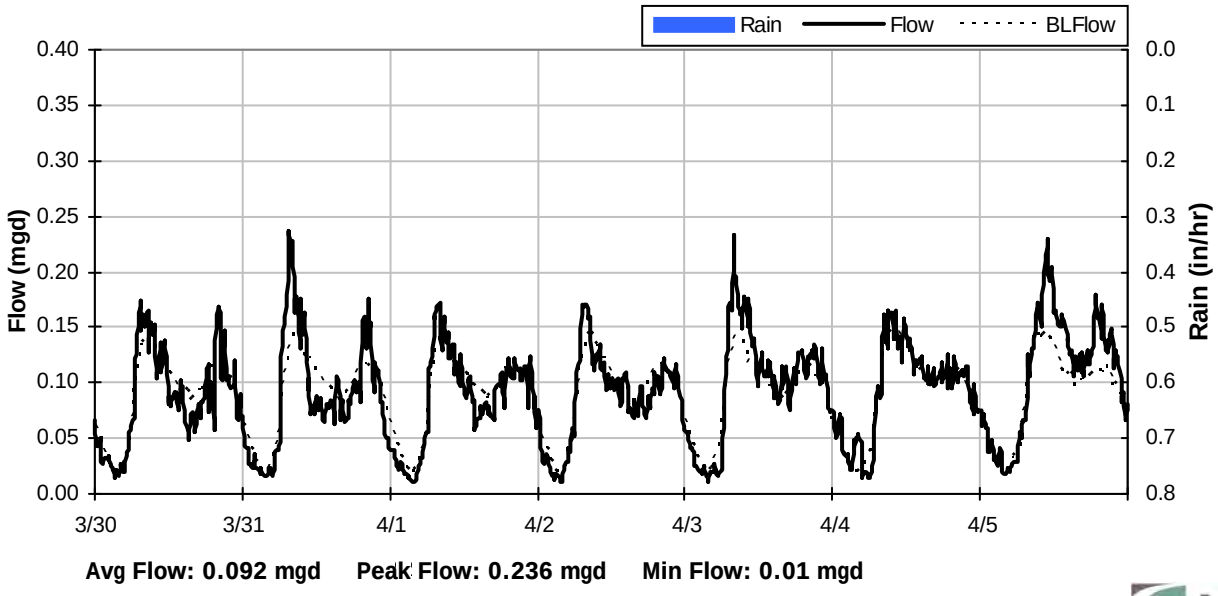
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 33







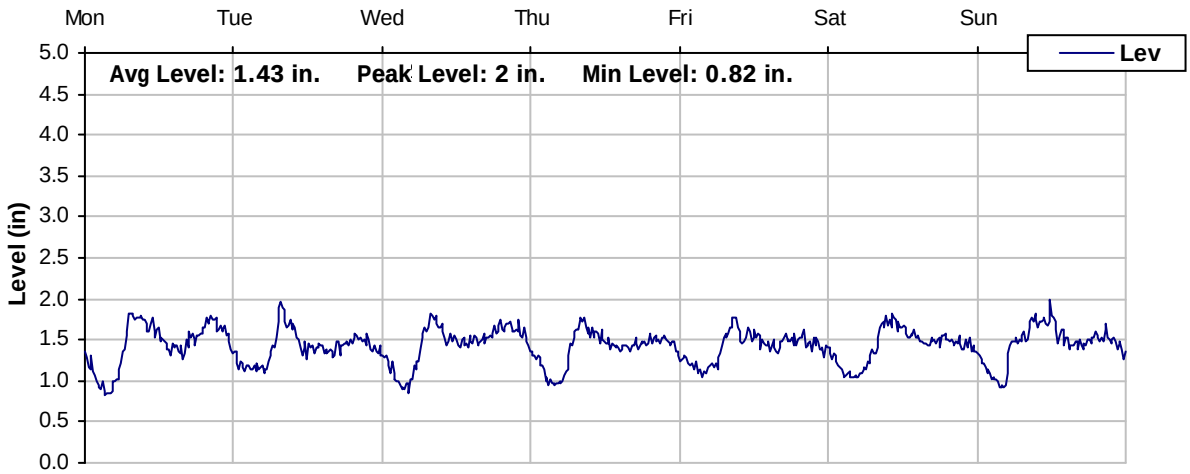
Avg Flow: 0.092 mgd **Peak Flow: 0.236 mgd** **Min Flow: 0.01 mgd**

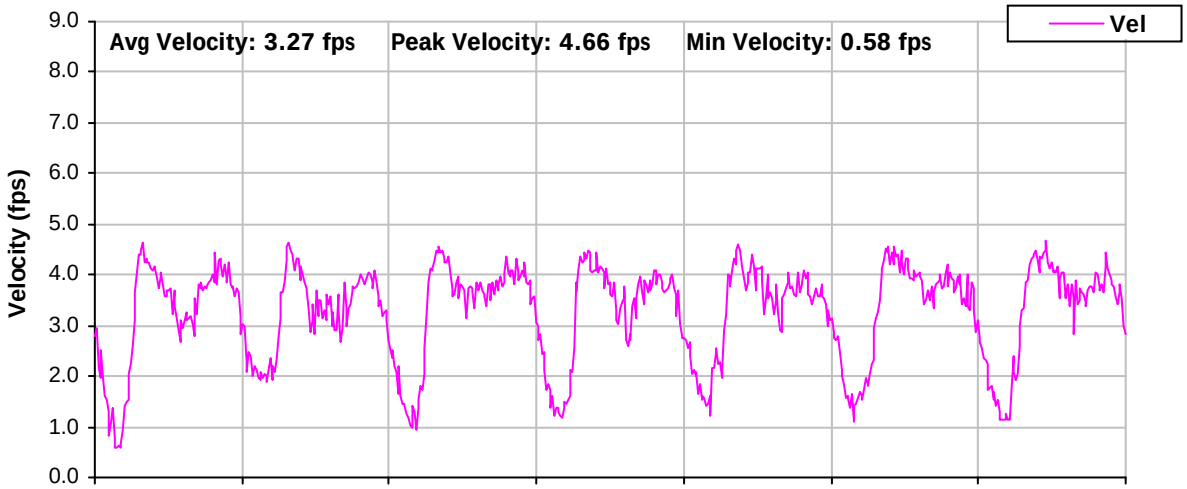
Level, Velocity and Flow

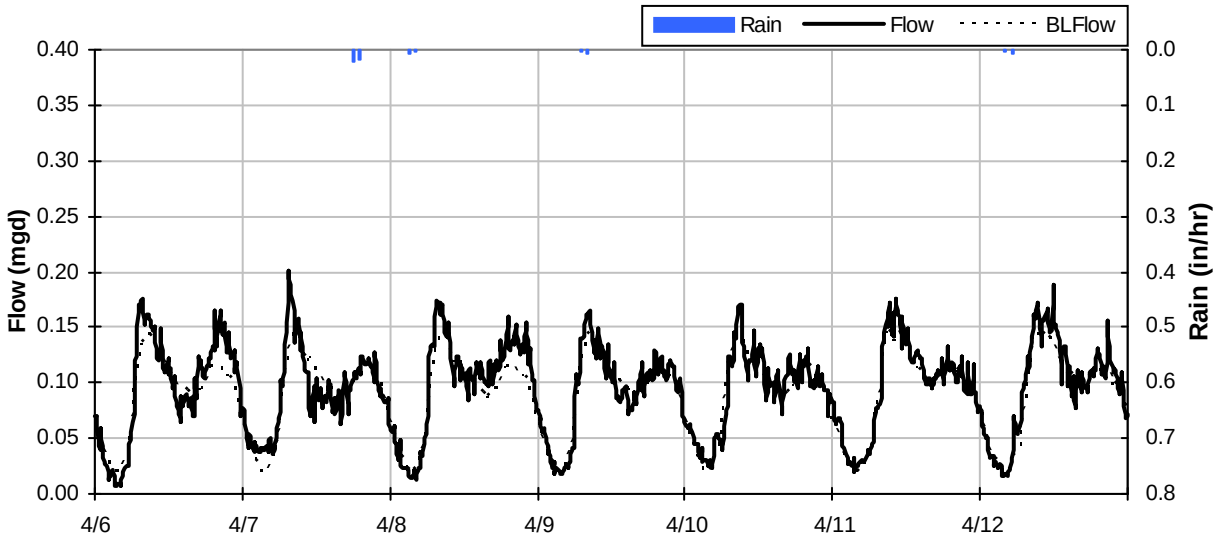
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 33







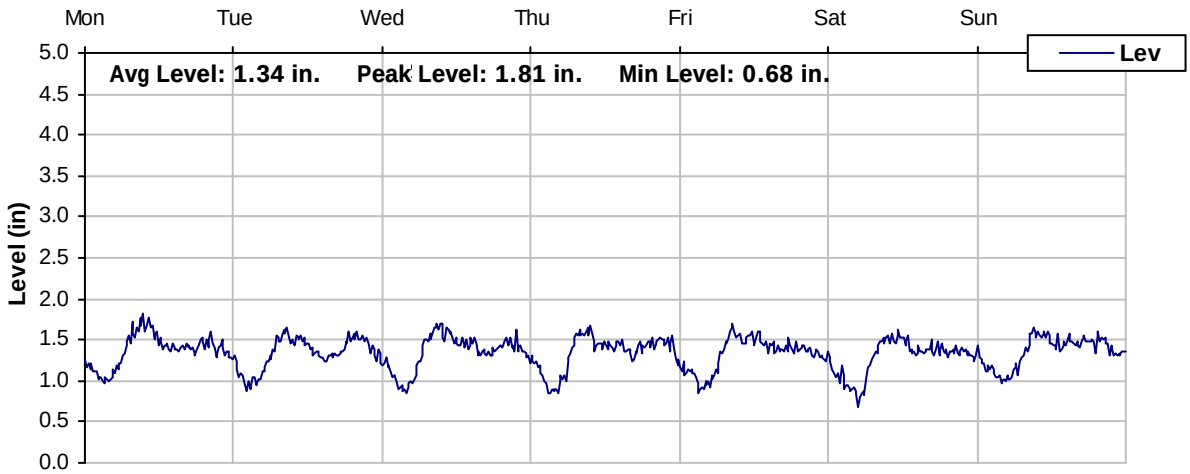
Avg Flow: 0.095 mgd **Peak Flow: 0.201 mgd** **Min Flow: 0.007 mgd**

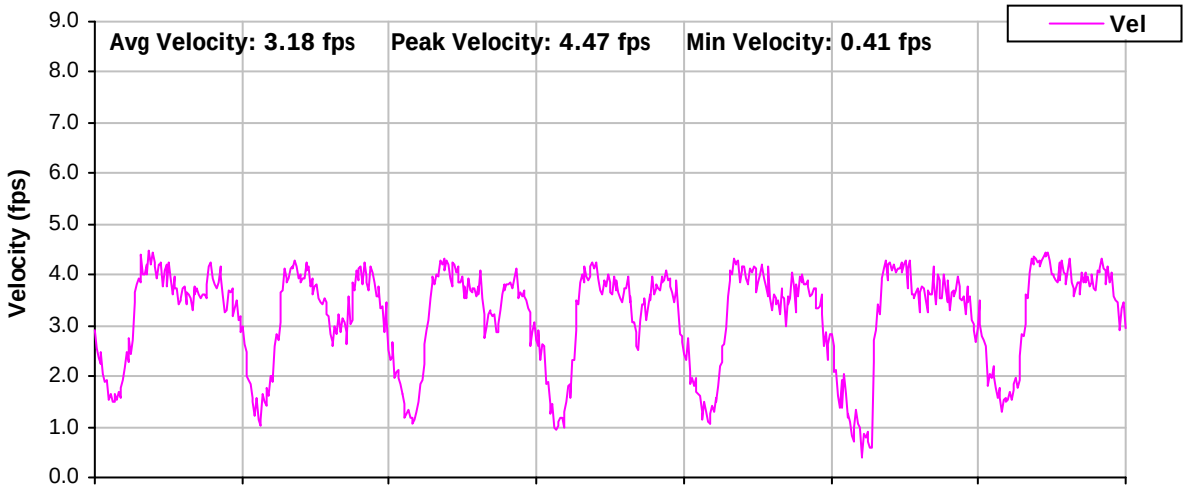
Level, Velocity and Flow

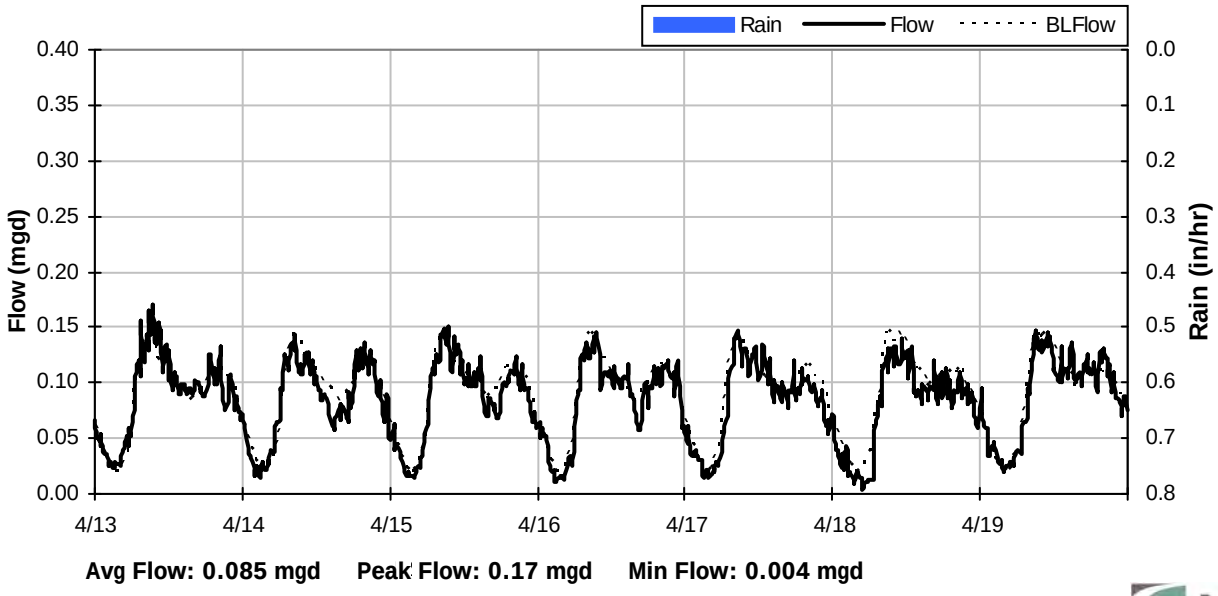
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 33







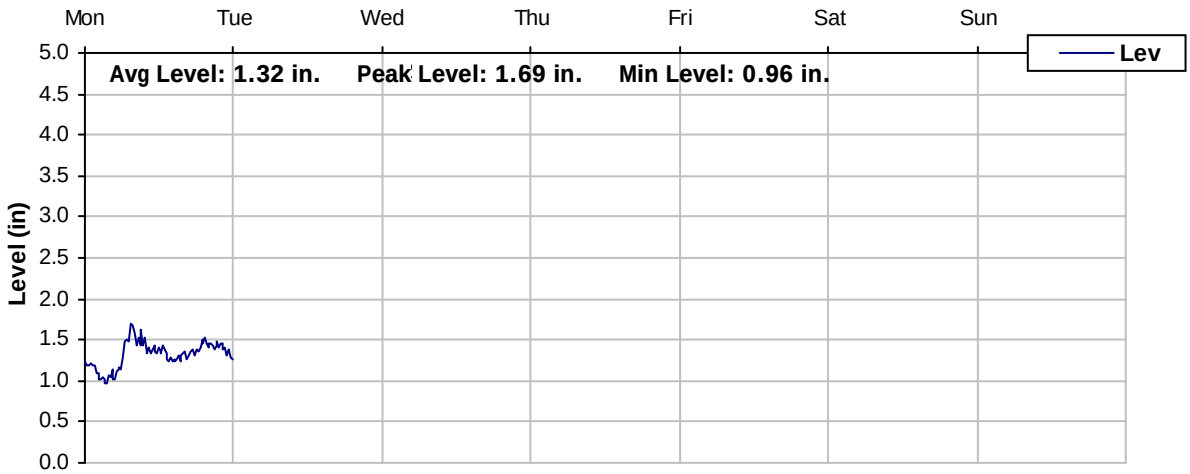
Avg Flow: 0.085 mgd **Peak Flow: 0.17 mgd** **Min Flow: 0.004 mgd**

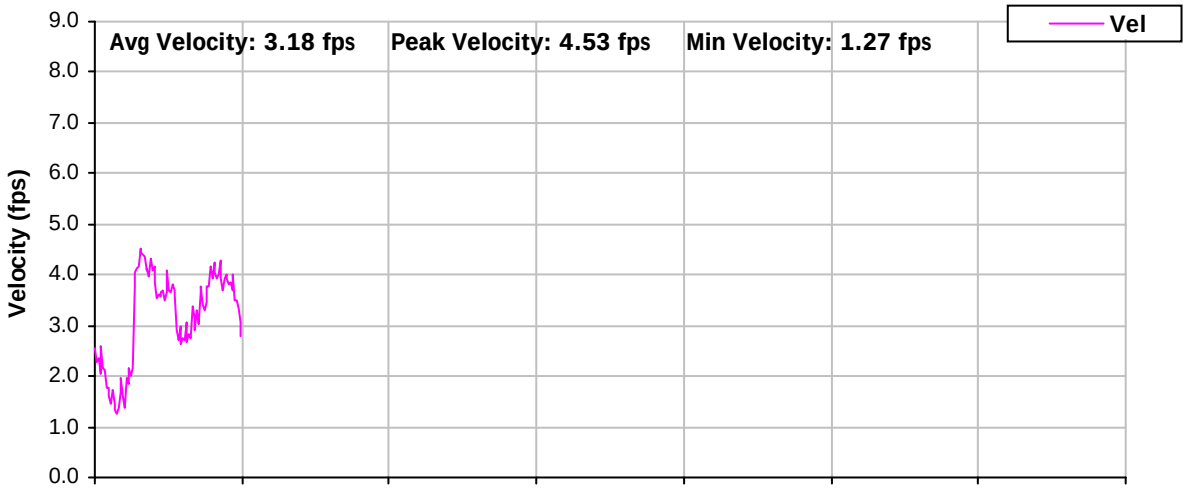
Level, Velocity and Flow

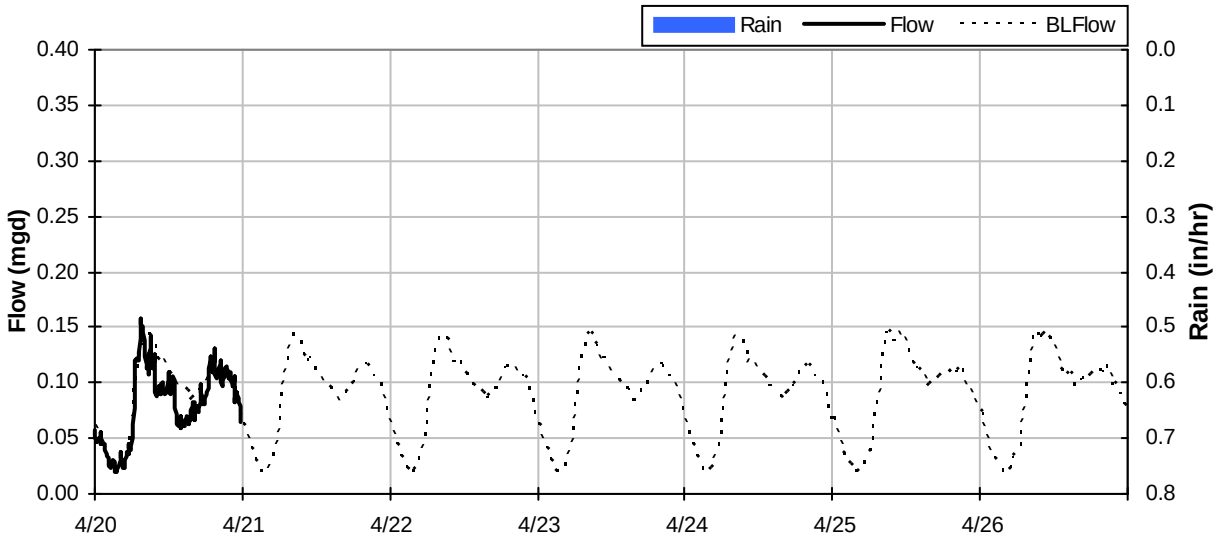
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 33







Avg Flow: 0.082 mgd **Peak Flow: 0.157 mgd** **Min Flow: 0.02 mgd**

Temporary Flow Monitoring Study

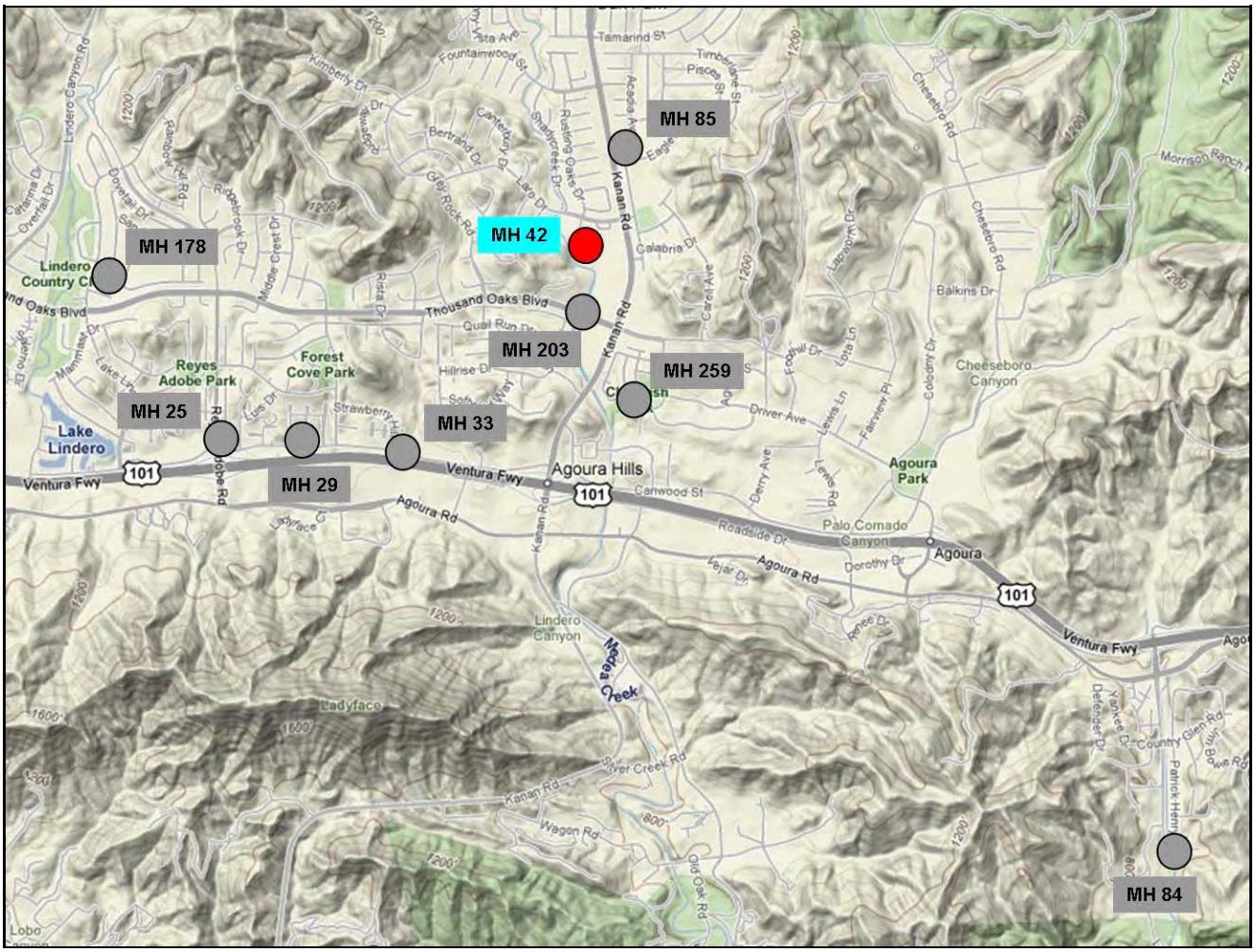
Sanitary Sewer Collection System

Monitoring Site: MH 42

Location: Rustling Oaks Drive, south of Laro Drive

Size / Type Line: 12-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 42

Location: Rustling Oaks Drive, south of Laro Drive

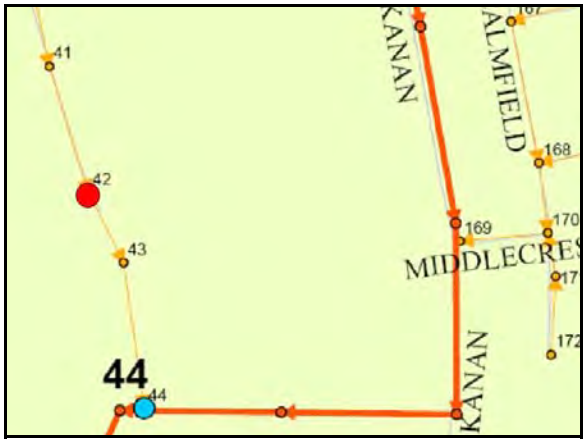
Diameter: 12 inches

Average Dry Weather Flow: 0.18 *mgd*

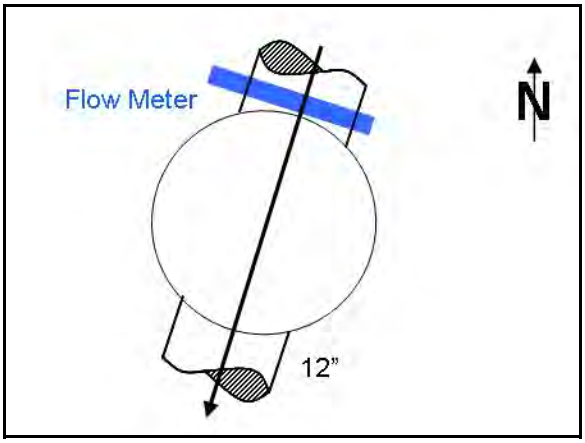
Peak Measured Flow: 0.41 *mgd*

Satellite Map

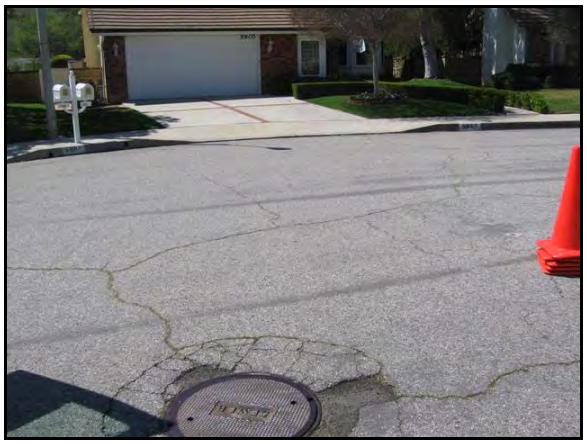
Sanitary Map



Flow Sketch



Street View Photo



Plan View Photo

V&A

	Site Information Report Photos	**Monitoring Site:** MH 42

Manhole Lid

North Inlet

	Site Information Report Photos	**Monitoring Site:** MH 42

South Outlet

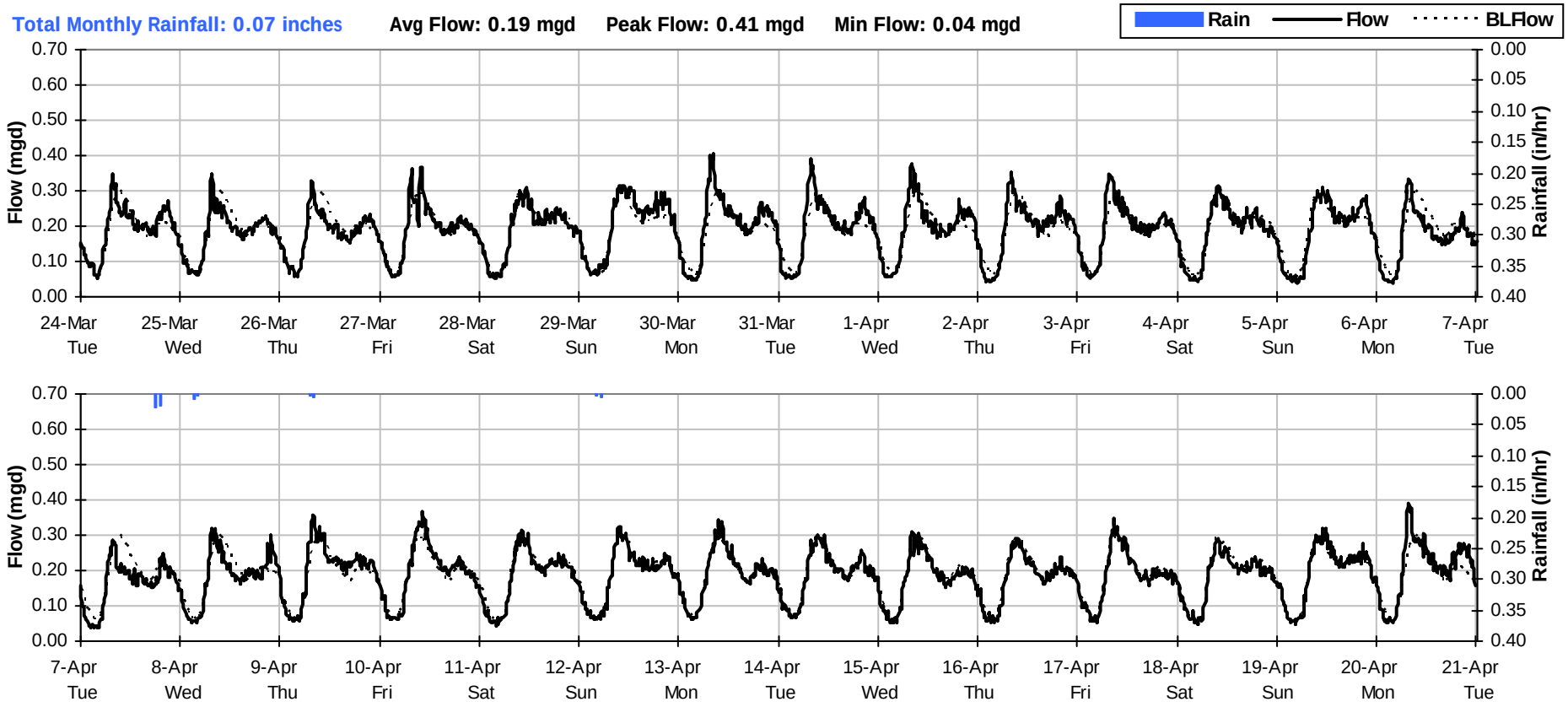
Period Flow Summary

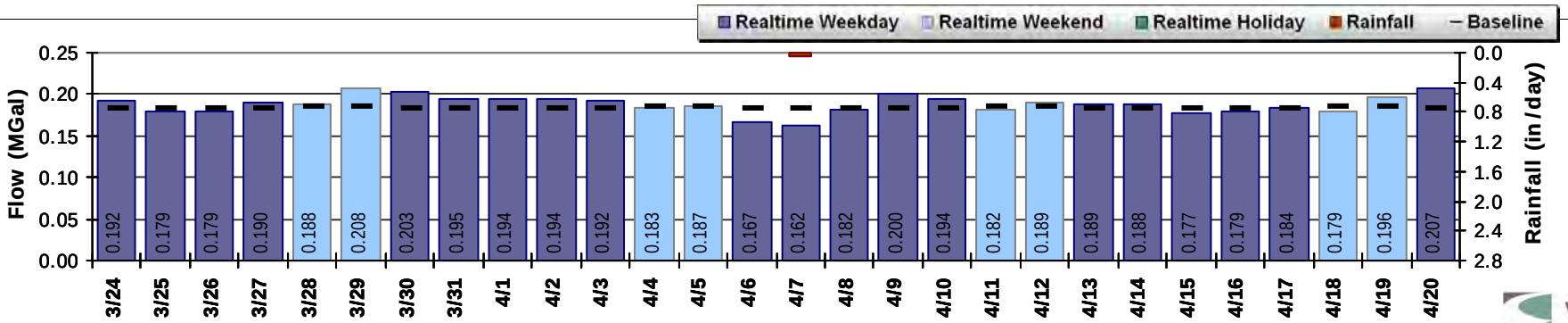
March 24, 2009 to April 21, 2009

Monitoring Site:

MH 42

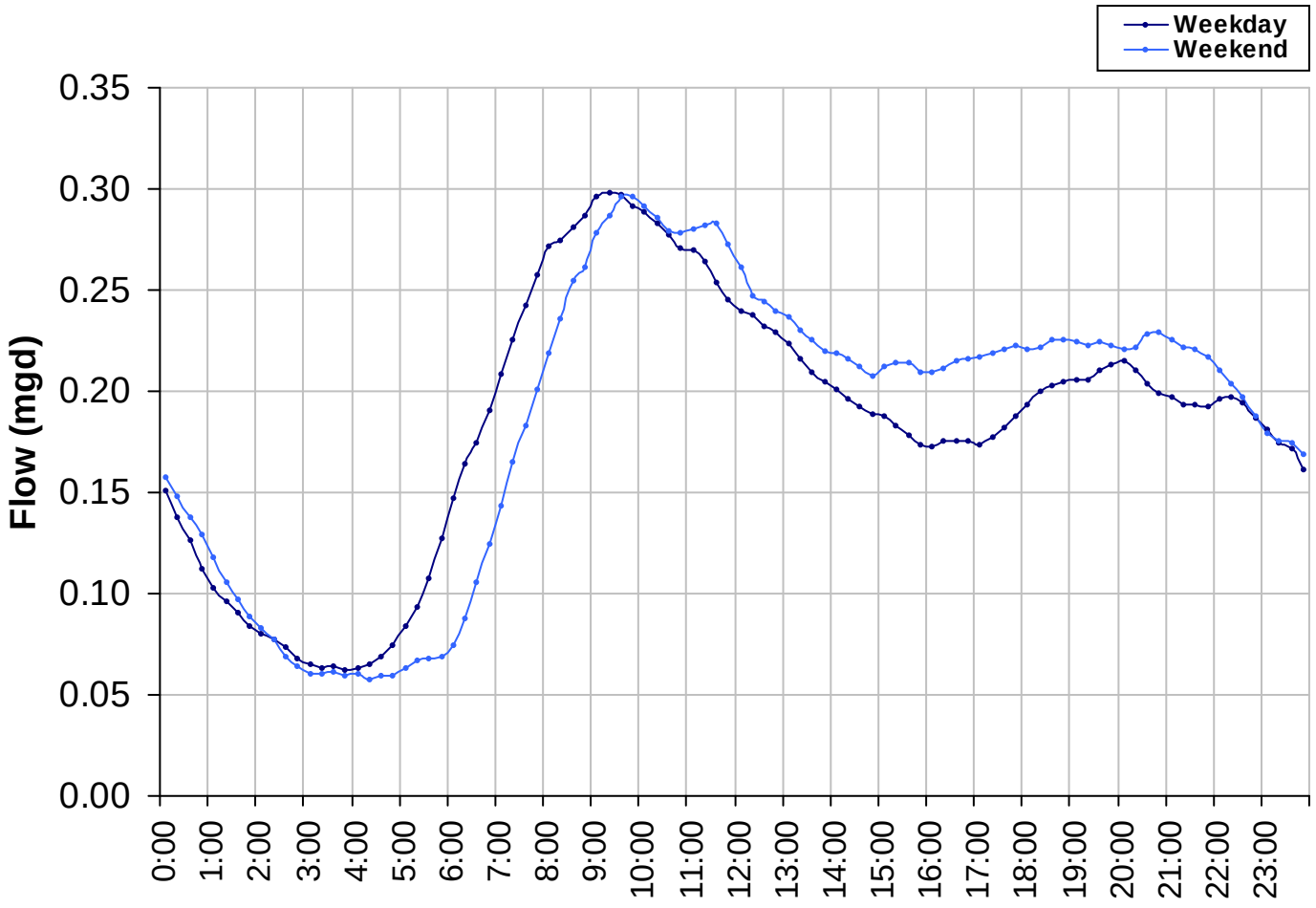
Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.19 mgd** **Peak Flow: 0.41 mgd** **Min Flow: 0.04 mgd**





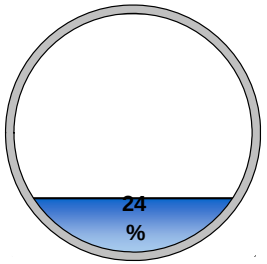
Average Dry Weather Flow

Monitoring Site:
MH 42



Peak Measured Flow:

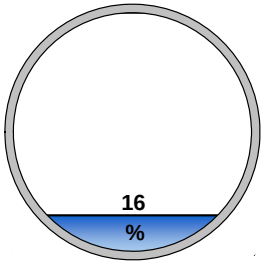
0.41 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.18 *mgd*

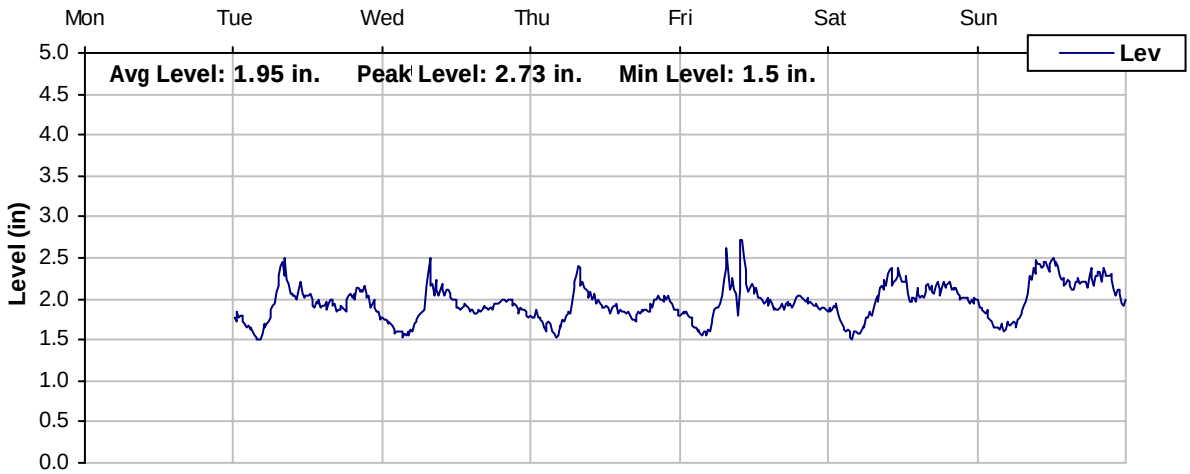


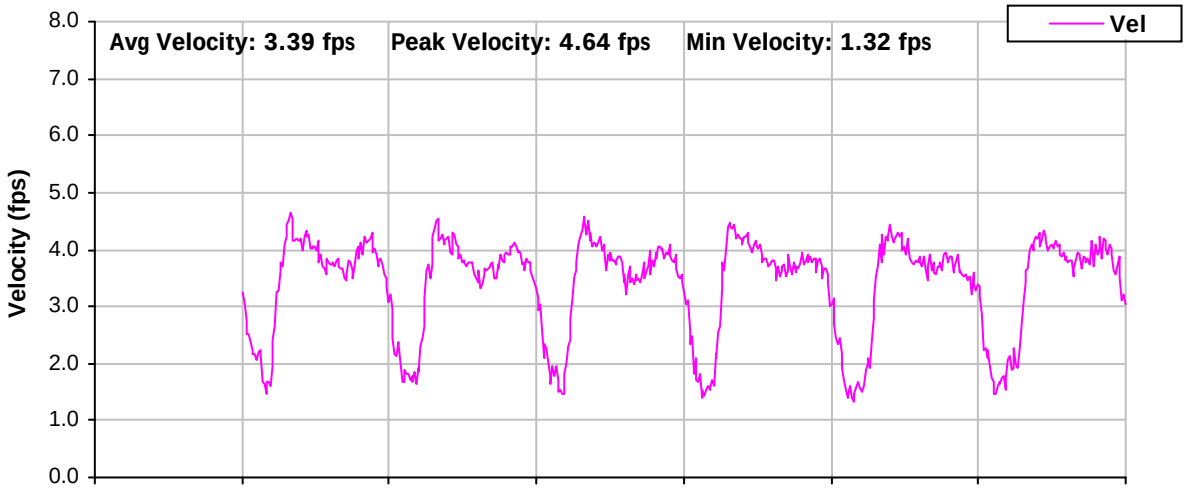
Level, Velocity and Flow

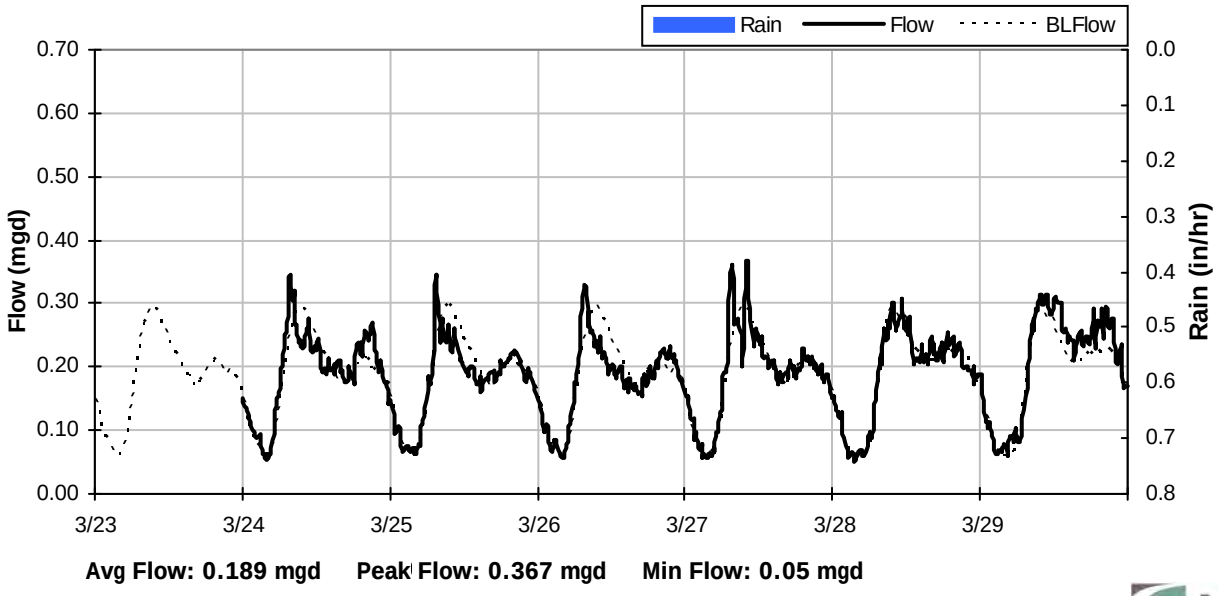
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 42







