

City of Austin, Texas
Purchase Specifications
For

**CROSTOWN TUNNEL BASIN
WASTEWATER FLOW MONITORING SERVICES**

1.0 SCOPE AND CLASSIFICATION

1.1 Scope

This specification establishes the minimum requirements for wastewater flow monitoring services for the City of Austin Water Utility (“City”). This service is to monitor flow in the wastewater system and to use the data to investigate Inflow and Infiltration (I&I), to calibrate hydraulic models, and as a warning tool for wastewater mains that are surcharged and are potential wastewater overflows (SSO). To calibrate the hydraulic model, it is vital for the City to obtain a large amount of accurate data during dry weather and especially during wet “rain” weather events.

1.2 Base Bid

There are twenty-six (26) permanent flow meter locations listed in Table 1. The duration of the contract for these sites shall be twelve (12) months, with two (2) twelve (12) month extension options.

1.3 Additive Bid # 1

Additive Bid # 1 composes of nine (9) flow meter locations listed in Table 2. The duration of this contract shall be six (6) months. The City will evaluate the value of the bid and decide if they would like to proceed with the contract. If the City chooses to accept the bid of Additive Bid # 1, all work associated with this contract will commence in conjunction with the Base Bid.

1.4 Additive Bid # 2

Additive Bid # 2 composes of nine (9) flow meter locations listed in Table 3. The duration of this contract shall be six (6) months. The City will evaluate the value of the bid and decide if they would like to proceed with the contract. If the City chooses to accept the bid of Additive # 2, all work associated with this contract will commence after work has been completed in Additive Bid # 1.

1.5 The City reserves the right to select any combination of Base and Additive Bids.

1.6 The Contractor shall provide a bid for all line items on the Bid Sheet (Section 0600) to be considered for award.

1.7 Award of the contract will be based on the overall low bidder of the Base Bid and all the Additives for percentage points.

DATE	PREPARED BY	ISSUANCE/REVISION	DEPT USING	PURCHASING APPROVAL
3/1/2013	Soo Koon Soon	Issuance	Lydia Torres	Gage Loots

2.0 APPLICABLE SPECIFICATIONS

- 2.1 All federal, state, country, local and municipal statues, laws, and regulations.
- 2.2 TMUTCD: Texas Department of Transportation Manual on Uniform Traffic Control Devices.
- 2.3 National Fire Protection Agency (NFPA) 820
- 2.4 National Electric Code (NFPA 70)
- 2.5 American National Standards Institute (ANSI)
- 2.6 29 CFR, Part 1926; United States Department of Labor Rules 29 CFR, Part 1926 Occupational Safety and Health Administration (OSHA)
- 2.7 29 CFR Part 1910.146, OSHA Permit Required Confined Spaces
- 2.8 ANSI Z 117, Safety Requirements for Confined Spaces
- 2.9 Austin Water Utility Standard Operating Procedure C-4, Confined Space Entry

3.0 MATERIALS REQUIREMENTS

- 3.1 The Contractor shall provide all labor, materials, equipment, and everything else necessary to install, monitor flow, collect the flow data and automatically transfer the data on an hourly basis to a FTP site provided by the City.
- 3.2 The Contractor shall provide and install a Flow Meter System (FMS) that consists of flow meter logger, flow meter sensor, remote terminal unit (RTU) and modem, power source and associated barriers for an intrinsically safe environment.
- 3.3 The Contractor shall provide flow meter devices capable of collecting data at five (5) minute intervals. The flow sensors or probes shall maintain recording accuracies during surcharge conditions. The Contractor shall furnish the necessary hardware devices to attach the probe to the wastewater main and install them. The flow meter shall meet the following flow component measurement:
 - a. Depth component of flow – The Contractor shall use ultrasonic depth sensor for primary depth measurement and pressure depth sensor for redundancy. Recording the depth component of the wastewater flow depth to an accuracy of at least 0.5 inches using ultra-sonic sensors together with a pressure transducer to record depth of surcharge. The range of the pressure transducer shall be the minimum standard range that exceeds the depth of the manhole for each location.
 - b. Velocity component of flow – recording the velocity component of the wastewater flow with an accuracy of 0.1 feet per second with a range of 0.75 to 15 fps.
- 3.4 The Contractor shall provide the software packages for the meters to the City at no additional cost to the City. The flow meters to be used shall be capable of measuring open channel flows with different cross sectional area and also non-circular pipes. The following are the only acceptable flow meters:
 - a. Flow Shark Triton as manufactured by ADS Environmental Services.
 - b. FLO-Dar Intrinsically Safe Sensor / FL 900 System Meter as manufactured by HACH Company.