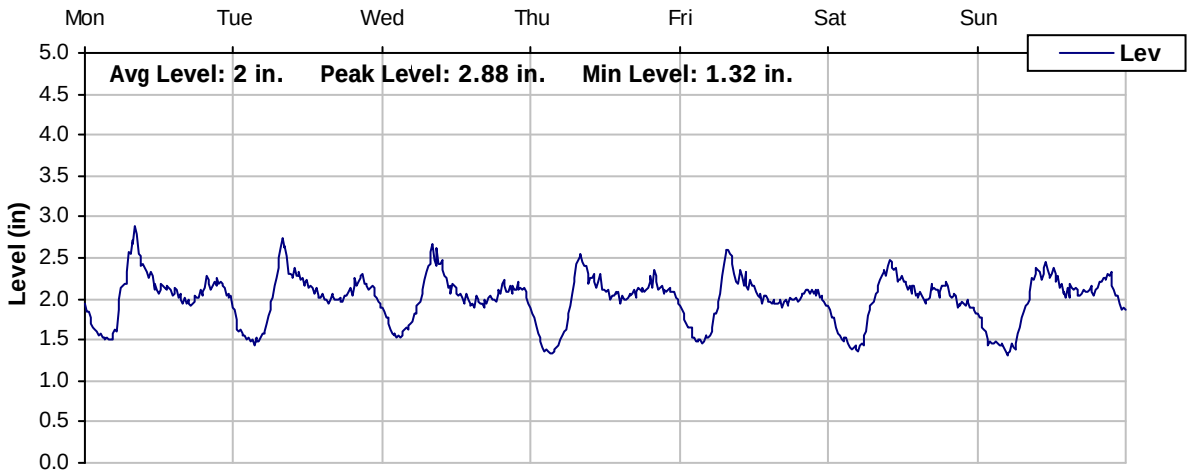
Avg Flow: 0.189 mgd **Peak Flow: 0.367 mgd** **Min Flow: 0.05 mgd**

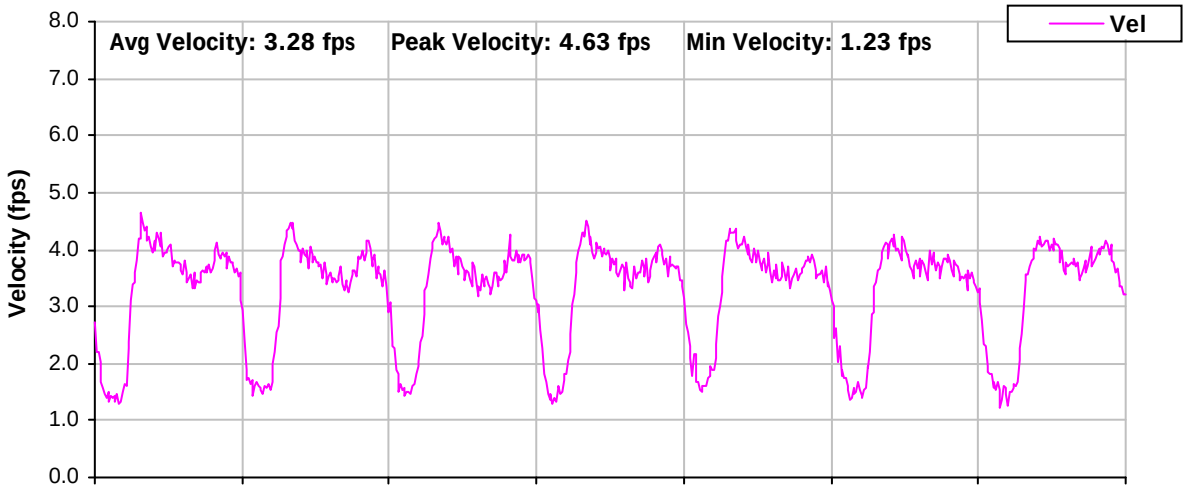
Level, Velocity and Flow

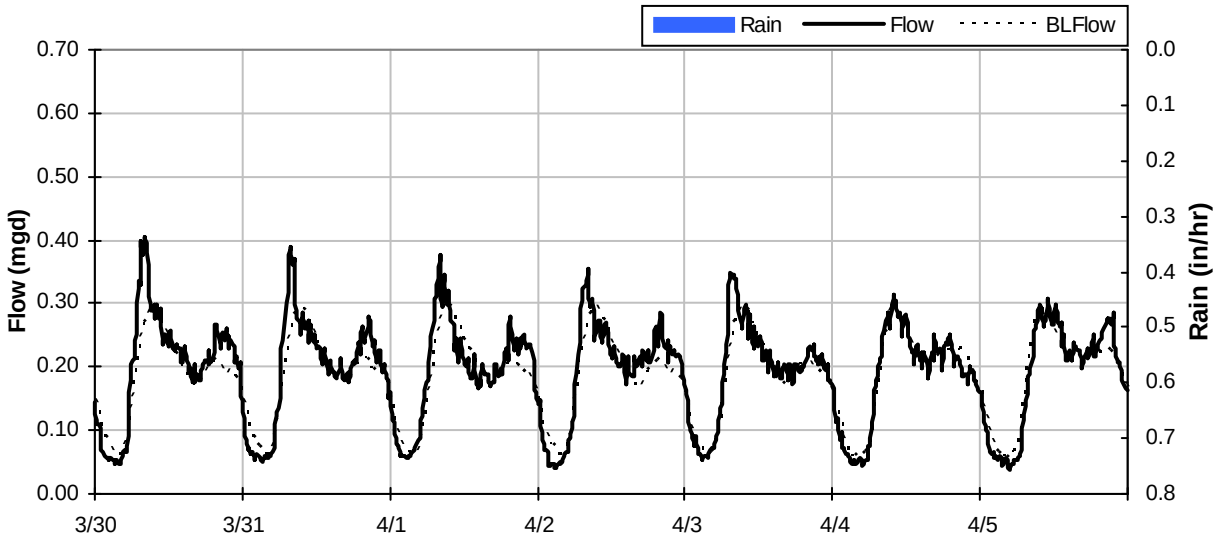
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 42







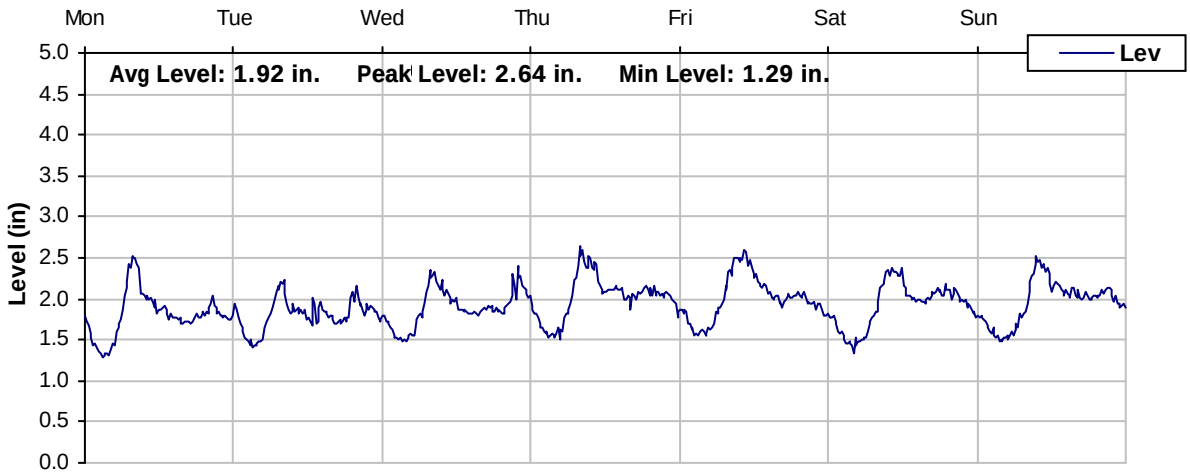
Avg Flow: 0.193 mgd **Peak Flow: 0.406 mgd** **Min Flow: 0.039 mgd**

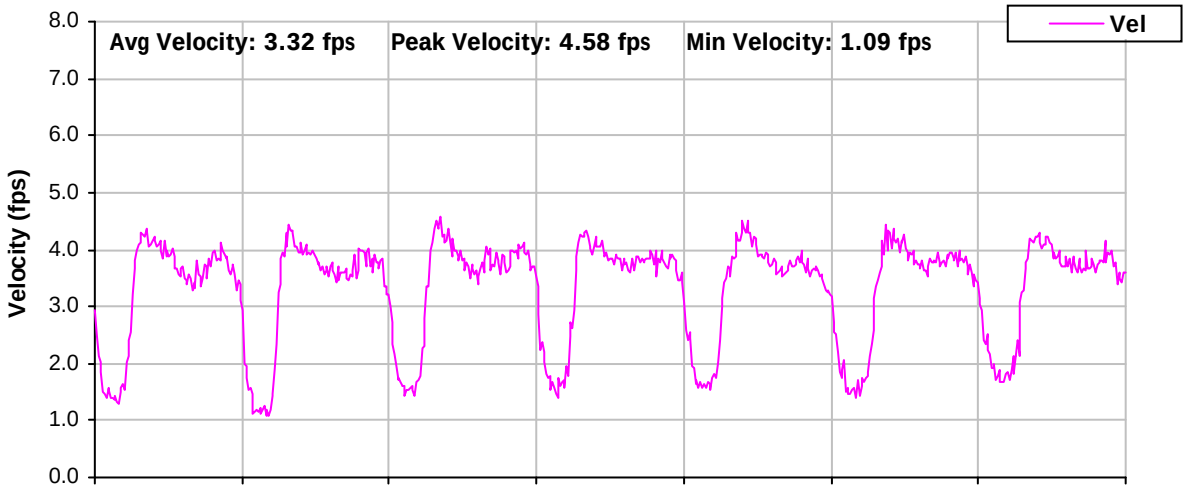
Level, Velocity and Flow

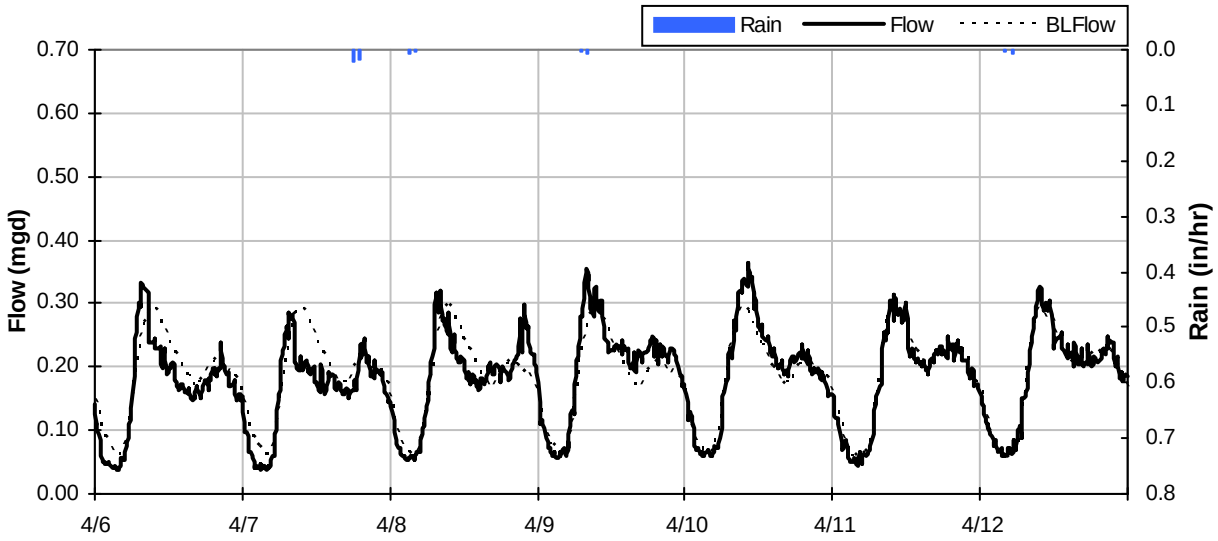
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 42







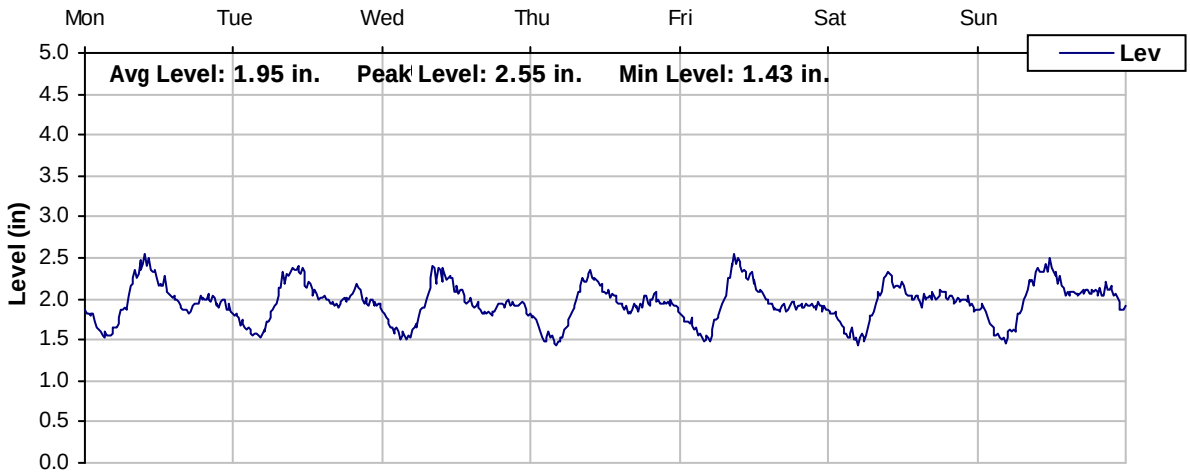
Avg Flow: 0.182 mgd **Peak Flow: 0.364 mgd** **Min Flow: 0.038 mgd**

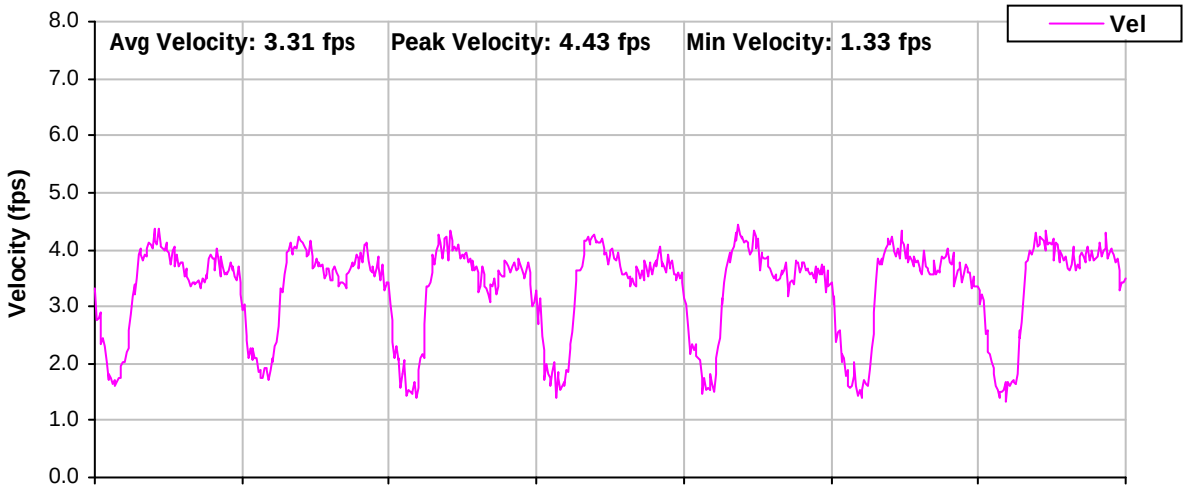
Level, Velocity and Flow

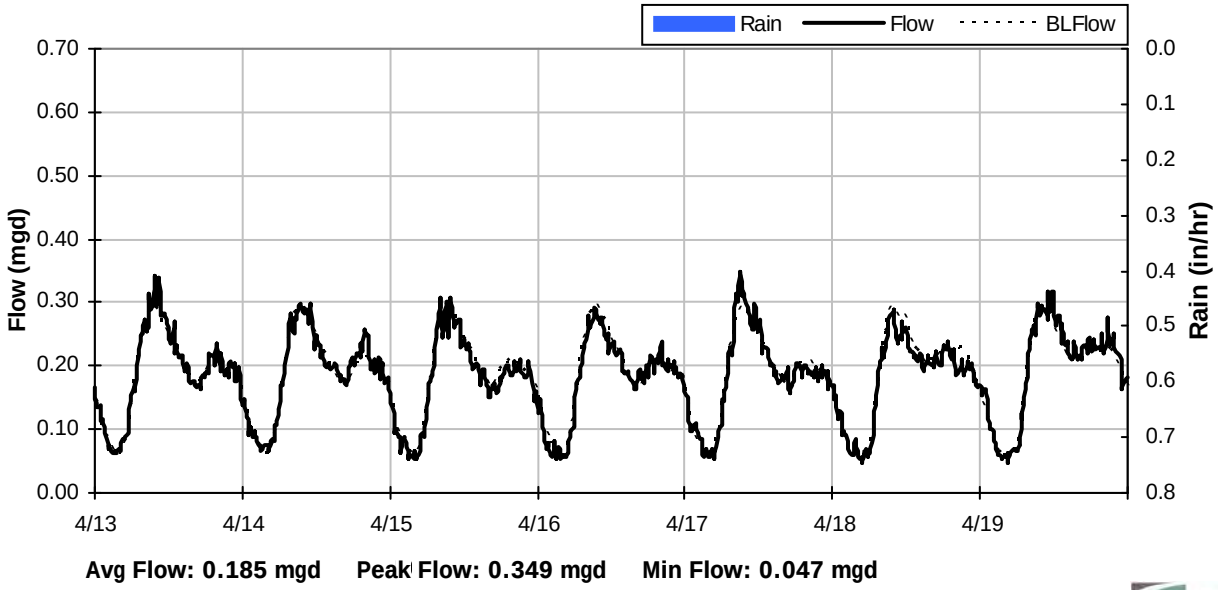
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 42







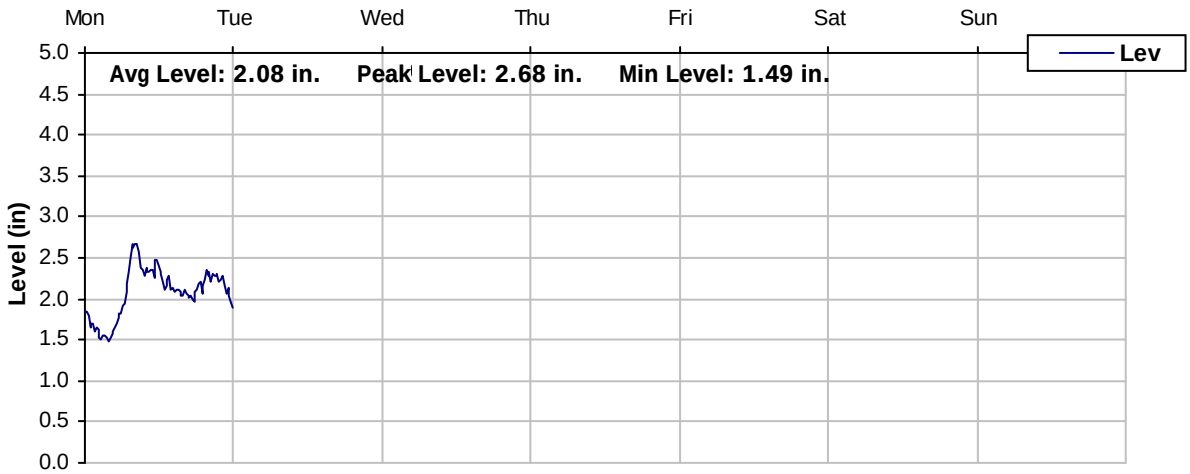
Avg Flow: 0.185 mgd **Peak Flow: 0.349 mgd** **Min Flow: 0.047 mgd**

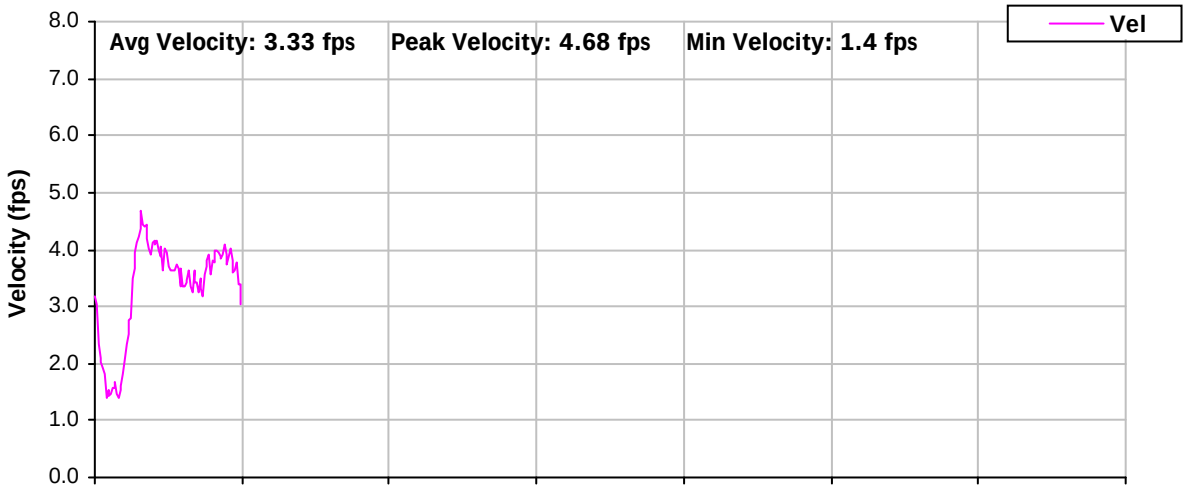
Level, Velocity and Flow

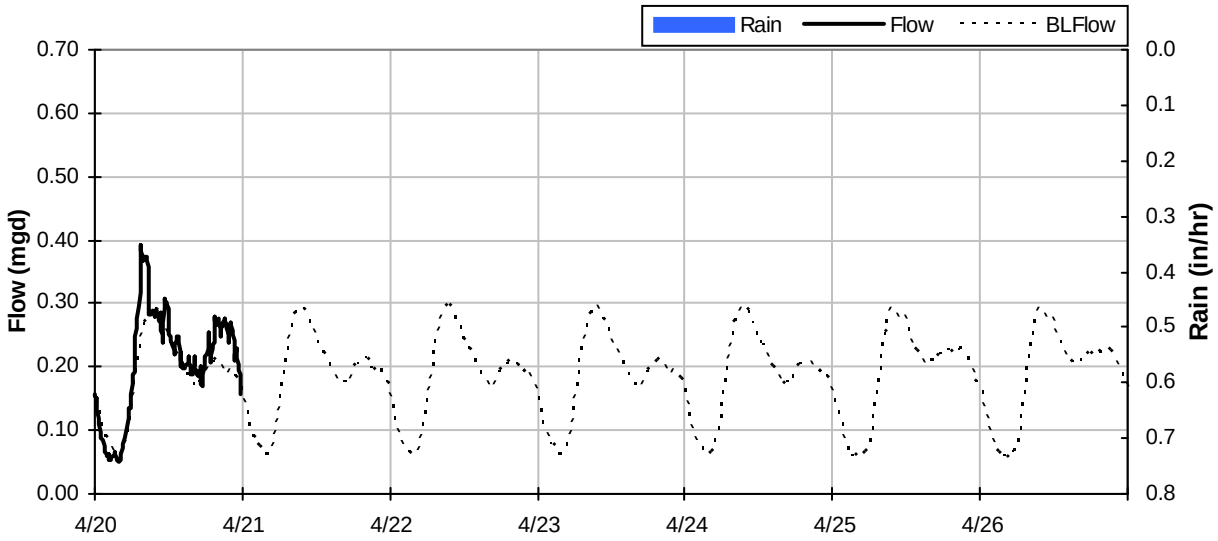
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 42







Avg Flow: 0.207 mgd **Peak Flow: 0.392 mgd** **Min Flow: 0.051 mgd**

Temporary Flow Monitoring Study

Sanitary Sewer Collection System

Monitoring Site: MH 84

Location: Park Vista Road and Patrick Henry Place

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report

Site Information Report

Monitoring Site: MH 84

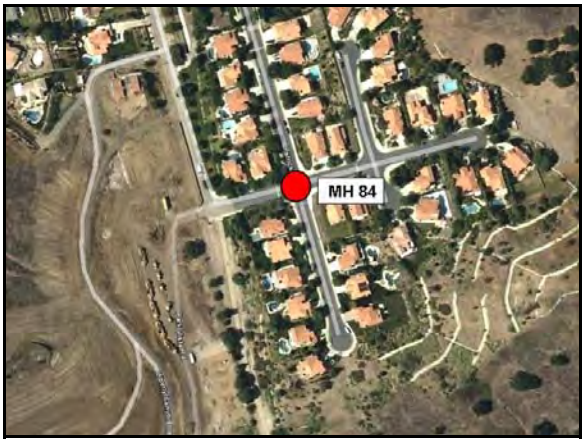
Location: Park Vista Road and Patrick Henry Place

Diameter: 8 inches

Average Dry Weather Flow: 0.01 *mgd*

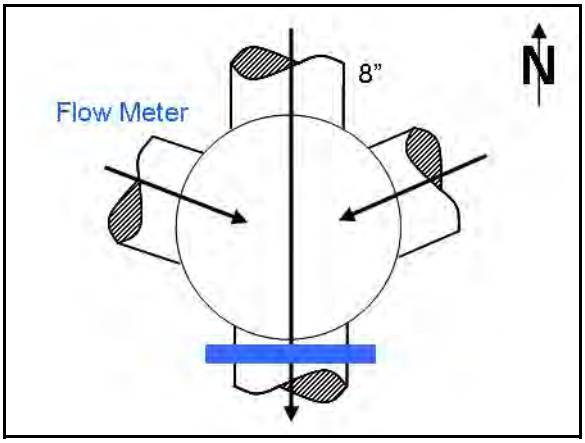
Peak Measured Flow: 0.04 *mgd*

Satellite Map

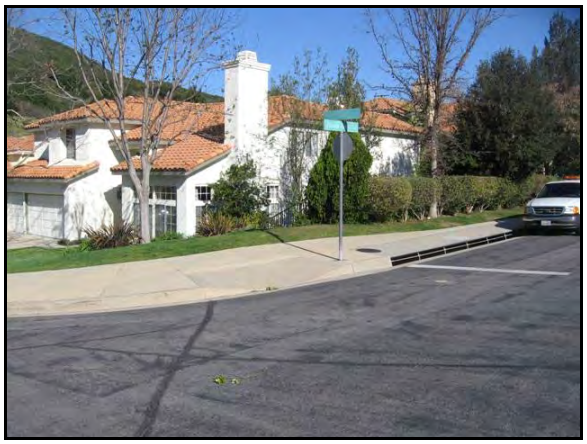


Sanitary Map

Flow Sketch



Street View Photo

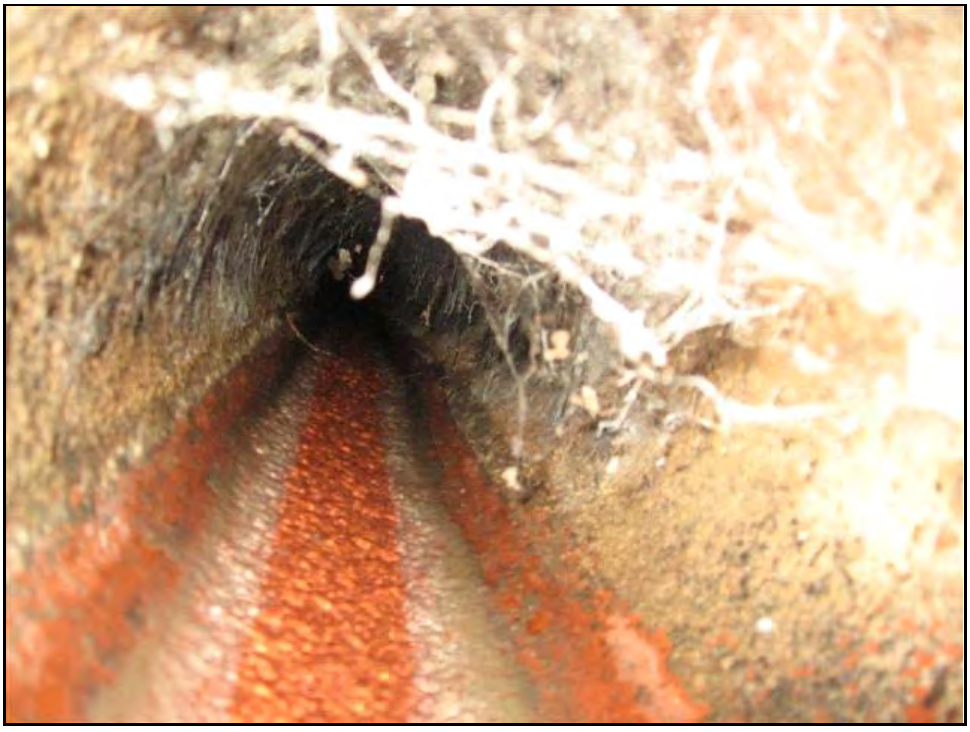


Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 84

Manhole Lid

East Inlet



	Site Information Report Photos	**Monitoring Site:** MH 84

North Inlet

South Inlet

	Site Information Report Photos	**Monitoring Site:** MH 84

West Outlet

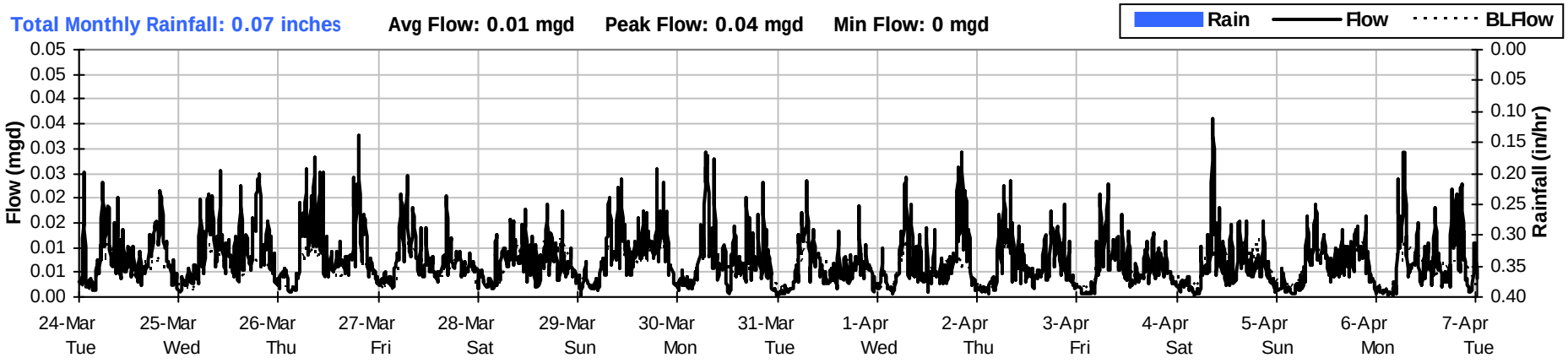
Period Flow Summary

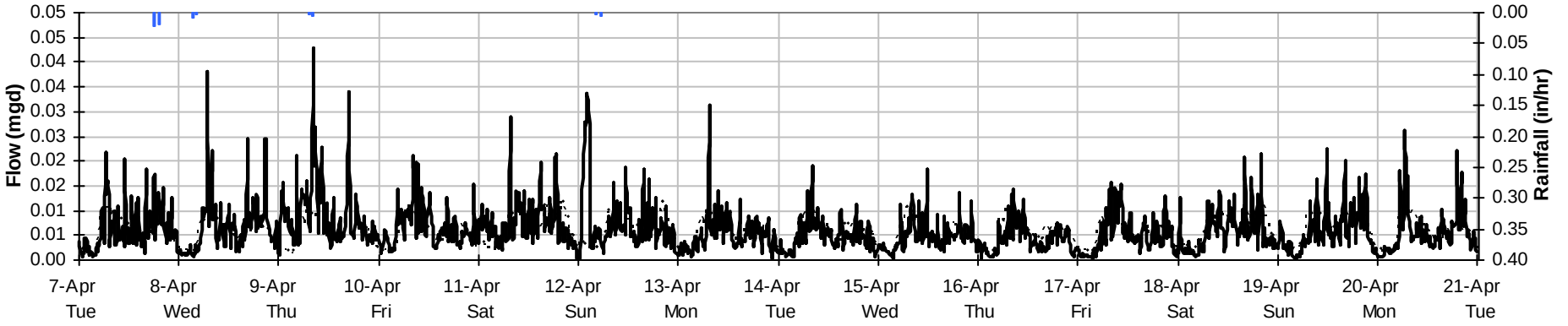
March 24, 2009 to April 21, 2009

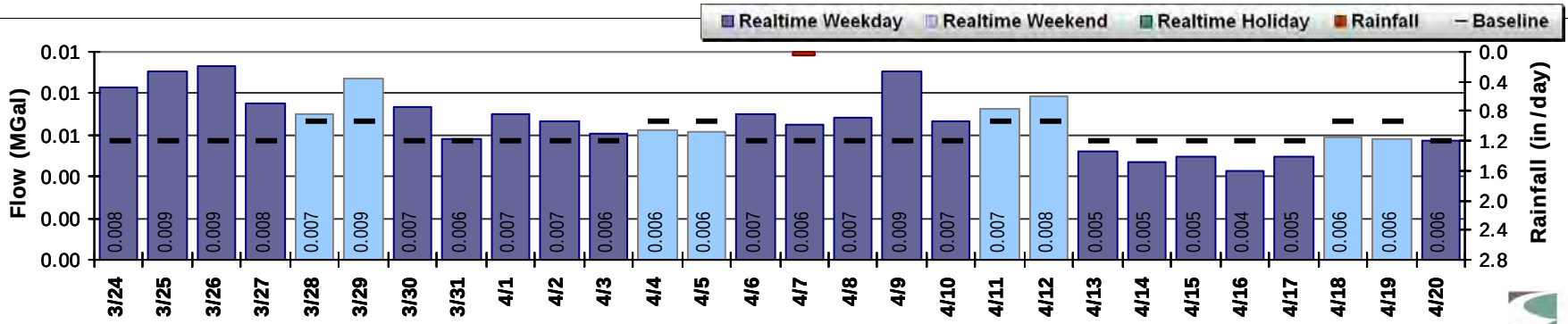
Monitoring Site:

MH 84

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.01 mgd** **Peak Flow: 0.04 mgd** **Min Flow: 0 mgd**

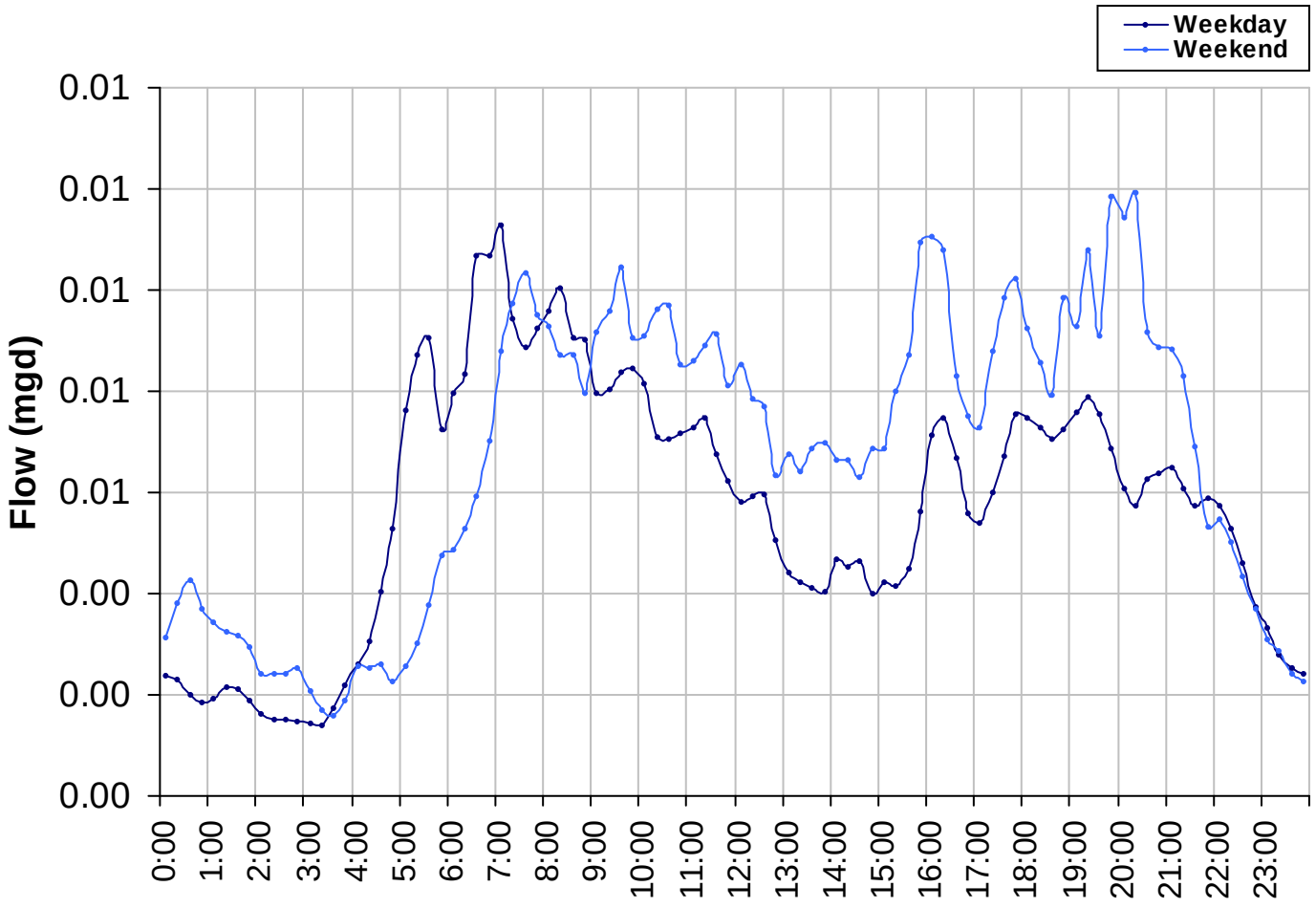






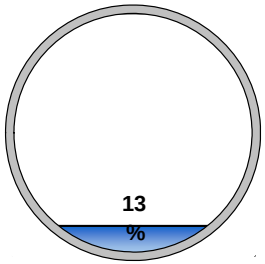
Average Dry Weather Flow

Monitoring Site:
MH 84



Peak Measured Flow:

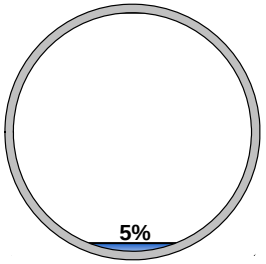
0.04 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.01 *mgd*

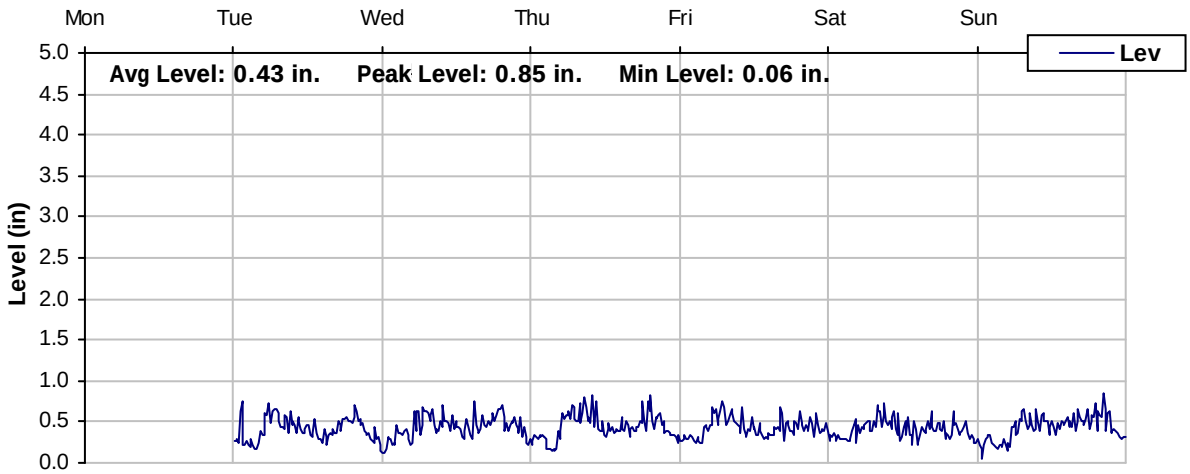


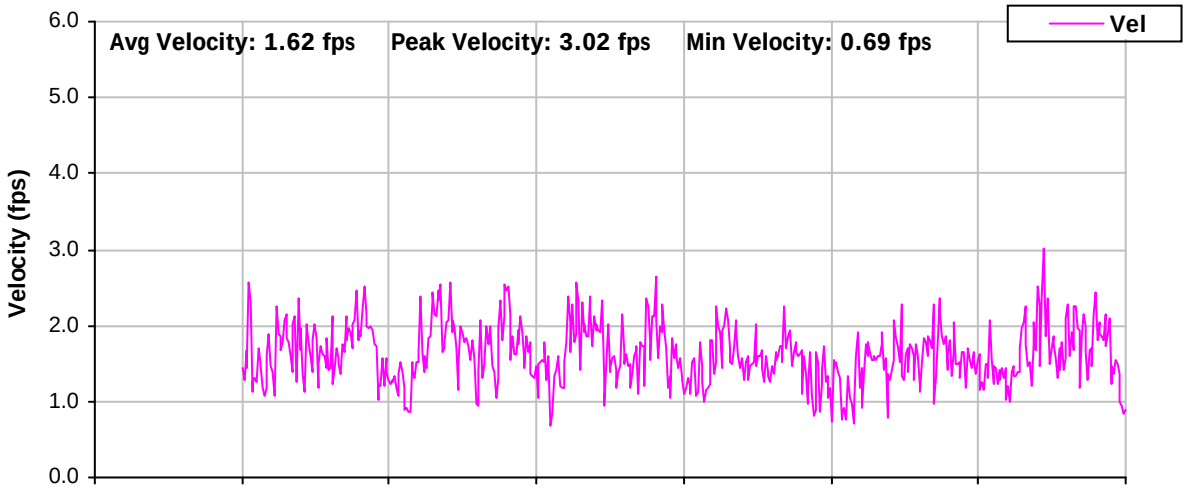
Level, Velocity and Flow

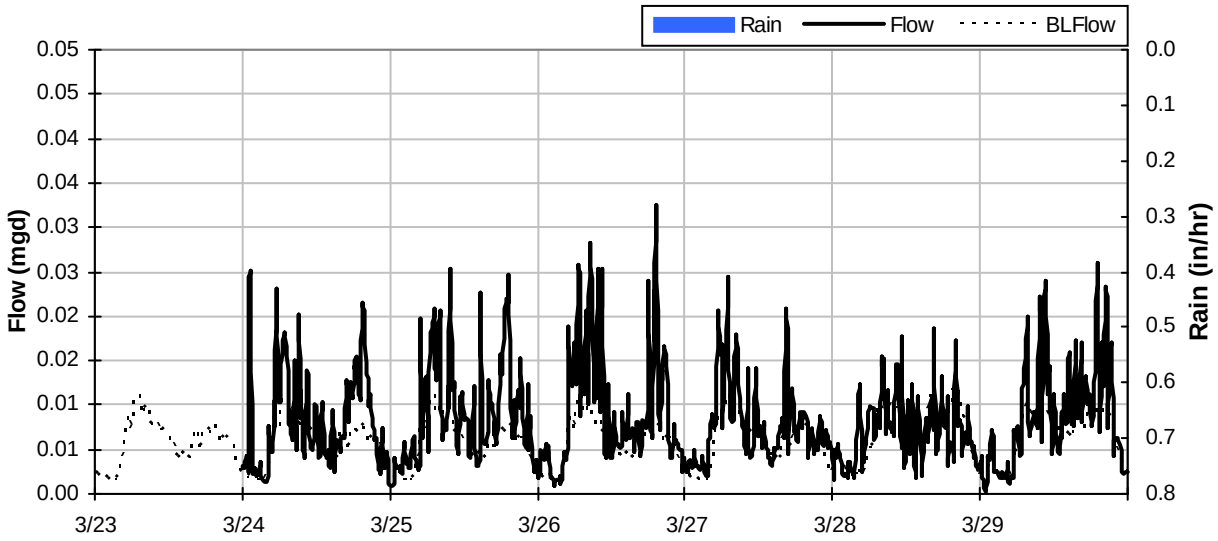
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 84







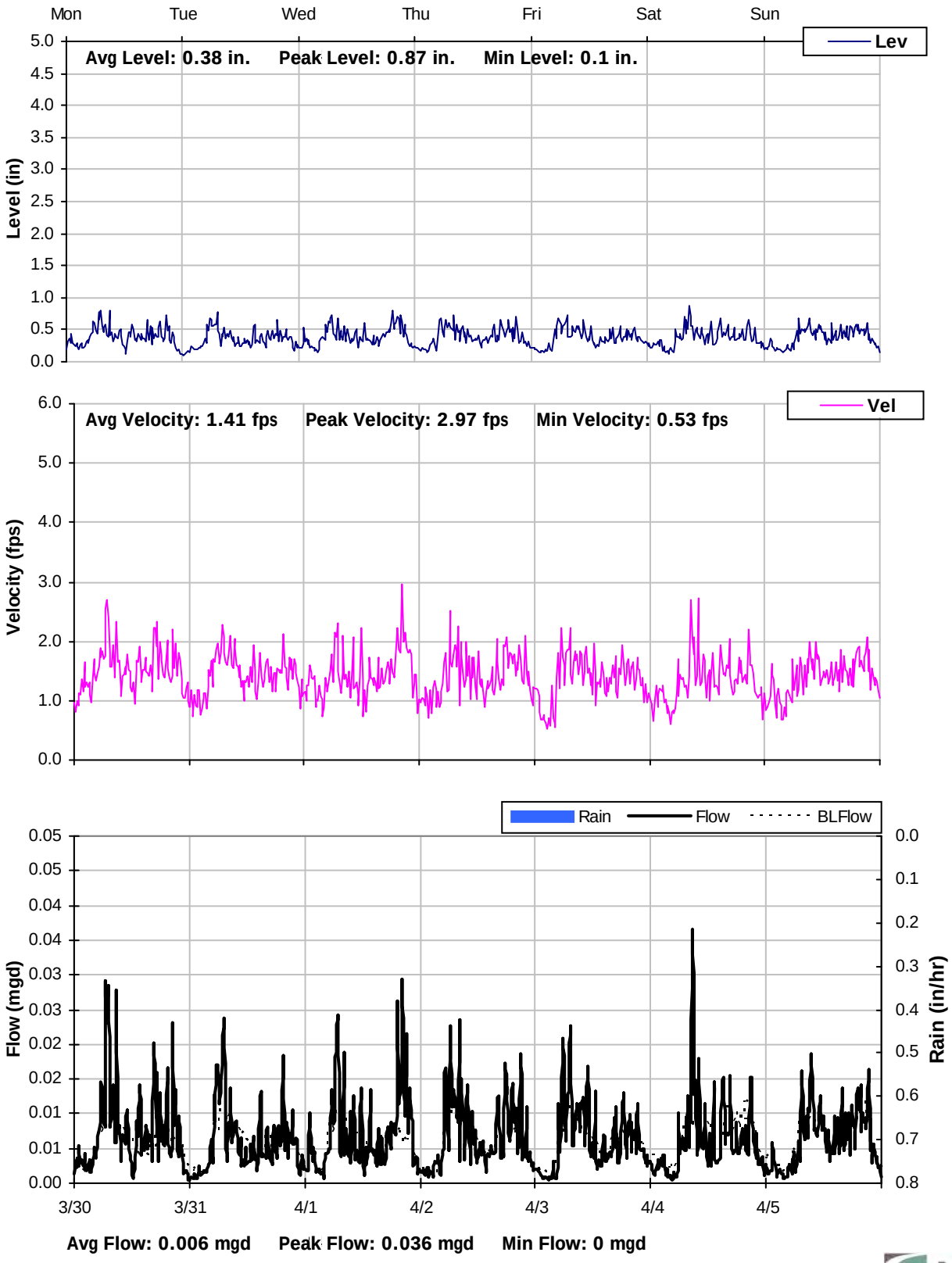
Avg Flow: 0.008 mgd **Peak Flow: 0.033 mgd** **Min Flow: 0 mgd**

Level, Velocity and Flow

From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 84

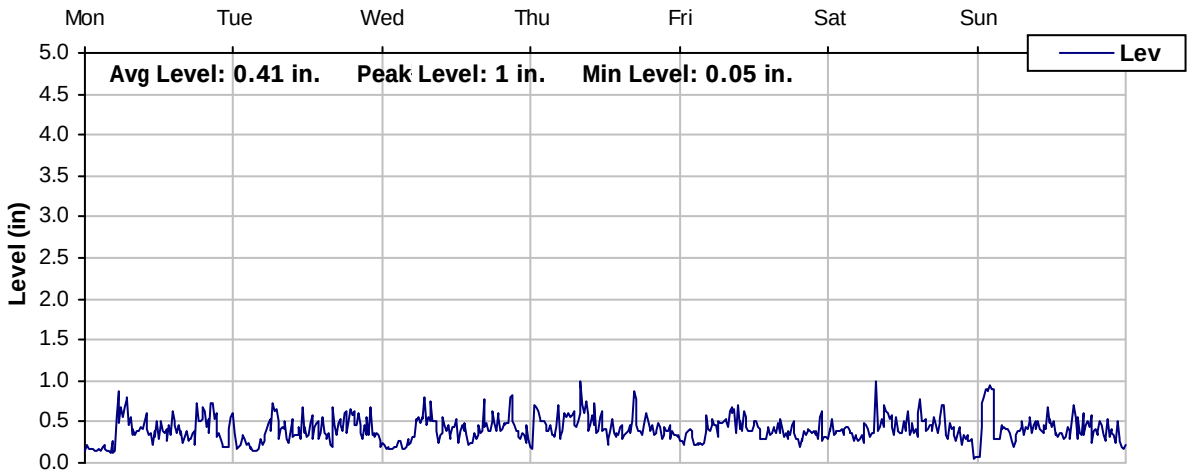


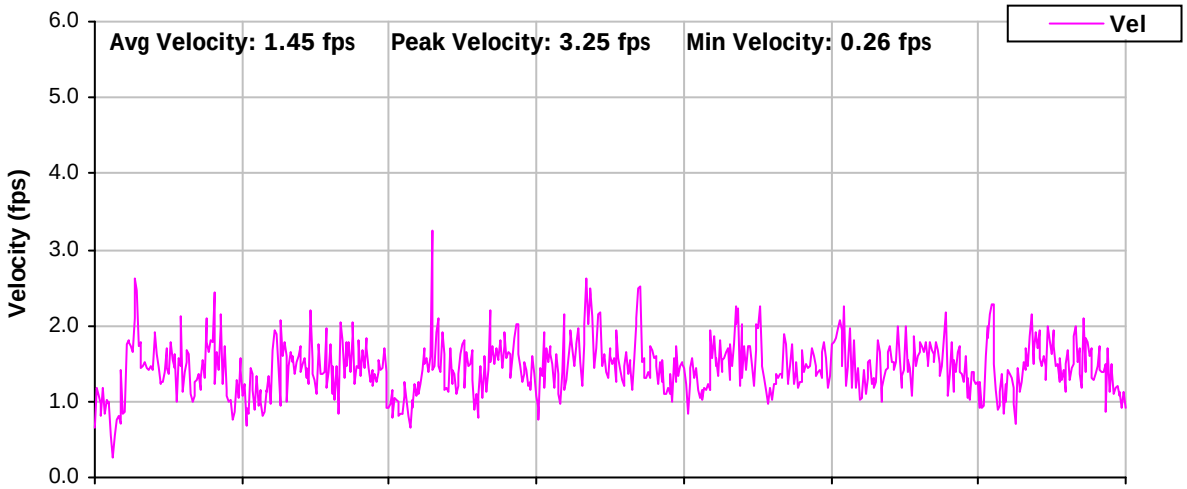
Level, Velocity and Flow

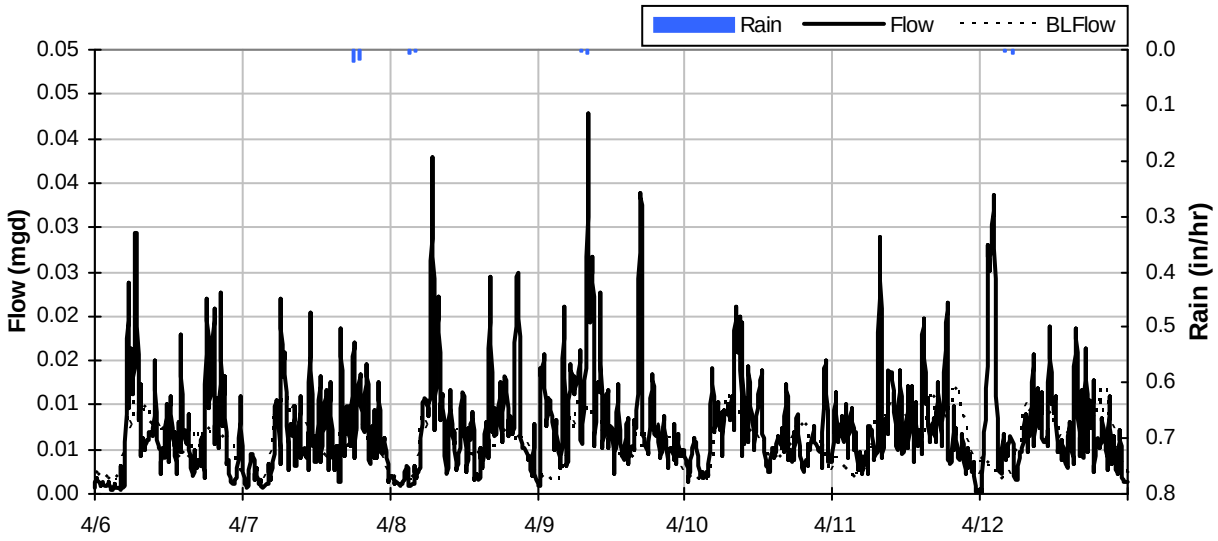
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 84







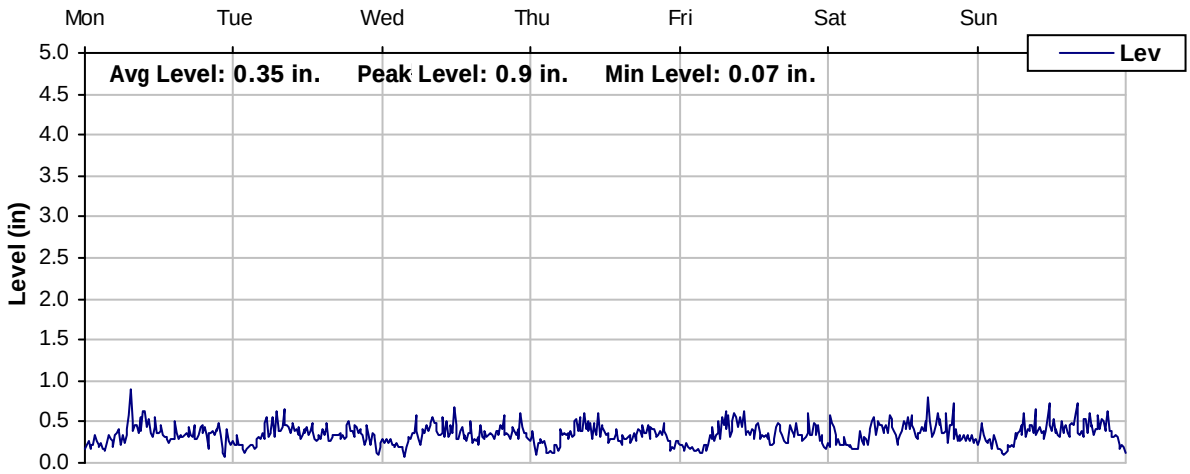
Avg Flow: 0.007 mgd **Peak Flow: 0.043 mgd** **Min Flow: 0 mgd**

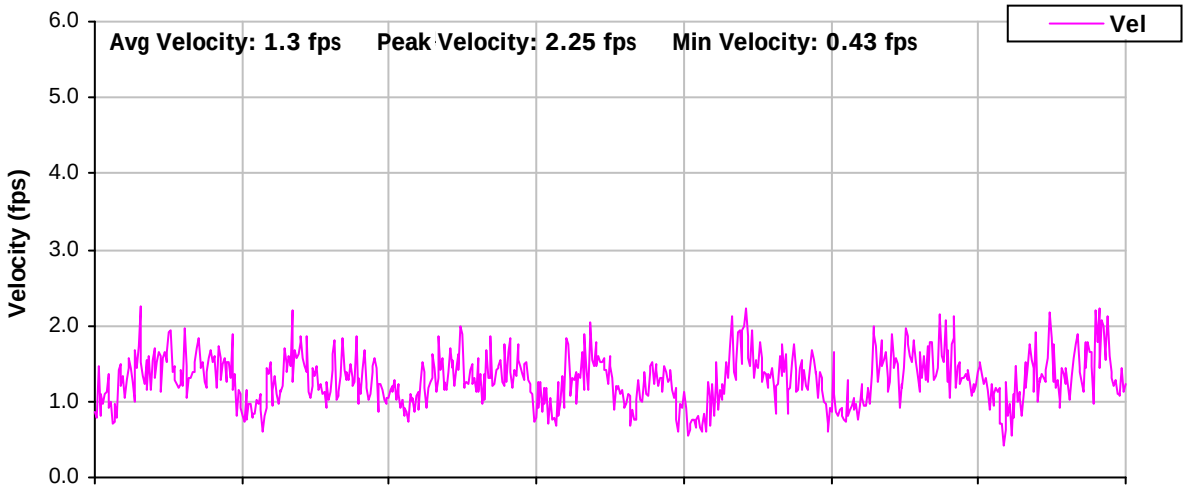
Level, Velocity and Flow

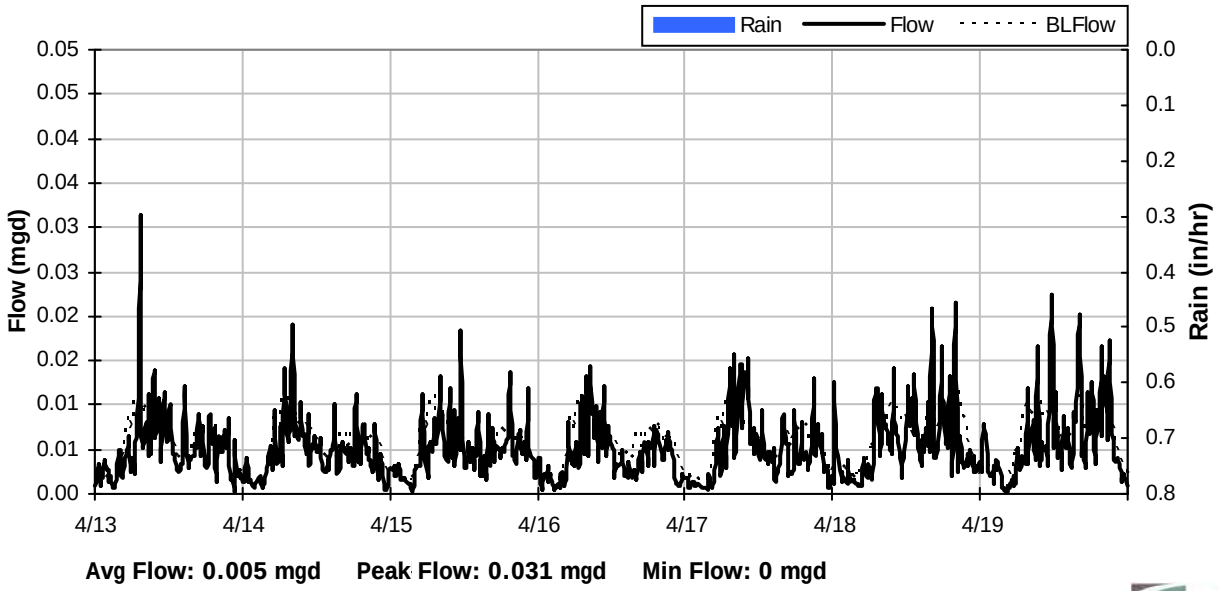
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 84







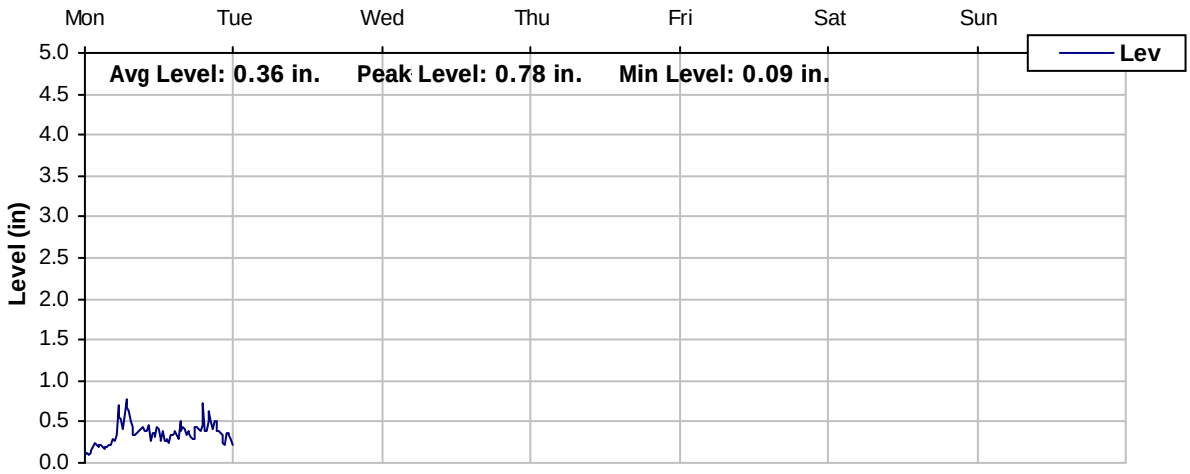
Avg Flow: 0.005 mgd **Peak Flow: 0.031 mgd** **Min Flow: 0 mgd**

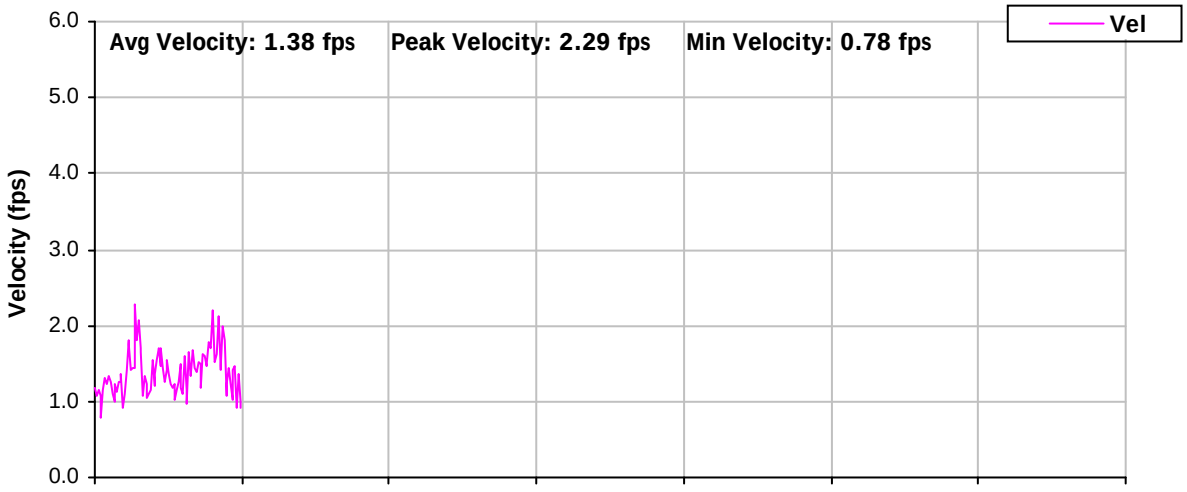
Level, Velocity and Flow

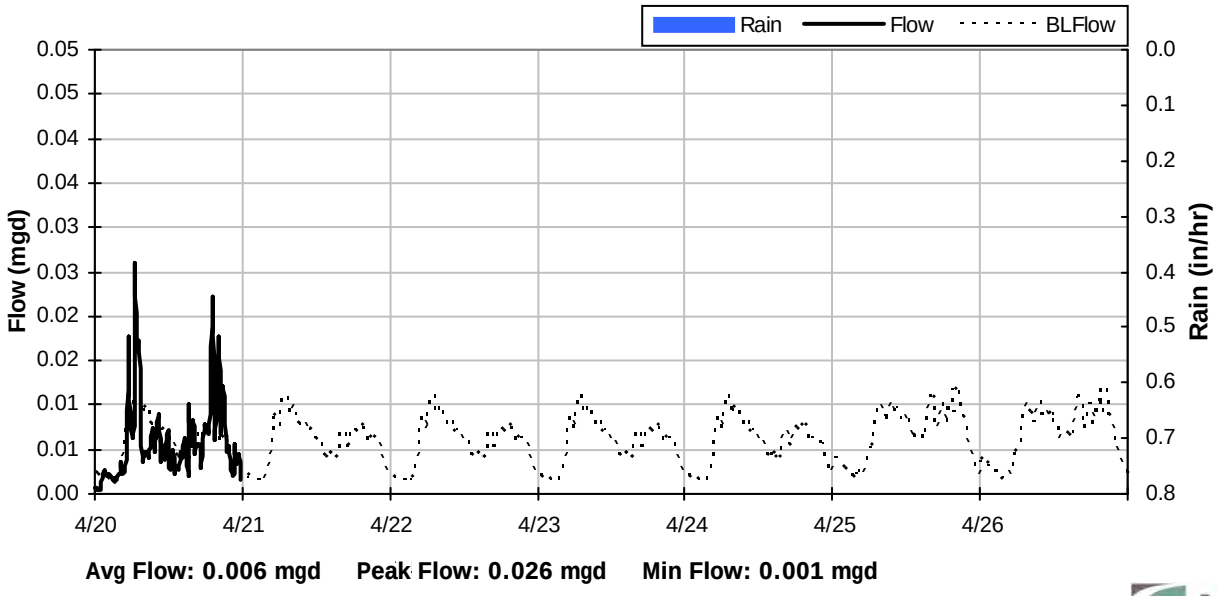
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 84







Avg Flow: 0.006 mgd **Peak Flow: 0.026 mgd** **Min Flow: 0.001 mgd**

Temporary Flow Monitoring Study

Sanitary Sewer Collection System

Monitoring Site: MH 85

Location: Dargan Street, west of Acadia Avenue

Size / Type Line: 10-inch Sanitary Sewer Pipe

Data Summary Report

Site Information Report

Monitoring Site: MH 85

Location: Dargan Street, west of Acadia Avenue

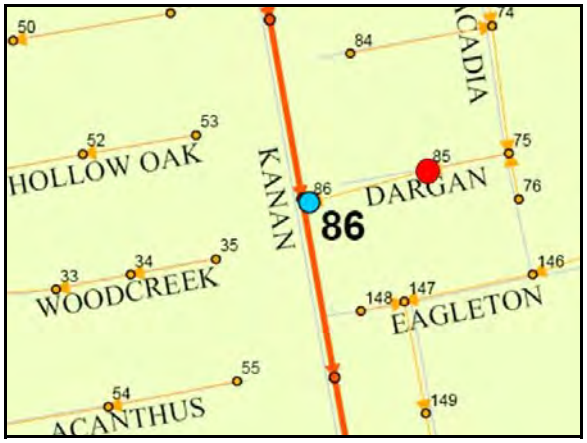
Diameter: 10 inches

Average Dry Weather Flow: 0.06 *mgd*

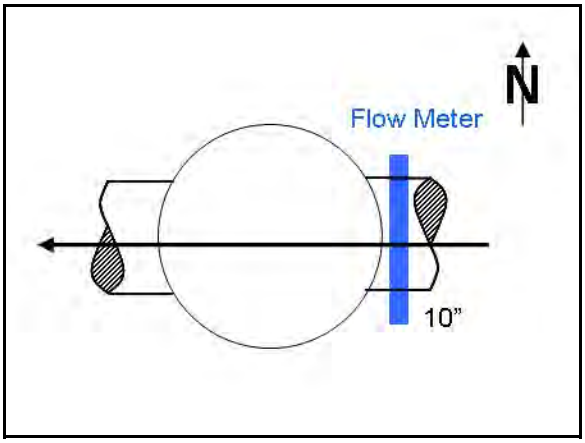
Peak Measured Flow: 0.15 *mgd*

Satellite Map

Sanitary Map



Flow Sketch



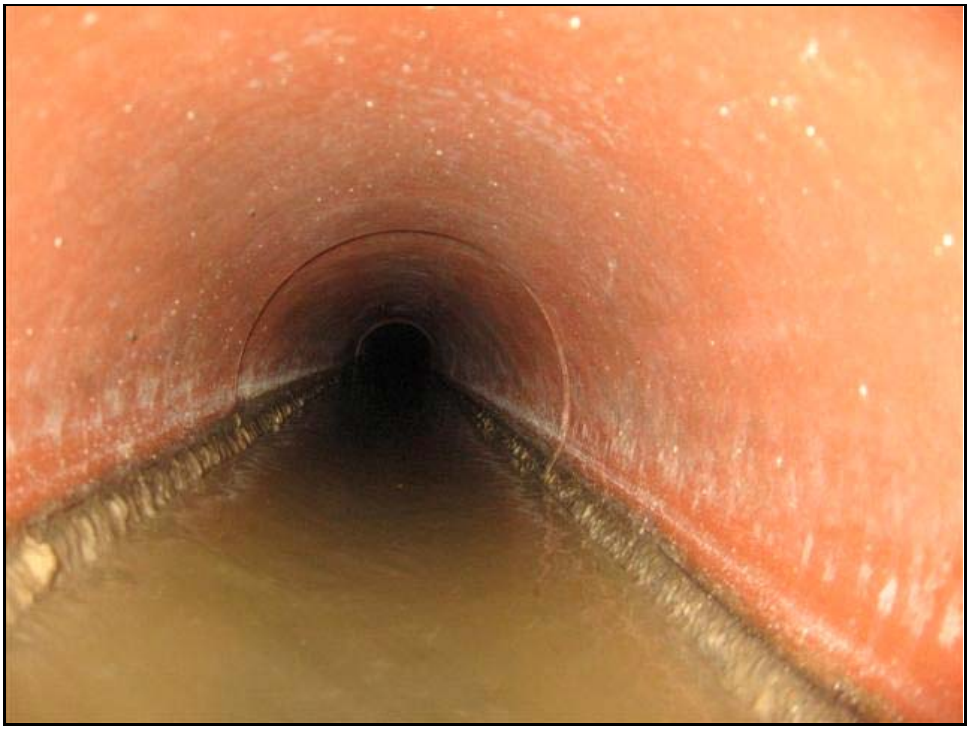
Street View Photo

Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 85

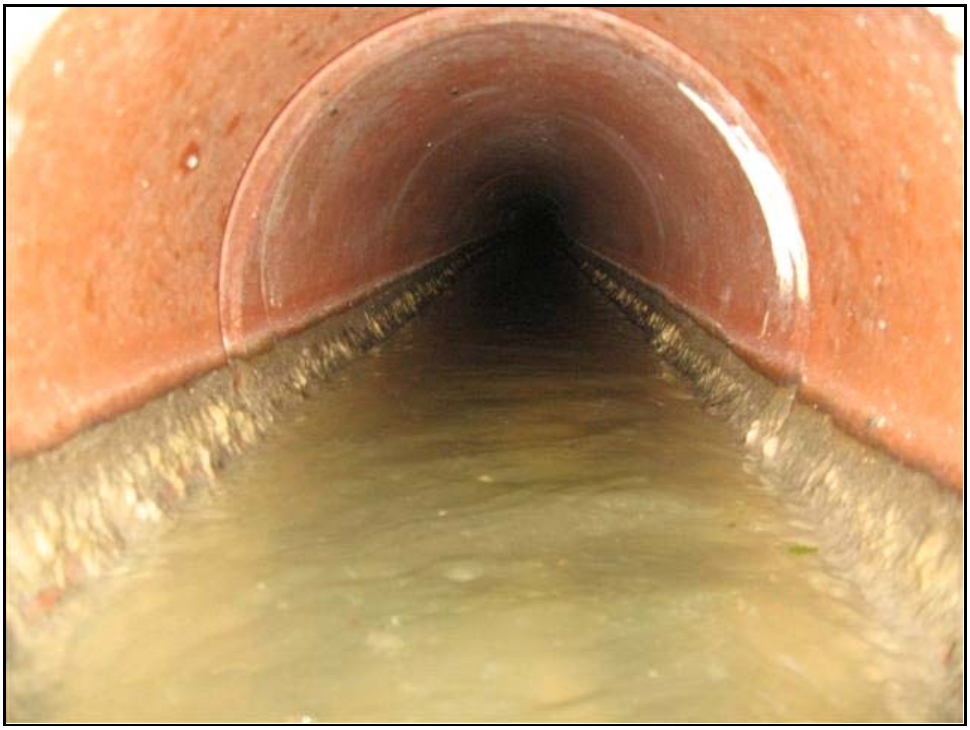
Manhole Lid

East Inlet



	Site Information Report Photos	**Monitoring Site:** MH 85

West Outlet



V&A

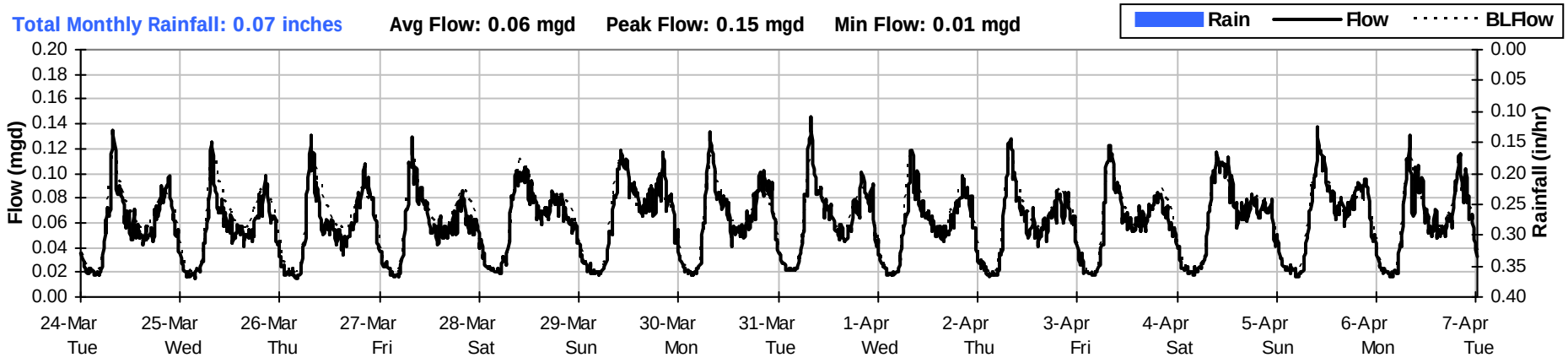
Period Flow Summary

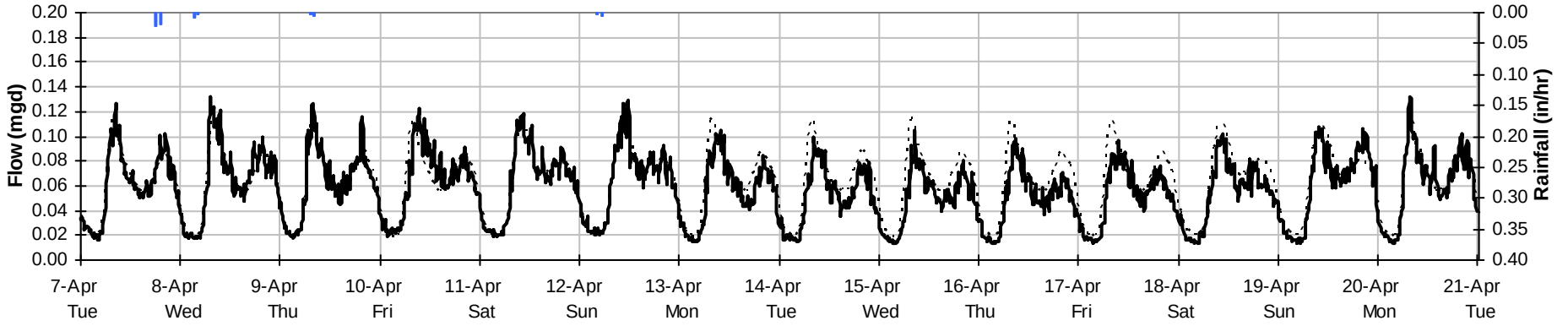
March 24, 2009 to April 21, 2009

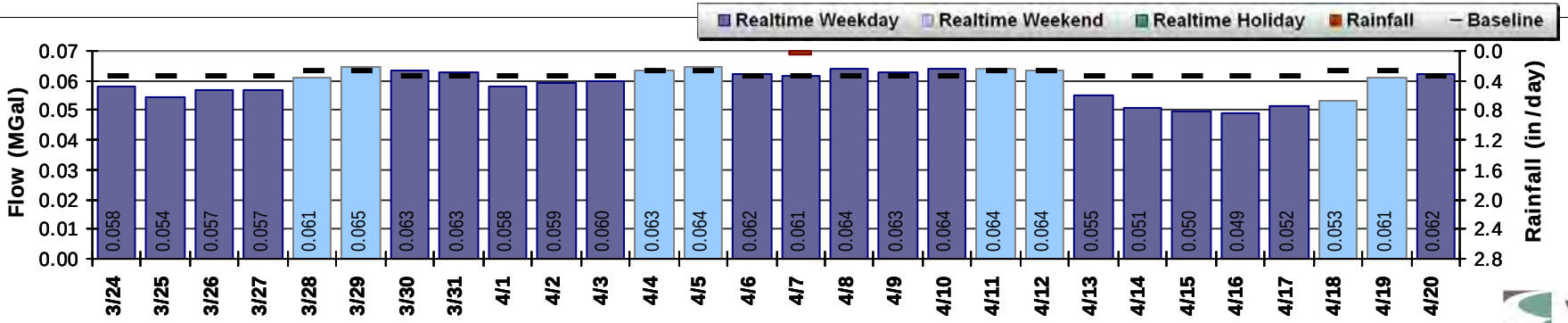
Monitoring Site:

MH 85

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.06 mgd** **Peak Flow: 0.15 mgd** **Min Flow: 0.01 mgd**