- 3.5 The RTU and modem shall be compatible with the flow meter. The Contractor shall be responsible for costs associated with the transmission or transfer of data to the FTP site of the City. Refer to Section 4.17 for additional requirements.
- 3.6 Power source may be solar, AC or batteries. The Contractor shall maintain the source of power for the duration of the contract. The Contractor shall be responsible for costs associated with the power source for the Flow Meter System.
- 3.7 The Contractor shall document and examine the hydraulic condition of the wastewater flow at the flow meter site. The Contractor is responsible to use the appropriate flow meter and sensor that matches the hydraulic condition. The Contractor shall submit the documentation to the City for review and approval prior to the installation of the FMS.

4.0 CONTRACTOR REQUIREMENTS

- 4.1 The Contractor shall have access to spare and replacement flow meters.
- 4.2 There are existing meters in the majority of the flow monitoring locations listed in Table 1. The City will be responsible for removing the FMS components. The Contractor shall coordinate with the City during this period to minimize the loss of data due to the removal of the City meter and installation of the Contractor's meter.
- 4.3 The Contractor shall be prepared to install FMS at site conditions ranging from busy streets and state highways to isolated creek beds. Paved roads may not be nearby; therefore, the Contractor shall either carry or drive the equipment off road and possibly remove small amounts of debris and/or sediment from around the manhole for accessibility.
- 4.4 The Contractor shall investigate each of the flow metering sites listed in Table 1 and verify if the existing flow condition is suitable for the flow meter to record accurate data. The Contractor shall request in writing, provide justification and obtain approval from the City for an alternate location for a metering site.
- 4.5 If the Contractor determines that the site has met Section 4.4 and only needs to be cleaned due to the presence of accumulated "large" trash or trash from subsequent storm events, the Contractor needs to request in writing and coordinate with the City to clean the sewer main. Depending on the site conditions, the cleaning of each main could take two (2) to four (4) weeks. The City will be responsible to clean the sewer main. Large trash may include tree limbs, rocks, construction materials, or any large objects. The Contractor shall be responsible for the cost to remove and reinstall the flow meter probes in the sewer main for cleaning purposes. The Contractor shall also be responsible to collect the verification points according to Section 4.7a. During this period, there will be no compensation for the Contractor when they could not meet the 90 percent uptime and accurate data requirements. When necessary, the Contractor shall remove minor debris, sediment or any object that alters the performance of the sensor.
- 4.6 In sites where sediment is present the Contractor shall develop a profile and accurately determine the cross sectional area of the flow at the depth-measuring point. Record the depth of the sediment in the Site Sheet (Table 4). The Contractor is responsible to enter the information into the flow meter so that the computation of the flow quantities has included the necessary adjustment for the presence of silt affecting the flow.
- 4.7 The Contractor shall demonstrate that flow is stabilized and submit a Flow Stabilization Report to the City for review and approval within two (2) months of receiving the notice to proceed from the City. The City will review the Flow Stabilization Report within 2 weeks. The Flow Stabilization Report shall be in format agreed upon by the City and Contractor and shall include, but not be limited to, the following:

- a. For each metering site, a plot of both the velocity and depth diurnal curve as shown on Figure 6 with four (4) verification points each shown to be on or close to the diurnal curve. Each verification point shall be taken on separate days and at different times of the day.
 - b. Site Sheet as shown on Table 4.
- 4.8 After the City approves the Flow Stabilization Report, the Contractor shall commence collecting flow data. Only data collected from that point on will be eligible for a payment request consideration.
- 4.9 The Contractor shall demonstrate to the City that the flow meter is capturing data according to these specifications.
- 4.10 At the end of the contract, the Contractor shall remove its FMS from the locations within thirty (30) calendar days.
- 4.11 The Contractor shall coordinate the permanent installation of objects within the flood plain (outside of manholes) with the local flood plain administrator, in accordance with the local codes, AWU Safety Regulations, National Fire Protection Agency 820 Standard, National Electric Code and federal (National Flood Plain Insurance Program) regulations. The Contractor shall be responsible for the cost of such coordination activities.
- 4.12 The Contractor shall perform routine maintenance services for each FMS every (30) calendar days. Routine maintenance shall include the following:
 - a. Replace battery, scrub sensors, troubleshoot the equipment and restore or replace any defective or non-performing equipment, and calibrate level sensors, as necessary.
 - b. Level sensor calibration shall include comparing the returned level sensor values against independent devices.
 - c. Collect a verification point for each FMS and a velocity profile for each FMS by measuring the instantaneous velocity at pre-defined depths and then integrating them to derive an average for comparison to the meters calculated average velocity. Submit records of level and velocity verification to the City with each monthly payment request.
- 4.13 Emergency maintenance shall be performed by the Contractor to produce accurate data and as required by the Contractor's data analysts or the City's data analysts. The Contractor shall dispatch their field crew within forty-eight (48) hours for maintenance service and complete the service within seventy-two (72) hours after notification. Measurements, adjustments, and efforts undertaken during site visits shall be logged in a maintenance log specific to that site, which shall be available within three (3) business days after request by the City. When the City determines that the FMS requires the emergency maintenance due to conditions listed, the City will contact the Contractor's data analyst and discuss the concern. In the event, there is not an agreement between the City and the Contractor, the City reserves the right to require the Contractor perform the emergency maintenance without additional cost to the City.
- 4.14 Figure 1 illustrates the data transfer from the meter to the FTP site. The Contractor shall be responsible to produce the Telog EDF to be transferred to the FTP site. The City's Telog Module E-AIM3 can only accept flow meter data in the Telog EDF format.

The City will not accept any other data format. The Contractor shall be responsible for all costs associated with data transfer and cell communication usage. The Contractor shall set up the cell provider at no cost to the City.

- 4.15 Occasionally, the City reserves the right to request the Contractor to poll the meter and obtain the data. The data cannot be older than 15 minutes old or 15 minutes from real time data. The Contractor shall loan the software package to the City so that the City can perform this function.
- 4.16 The Contractor shall utilize trained data analysts experienced in processing and analyzing flow data from wastewater systems. The Contractor shall use various analytical tools such as hydrographs, scattergraphs, and flow balancing methods to verify the accuracy and precision of the flow data.
- 4.17 The Contractor shall schedule the data collection activities in a manner to allow data review by a trained data analyst within twenty-four (24) hours of the data collection or delivery from the field. The data analyst shall assess any maintenance or monitor performance issues and a crew shall be dispatched to resolve the issue. The Contractor shall provide data analysis services for each flow-monitoring site. Data analysis shall include a comprehensive review of collected data upon receipt, the accuracy of the data, identify data gaps, equipment service needs, as well as the conversion of raw flow data into final edited data. An experienced data analyst shall review the flow data in order to verify diurnal patterns and reasonable depths and velocities using data diagnostic tools such as hydrographs and "scattergraphs". In addition, the data analyst shall check for data characteristics as describe in Section 7.3a – 7.3d. Record any data adjustments and submit it to the City within three (3) business days upon request. The frequency of the review will be dependent of the flow data received. For sites where the difference exceeds ten (10) percent in comparison between the flow data and the field verification points as described in Section 4.7, the Contractor shall review the data more frequently. For sites that do not exhibit such conditions, the review frequency shall not be less than once a month.
- 4.18 The Contractor shall utilize FMS that shall comply with NFPA 820 Class 1, Division 1 requirements. However, it is acceptable to use intrinsically safe barrier and/or vapor barrier to define the established boundary for intrinsic condition outside the manhole. Any component that is inside the manhole shall be intrinsically safe rated and shall meet the NFPA 820 Class 1, Division 1 standards.
- 4.19 Substitutions or deviations in equipment or arrangement during the term of the contract must have prior written approval by the City.
- 4.20 There shall be no additional costs to the City including but not limited to: substitutions and/or deviations, data and equipment, computer or cell compatibility, reporting, transferring software, training, maintenance service, debris removal, permits and licenses, removal emergency safety plan.
- 4.21 The Contractor shall comply with the requirements of Section 5.1 Permit Application when they are working on City streets.
- 4.22 The installation of the FMS and obtaining the data may be performed outside normal business hours of 7:00 a.m. to 6:00 p.m. The flows are dynamic and especially after a rain event. The City will not assist in the flow control or diversion for any installation or maintenance of the FMS. The Contractor may provide their own flow management at no cost to the City for the installation of the FMS and if so, the Contractor shall comply with all the requirements of Section 5.2 ("Flow Management").