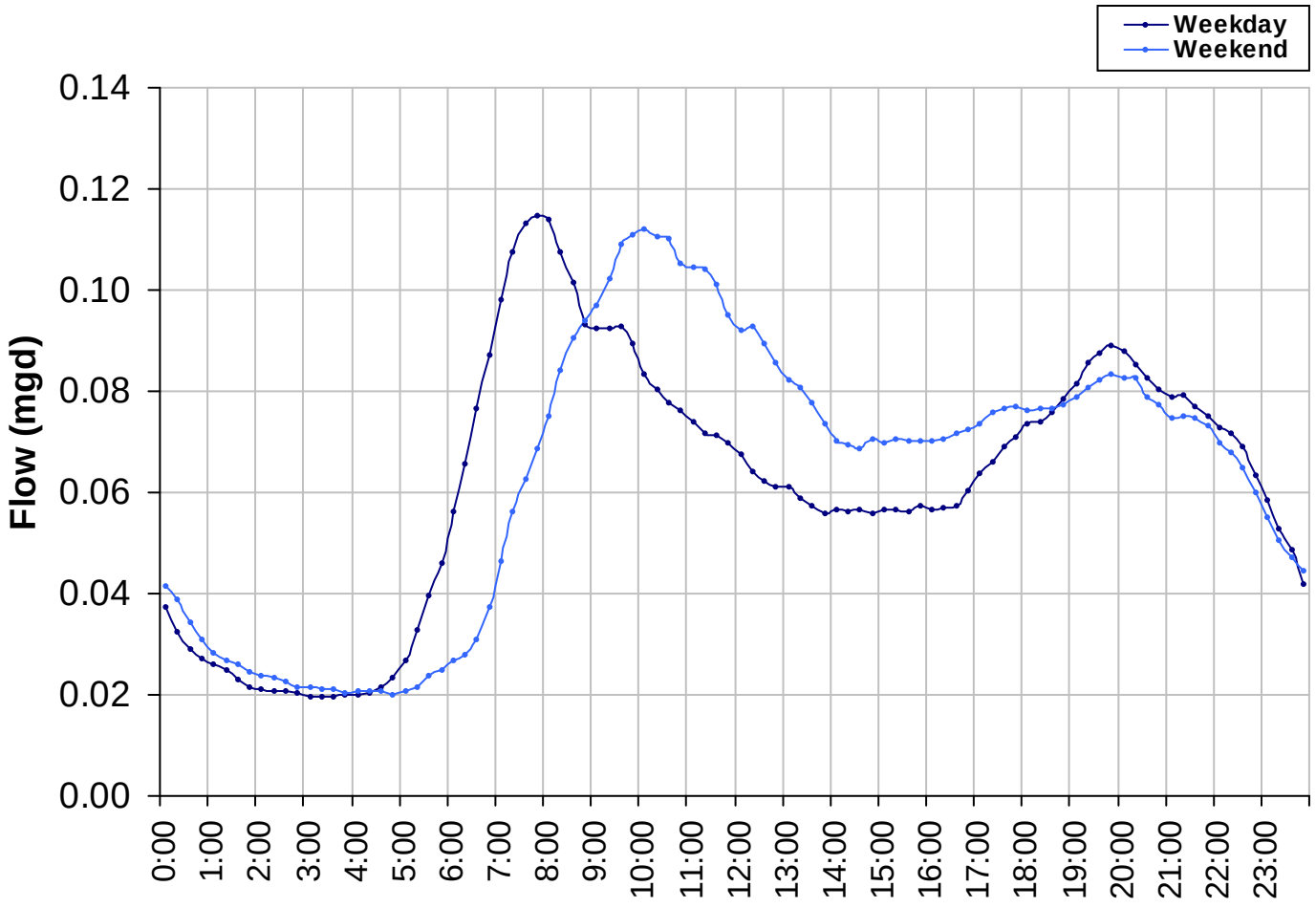




V&A

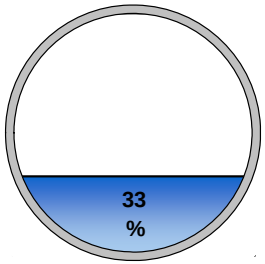
Average Dry Weather Flow

Monitoring Site:
MH 85



Peak Measured Flow:

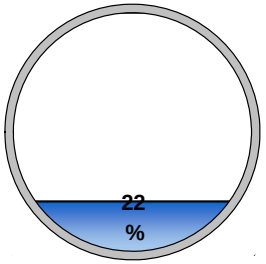
0.15 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.06 *mgd*

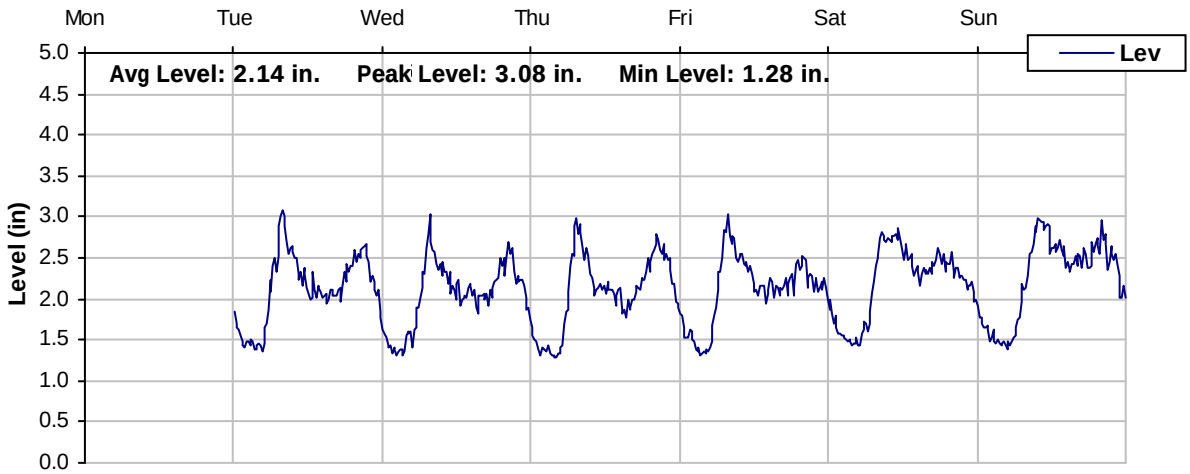


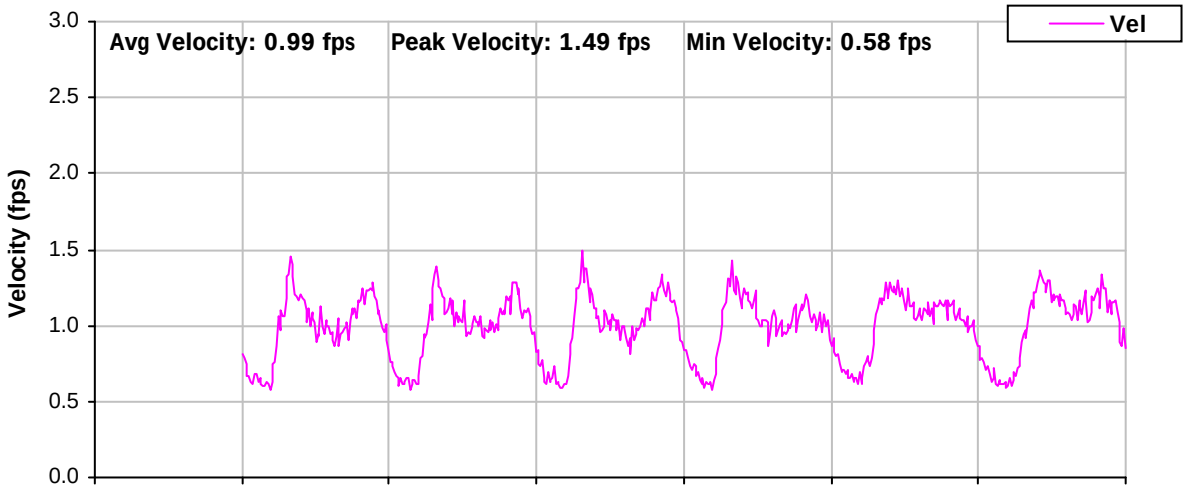
Level, Velocity and Flow

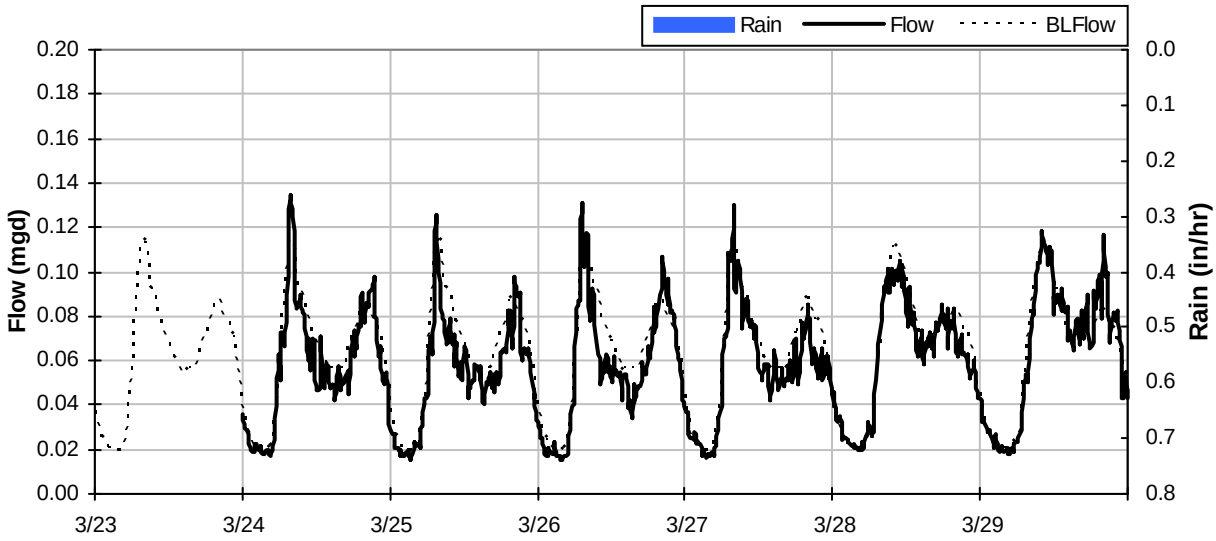
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 85







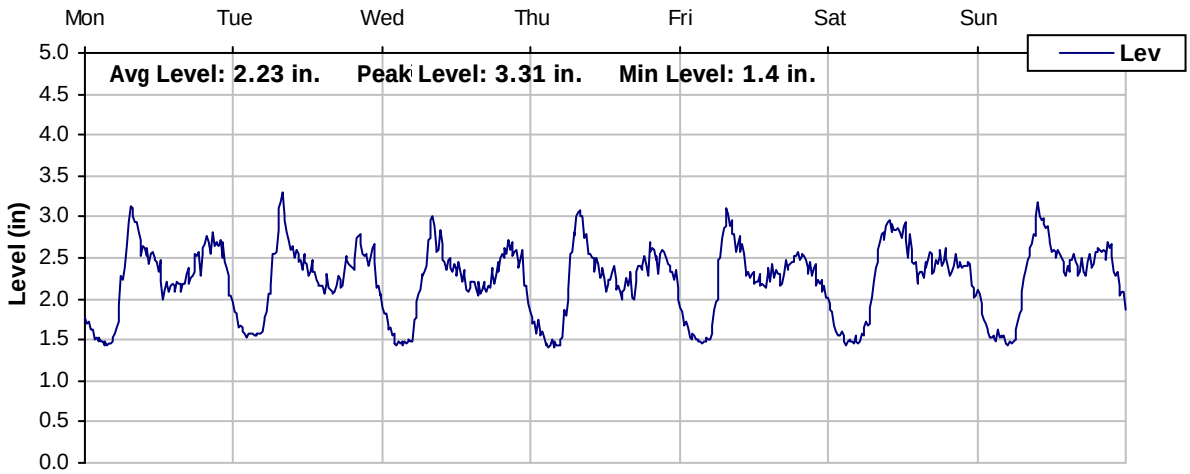
Avg Flow: 0.059 mgd **Peak Flow: 0.134 mgd** **Min Flow: 0.016 mgd**

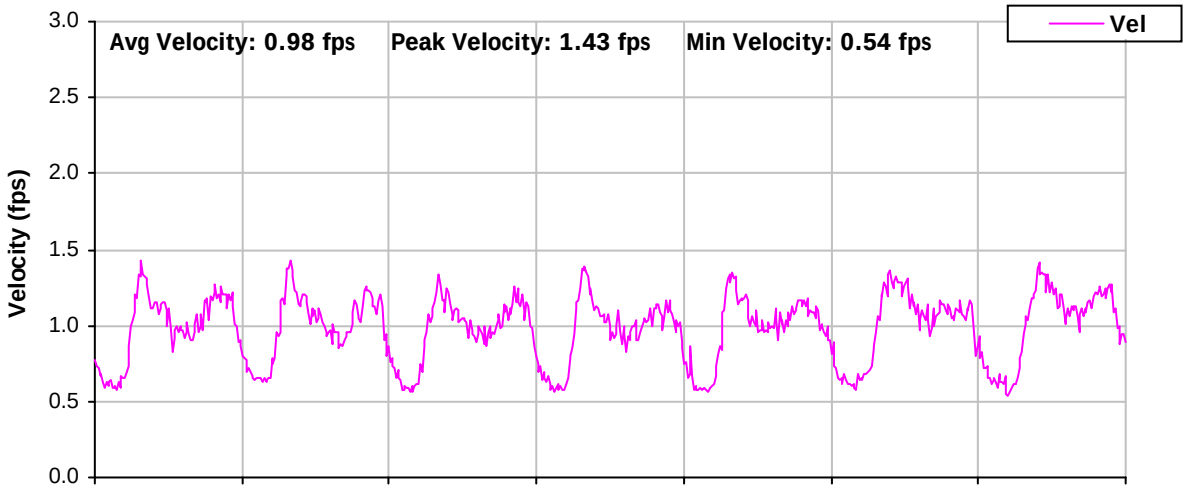
Level, Velocity and Flow

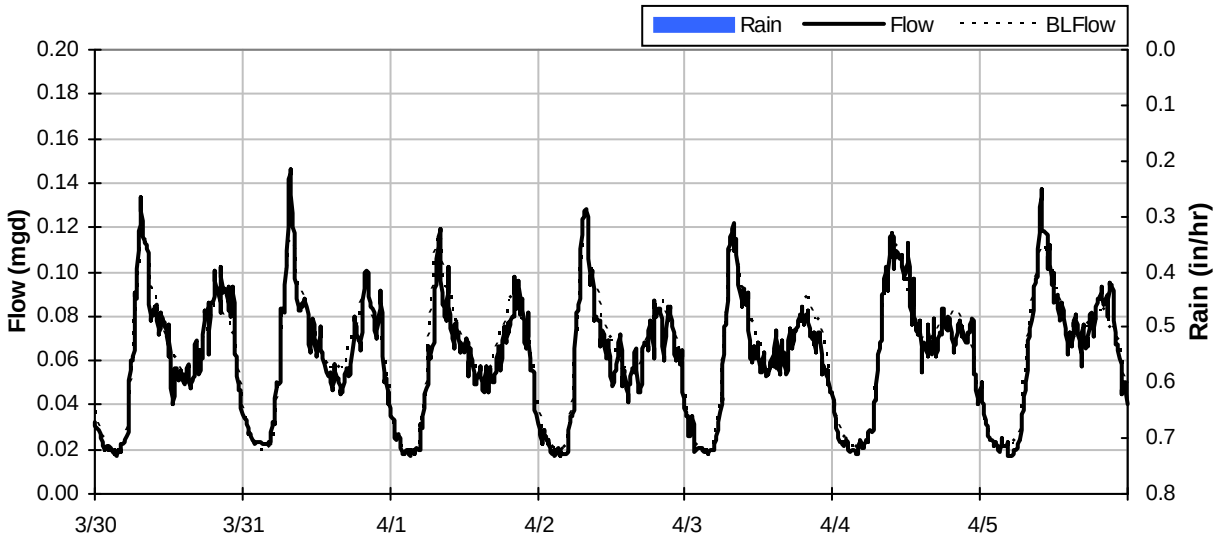
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 85







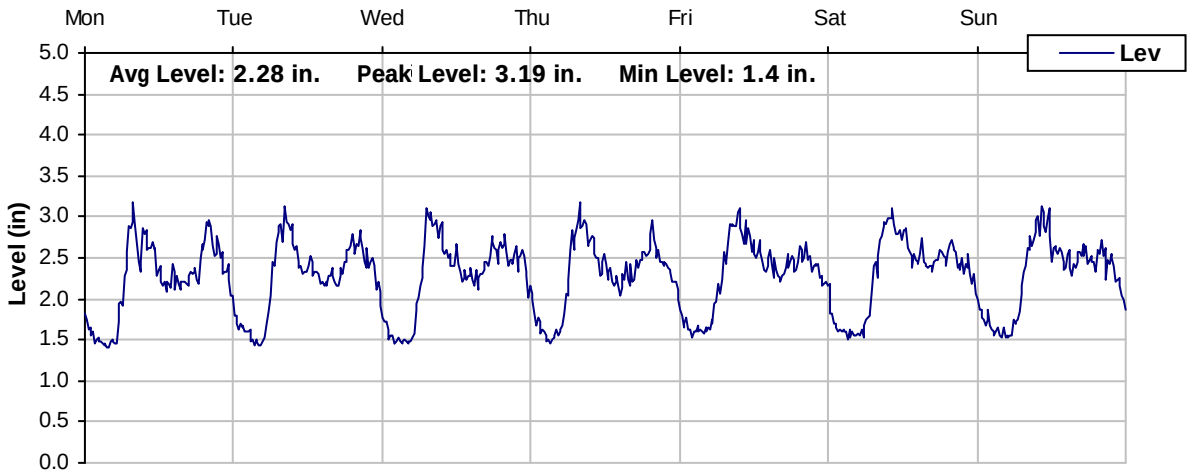
Avg Flow: 0.062 mgd **Peak Flow: 0.146 mgd** **Min Flow: 0.017 mgd**

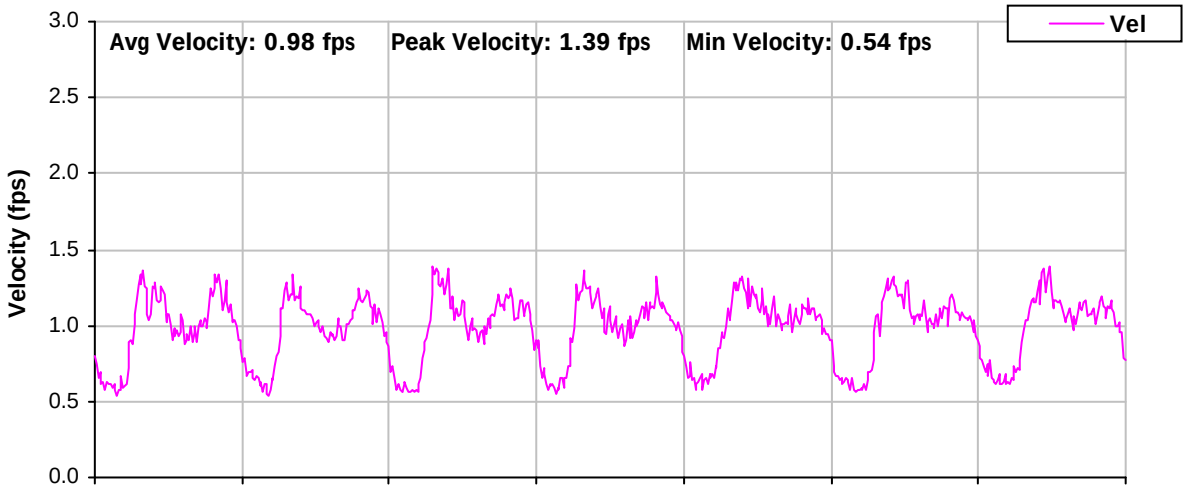
Level, Velocity and Flow

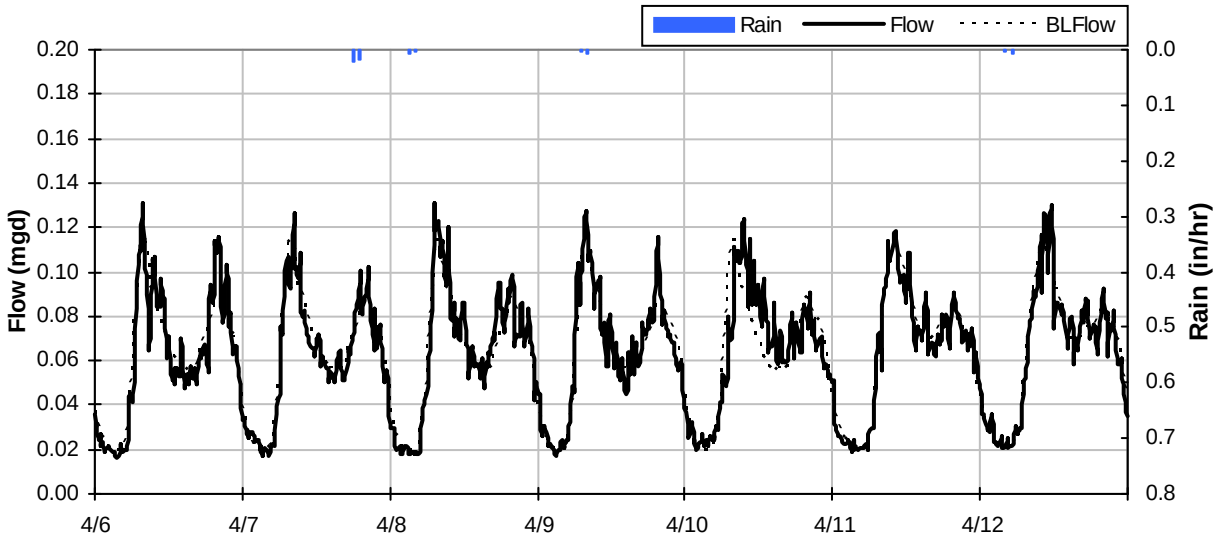
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 85







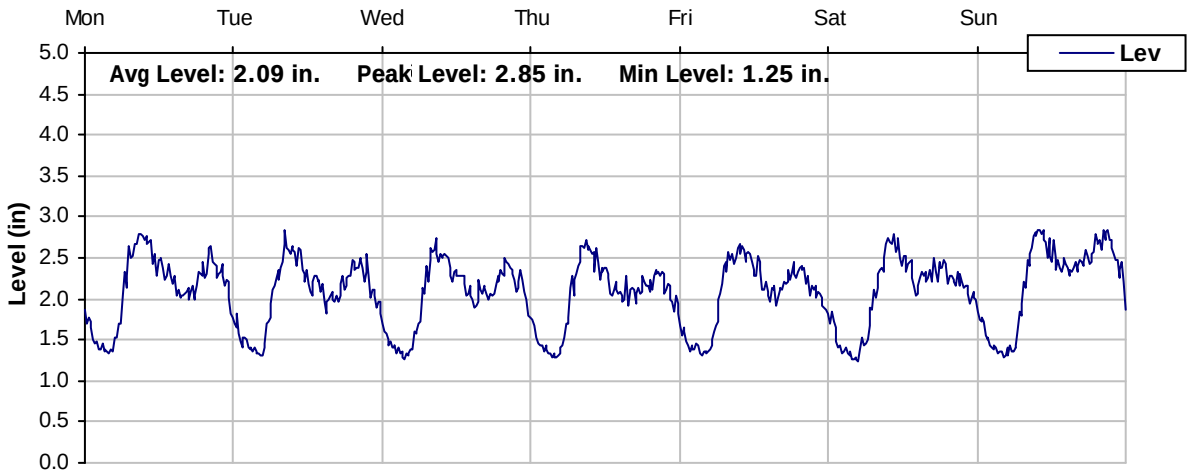
Avg Flow: 0.063 mgd **Peak Flow: 0.131 mgd** **Min Flow: 0.016 mgd**

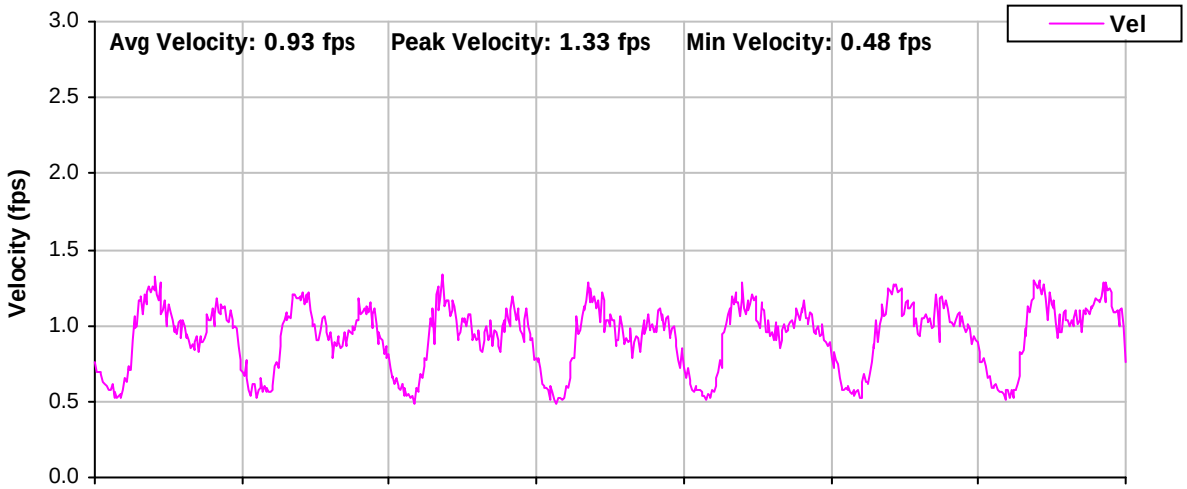
Level, Velocity and Flow

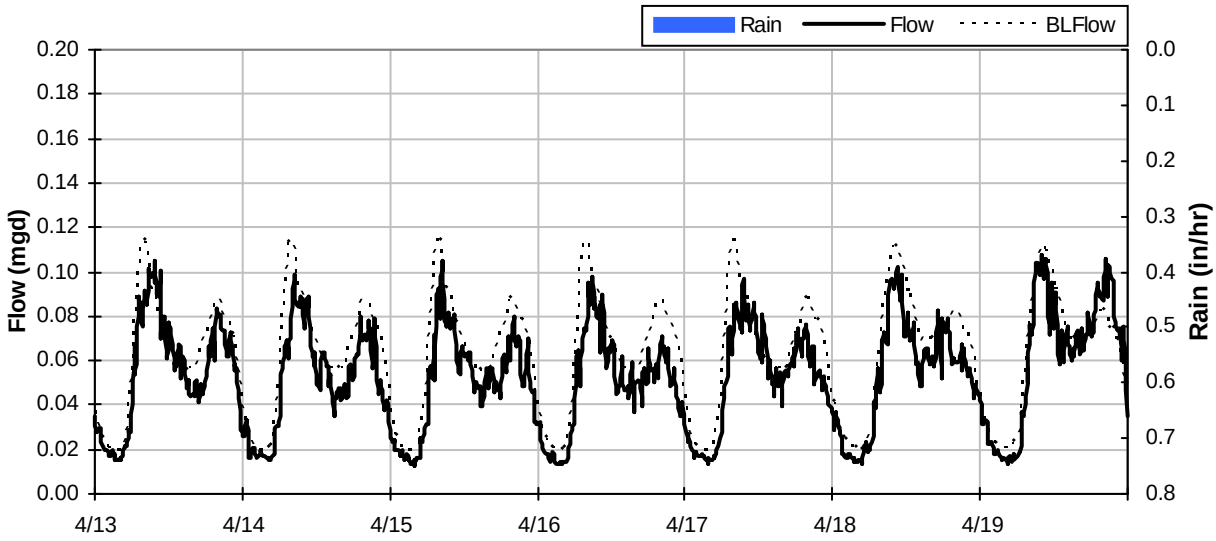
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 85







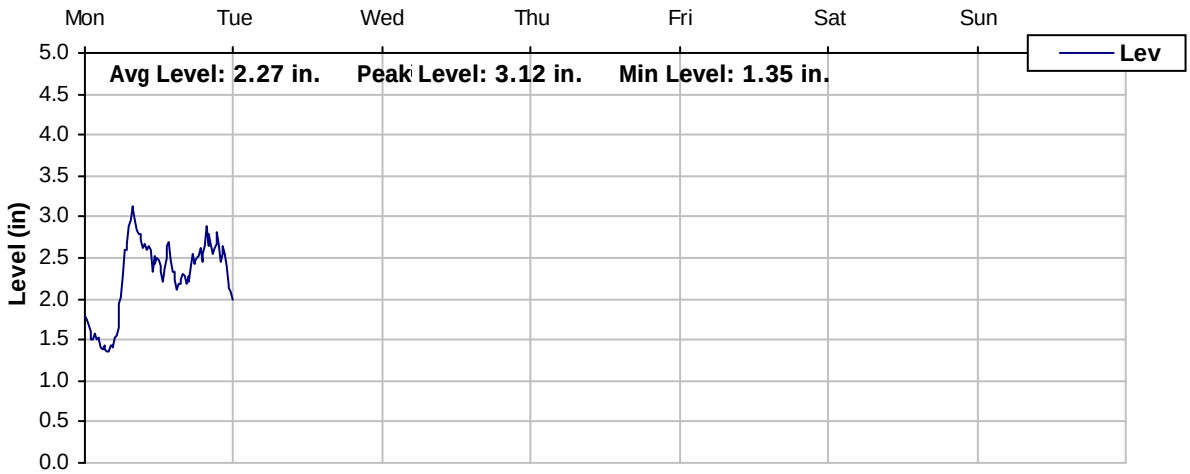
Avg Flow: 0.053 mgd **Peak Flow: 0.108 mgd** **Min Flow: 0.013 mgd**

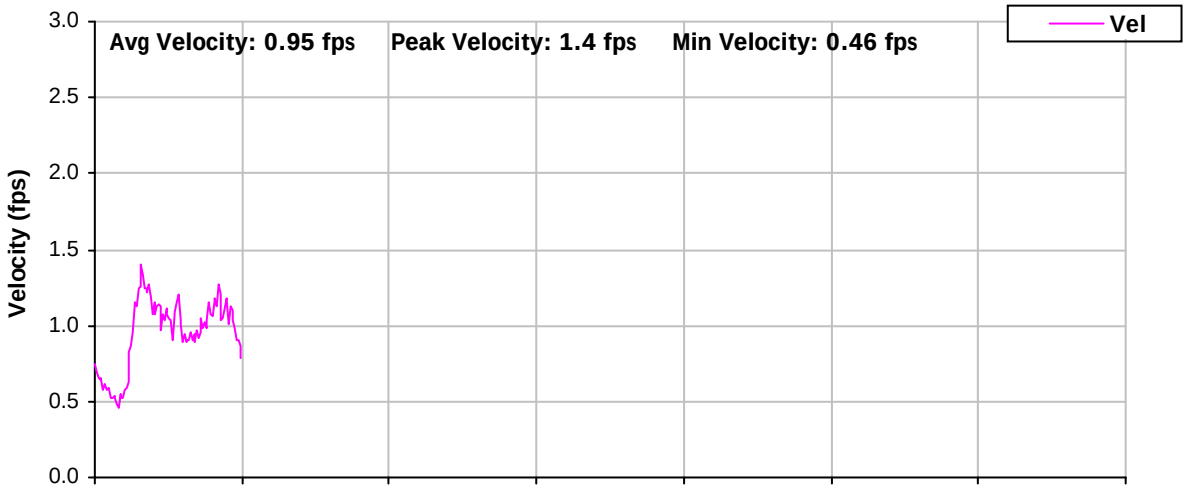
Level, Velocity and Flow

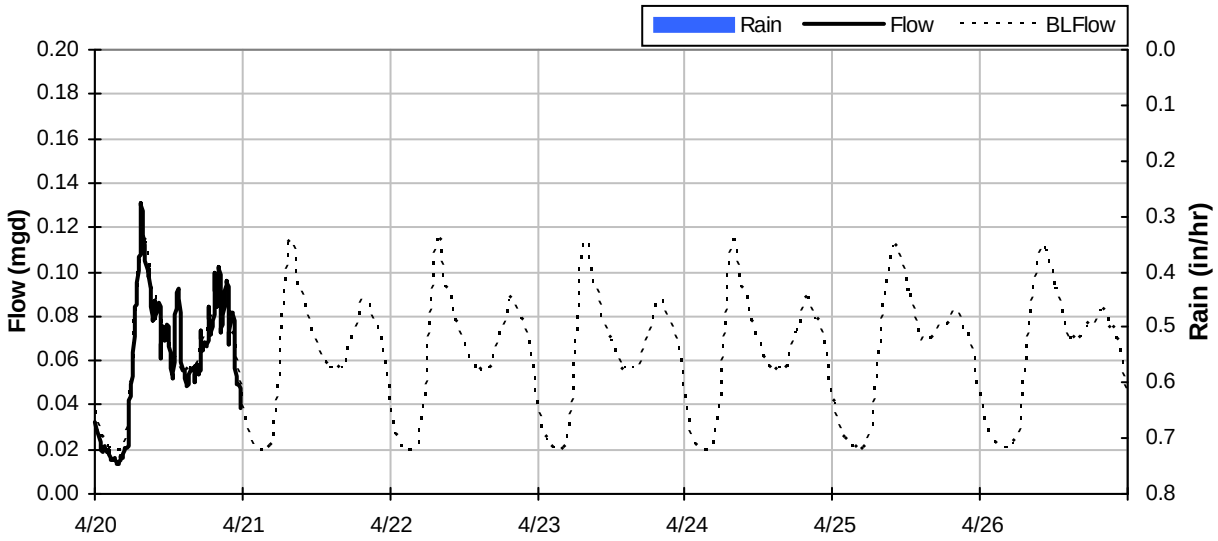
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 85







Avg Flow: 0.062 mgd **Peak Flow: 0.131 mgd** **Min Flow: 0.013 mgd**

Temporary Flow Monitoring Study

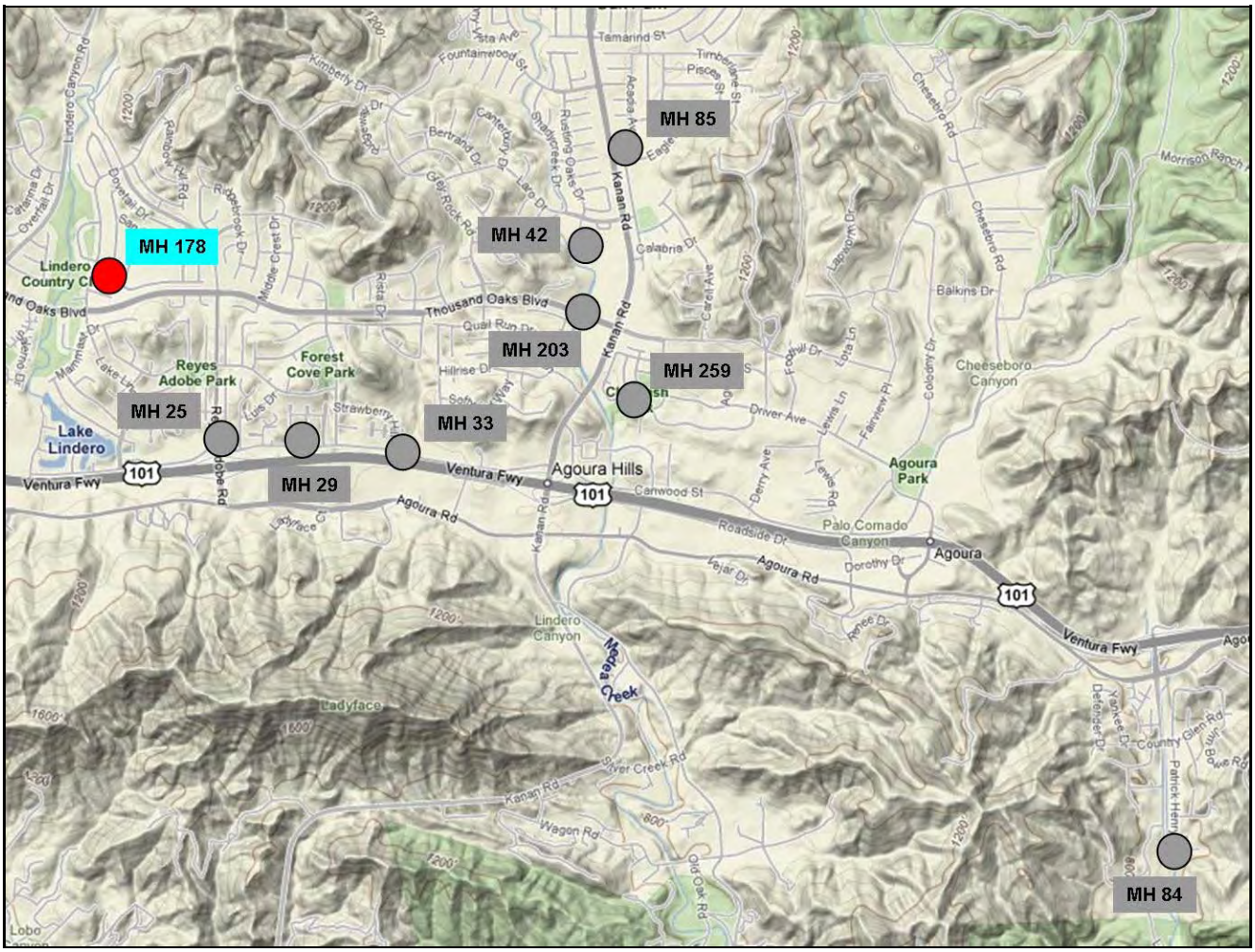
Sanitary Sewer Collection System

Monitoring Site: MH 178

Location: Rainbow View Drive and Wheelhouse Lane

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 178

Location: Rainbow View Drive and Wheelhouse Lane

Diameter: 8 inches

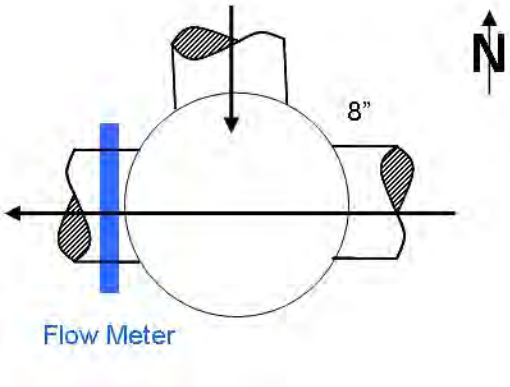
Average Dry Weather Flow: 0.09 *mgd*

Peak Measured Flow: 0.27 *mgd*

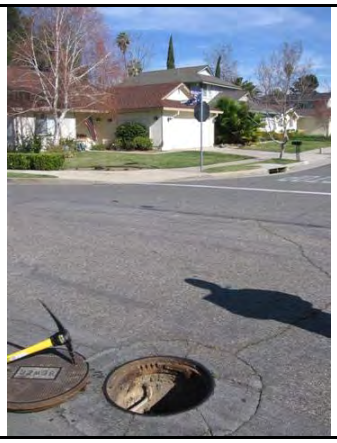
Satellite Map

Sanitary Map

Flow Sketch



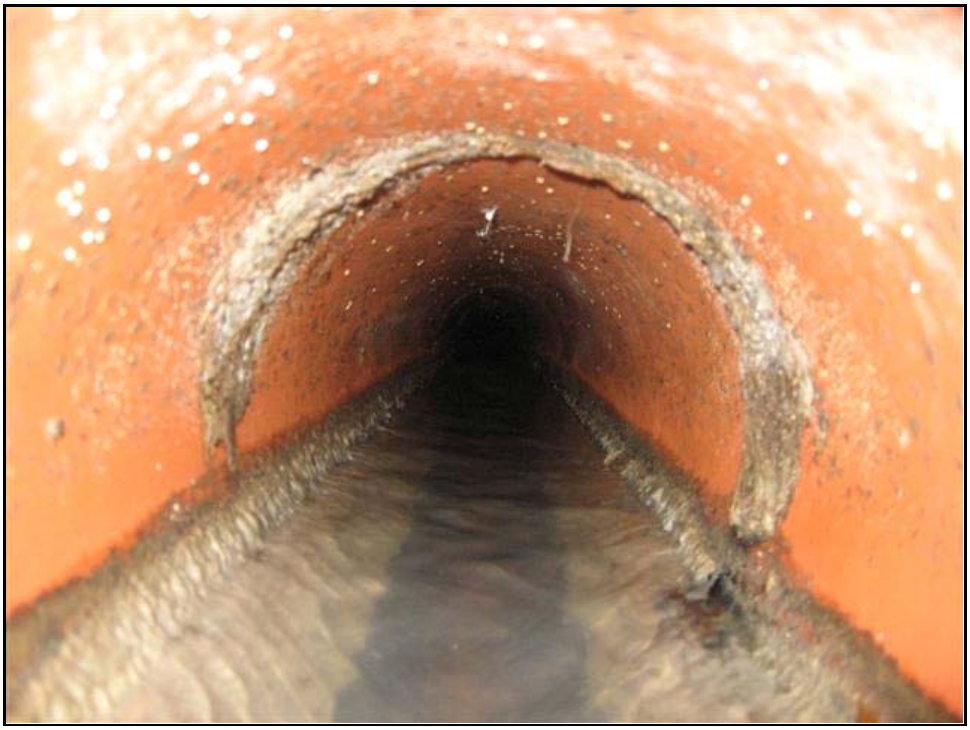
Street View Photo



Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 178

East Inlet



North Inlet

	Site Information Report Photos	**Monitoring Site:** MH 178

West Outlet

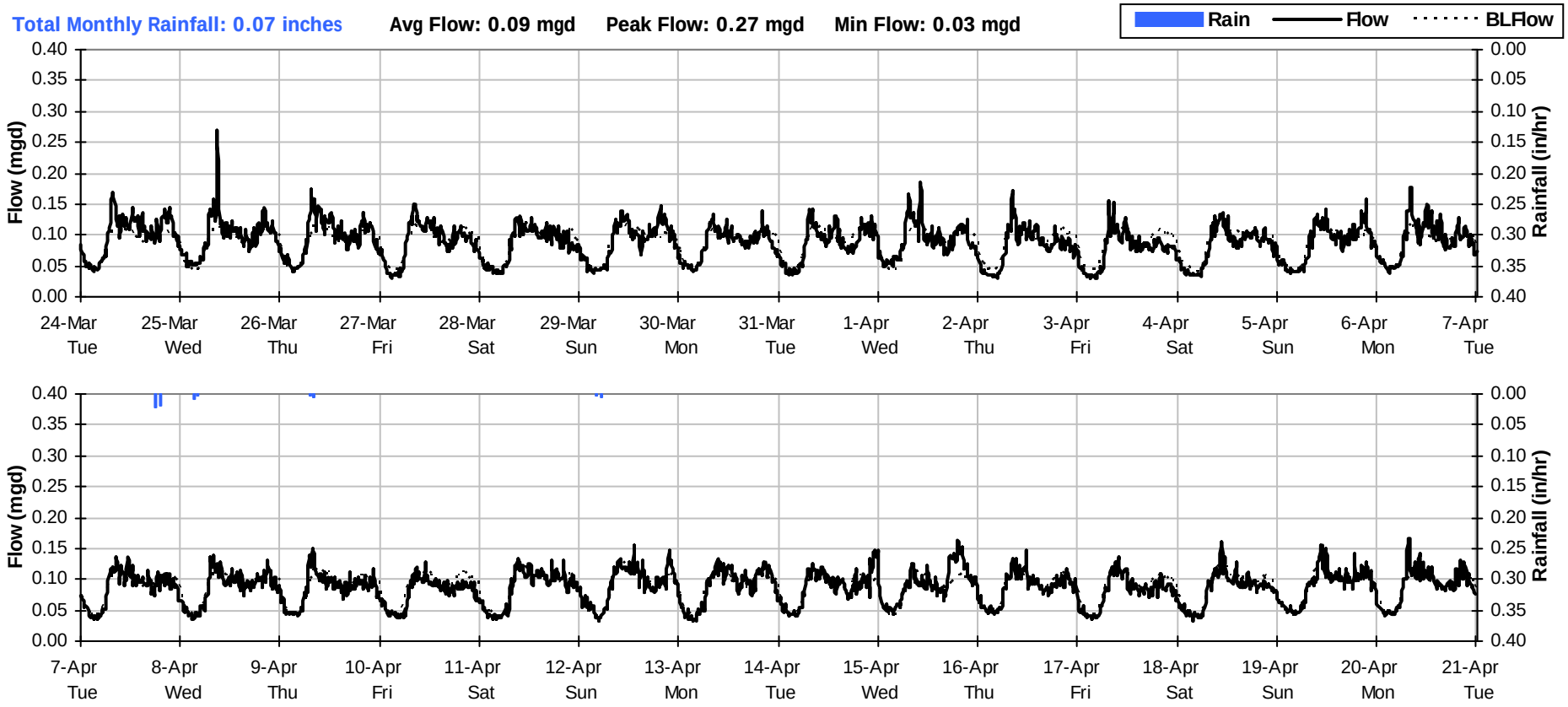
Period Flow Summary

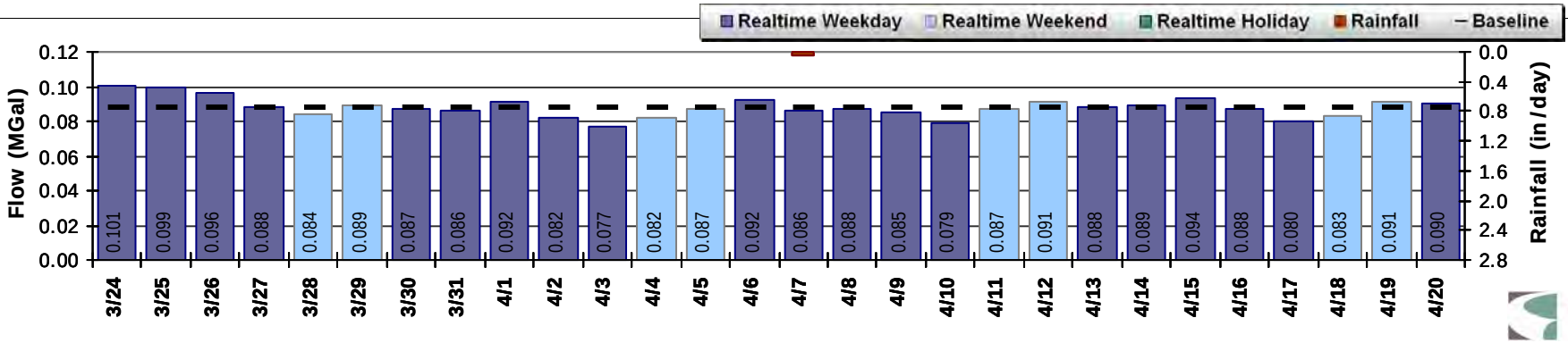
March 24, 2009 to April 21, 2009

Monitoring Site:

MH 178

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.09 mgd** **Peak Flow: 0.27 mgd** **Min Flow: 0.03 mgd**

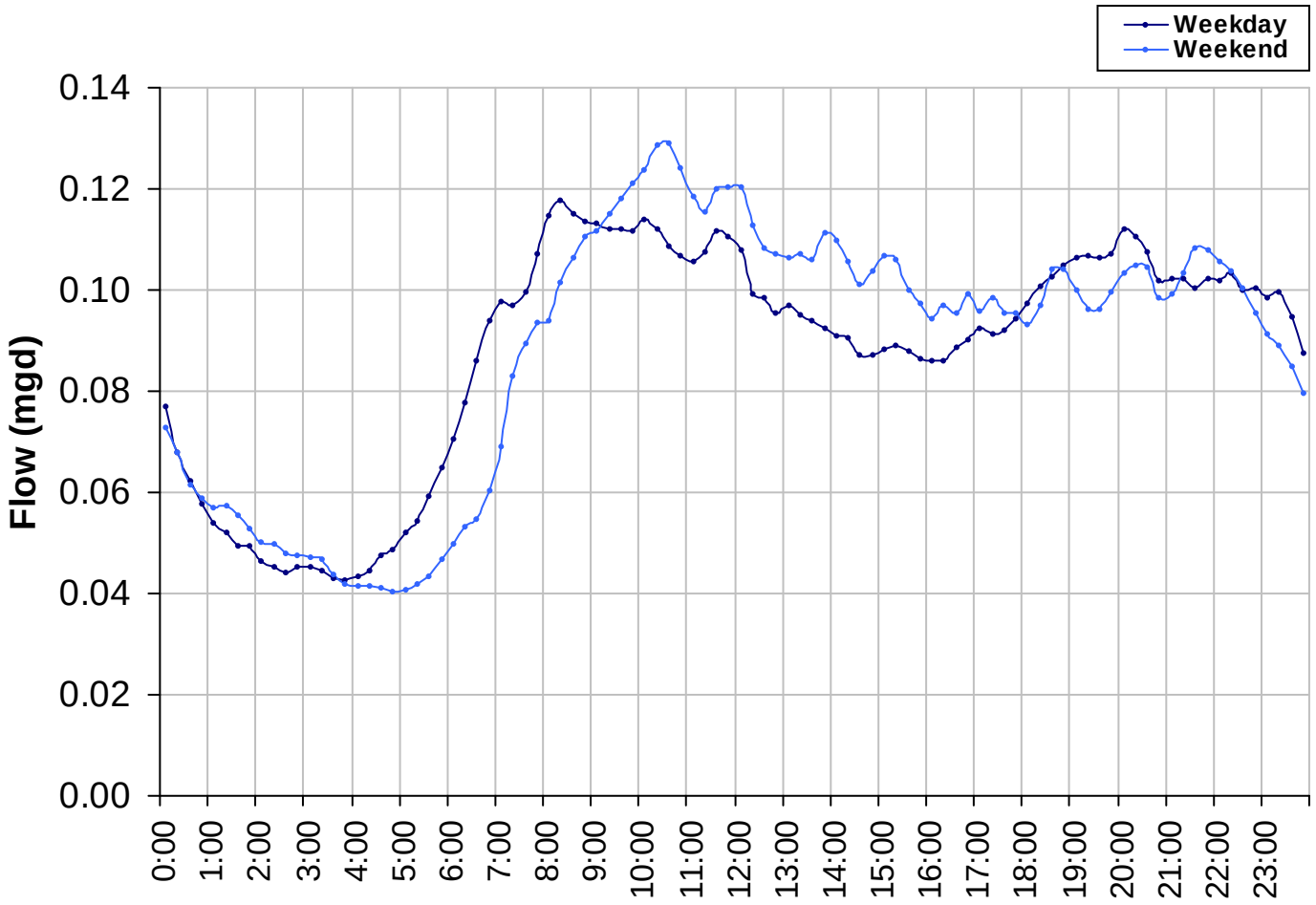




V&A

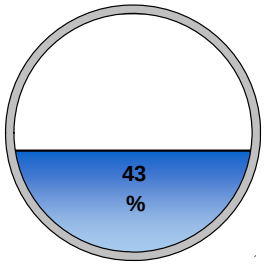
Average Dry Weather Flow

Monitoring Site:
MH 178



Peak Measured Flow:

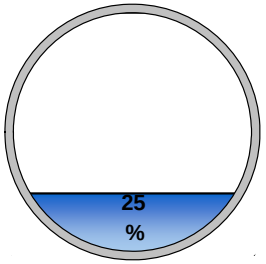
0.27 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.09 *mgd*

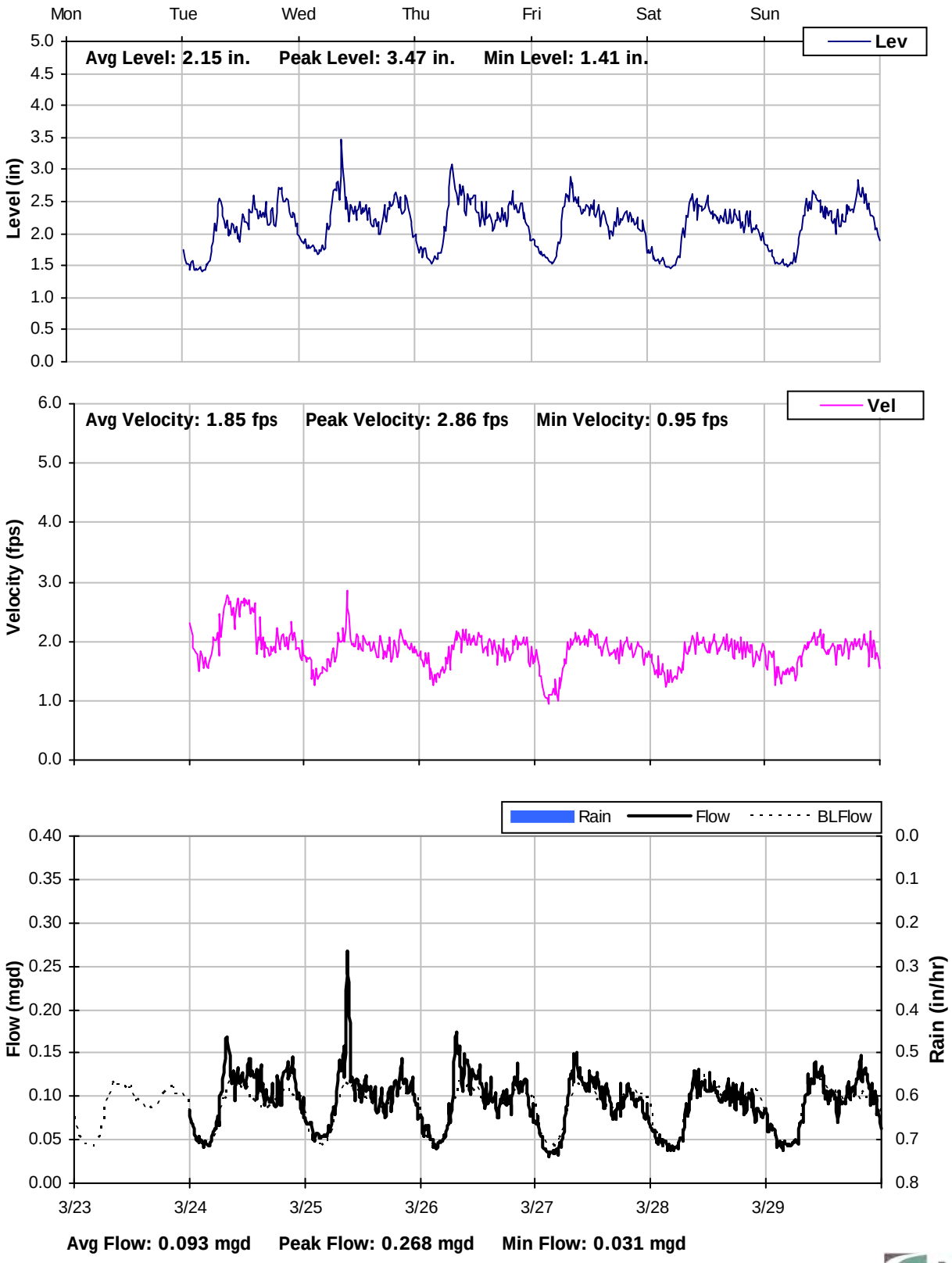


Level, Velocity and Flow

From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 178

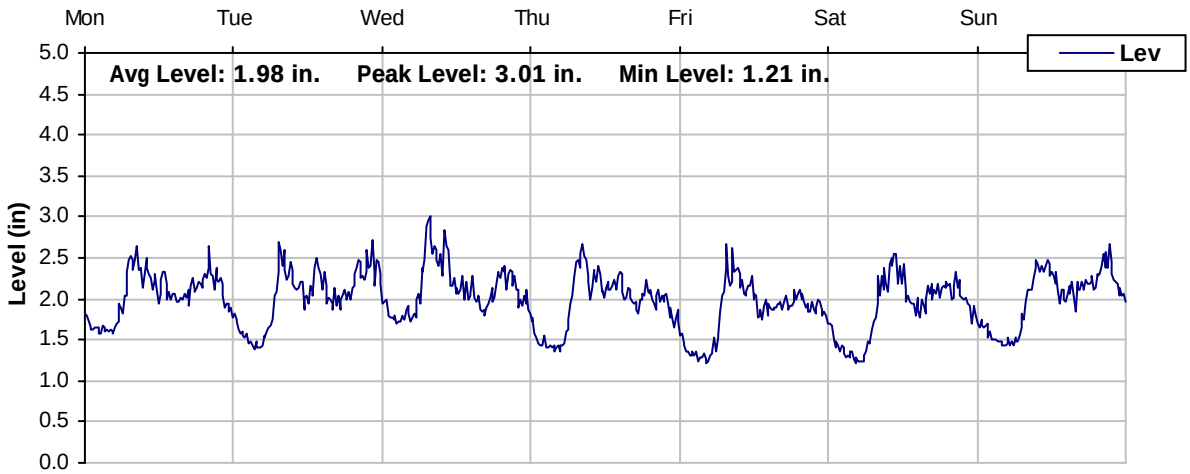


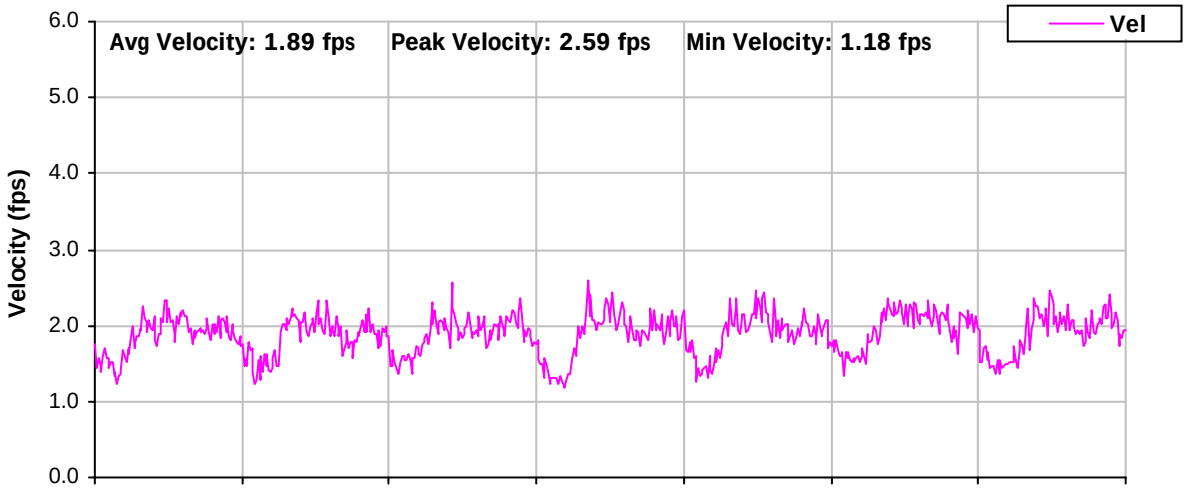
Level, Velocity and Flow

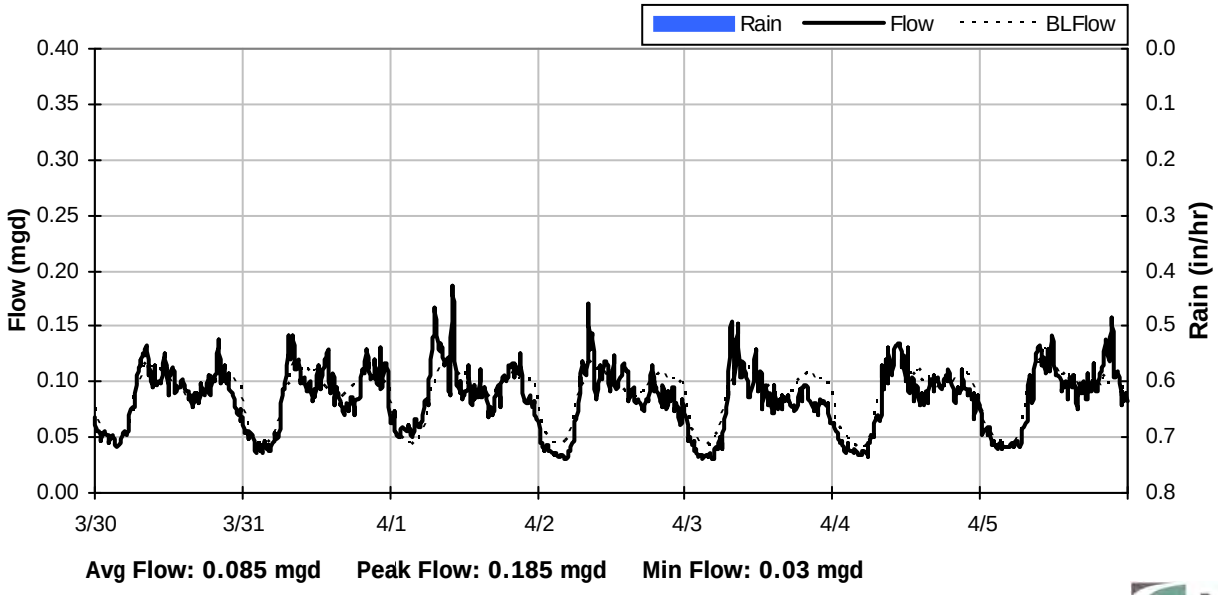
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 178







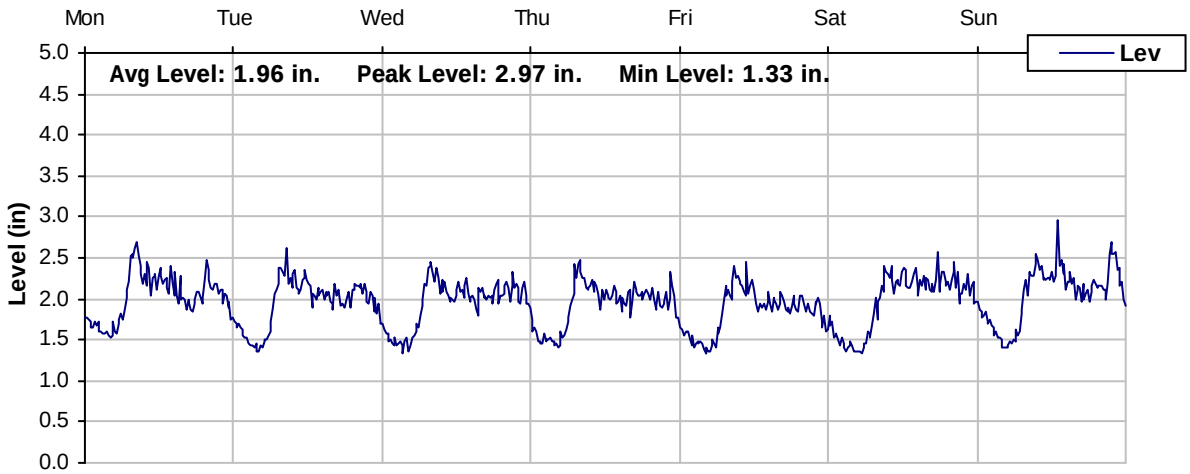
Avg Flow: 0.085 mgd **Peak Flow: 0.185 mgd** **Min Flow: 0.03 mgd**

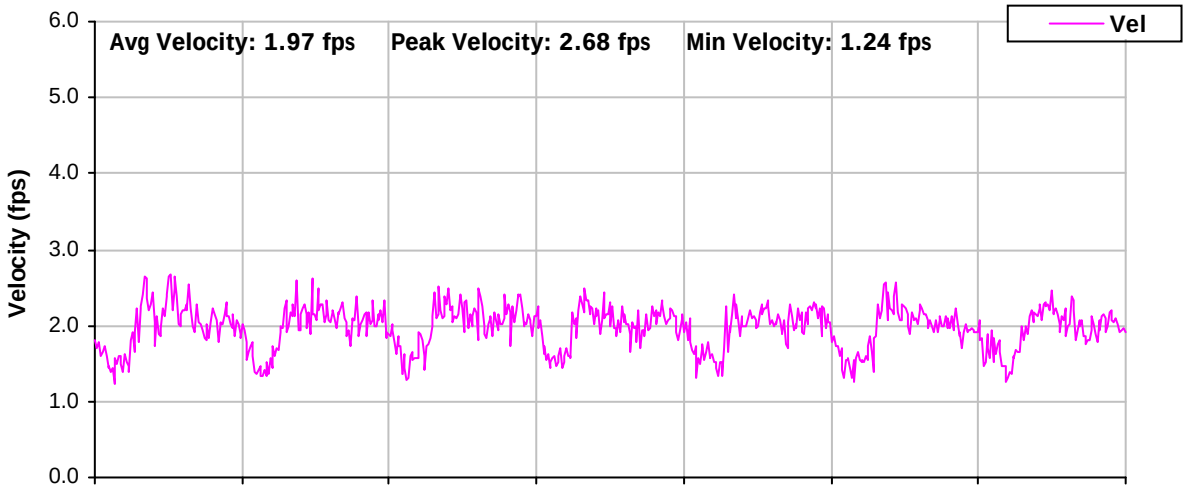
Level, Velocity and Flow

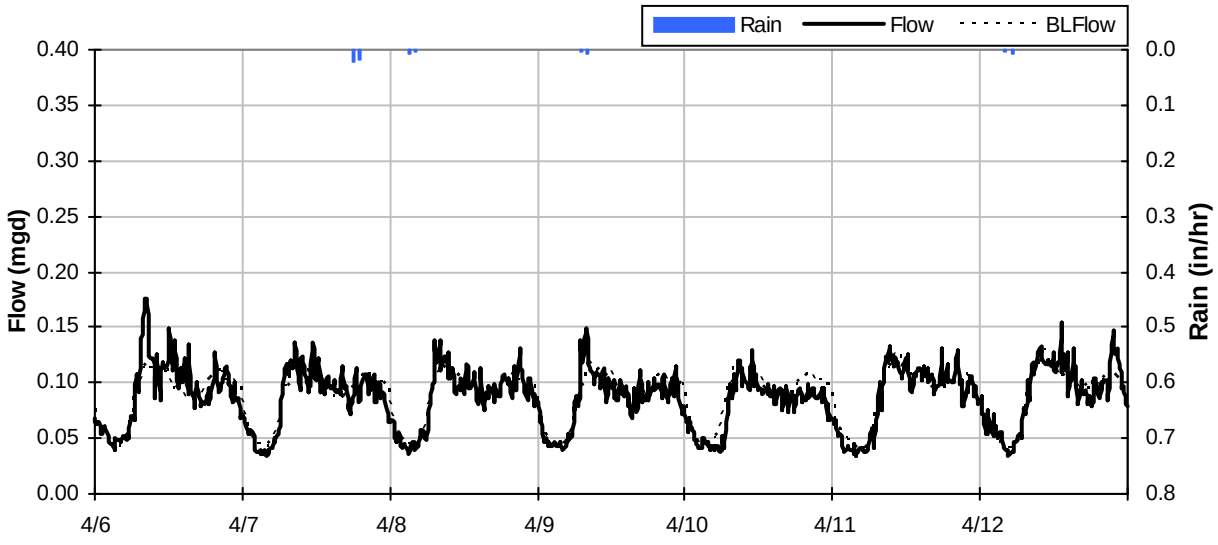
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 178







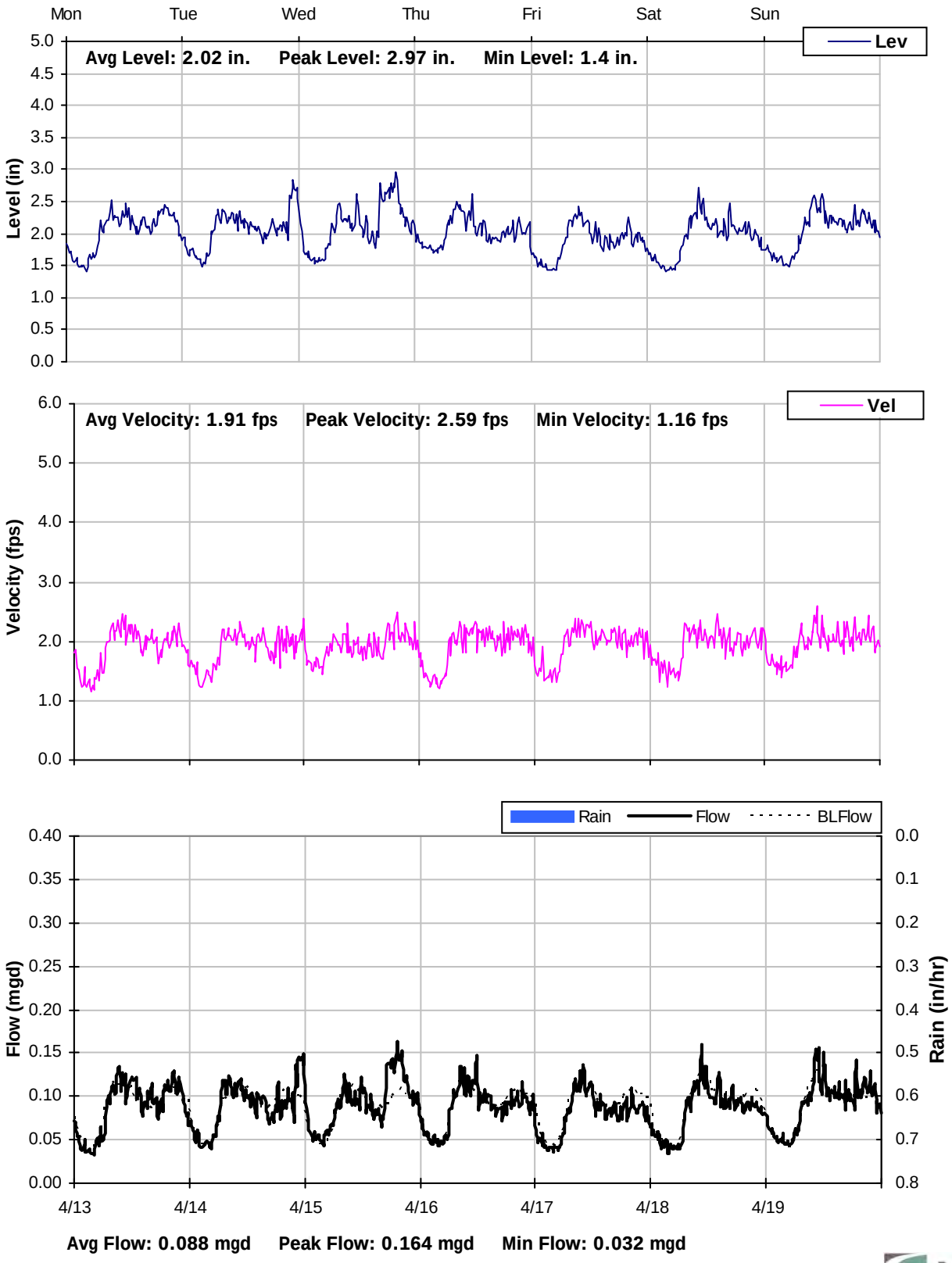
Avg Flow: 0.087 mgd **Peak Flow: 0.176 mgd** **Min Flow: 0.034 mgd**

Level, Velocity and Flow

From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 178

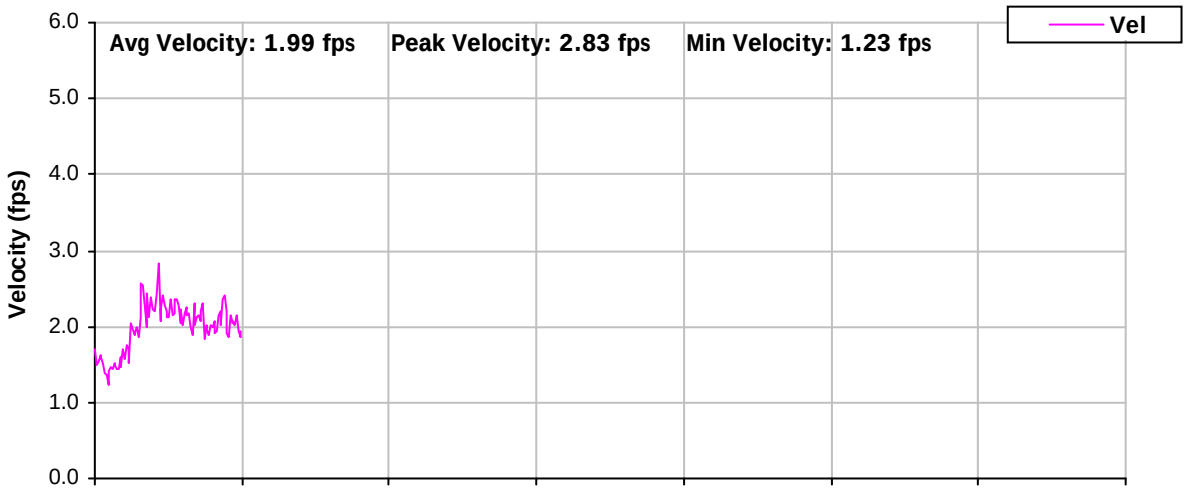


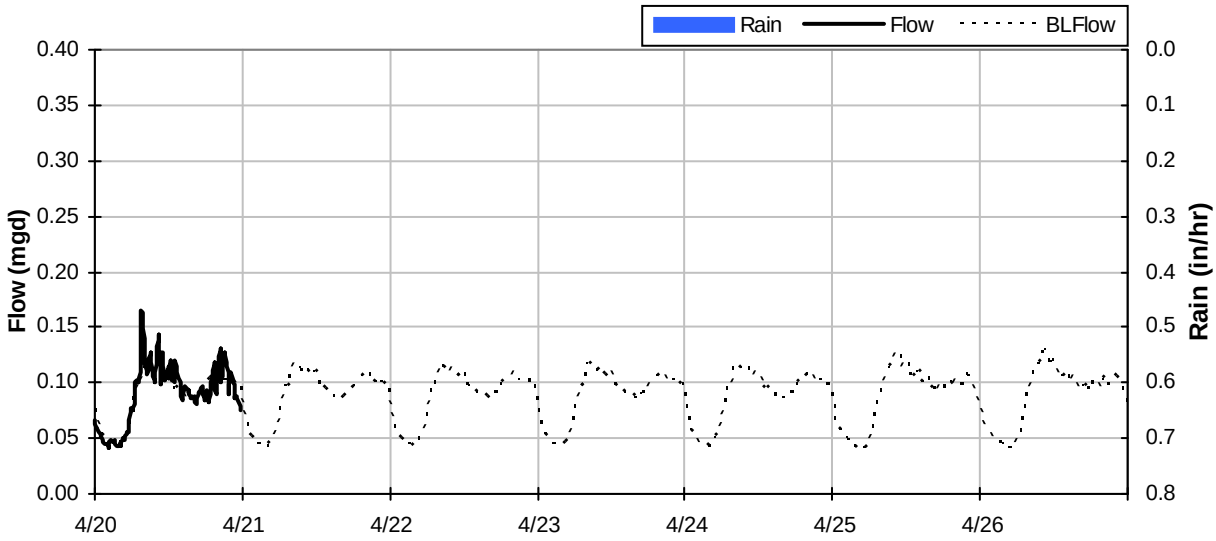
Level, Velocity and Flow

From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 178





Avg Flow: 0.09 mgd **Peak Flow: 0.165 mgd** **Min Flow: 0.041 mgd**

Temporary Flow Monitoring Study

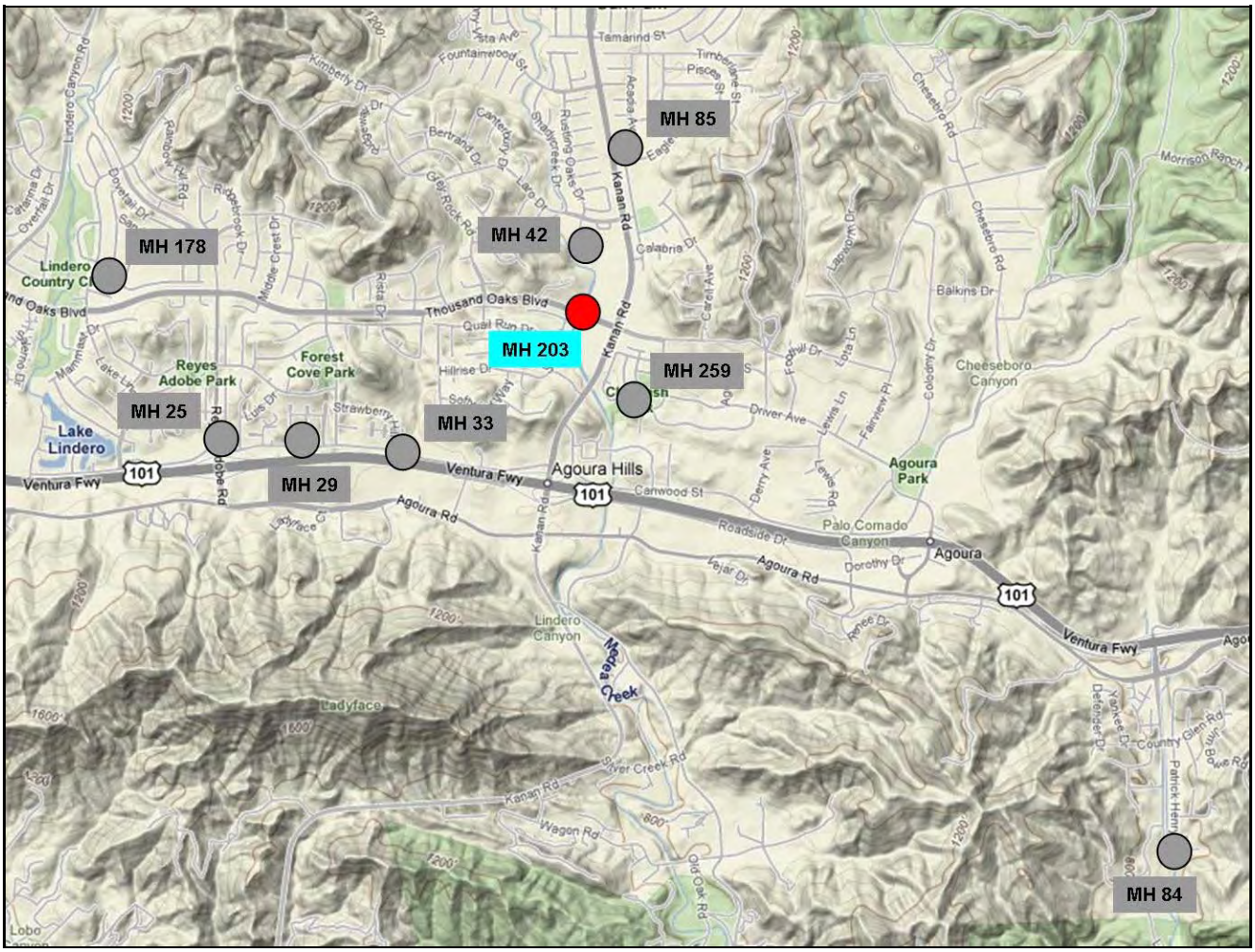
Sanitary Sewer Collection System

Monitoring Site: MH 203

Location: Thousand Oaks Boulevard, west of Kanan Road

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 203

Location: Thousand Oaks Boulevard, west of Kanan Road

Diameter: 8 inches

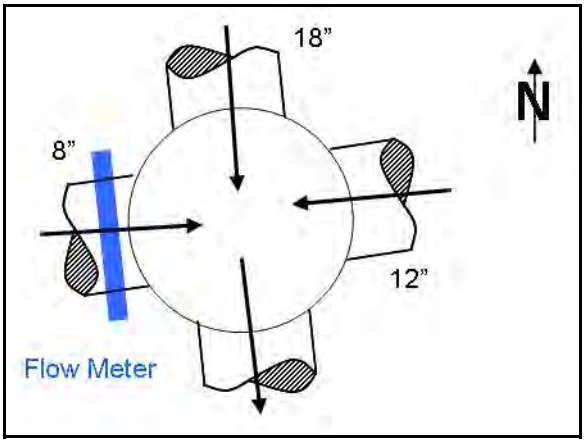
Average Dry Weather Flow: 0.09 *mgd*

Peak Measured Flow: 0.20 *mgd*

Satellite Map

Sanitary Map

Flow Sketch



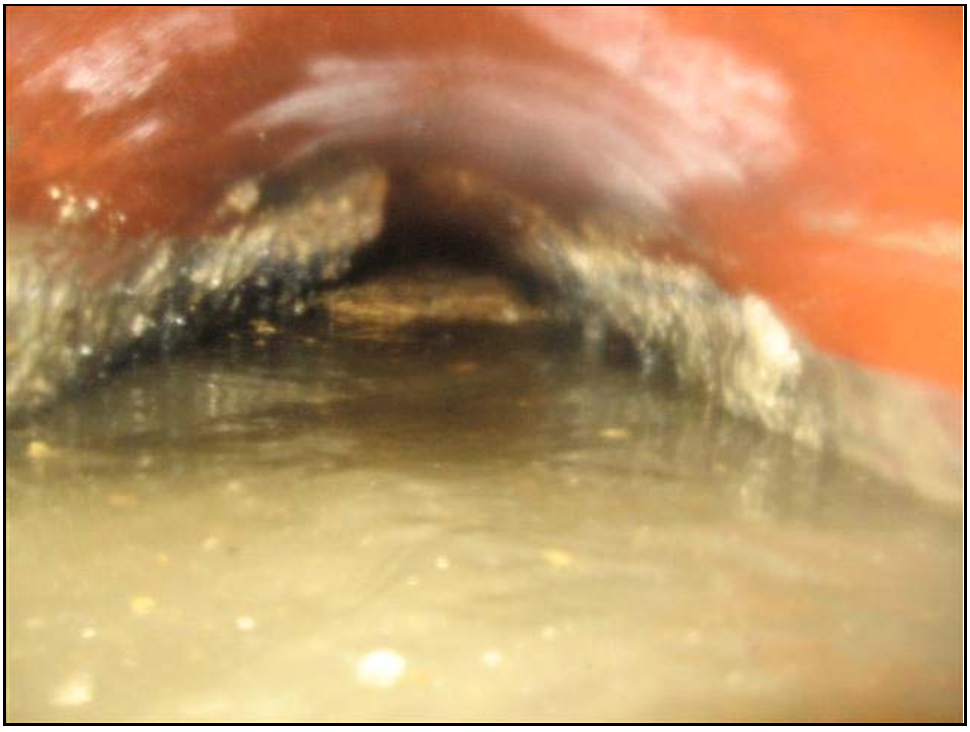
Street View Photo

Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 203

Manhole Lid

East Inlet



	Site Information Report Photos	**Monitoring Site:** MH 203

North Inlet

West Inlet

	Site Information Report Photos	**Monitoring Site:** MH 203

South Outlet

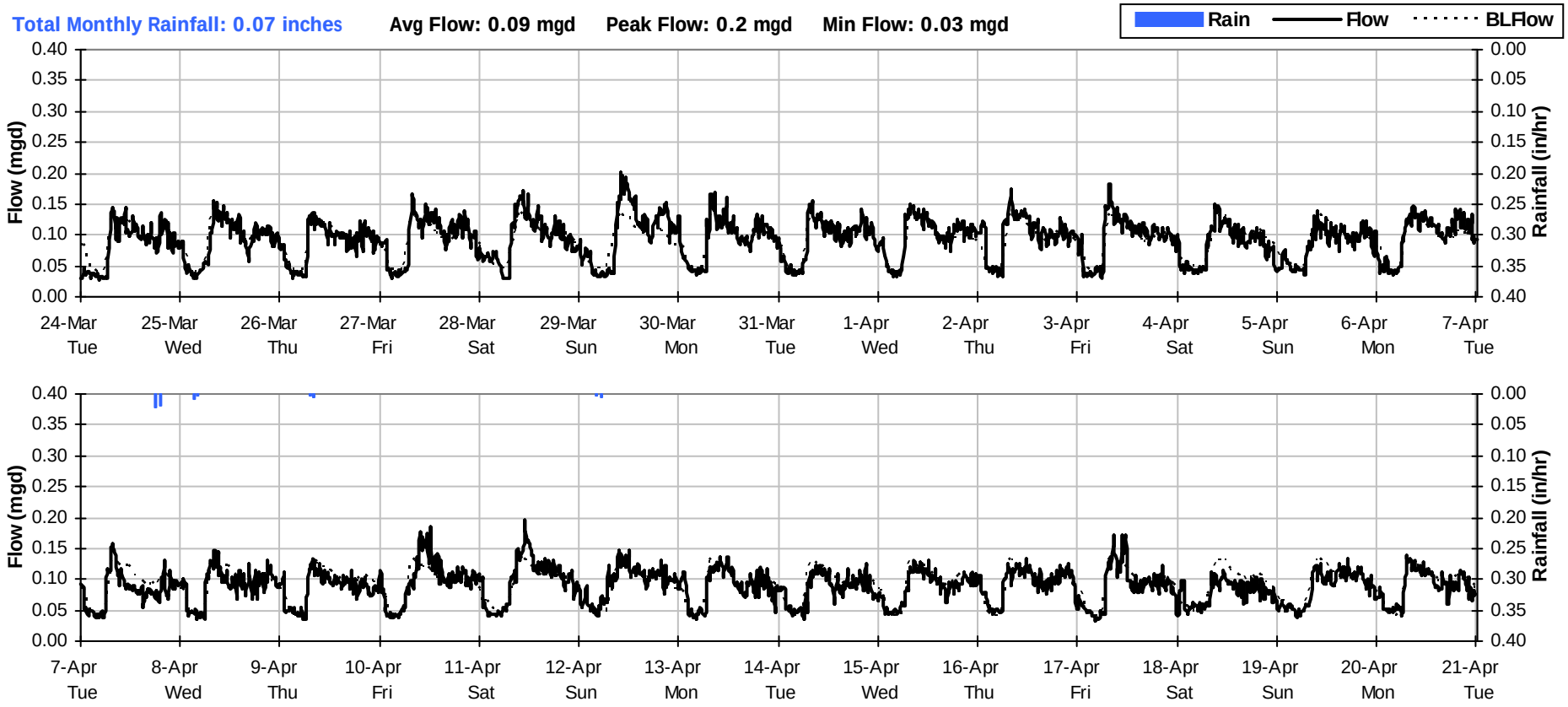
Period Flow Summary

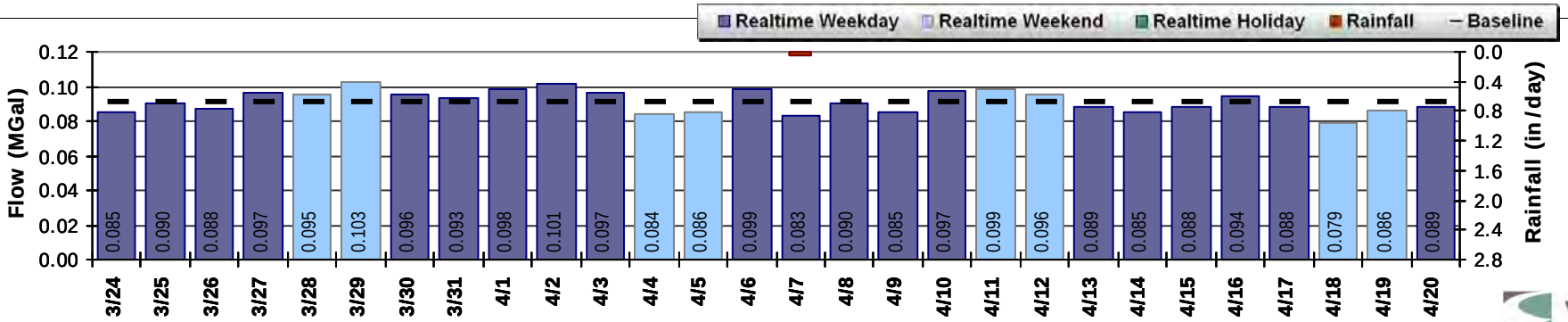
March 24, 2009 to April 21, 2009

Monitoring Site:

MH 203

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.09 mgd** **Peak Flow: 0.2 mgd** **Min Flow: 0.03 mgd**

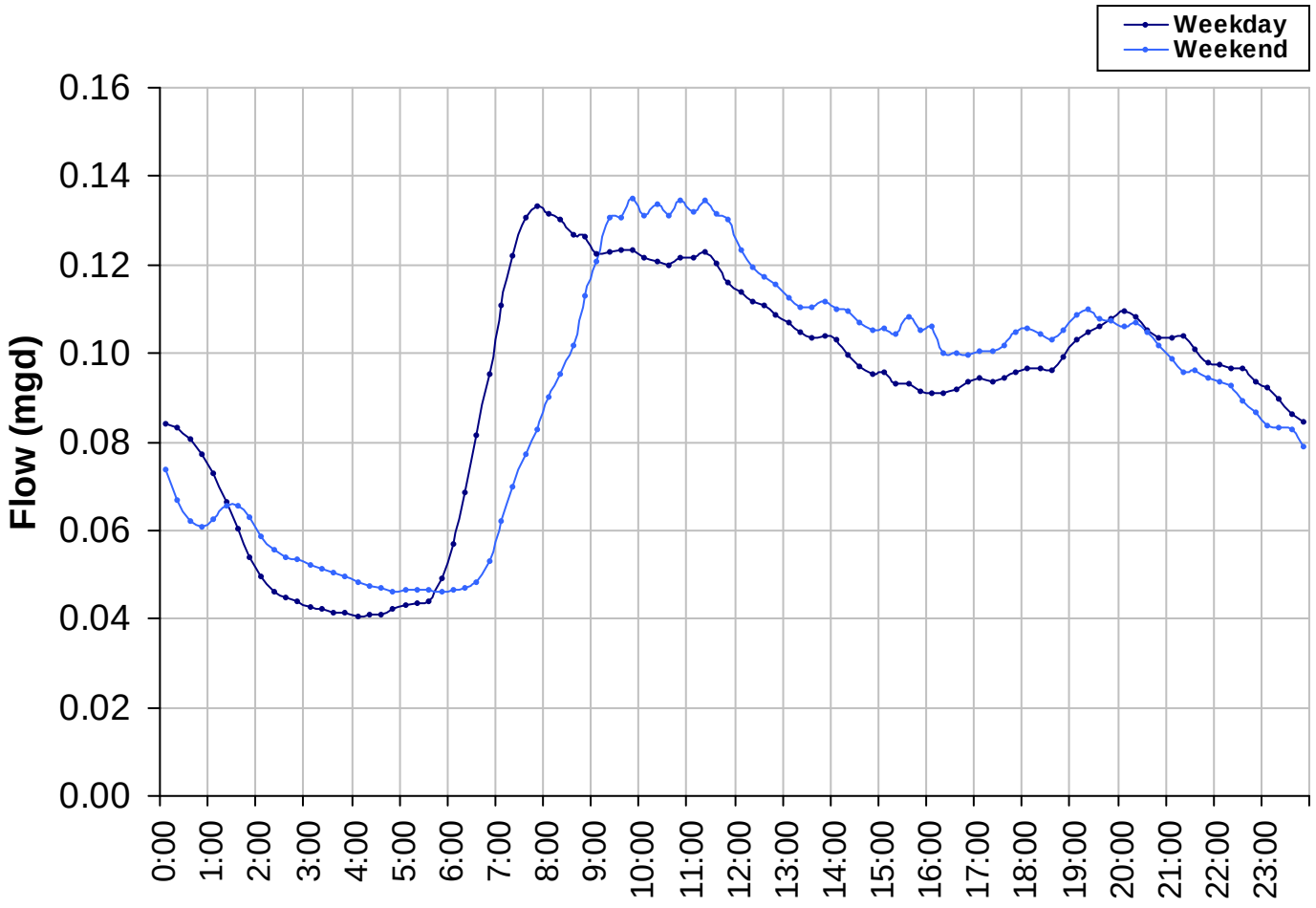




V&A

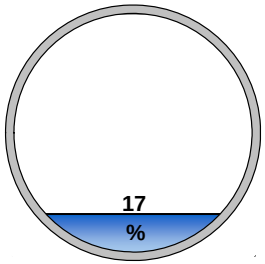
Average Dry Weather Flow

Monitoring Site:
MH 203



Peak Measured Flow:

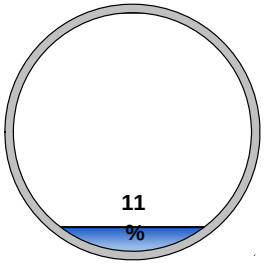
0.20 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.09 *mgd*

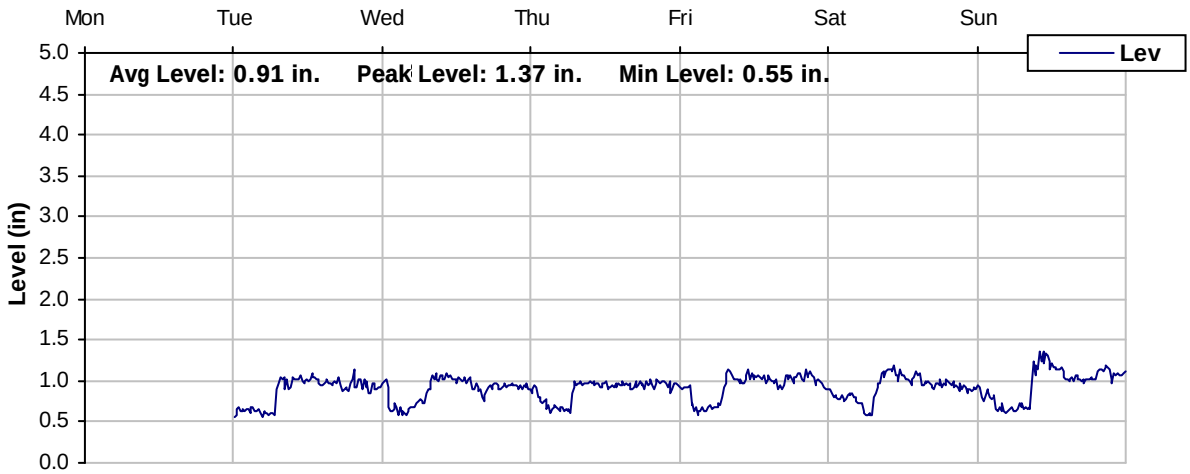


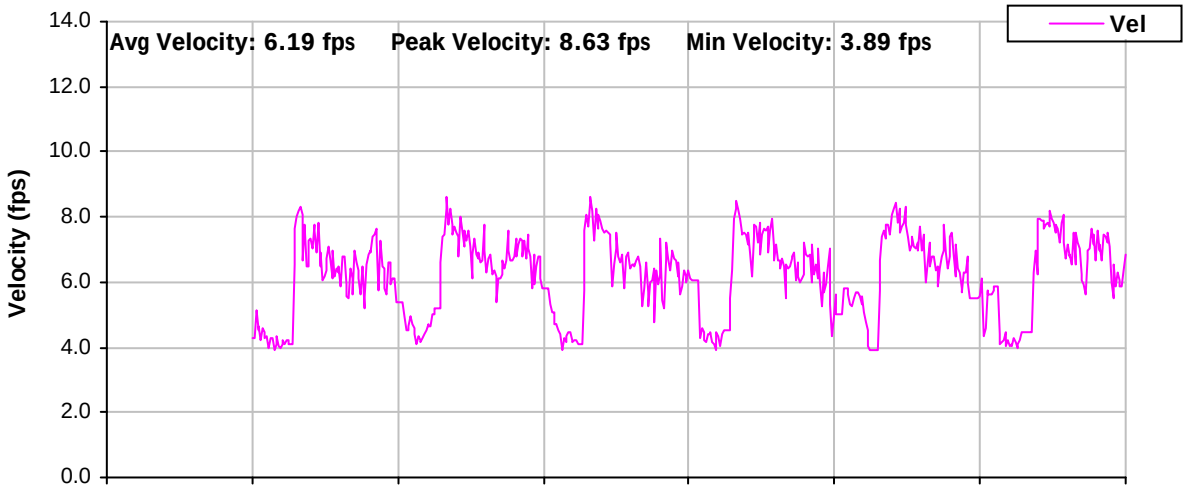
Level, Velocity and Flow

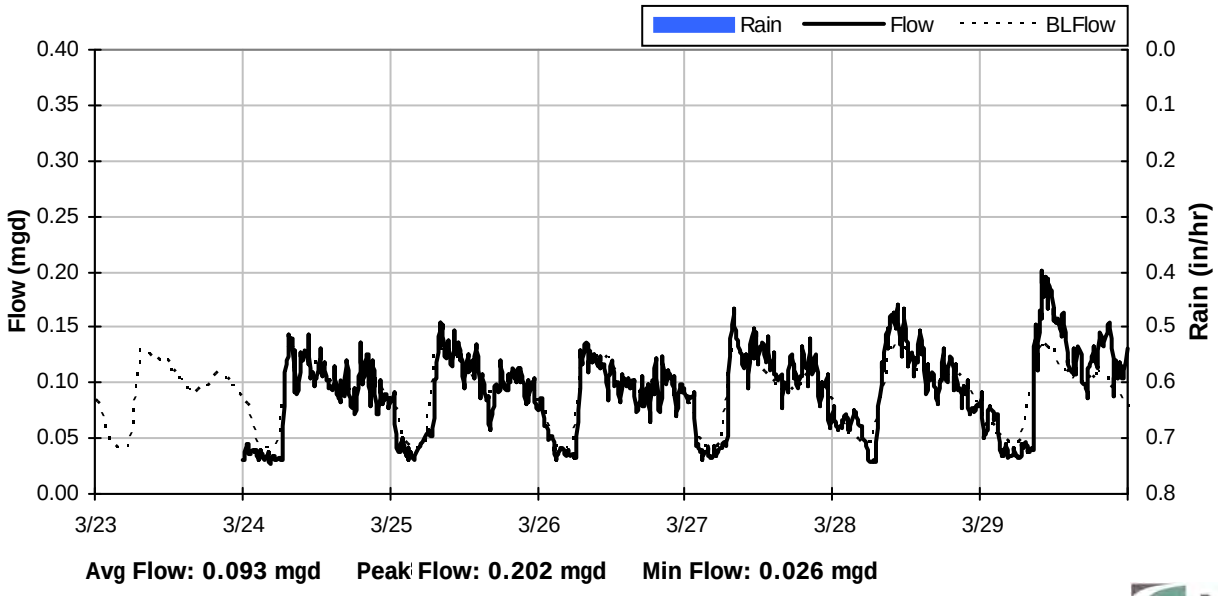
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 203







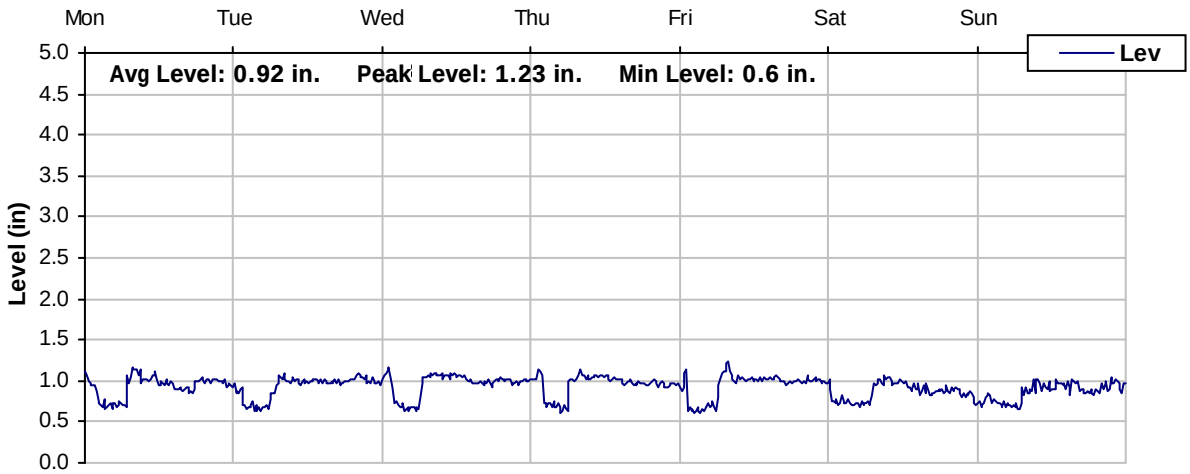
Avg Flow: 0.093 mgd **Peak Flow: 0.202 mgd** **Min Flow: 0.026 mgd**

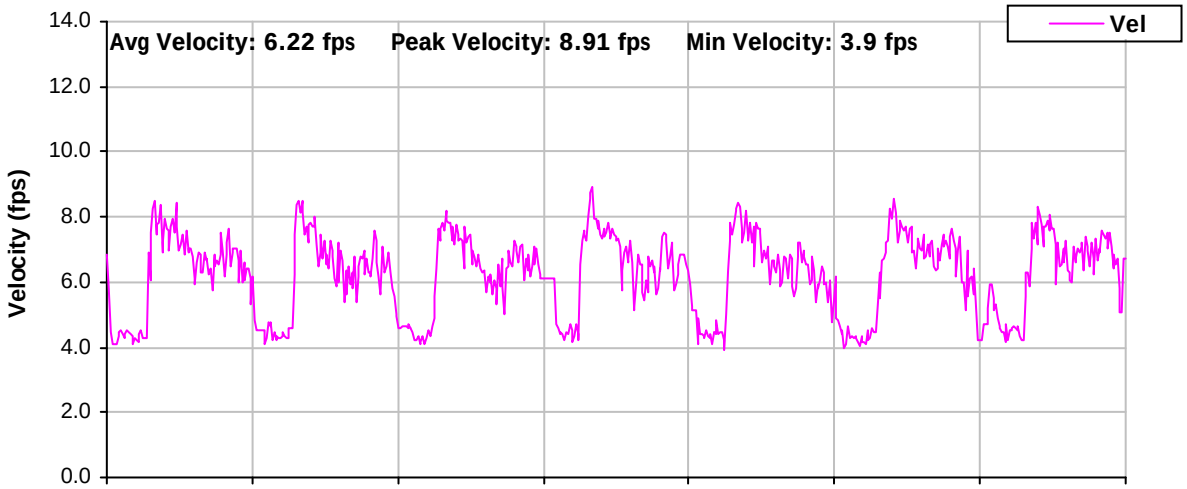
Level, Velocity and Flow

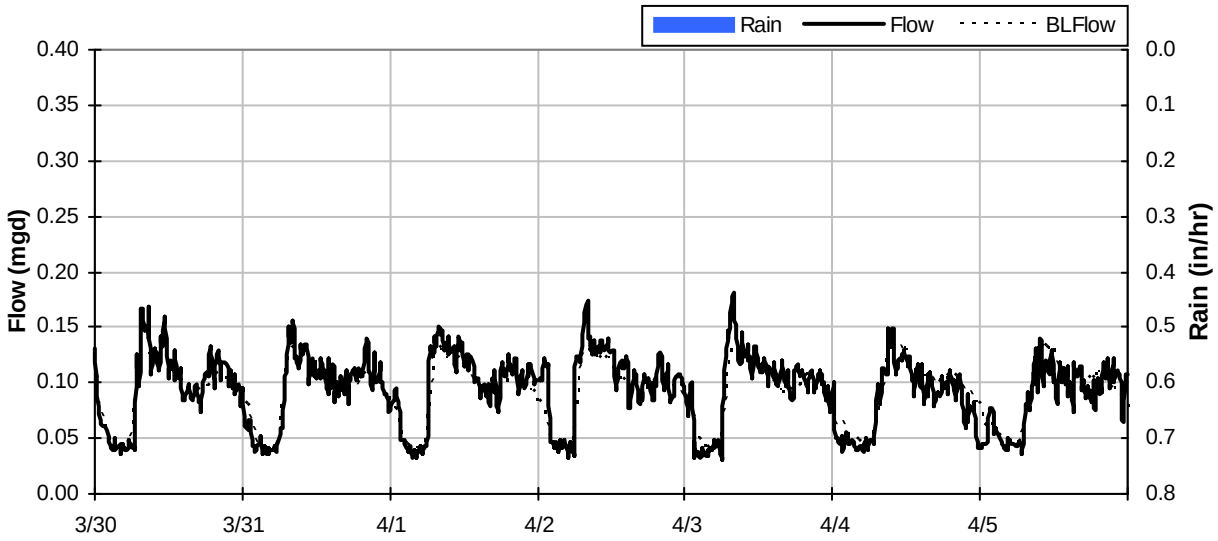
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 203







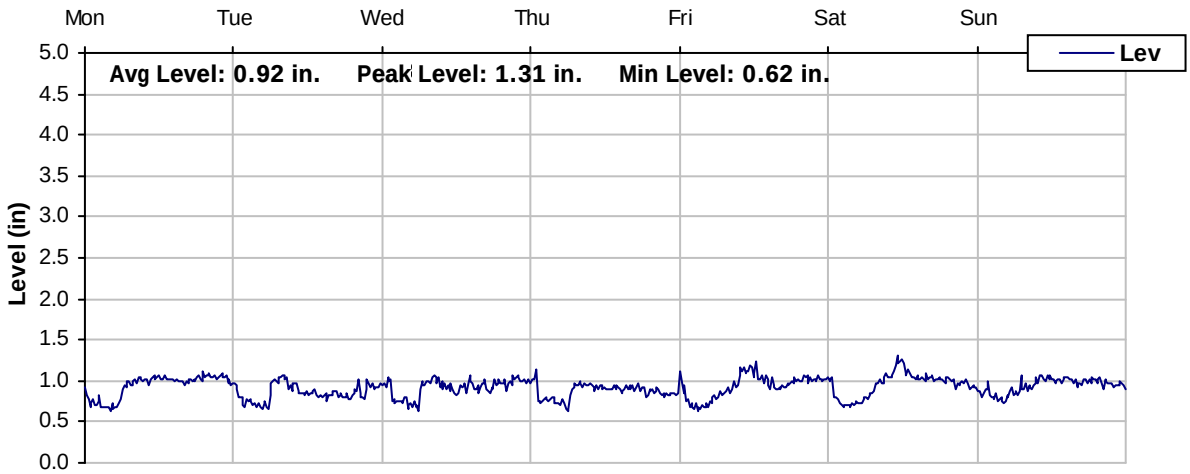
Avg Flow: 0.094 mgd **Peak Flow: 0.181 mgd** **Min Flow: 0.031 mgd**

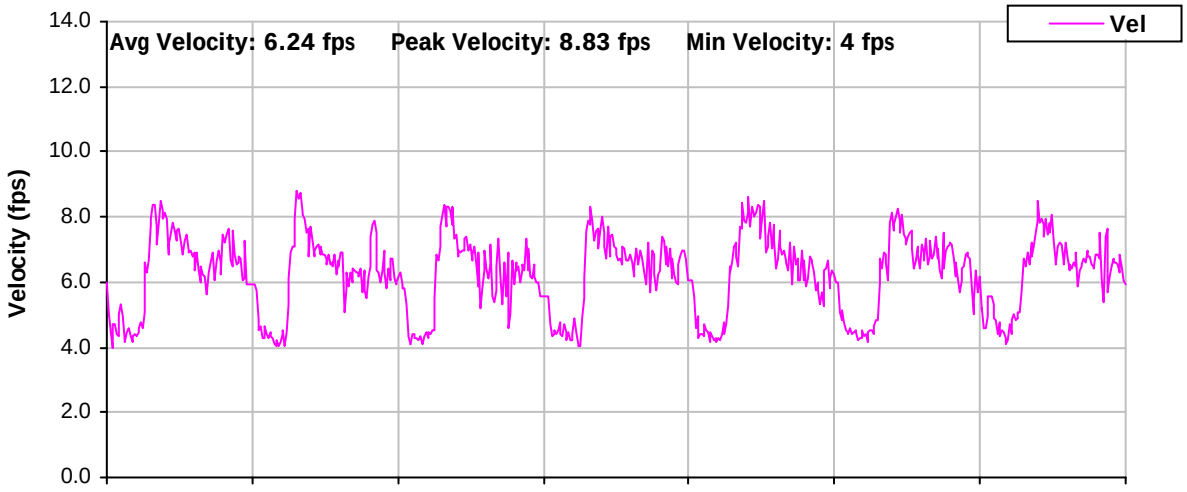
Level, Velocity and Flow

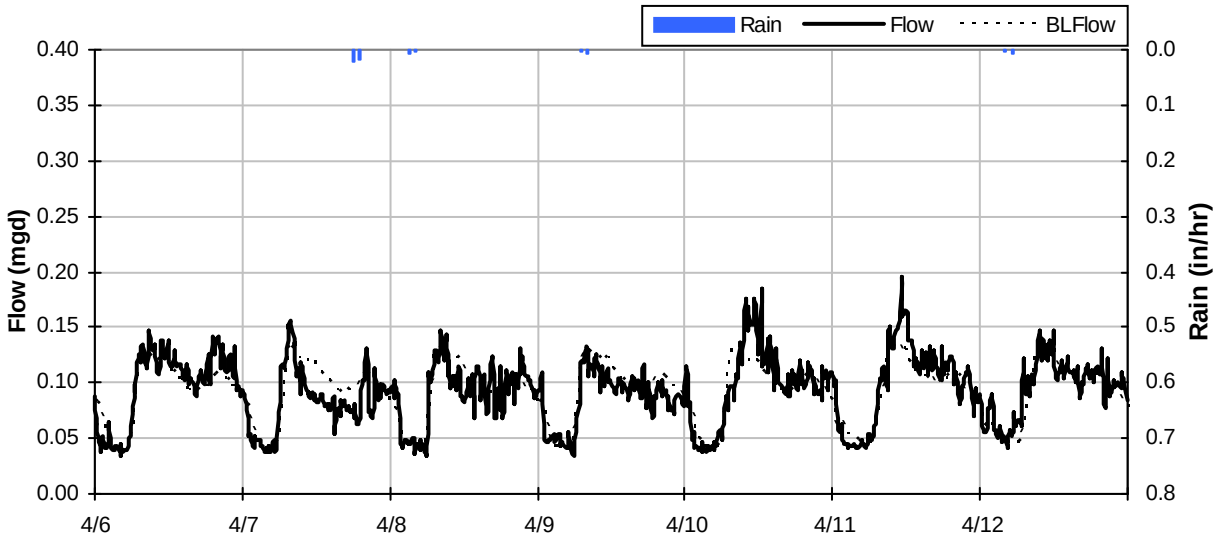
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 203







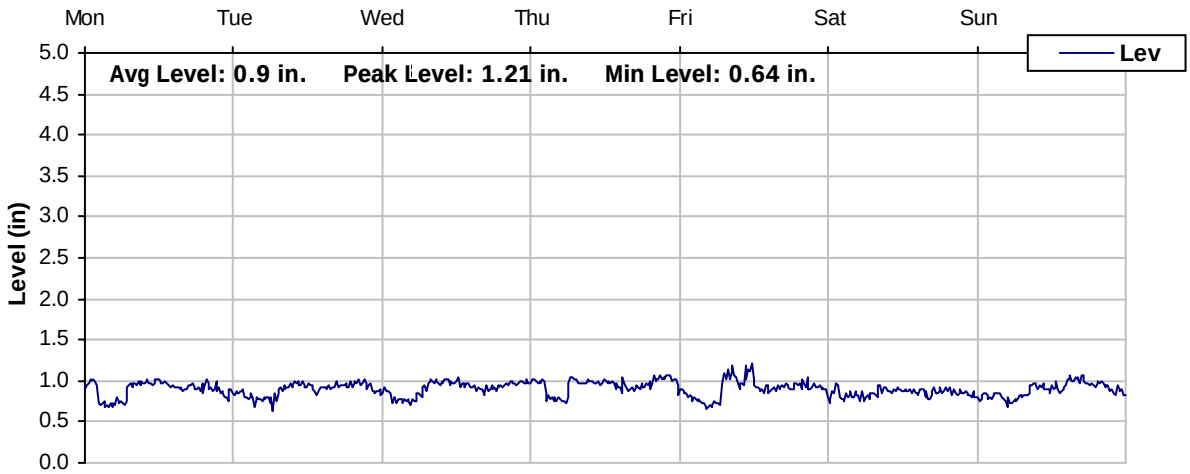
Avg Flow: 0.093 mgd **Peak Flow: 0.196 mgd** **Min Flow: 0.034 mgd**

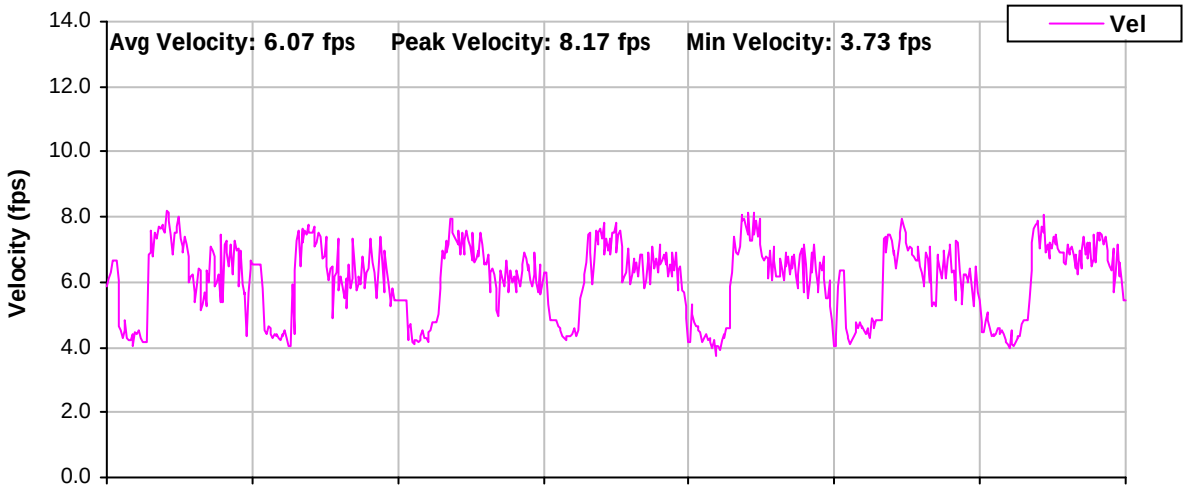
Level, Velocity and Flow

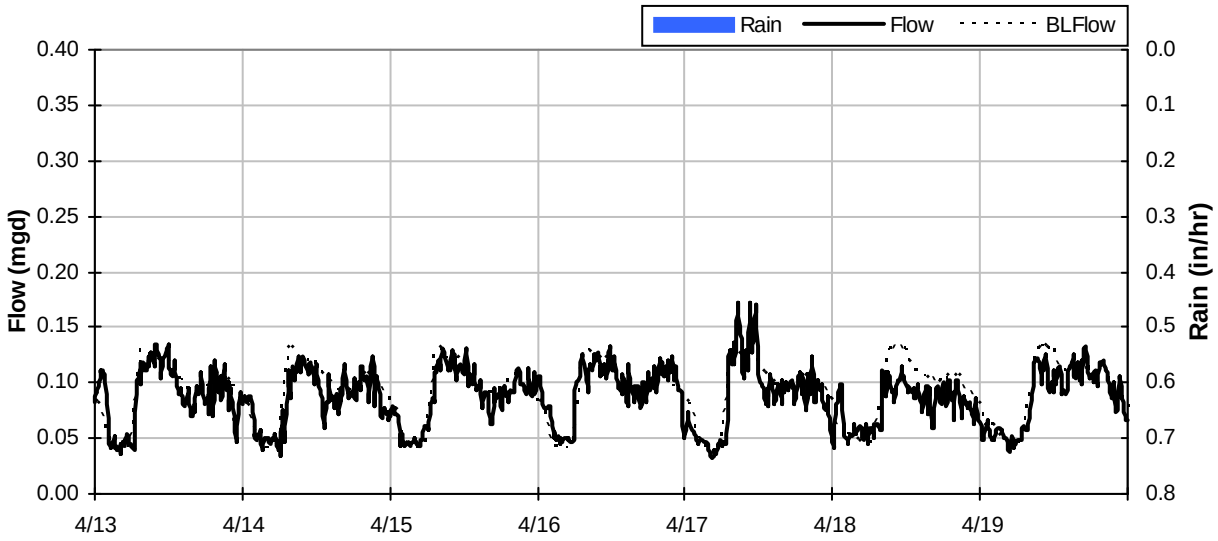
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 203







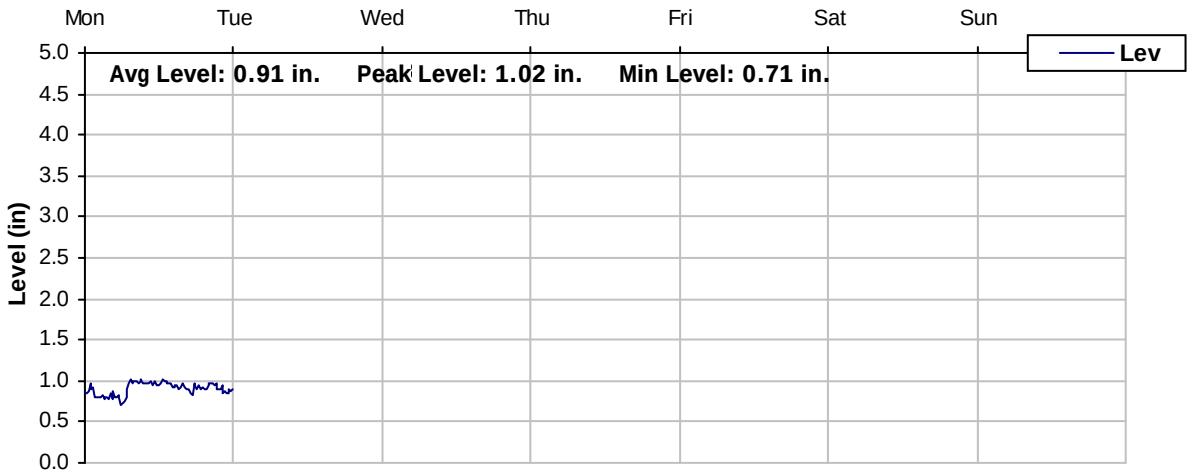
Avg Flow: 0.087 mgd **Peak Flow: 0.171 mgd** **Min Flow: 0.032 mgd**

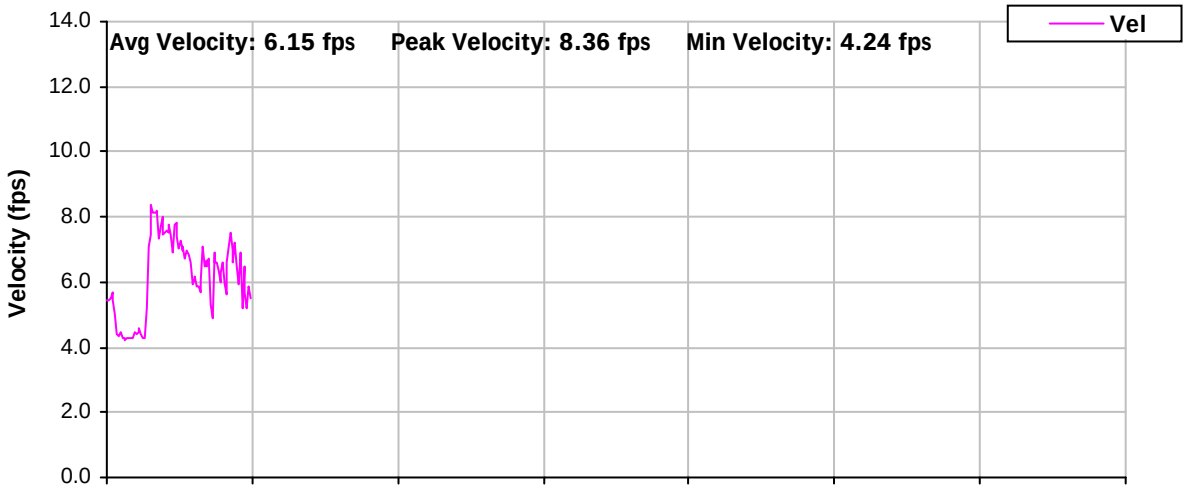
Level, Velocity and Flow

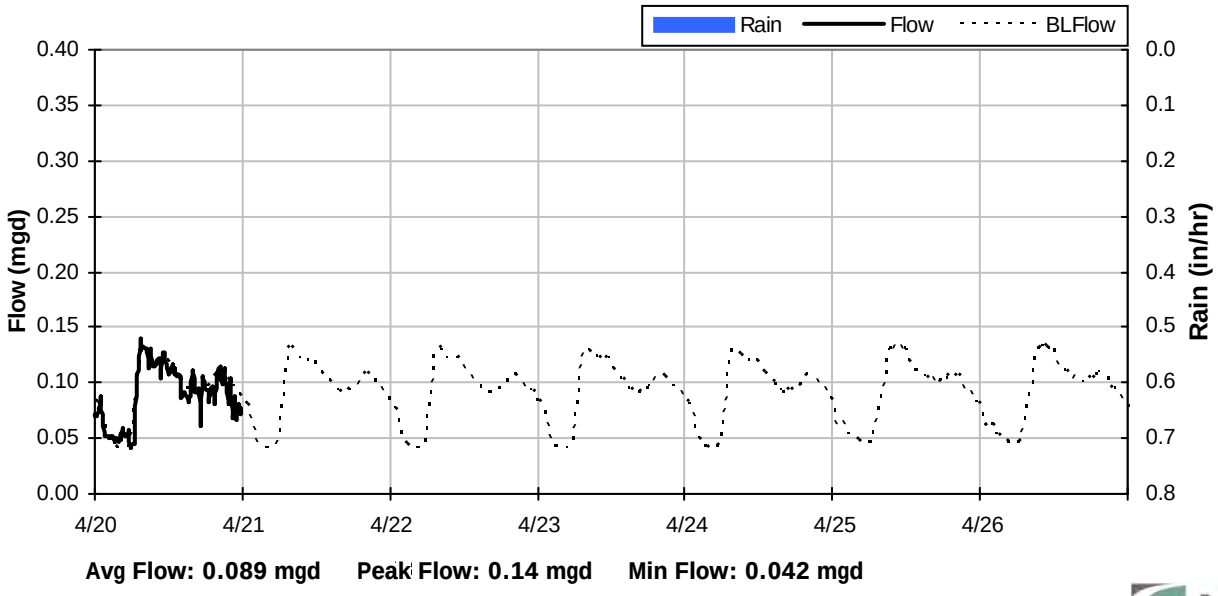
From 4/20/2009 to 4/27/2009

Monitoring Site:

MH 203







Avg Flow: 0.089 mgd **Peak Flow: 0.14 mgd** **Min Flow: 0.042 mgd**

Temporary Flow Monitoring Study

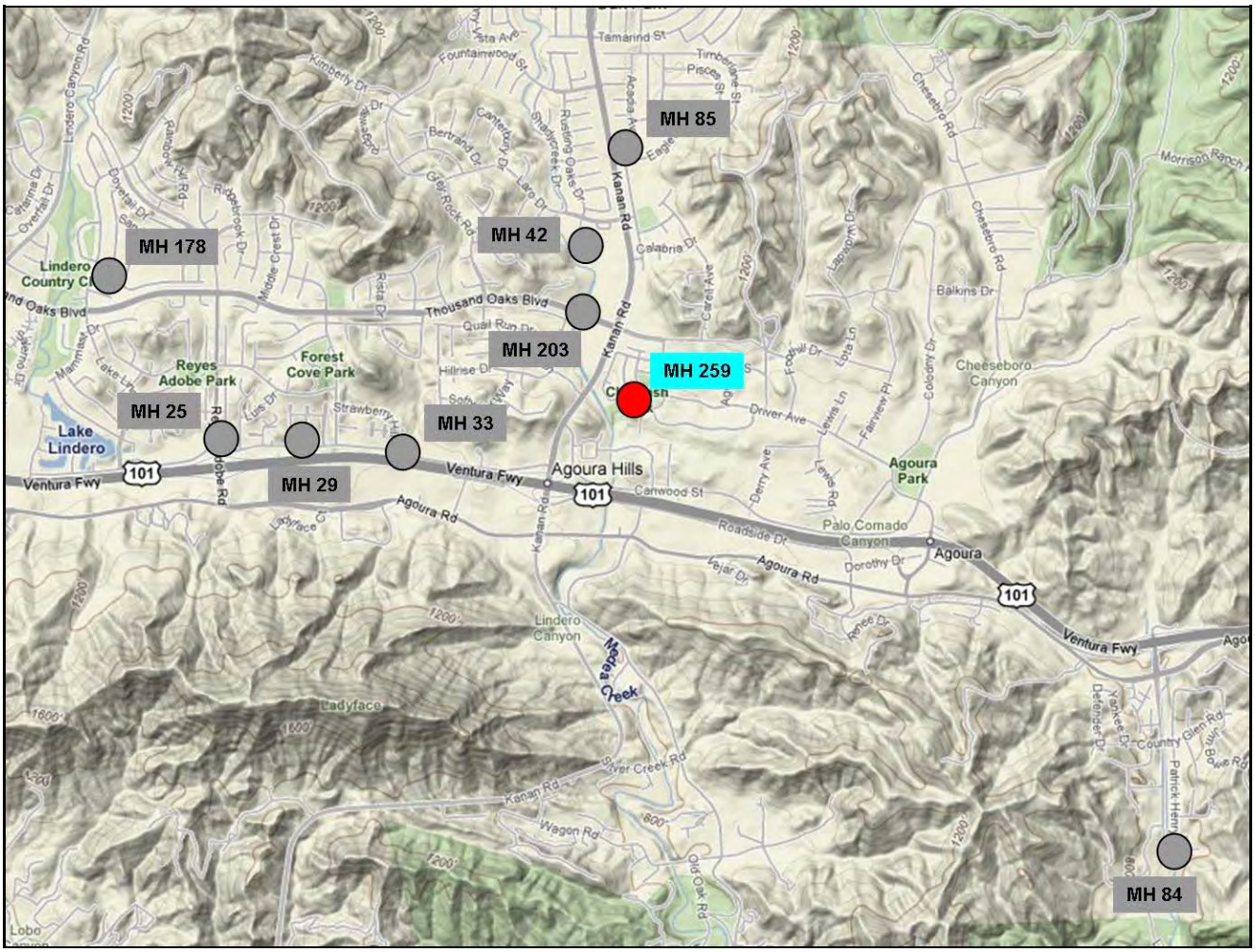
Sanitary Sewer Collection System

Monitoring Site: MH 259

Location: Chumash Park near Medea Valley Drive

Size / Type Line: 8-inch Sanitary Sewer Pipe

Data Summary Report



Site Information Report

Monitoring Site: MH 259

Location: Chumash Park near Medea Valley Drive

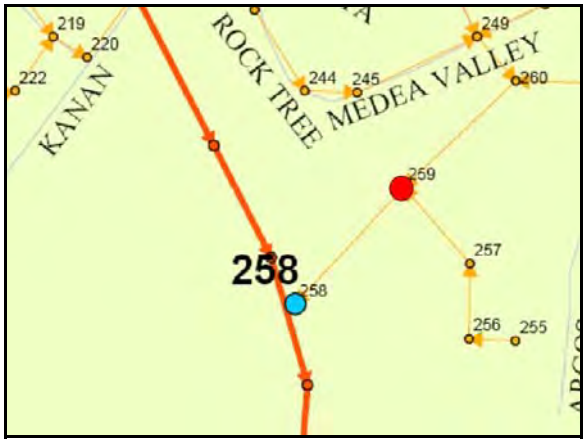
Diameter: 8 inches

Average Dry Weather Flow: 0.14 *mgd*

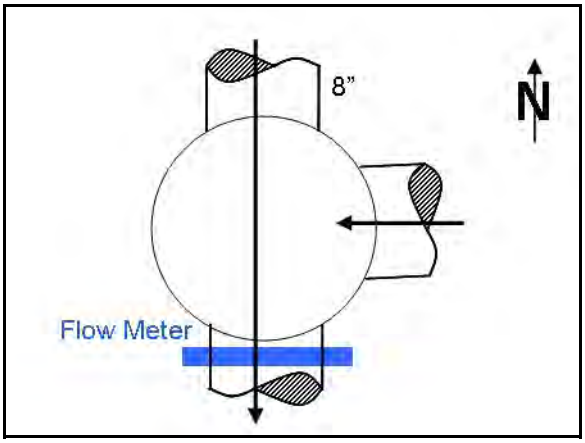
Peak Measured Flow: 0.35 *mgd*

Satellite Map

Sanitary Map



Flow Sketch



Street View Photo

Plan View Photo

	Site Information Report Photos	**Monitoring Site:** MH 259

East Inlet

South Inlet

	Site Information Report Photos	**Monitoring Site:** MH 259

West Outlet

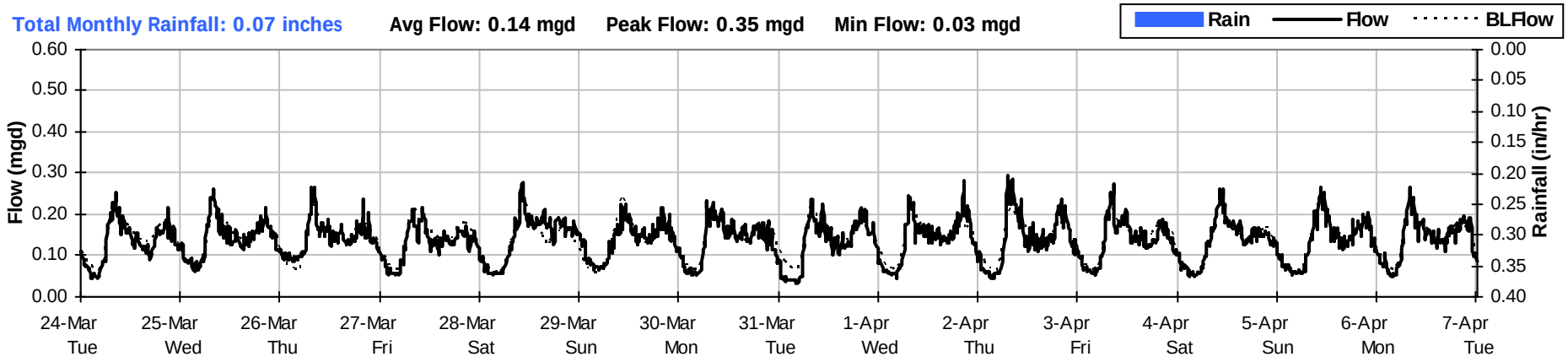
Period Flow Summary

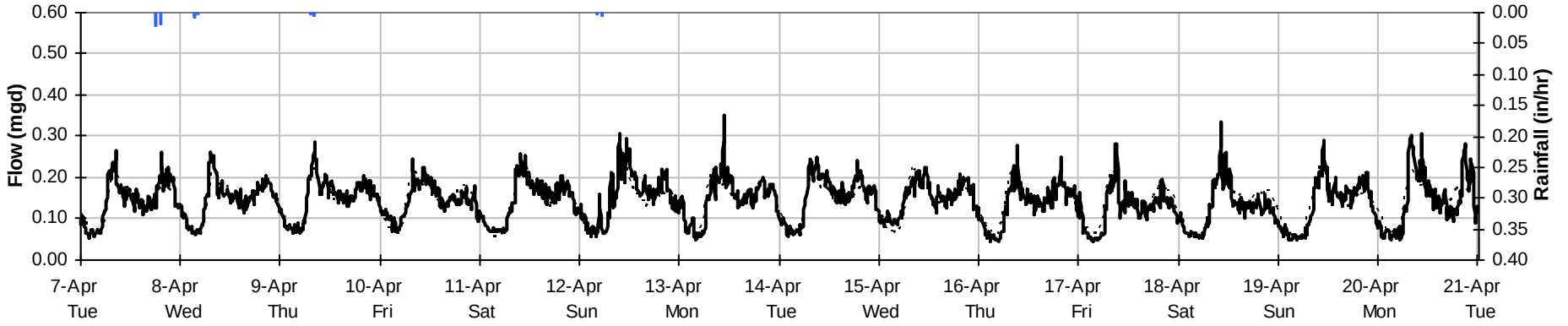
March 24, 2009 to April 21, 2009

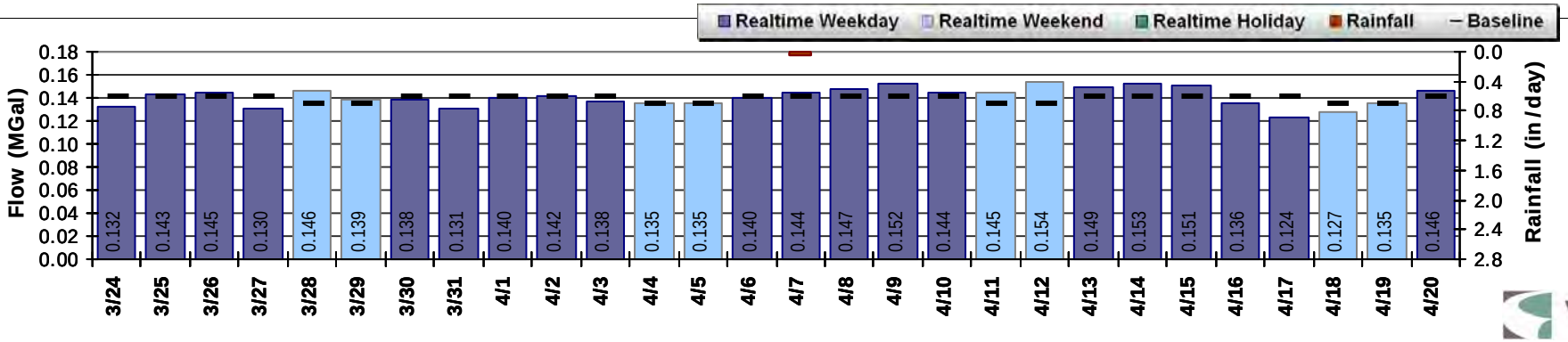
Monitoring Site:

MH 259

Total Monthly Rainfall: 0.07 inches **Avg Flow: 0.14 mgd** **Peak Flow: 0.35 mgd** **Min Flow: 0.03 mgd**

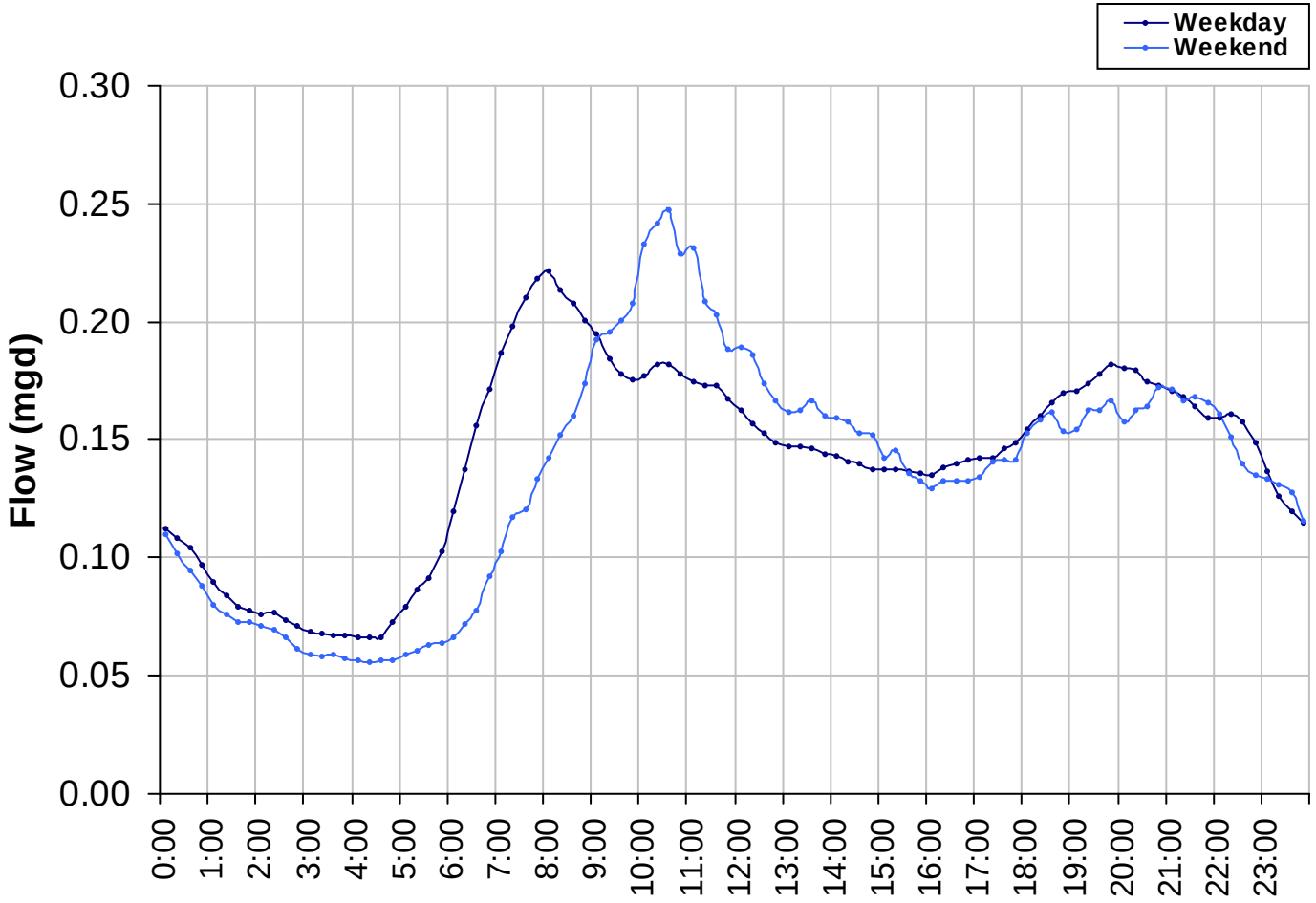






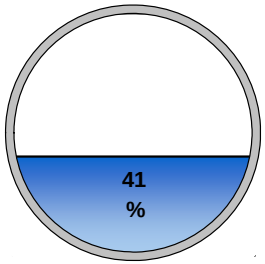
Average Dry Weather Flow

Monitoring Site:
MH 259



Peak Measured Flow:

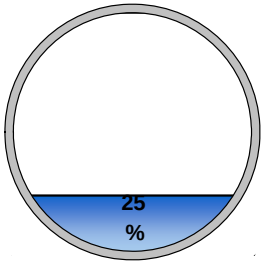
0.35 *mgd*



Peak measured flow shown in weekly graphs on following pages

Average Dry Weather Flow:

0.14 *mgd*

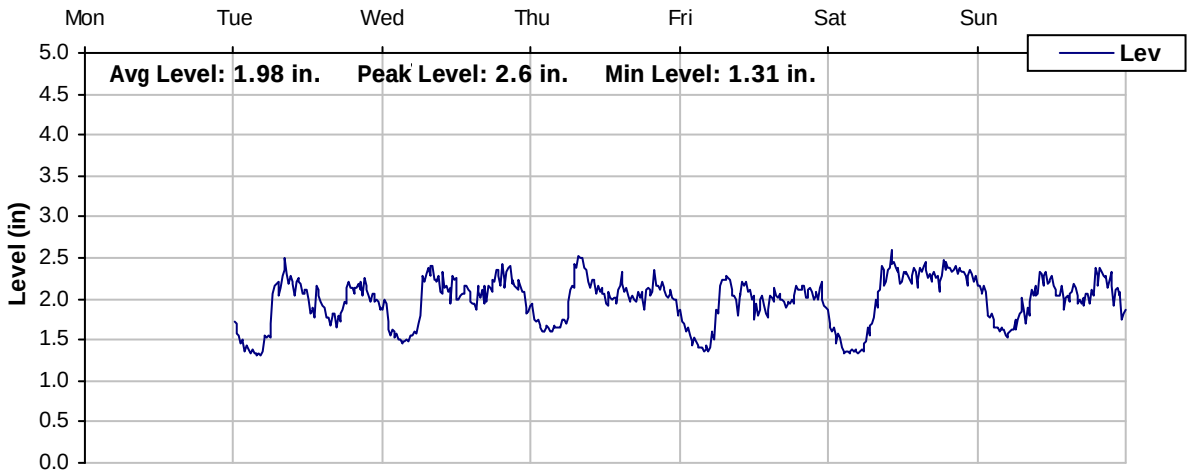


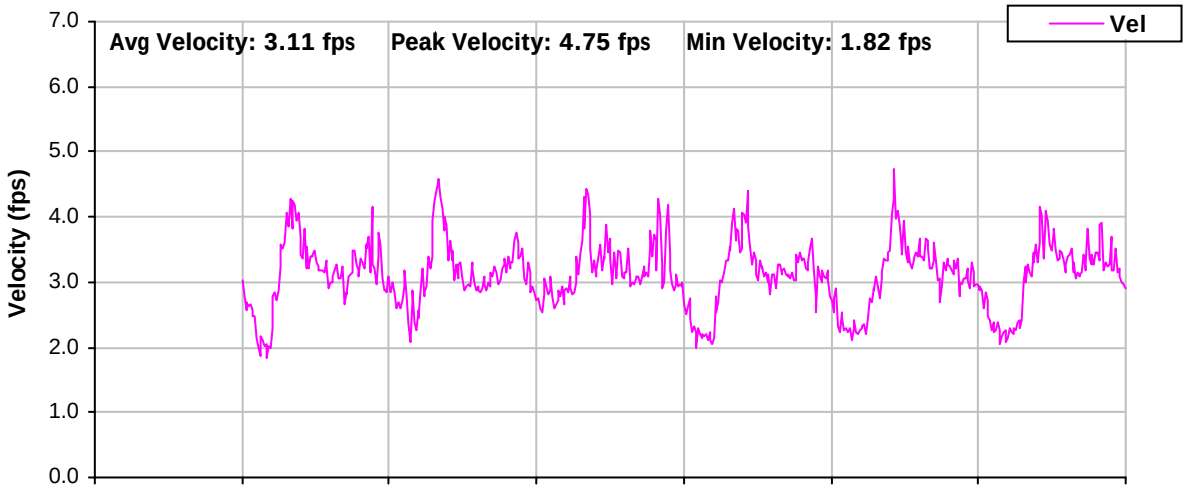
Level, Velocity and Flow

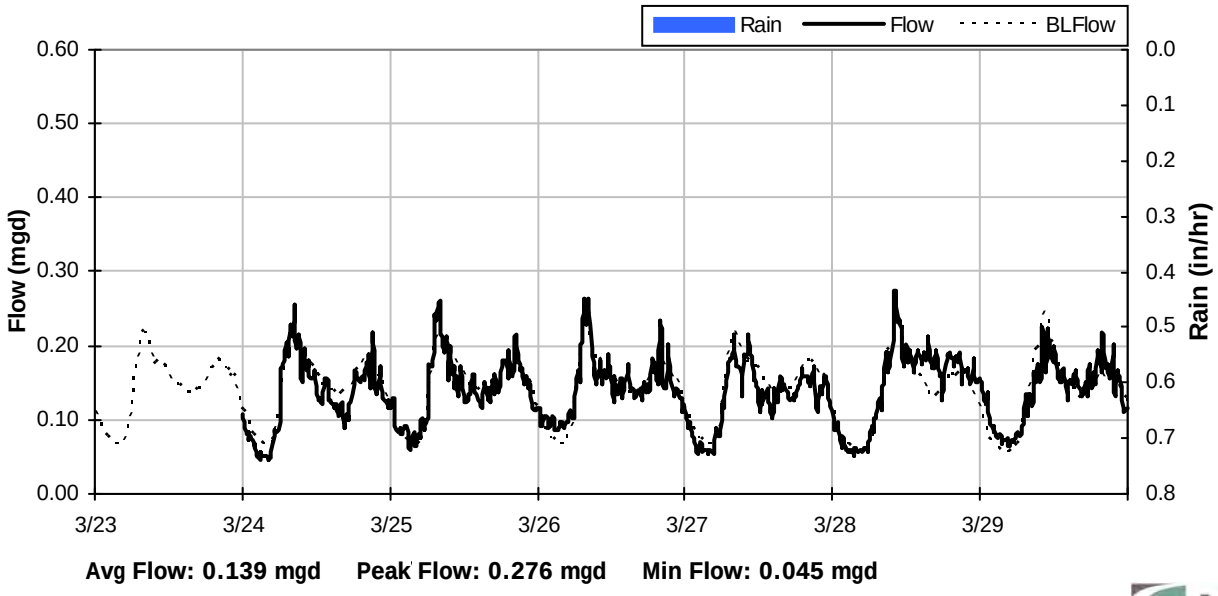
From 3/23/2009 to 3/30/2009

Monitoring Site:

MH 259







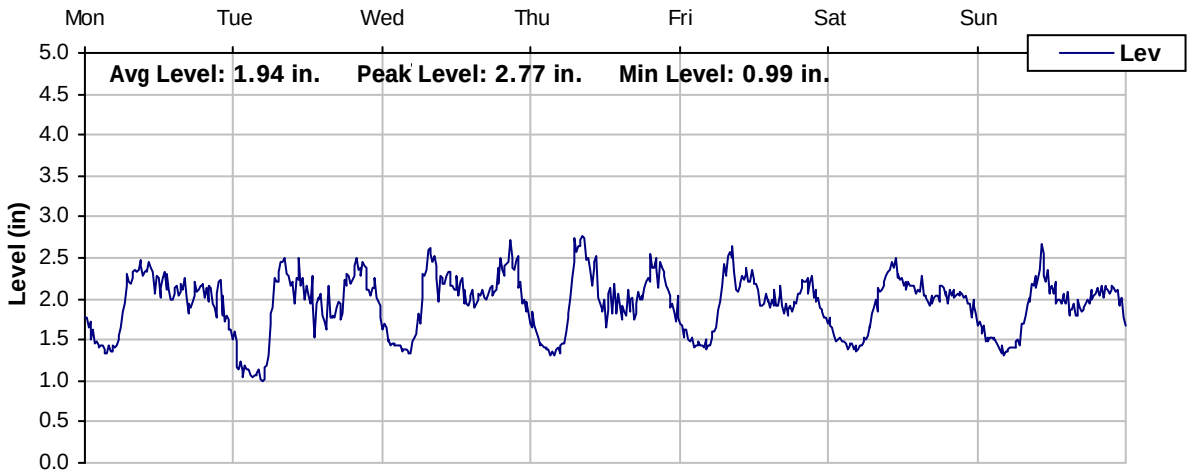
Avg Flow: 0.139 mgd **Peak Flow: 0.276 mgd** **Min Flow: 0.045 mgd**

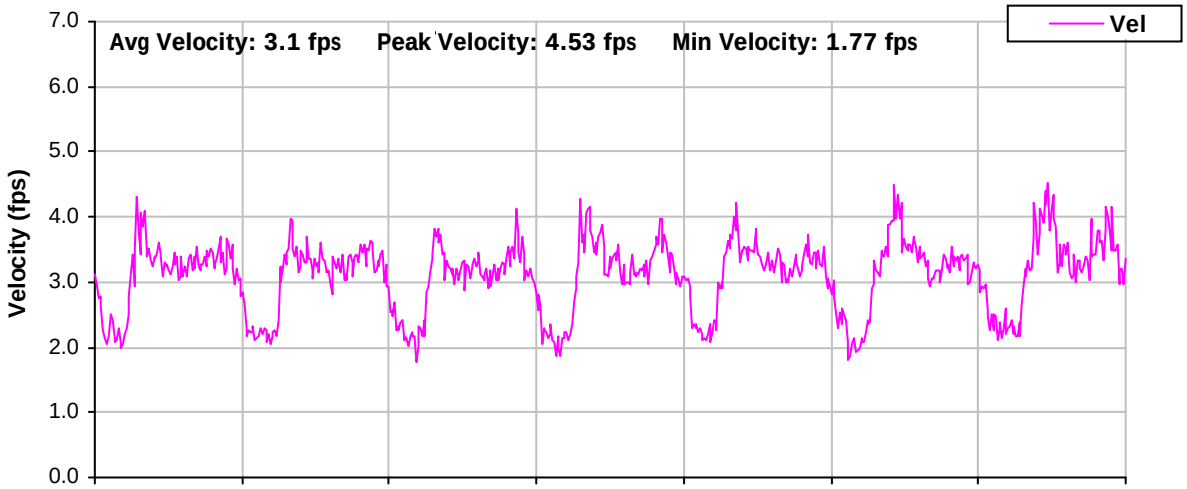
Level, Velocity and Flow

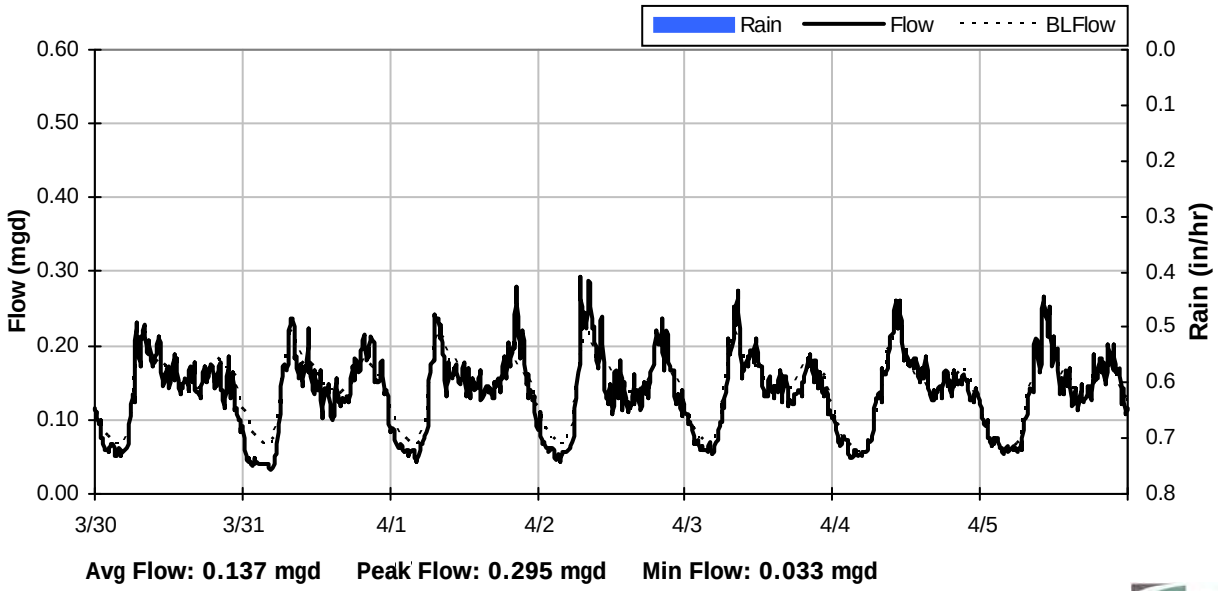
From 3/30/2009 to 4/6/2009

Monitoring Site:

MH 259







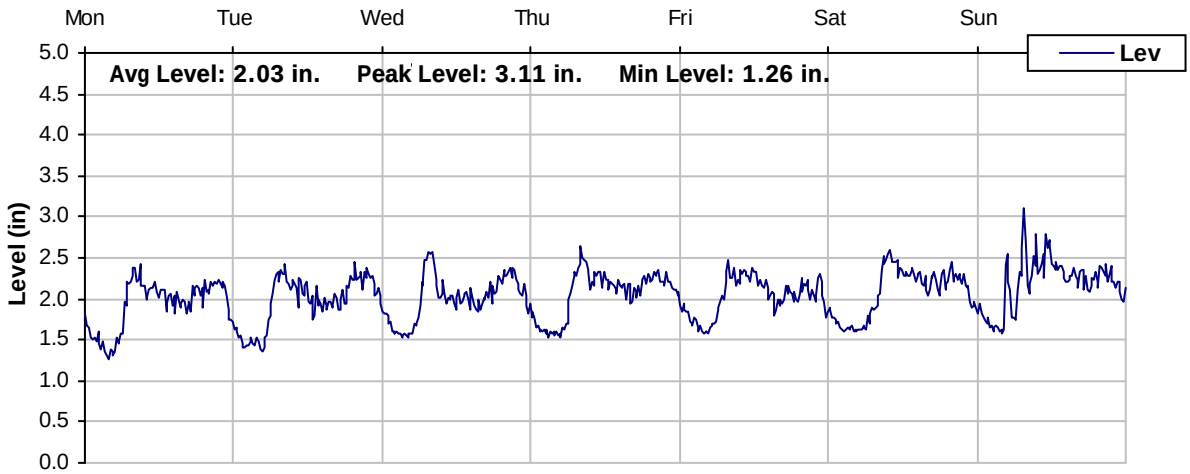
Avg Flow: 0.137 mgd **Peak Flow: 0.295 mgd** **Min Flow: 0.033 mgd**

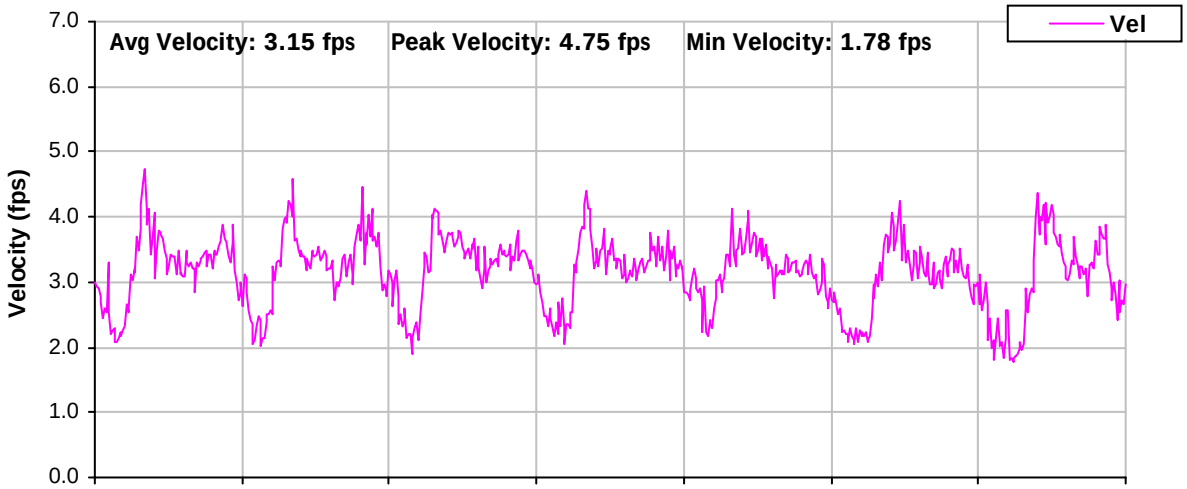
Level, Velocity and Flow

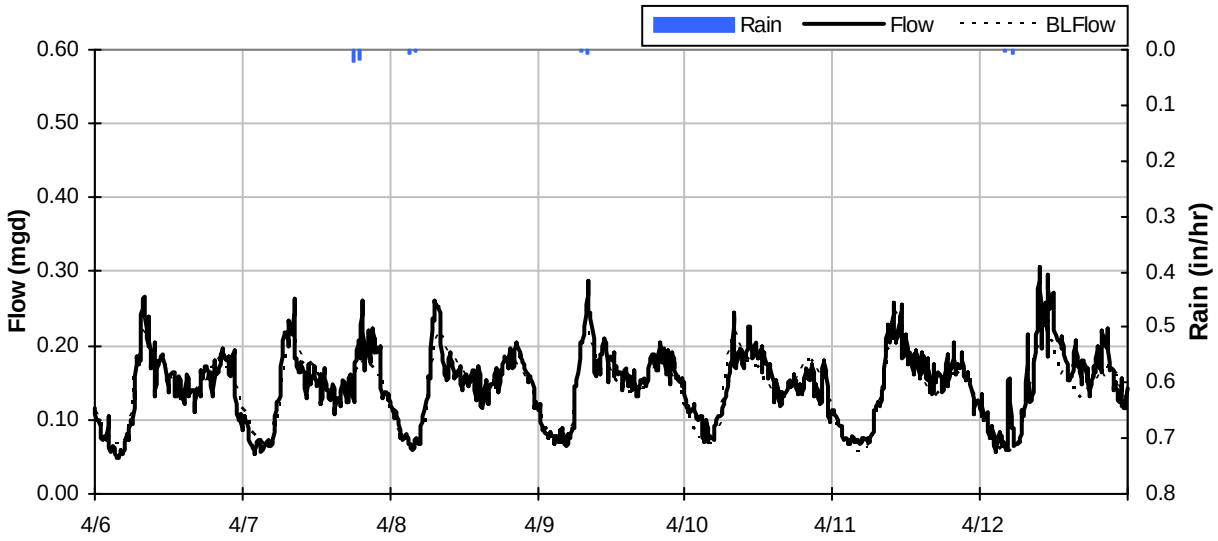
From 4/6/2009 to 4/13/2009

Monitoring Site:

MH 259







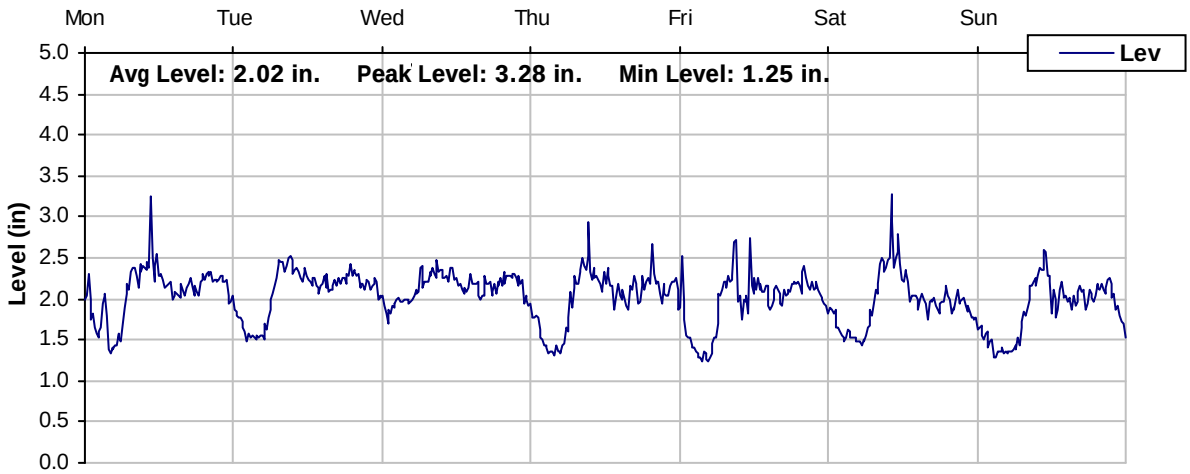
Avg Flow: 0.147 mgd **Peak Flow: 0.307 mgd** **Min Flow: 0.049 mgd**

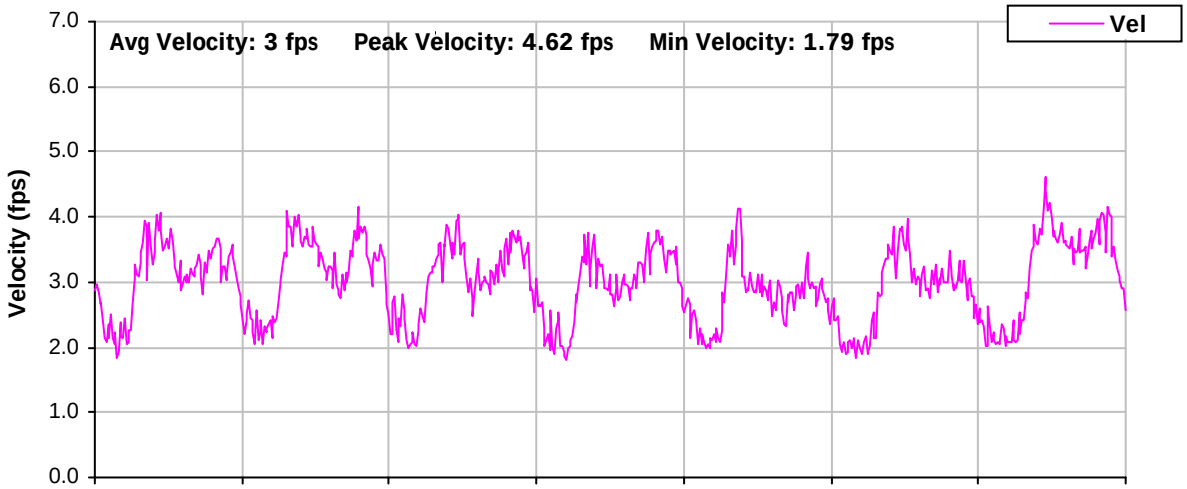
Level, Velocity and Flow

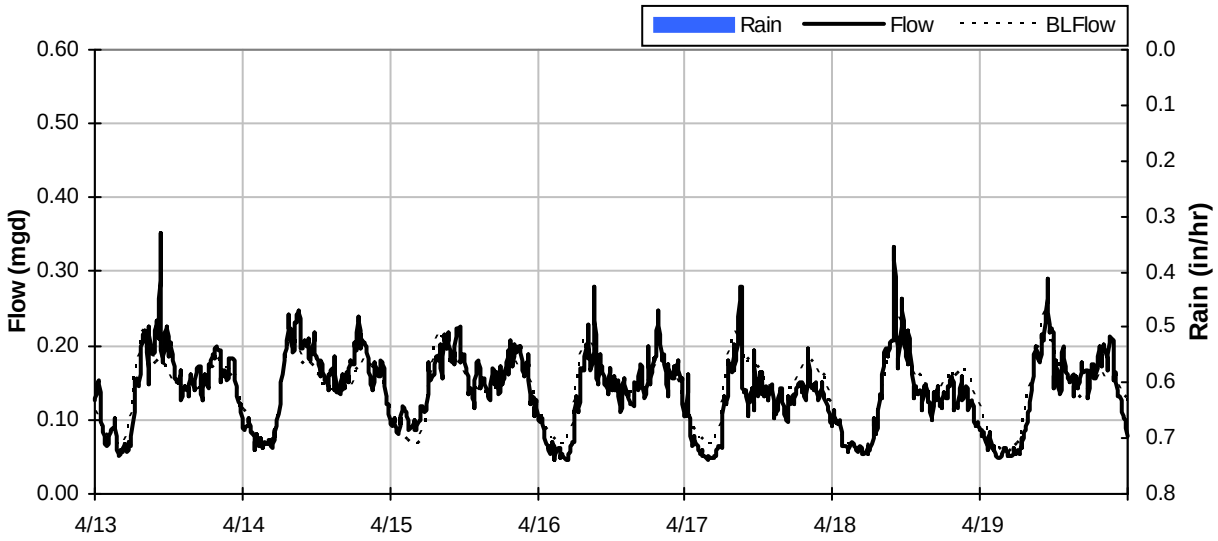
From 4/13/2009 to 4/20/2009

Monitoring Site:

MH 259







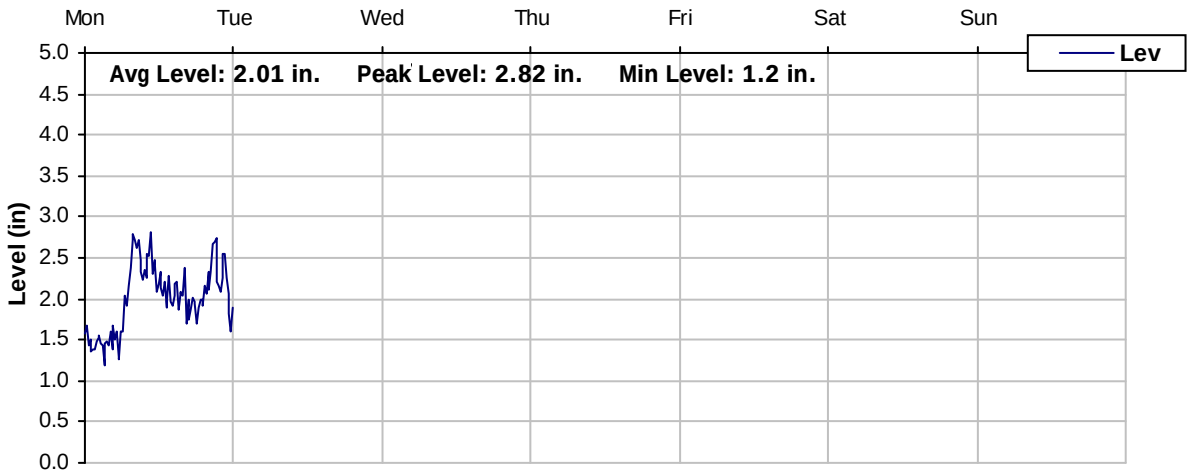
Avg Flow: 0.139 mgd **Peak Flow: 0.352 mgd** **Min Flow: 0.044 mgd**