5.1 Permit Application

5.1.1 City of Austin Right of Way Department for the Temporary Use of Right of Way Permits (TURP).

- A. Request for the use of City right-of-way, including sidewalks, traffic lanes, parking lanes or meters, for all purposes, must be authorized by the Austin Transportation Department. The cost associated with the permitting process will be included in each flow metering locations.
- B. Contractor is responsible for submitting an application for the Permit for Temporary Use of the Right of Way (TURP) with an engineered traffic control plan. A sample TURP and instructions can be found online at the City web site <http://www.austintexas.gov/service/temporary-use-right-way> or in Appendix 1. Submit Application to:

RIGHT-OF-WAY AUTHORIZATIONS
Right of Way Management
Austin Transportation Department
City of Austin, 505 Barton Springs Road, Suite 850
Austin, TX 78704

This application is provided for Temporary Use of R.O.W. permits and is required for all work performed within the right-of-way of the City of Austin that does not involve utility cuts. The Contractor shall coordinate with scheduled R.O.W. work.

- C. Some typical information that may be required to be provided along with the application will be:
- Approximate time frame of each manhole.
 - Possibility of intersection work.
 - Locations of each manhole and type of closure involved including sidewalk, parking or traffic lane.
 - Traffic Control Plan to address each type of closure scenario.
- D. Engineered traffic control plan shall be prepared by a professional engineer licensed to practice in the State of Texas. If the installation of FMS at a location that disrupts the normal flow of traffic in work areas, the Contractor shall make every effort to minimize the disruption of traffic flow, comply with the City of Austin Transportation Criteria Manual and Texas Department of Transportation Manual on Uniform Traffic Control Devices. The Contractor is required to use the City of Austin standard details as they apply. If any of these details are not appropriate for a specific Work area, the Contractor shall provide the City with appropriate details and the City shall authorize the Contractor to prepare a traffic control plan appropriate for the Work area. The cost associated in developing the traffic control plan will be included in cost for the installation of the FMS.
- E. Contractor is responsible for the appropriate use of standard Traffic Control details that is available online at <http://www.austintexas.gov/service/temporary-use-right-way>.

5.1.2 It is the Contractor's responsibility to submit the application and obtain a permit, for any work performed in the Texas Department of Transportation right of way.

5.1.3 Contractor shall obtain a permit and also all work and procedures shall be performed in

conformance with the conditions described in the General Permit. Contractor shall show proof of General Permit as issued by the Department of Watershed Protection and Development Review, upon request.

5.2 Flow Management

- 5.2.1 The Contractor shall furnish all labor, supervision, tools, equipment, appliances, and materials to perform all operations in connection with bypass pumping of wastewater and wet weather flows around pipe segment(s) for flow management.
- 5.2.2 The purpose of by-pass pumping is to prevent sewage overflows and provide reliable sewer service to the users of the sanitary sewer at all times. The Contractor shall maintain sewage flow in the construction area in order to prevent back-up and/or overflow into upstream pipe segments and laterals, adjacent ditches, storm sewers, and waterways.
- 5.2.3 The normal practice will be to setup by-pass pumping at the beginning of each work day and pump around the day's pipe to be re-laid. The preferred suction point will be at a manhole upstream of the relay section. In some cases, the suction location may be the existing pipe in the trench. Discharge of bypass must be into a manhole (discharge into a cleanout is not acceptable). At the end of the work day, the new and existing pipe will be reconnected to allow gravity flow until the next work day. Access to driveways must be coordinated with residences / businesses and maintained during by-pass pumping.
- 5.2.4 By-pass pumping is the installation and operation of bulkheads, plugs, hoses, piping, and pumps to maintain wastewater flow and prevent backup and overflow. By-pass pumping provides continuous sewer service to the users of the sanitary sewer system while maintenance or construction operations are in progress by diverting flow when necessary around the construction location and pumping it to a downstream manhole.
- 5.2.5 It is the sole responsibility of the Contractor to locate and identify all existing sewer lines and services and to provide any and all labor, material, equipment, techniques and methods to bypass pump as necessary for his construction methods and to monitor the effectiveness of this installed system and its effect on adjacent facilities.
- 5.2.6 Operate, maintain and modify the system(s) as required to conform to this specification. Upon completion of the work, the Contractor shall remove the system(s).
- 5.2.7 Contractor shall assume sole responsibility for bypass pumping systems and for all loss or damage resulting from partial or complete failure of protective measures and any spills or resultant damage caused by his operation.
- 5.2.8 The pump and by-pass pumping lines shall be of adequate capacity and size to handle the peak flow conditions. All piping, joints, and accessories shall be designed to withstand at least twice the maximum system pressure, or a minimum of 50 psi, whichever is greater.
- 5.2.9 By-pass pumping operations shall use leak proof rigid pipe. Discharge hose will only be allowed in short sections and by specific permission from the engineer.
- 5.2.10 All pumps shall be fully automatic and solids handling, self-priming pumps in good working order with a working pressure gauge on the discharge. Self-priming pumps shall not require the use of foot-valves in the priming system. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows. The

- Contractor shall provide the necessary stop/start controls for each pump. A back-up pump of the same capacity as the primary pump shall be maintained on site at all times to be used in the event that the primary pump fails. No wastewater shall be allowed to drain or stand in earthen sump pits.
- 5.2.11 The Contractor shall be required to have all materials, equipment, and labor necessary to complete the repair or replacement on the job site prior to isolating the wastewater manhole or line segment and beginning by-pass pumping operations.
- 5.2.12 The Contractor shall provide a written plan and or sketch for implementation and sequencing of by-pass pumping for review and approval of the City prior to installation of the by-pass system. The plan shall include sufficient detail to show the location, number and size of pumps, the number, location, size and type of hoses and/or rigid piping, and the location of the downstream discharge. Show any special features where pipes or hoses cross roadways, such as temporary trenches, support bridges, etc. A plan for each line segment(s) around which flows are being by-passed is required. The plan shall include but not be limited to details of the following:
- A. Project information including the project name, location, and permit number (from plan cover sheet).
 - B. Contact information for general contractor/submitting entity shall include the company name, contact person (24hrs/day), phone number(s), and fax number.
 - C. Staging areas for pumps including a schematic showing the arrangement and layout of the pumping and bypassing facilities at various stages in the work.
 - D. Sewer plugging method and types of plugs.
 - E. Calculations for selection of bypass pump and pipe size(s) based on wastewater flows.
 - F. Length, size, material, location and method of installation of suction piping (if required).
 - G. Length, size, material, location, method of installation and location of discharge piping.
 - H. Pump manufacturer, model, sizes, capacity, and number of each size to be on site and power requirements.
 - I. Calculations of static lift, friction losses, and flow velocity, (pump curves showing pump operating range shall be submitted).
 - J. Downstream discharge plan.
 - K. Method of protecting discharge manholes or structures from erosion and damage.
 - L. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill.
 - M. Method of noise control for each pump.
 - N. Any temporary pipe supports and anchoring required.
- 5.2.13 Do not divert sewage outside of the sanitary sewer system. The Contractor shall take all necessary steps to prevent flooding of public or private property. Maintaining flow inside the