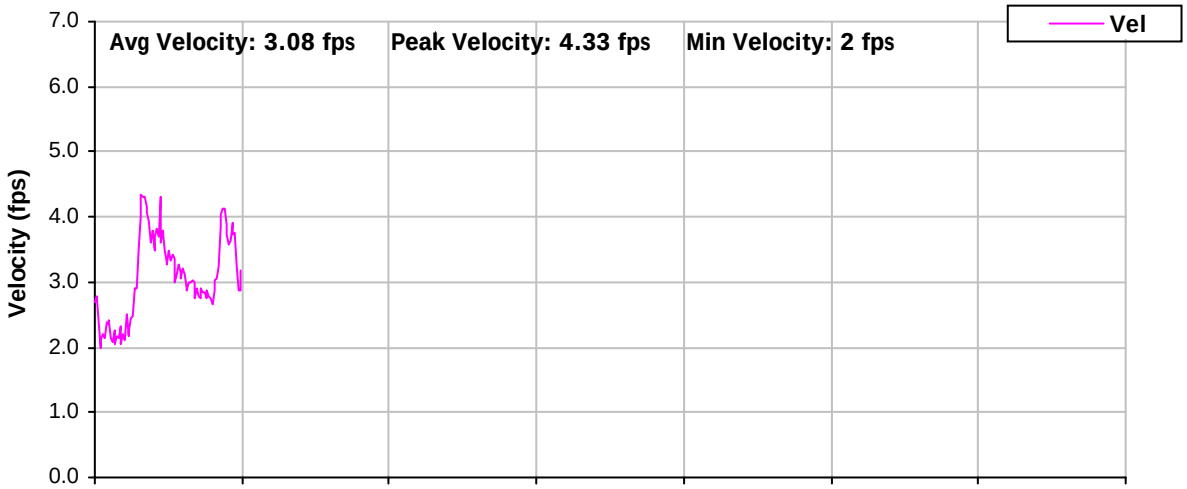
Level, Velocity and Flow

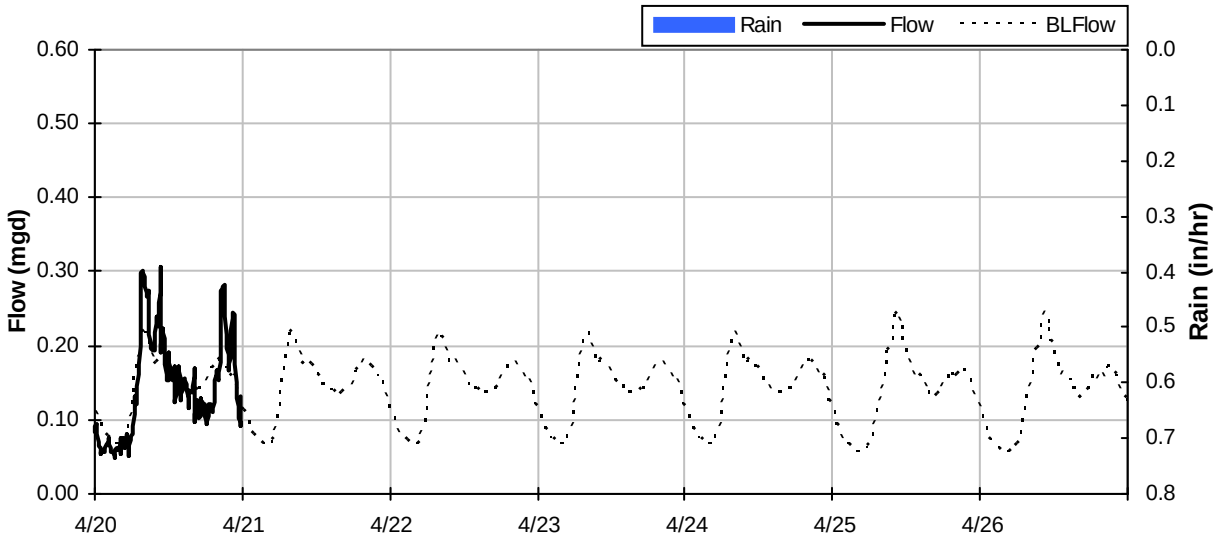
From 4/20/2009 to 4/27/2009

Monitoring Site:

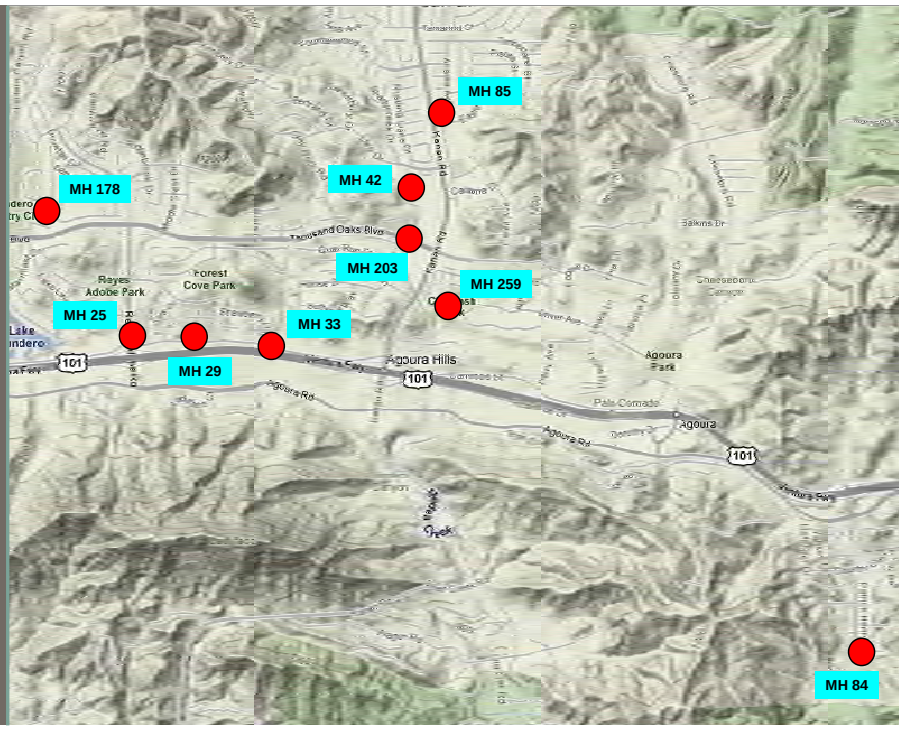
MH 259







Avg Flow: 0.146 mgd **Peak Flow: 0.306 mgd** **Min Flow: 0.048 mgd**



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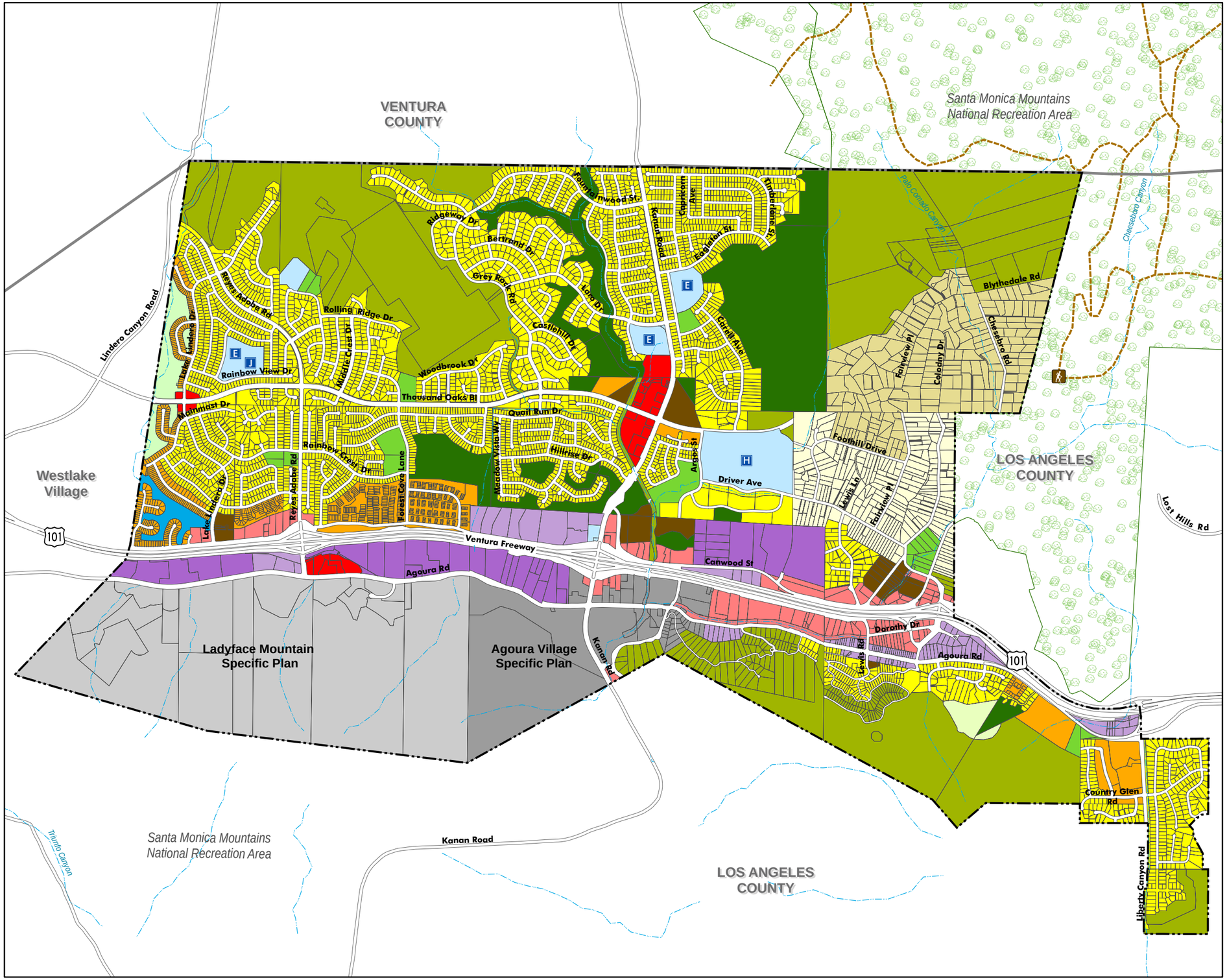
APPENDIX ‘L-5’

City Land Use Designations Map



General Plan Land Use

Land Use Designations

- Rural Residential (RR)
- Very Low-Residential (<2 du/ac) (RV)
- Low Density-Residential (1-2 du/ac) (RL)
- Single Family-Residential (2-6 du/ac) (RS)
- Medium Density-Residential (6-15 du/ac) (RM)
- High Density-Residential (15-20 du/ac) (HDR)
- Commercial Shopping Center (CS)
- Commercial Retail/Service (CRS)
- Commerical Recreation (CR)
- Business Park Office Retail (BP-OR)
- Business Park-Manufacturing (BP-M)
- Public Facility (PF)
- Open Water (OW)
- Local Park (P)
- Restricted Open Space (OS/R)
- Open Space/Deed Restricted (OS/R/DR)
- Agoura Village Specific Plan (SP)
- Ladyface Specific Plan (SP)

Base Map Features

- County Boundary
- City Boundary
- Water Courses
- Santa Monica Mountains National Recreation Area
- Trails and Fire Roads
- Trail Head/Parking
- Schools

Last Updated: November 21, 2006

0 1,000 2,000 3,000 4,000 Feet

CITY OF AGOURA HILLS

THIS AREA ON PRIVATE DISPOSAL SYSTEMS

SPLIT

N

0 250500 1,000 1,500

Feet

1 inch = 500 feet

MATCHLINE - SEE RIGHT

MATCHLINE - SEE LEFT

LEGEND

- SEWER PIPES
- 0.85 < d/D (UNSTABLE OR FULL FLOW)
- 0.64 < d/D < 0.85
- 0.50 , d/D < 0.64 (EXCEEDS DESIGN - MONITOR)
- LOCAL MANHOLES
- PRIVATE SEWER PIPES
- PRIVATE SEWER MANHOLES
- LVMWD Sewer Trunk
- SEWER MAINTENANCE ZONES
- (53) SEWER MAINTENANCE ZONE ID'S
- CITY BOUNDARY

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CITY OF AGOURA HILLS
SEWER SYSTEM MANAGEMENT PLAN
JUNE 2009

APPENDIX L-2:

SEWER SYSTEM CAPACITY ANALYSIS DEFICIENT PIPES

POLICIES FOR MANAGING AVAILABLE SEWER CAPACITY

INTRODUCTION

In 2009 the City serves the wastewater disposal needs of approximately 23,350 people. The community sewers receive and convey approximately 3.6 million gallons per day of wastewater to regional CSD trunk sewers and wastewater treatment plants.

The purpose of this document is to describe the policies and practices followed by the City in tracking and determining the remaining available capacity within its sanitary sewer system. Tracking (monitoring) is necessary because of the significant lead time required for accomplishing such improvements as sewer rehabilitation or facility expansion without overloading sewage facilities. The objective is to enable the City to:

- Become more aware of how the sewer facilities are performing in order to take steps necessary to avoid (prevent) a SSO or nuisance problem due to operations.

- Provide all local decision makers with information needed to make informed decisions about the capacity of the wastewater system and its ability to accommodate new or increased connections.

- Make commitments for new or upsized connections with confidence that there is adequate capacity to serve additional demand as well as existing customers.

- Determine when the issuance of additional building permits must be curtailed until sewer facility improvements are completed so that facilities are maintained in compliance with discharge permit criteria.

- Have more lead time to plan and arrange financing for needed sewer system upgrades.

LEGAL MANDATE TO MANAGE WASTEWATER ALLOCATIONS

Local sewering entities have a crucial role in providing safe and adequate wastewater systems and high quality operational performance. These entities face many challenges to maintain and operate their systems in compliance with Federal and State laws and regulations. Cost continues to increase to keep these increasingly complex facilities operating properly, and the ability to raise rates to keep pace with costs is a challenge.

Perhaps most challenging is the need to manage the allocation of flow for new or expanding customer discharges in conformance with local land use, water and sewage plans, and the NPDES and local permit limits. The agency responsible for issuing building/development

approvals and permits must ensure adequate capacity is or will be reasonably available without impairing water quality or threatening public health and safety.

ACTIONS TO BE TAKEN TO MANAGE AVAILABLE SEWER CAPACITY

Sewering entities are expected to manage their facility capacities responsibly and to ensure sewer systems remain within design capacity. In order to accomplish these expectations, it is necessary to prepare a planning and engineering tool used to monitor the relationship between sewer facility capacity and population/economic growth while complying with statutes and regulations relative to discharges. Such tool could be a Municipal Sewage Capacity Plan/Report (MSCP/R).

A MSRC/P would contain information on sewage system capacity including the demand created by both the existing and proposed development. To ensure the accuracy of such report will require the City to monitor flows, evaluate the need for additional capacity, identify deficiencies, take proactive, corrective steps to maintain system capacity, and to undertake orderly and timely projects to maintain or improve the system capacity. These actions for a successful reporting tool will be accomplished through the application of the following policies:

1. Develop a moving 10 year capital improvement program that:

    a. Includes pro-active sanitary sewer system improvements to correct and prevent system failures and overflows,

    b. Addresses current and reasonably anticipated regulatory requirements,

    c. Provides sewer capacity in a timely manner to accommodate system expansion and redevelopment,

    d. Maintains level of service standards that are desired and acceptable to the community.

2. Actively manage the sanitary sewer conveyance system through a data collection and analysis process that determines wastewater usage by development type, projects future demand, and identifies inflow/infiltration deficiencies.

3. Issue development approvals based upon available capacity of the sanitary sewer system.

4. Implement work process and data management systems improvements for sewer service management, operation, and maintenance that comply with SSMP regulations and result in more effective and efficient sewer service.

5. Abate storm water inflow and groundwater infiltration to maintain capacity for sewer service and minimize service costs.

6. Expand the production and annual average use of recycled water to reduce the cost and environmental risk of effluent disposal and reduce reliance upon potable water sources.

7. Implement complete asset management program for sustaining the sewer infrastructure through optimized service levels, managed risks, and minimized life-cycle costs of asset ownership

City of Agoura Hills
CCTV INSPECTION REPORT
Spring 2009

Introduction and History

The City owns and operates its local sanitary sewer system consisting of approximately 54 miles of gravity flow sewer pipelines (of 8 to 15-inch in diameter, mostly vitrified clay pipe) and 1,294 manholes. The existing sewer system consists completely of local collector sewers that discharge to trunk sewers owned and operated by the Las Virgenes Municipal Water District in western Los Angeles County.

As part of the services provided by LACDPW for cities within the CSMD, the DPW did perform CCTV inspection (a recorded video inspection of a portion of the community's sewer system) on 5.4 miles of the city sewer system between June and August 2006. The DPW provided the city with a report on that investigation effort, and that work is not part of the CCTV inspection addressed in this report.

As part of this SSMP document preparation, a separate CCTV investigation report was obtained through a subconsultant (Ventura Regional sanitation District) who inspected another 10% of the city sewer system. This investigation was performed on segments of the system as mutually selected by Willdan and City personnel in order to address areas of concern. The video logging and documentation provided a current physical condition and evaluation record of the selected portion of the sewer system. The resulting findings are addressed in this report segment and depicted on the two exhibit maps in appendix 'N-3'.

The purpose of this report is two fold. 1) To document and synthesize the CCTV inspection results, and 2) To establish a list of improvement projects to eliminate both structural and maintenance defects identified in the mainline sewer. The objective is to preserve the City's infrastructure investment, maintain service, prevent failures and limit inflow, infiltration and overflow potential.

Study Approach

Preparation of the Year 2009 CCTV Inspection Report involved the following sequence of tasks used in this study:

1. Review the digital video record of the CCTV inspection along with the inspection log and evaluation summary, prepared by the contractor.
2. Establish a priority list for implementation of recommended improvements. Factors considered in formulating the priority list included: a) severity of damage to the

existing pipe, b) risk potential for public health problems, c) prior maintenance problems made known, if any, d) consequences to other known improvement projects, and, e) other criteria of relevance.

3. Development of recommendations for system improvements to correct defects based on the above priority list.
4. Preparation of cost estimate for the recommended structural improvements.
5. Preparation of the CCTV Inspection report.

Analysis of CCTV Inspection

Analysis of the CCTV inspection consisted of reviewing the digital video inspection log and evaluation summary, and the digital videos as necessary. . Identified defects were ranked by the severity of the defect based on deficiency criteria listed below. The length of sewer to be repaired or replaced was based on the type or extent of repairs that are needed. The types of repair considered consisted of:

1. Spot Repair (Remove and replace a segment or several segments of mainline pipe)
2. Remove and replace the reach between manholes.
3. Sewer pipe lining with Cured in Place Pipe (CIPP).

Pipeline Grading System

The Pipeline Assessment and Certification Program (PACP), developed by The National Association of Sewer Service Companies (NASSCO), provides a uniform mechanism for creating reliable descriptions of pipe conditions. NASSCO has also developed a system based on the PACP codes to assign a condition rating to pipelines. Requirements of the grading system are as follows:

1. The grading system should be direct and objective.
2. The system should provide the ability to quantitatively measure the difference in pipe condition, between one inspection and subsequent inspections, and to prioritize among different pipe segments.

Many other approaches to sewer pipe grading have been used in the United States as well as in other parts of the World. These approaches generally use some type of defect grading that is then used to calculate an overall pipe rating. It is problematic to develop a single pipe segment rating that fully describes all of the important aspects of a pipe. Therefore the PACP Condition Grading System uses more than one method of rating pipe segment condition including a rating that considers the number of total defects within the pipe segment and a rating that considers the most severe types of defects within the pipe segment.

The PACP Condition Grading System only considers internal pipe conditions obtained from TV inspection. While other factors such as pipe material, depth, soils, and surface conditions also affect pipe survivability, those factors have not been included in the current version of the PACP Condition Grading System. It is expected that as the PACP further develops the PACP Condition Grading System will expand to include other factors.

The PACP Condition Grading System provides ratings for Structural Defects and Maintenance Defects.

APPROACH - Using the PACP Code Matrix, (see Appendix 'N-1') in which each defect code is assigned a condition grade of from 1 to 5; grades are assigned based on potential for further deterioration or pipe failure. Pipe failure is defined as when the pipe can no longer convey the pipe design capacity.

Grades are assigned for two categories, Structural, and Maintenance defects, as follows:

5 - Immediate Attention	Defects requiring immediate attention
4 - Poor	Severe defects that will become Grade 5 defects within the foreseeable future
3 - Fair	Moderate defects that will continue to deteriorate over time
2 - Good	Defects that have not begun to deteriorate
1 -Excellent	Minor defects

The mechanisms and rates of pipeline deterioration are highly dependent on local conditions. However the following general guidelines are provided to estimate the amount of time before the defect causes complete line failure. These guidelines should be verified by actual research under prevailing local conditions.

5 - Pipe has failed or will likely fail within the next five years. Missing materials with large voids and soil is visible.
4 - Pipe will probably fail in 5 to 10 years or will become category 5 in foreseeable future.
3 - Pipe may fail in 10 to 20 years and should be monitored for further deterioration and replaced as the conditions warrant.
2 - Pipe unlikely to fail for at least 20 years
1 - Failure unlikely in the foreseeable future

CONTINUOUS DEFECTS - The number of "repeated continuous" (joint) defect grades is calculated by dividing the length of the continuous defect by the joint length. For example, a 15 ft long repeating continuous defect, 3-foot joints, and a grade 2 defect, would equate to 5 grade 2 defects.

The number of "truly continuous" defects is calculated by dividing the length of the continuous defect by 5. Example, a 20-foot long continuous defect, grade 3, should equate to four Grade 3 defects. Fractions are rounded to the nearest whole number.

PIPE RATINGS - The pipe rating is based on the number of occurrences for each condition grade. Ratings are calculated separately for Structural and Maintenance Defects. Several ways of expressing pipe segment condition are used by the PACP Condition Grading System as follows:

Segment Grade Scores - Each pipe segment will have a Segment Grade Score for each of the five grades. The number of occurrences of each pipe grade is multiplied by the pipe grade to calculate the segment grade score. Example, six Grade 5 defects would be 6 times 5 and equates to a Segment Grade 5 Score of 30. If a pipe segment had no defects of a particular grade, then the Segment Grade Score for that grade would be 0.

Overall Pipe Rating -The five Segment Grade Scores are added together to calculate the Overall Pipe Rating. Structural Pipe Ratings are calculated using only Structural Defect grades, while O&M Pipe Ratings are calculated using only Maintenance Defect grades.

PACP Quick Rating -The PACP Quick Rating is a shorthand way of expressing the number of occurrences for the two highest severity grades. The PACP Quick Rating is a four character score as follows:

1. The first character is the highest severity grade occurring along the pipe length.
2. The second character is the total number of occurrences of the highest severity grade. If the total number exceeds 9, then alphabetic characters are used as follows - '0 to 14 - A; 15 to 19 - B; 20 to 24 - C; etc.
3. The third character is the next highest severity grade occurring along the pipe length.
4. The fourth character is the total number of the second highest severity grade occurrences, derived as in item 2 above.

Example

A segment of pipe with a PACP rating 4B27

This immediately shows that no grade 5 defects or grade 3 defects, however 15 to 19 grade 4 defects and seven grade 2 defects were found.

Another Example

A segment of pipe with a PACP rating 3224

Two grade 3 defects and four grade 2 defects, however no grade 5 or grade 4 defects were found.

The PACP Quick Rating provides the ability to summarize the number and severity of defects found within a pipe segment, as with the Pipe Rating, Quick Structural Ratings are calculated using only Structural Defect Grades, and Quick O&M Ratings are calculated using only O&M Defect Grades.

Pipe Ratings Index -This is an indicator of the distribution of defect severity. The Pipe Ratings Index is calculated by dividing the Pipe Rating by the number of defects. For example, the Structural Pipe Ratings Index would be the Structural Pipe Rating divided by the number of structural defects. Pipe Ratings Indexes are calculated for Structural, O&M, and Overall.

Summary

The following procedures are used to calculate pipe segment ratings using the PACP Condition Grading System:

1. Determine the number of occurrences for each condition grade within the pipe segment. Calculate separately for Structural Defect Grades and O&M Defect Grades.
2. Calculate the Segment Grade Score by multiplying the number of occurrences by the respective grade 1 through 5. Calculate the Structural Segment Grade Score and the O&M Segment Grade Score separately, and then add together for the Overall Segment Grade Score.
3. Calculate the Pipe Rating for the pipe segment by adding the Segment Grade Scores. Add all five Structural Segment Grade Scores for the Structural Pipe Rating, and add all five O&M Segment Grade Scores for the O&M Pipe Rating. Add all five Overall Segment Grade Scores for the Overall Pipe Rating.
4. Determine the PACP Quick Rating by calculating the number of occurrences of the two highest severity grades.
5. Calculate the Pipe Ratings Index by dividing the Pipe Rating by the number of defects.

Identified Structural Defects Correction Projects

General Repair Methods

Repairs to existing sewers can be separated into two categories, traditional removal and replacement of the damaged pipe with the standard trench operation or trenchless method using Cured in Place Pipe (CIPP) typically called a sewer-lining repair. Each method has advantages and disadvantages. The most cost effective repair of the sewer is a combination of the two methods since there may be only 8-10 foot length of sewer mainline that is in disrepair, but the remaining mainline contains cracks that can be repaired by lining the sewer with CIPP. The advantages and disadvantages and recommended uses for each method are listed below:

Traditional sewer replacement advantages are:

1. The sewer is replaced with a new VCP of the same diameter and will have a design life of over 50-years.
2. Only the section of pipe that is damaged needs to be replaced. (Listed as point repair in estimates) The remaining line is not replaced or disturbed.
3. Common trench construction method employed.
4. Best choice if the line to be repaired also needs to be upsized.

Disadvantages:

1. Sewer line must be taken out of service for the duration of the repair and a temporary sewer by-pass system must be used.
2. If sewer is located within a street, traffic must be rerouted or detoured around trench or construction operation.
3. Sewer is located in an easement, access, and working space may be a practical factor.

Trenchless (CIPP) sewer rehabilitation advantages:

1. Minimal traffic interruptions.
2. Can repair sewer defects under existing improvements, i.e. signs, fencing, etc.
3. Faster installation. Typically can install 300'-600' per day.
4. Sewer line is typically out of sewer less then 3 hours.
5. Can repair multiple defects in a sewer line.

Disadvantages:

1. Must have approximately 3000 to 4000-feet of lining to be economical due to higher mobilization and equipment costs.
2. Cannot be used to upsize deficient pipe.
3. Depending on pipe flow, may require temporary sewer by-pass system.

Recommended Sewer System Improvements

Presented in the engineer's estimate (Appendix 'N-2') is a brief summary of the measures recommended to correct the structural defects which are also shown on maps in Appendix 'N-3'. The criteria for recommending and prioritizing relief facilities are as follows:

1. Sewers with critical structural defects, ranked as category 5's, are recommended for prompt correction measures.

2. Sewers with structural defects, ranked as category 4's, are recommended for correction measures as funding is scheduled over the next 4-8 years. Sewers meeting these criteria should be monitored for signs of further deterioration.

3. Sewers with structural defects, ranked as category 3's, are recommended for correction measures as change in conditions warrant. Sewers meeting these criteria should be periodically monitored for signs of further deterioration.

Please note that the recommended sewer system improvements as presented here are general in nature and should not be considered as absolutes for final design. Rather, they should be considered more as a plan guide.

Recommended Sewer System Improvement Projects

Contained within the engineer's estimate (Appendix 'N-2') is a brief description of the recommended sewer system repair work for the identified structural defects. The first project is all of the category 5 structural defects. These repairs are recommended for immediate replacement as these pipes are of high risk for failure. The category 4 structural defects can be completed separately or together based on the funding available. It is recommended that the repair projects within each category be constructed as complete projects, if at all possible, in order to benefit from the economy of scale rather than to perform the repairs individually which would increase the cost considerably.

Sewer System Improvements Costs

The unit prices shown in the engineer's estimate (Appendix 'N-2') represent the anticipated construction cost applicable for mid 2008. Bid prices received on jobs of similar nature in Southern California area were one source of information used to derive the cost figure. In addition, manufacturers, suppliers of material and equipment, and local contractors were consulted on various cost items. The unit prices do not include right-of-way acquisition or legal costs. An additional 35% of construction cost is added to cover the cost of design engineering, contract administration, inspection, survey and contingency cost.

The engineer's estimate does not include an adjustment for inflation. Construction costs can be expected to fluctuate as corresponding changes occur in the national or local economy. One available indicator of these changes is the Engineering News-Record Construction Cost Index for the Los Angeles metropolitan area. This index is compiled from actual construction cost data for materials and labor and is reported in Engineering News-Record magazine. It is suggested that this index be used to update the unit prices presented in the Appendix and in adjusting the estimate from the date of the initial estimates.

Identified Maintenance Defect Locations

In general, category 5 defects are recommended for immediate correction. These defects may be complete blockages caused by root intrusion with maximum flow disruption. Roots can also fracture sewer lines, causing soil and ground water contamination.

Category 4 defects are recommended for correction within the next year. A high majority of those blockages are caused by root intrusion. These defects will become category 5 defects within the foreseeable future.

Categories 3 defects and lower are generally recommended for correction after the correction of category 5 and 4 defects. Pipe segments with a rating of 3 should be monitored for further deterioration and corrected as the conditions warrant and budgeted funds are available.

The location of Categories 5 and 4 maintenance defects are shown on the corresponding map in Appendix 'N-3'.

General Maintenance Methods

Maintenance is performed using rodders and/or high pressure cleaners (hereinafter referred to as HPCs). A rodder is preferably used to deal with root intrusion (though a rodder may be used to remove grease also). A rodder consists of a saw/blade attached to rod (metal cables) which is contained within a cage. The saw/blades and rods are fed out of the cage while spinning. The resulting motion cuts and dislodges roots and grease allowing the intrusions to move down the sewer line to be caught and removed at a downstream manhole. An HPC is preferably used to remove coagulated grease and grit (particulate matter) from the sewer lines. The HPC pumps water at a high pressure through the sewer lines. This water displaces the grease and grit. In some areas, workers may find it helpful to use a foaming chemical root treatment. This foam is pumped into selected sewer mains to kill existing roots and to inhibit their re-growth.

Summary

Ten percent of the city sewer system was CCTV inspected. Each reach of sewer inspected is put into a category based on the NASSCO-PACP (more fully described in the above Pipeline Grading System criteria section of this report).

Based on the ratings for Structural Defects, only one (1) location within the inspected system was identified as being Category 5 structurally defective, only one (1) location within the inspected system were identified as being Category 4 structurally defective, and two (2) locations within the inspected system were identified as being Category 3 structurally defective. The engineer's opinion of cost to repair the structurally defective segments is presented in Appendix 'N-2'.

Based on the ratings for Maintenance Defects, approximately 73 pipe segments (lengths between manholes) were reported containing a total of 546 various defects. Since these are maintenance activity related there is no repair cost estimate prepared.

APPENDIX ‘N-1’

NASSCO PACP Condition Grading System Code Matrix

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
Structural	Crack (C)	Circumferential (C)		CC	1	
		Longitudinal (L)		CL	2	
		Multiple (M)		CM	3	
		Spiral (S)		CS	2	
Structural	Fracture (F)	Circumferential (C)		FC	2	
		Longitudinal (L)		FL	3	
		Multiple (M)		FM	4	
		Spiral (S)		FS	3	
Structural	Pipe Failures (Silent)	Broken (B)		B	1 clock pos - 3, 2 clock pos - 4, >=3 clock pos - 5	
		Broken (B)	Soil Visible (SV)	BSV	5	
		Broken (B)	Void Visible (V V)	BVV	5	
		Hole (H)		H	1 clock pos - 3, 2 clock pos - 4, >= 3 clock pos - 5	
		Hole (H)	Soil Visible (SV)	HSV	5	
		Hole (H)	Void Visible (V V)	HVV	5	
Structural	Collapse (X)	Pipe (P)		XP	5	
		Brick (B)		XB	5	
Structural	Deformed (D)	(Pipe) (P)		D	<=10% - 4,>10% - 5	
		Brick (B)	Horizontally (H)	DH	5	
		Brick (B)	Vertically (V)	DV	5	
Structural	Joint (J)	Offset (displaced) (O)	Med (M)	JOM	1	
			Large (L)	JOL	2	
		Separated (open) (S)	Med (M)	JSM	1	
			Large (L)	JSL	2	
		Angular (A)	Med (M)	JAM	1	
			Large (L)	JAL	2	
	Surface Damage Chemical (S)	Roughness Increased (RI)	C	SRIC	1	
		Surface Spalling (SS)	C	SSSC	2	
		Aggregate Visible (AV)	C	SAVC	3	
		Aggregate Projecting (AP)	C	SAPC	3	
		Aggregate Missing (AM)	C	SAMC	4	
		Reinforcement Visible (RV)	C	SRVC	5	
		Reinforcement Corroded (RC)	C	SRCC	5	
		Missing Wall (MW)	C	SMWC	5	
		Other (Z)	C	SZC		
	Surface Damage Mechanical (M)	Roughness Increased (RI)	M	SRIM	1	
		Surface Spalling (SS)	M	SSSM	2	
		Aggregate Visible (AV)	M	SAVM	3	
		Aggregate Projecting (AP)	M	SAPM	3	

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Aggregate Missing (AM)	M	SAMM	4	
		Reinforcement Visible (RV)	M	SRVM	5	
		Reinforcement Corroded (RC)	M	SRCM	5	
		Missing Wall (MW)	M	SMWM	5	
		Other (Z)	M	SZM	N/A	
	Surface Damage Not Evident (Z)	Roughness Increased (RI)	Z	SRIZ	1	
		Surface Spalling (SS)	Z	SSSZ	2	
		Aggregate Visible (AV)	Z	SAVZ	3	
		Aggregate Projecting (AP)	Z	SAPZ	3	
		Aggregate Missing (AM)	Z	SAMZ	4	
		Reinforcement Visible (RV)	Z	SRVZ	5	
		Reinforcement Corroded (RC)	Z	SRCZ	5	
		Missing Wall (MW)	Z	SMWZ	5	
		Other (Z)	Z	SZZ	N/A	
	Surface Damage (Metal Pipes)	Corrosion (CP)		SCP	3	
Structural	Lining Failure (LF)	Detached (D)		LFD	3	
		Defective End (DE)		LFDE	3	
		Blistered (B)		LFB	3	
		Service Cut Shifted (CS)		LFCS	3	
		Abandoned Connection (AC)		LFAC		
		Overcut Service (OC)		LFOC	3	
		Undercut Service (UC)		LFUC	3	
		Buckled (BK)		LFBK	3	
		Wrinkled (W)		LFW	3	
		Other (Z)		LFZ		
Structural	Weld Failure (WF)	Circumfrential (C)		WFC	2	
		Longitudinal (L)		WFL	2	
		Multiple (M)		WFM	3	
		Spiral (S)		WFS	2	
Structural	Point Repair (RP)	Localized Lining (L)		RPL		
		Localized Lining (L)	Defective (D)	RPLD	4	
		Patch Repair (P)		RPP		
		Patch Repair (P)	Defective (D)	RPPD	4	
		Pipe Replaced (R)		RPR		
		Pipe Replaced (R)	Defective (D)	RPRD	4	
		Other (Z)		RPRZ		
		Other (Z)		RPRZD		
Structural	Brickwork (Silent)	Displaced (DB)		DB	3	
		Missing (MB)		MB	4	
		Dropped Invert (DI)		DI	5	
		Missing Mortar	Slight	MMS	2	
			Medium	MMM	3	
			Large	MML	3	

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
O&M	Deposits Attached (DA)	Encrustation (E)		DAE		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Grease (G)		DAGS		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Ragging (R)		DAR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other (Z)		DAZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
	Deposits Settled (DS)	Hard/Compacted (C)		DSC		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Fine (F)		DSF		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Gravel (G)		DSGV		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other (Z)		DSZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
	Deposits Ingress (DN)	Fines silt/sand (F)		DNF		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Gravel (GV)		DNGV		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other (Z)		DNZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
O&M	Roots (R)	Fine (F)	Barrel (B)	RFB		2
			Lateral (L)	RFL		1
			Connecfion (C)	RFC		1
	Roots (R) at a Joint		N/A	RF		1
		Tap (T)	Barrel (B)	RTB		3
			Lateral (L)	RTL		2
			Connecfion (C)	RTC		2
	Roots (R) at a Joint		N/A	RT		2
		Medium (M)	Barrel (B)	RMB		4
			Lateral (L)	RML		3
			Connecfion (C)	RMC		3
	Roots (R) at a Joint		N/A	RM		3
		Ball (B)	Barrel (B)	RBB		5

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
			Lateral (L)	RBL		4
			Connecfion (C)	RBC		4
	Roots (R) at a Joint		N/A	RB		4
O&M	Infiltration (I)	Weeper (W)		IW		2
		Dripper (D)		ID		3
		Runner (R)		IR		4
		Gusher (G)		IG		5
O&M	Obstacles/Obstructions (OB)	Brick or Masonry (B)		OBB		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Pipe Material in Invert (M)		OBM		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Protruding Thru Wall (I)		OBI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Wedged in Joint (J)		OBJ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Thru Connection (C)		OBC		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		External Pipe or Cable In Sewer (P)		OBP		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Built Into Structure (S)		OBS		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Construction Debris (N)		OBN		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Rocks (R)		OBR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other Objects (Z)		OBZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
O&M	Vermin (V)	Rat (R)		VR		2
		Cockroach (C)		VC		1
		Other (Z)		VZ		1
Construction Features	Tap (T)	Factory Made (F)		TF		
			Capped (C)	TFC		
			Defective (D)	TFD		2
			Intruding (I)	TFI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Active (A)	TFA		

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Break-In/Hammer (B)		TB		
			Capped (C)	TBC		2
			Defective (D)	TBD		3
			Intruding (I)	TBI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Active (A)	TBA		
		Saddle (S)		TS		
			Capped (C)	TSC		
			Defective (D)	TSD		2
			Intruding (I)	TSI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Active (A)	TSA		
Construction Features	Intruding Seal Material (IS)			IS		
		Sealing Ring (SR)		ISSR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Hanging	ISSRH		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Broken	ISSRB		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Grout (GT)		ISGT		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other (Z)		ISZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
Construction Features	Line (L)	Left (L)		LL		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Left/UP (LU)		LLU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Left/Down (LD)		LLD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Right (R)		LR		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Right/Up (RU)		LRU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4

NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Right/Down (RD)		LRD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Up (U)		LU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Down (D)		LD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
Construction	Access Points (A)					
		Cleanout (CO)		ACO		
			Mainline (M)	ACOM		
			Property (P)	ACOP		
			House (H)	ACOH		
		Discharge Point (DP)		ADP		
		Junction Box (JB)		AJB		
		Meter (M)		AM		
		Manhole (MH)		AMH		
		Other Special Chamber (OC)		AOC		
		Tee Connection (TC)		ATC		
		WW Access Device (WA)		AWA		
		Wet Well (WW)		AWW		
Other	Miscellaneous (M)	Camera Underwater (CU)		MCU		4
		Dimension/Diam/Shape Change (SC)		MSC		
		General Observation (GO)		MGO		
		General Photograph (GP)		MGP		
		Material Change (MC)		MMC		
		Lining Change (LC)		MLC		
		Joint Length Change (JL)		MJL		
		Survey Abandoned (SA)		MSA		
		Water Level (WL)		MWL		
		Water Level (WL)	(S)	MWLS		<=30% - 2, <=50% - 3, >50% - 4
		Water Mark (WM)		MWM		>=50% 4, >=75% 5
		Dye Test (Y)		MY		
			Visible (V)	MYV		5
			Not Visible (N)	MYN		3

APPENDIX ‘N-2’

Engineer’s Estimate

City of Agora Hills

Table 1 Priority Ranking and Summary of Structural Defect Correction Measures								
Priority Ranking	Defect Category	WINCAN Run No.	Street Name	Description of Repair	From		To	Cost
1	5	116	Provident Rd	Point Repair	MH 76	-	MH 77	$4,200
				SUBTOTAL - DEFECT CATEGORY 5 REPAIRS:				**$4,200**
2	4	102	Endeavor St	Point Repair	MH 109	-	MH 104	$4,200
				SUBTOTAL - DEFECT CATEGORY 4 REPAIRS:				**$4,200**
3	3	136	Canwood Dr	Point Repair	MH 44	-	MH 43	$12,600
4	3	117	Patrick Henry Pl	Point Repair	MH 77	-	MH 78	$4,200
				SUBTOTAL - DEFECT CATEGORY 3 REPAIRS:				**$16,800**
				TOTAL - DEFECT CATEGORY 3, 4, & 5 REPAIRS:				**$25,200**