- existing pipe during rehabilitation operations is preferred.
- 5.2.14 Any time the by-pass pump(s) are operating, an experienced operator shall be on site to monitor the operation: adjust pump speed, valves, etc.; maintain and make minor repairs to the system; and report problems.
- 5.2.15 Where work requires by-passing beyond working hours, the Contractor shall operate by-pass pumping and man the system for twenty-four (24) hours per day.
- 5.2.16 Contractor shall ensure that no damage will be caused to private property as a result of by-pass pumping operations. Access to adjacent properties shall be maintained at all times. Ramps, steel plates, or other methods shall be employed by the Contractor to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.
- 5.2.17 Contractor shall complete the work as quickly as possible and satisfactorily pass all tests, inspections, and repair all deficiencies prior to discontinuing by-pass pumping operations and returning flow to the sewer manhole or line segment.
- 5.2.18 During by-pass pumping, do not allow sewage to be leaked, dumped, or spilled in or onto any area outside of the existing sanitary sewer system.
- 5.2.19 In the event of accidental spill or overflow, immediately stop the discharge and take action to clean up and disinfect the spill. Promptly notify the City so that required reporting can be made to the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA) by the City.
- 5.2.20 In the event of accidental spill or overflow, the Contractor is responsible for any damages that may have occurred to public or private property including cleaning, disinfection, and other corrections to the satisfaction of the City at no cost to the City.
- 5.2.21 Contractor shall not intentionally damage, alter, or remove portions of the existing sewer system structures for the purpose of installing a by-pass pumping system without specific approval from the City or Inspector. If a structure is damaged, it shall be reconstructed or replaced to the satisfaction of the City at no additional cost to the City.
- 5.2.22 The Contractor shall be responsible for any and all damage that results directly or indirectly from the interference of storm water runoff to by-passing equipment, piping, and/or appurtenances.
- 5.2.23 When by-pass pumping operations are complete, piping shall be drained into the sanitary sewer prior to disassembly, and all pumps and lines shall be flushed with clean water until all discharge is clear.
- 5.2.24 The Contractor shall report any by-pass pumping activities not included in the submitted plan to the City prior to proceeding with these activities.
- 5.2.25 The Contractor shall cease by-pass pumping operations when directed by the City.
- 5.2.26 The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The City will be given 24 hours notice prior to testing.

6.0 SAFETY

- 6.1 Prior to installing any FMS, the Contractor shall submit their safety plan to the City for review and approval. The Contractor shall modify their safety plan as required by the City. The safety plan shall include, but not be limited to, the following;
- a. Site Report: Documenting pre-installation site conditions. This report shall include site pictures, device serial numbers, manholes numbers, GPS coordinates (NAD 83) of manhole (to within five (5) foot horizontal and vertical accuracy), site names and any additional information deemed pertinent by the Contractor.
 - b. Confined space safety plan: The Contractor shall provide confined space access safety equipment, and traffic control devices required to meet Federal, State and Local requirements. The Contractor's employees involved in the installation and maintenance of the equipment shall be OSHA Confined Space Entry (CSE) certified, and shall adhere to federal, state and local rules, regulations, and requirements regarding CSE. The Contractor shall submit proof of CSE certifications. Whenever the Contractor uses the equipment for confined space entry that requires the equipment handler to be certified by the equipment manufacturer then the Contractor shall submit to the City the manufacturer certifications for each of the Contractor's employees that uses such equipment. The Contractor shall submit these certifications at the initial progress meeting. The Contractor shall submit a meter removal plan for emergency conditions. These plans will be reviewed by the City and the Austin Water Utility Safety Officer. The City reserves the right to request that the emergency conditions removal plan be revised and resubmitted to the City.
- 6.2 Prior to removal of any FMS, the Contractor shall submit their safety plan with post installation site conditions. The City shall be the final judge of acceptance of the safety plans.

7.0 ACCEPTANCE AND PAYMENT OF WORK

- 7.1 The Contractor shall post the data hourly automatically in Telog EDF file format to a secured FTP site provided by the City.
- 7.2 Data shall be posted by the Contractor to the FTP site must include the flow meter alarm data.
- 7.3 The raw data delivered to the City shall be a minimum 90% of up time and also 90% accurate data for each meter on a monthly basis for the monitoring period. Up time and accurate data are considered as raw data without any of the following;
- a. Missing Data as shown on Figure 1.
 - b. Flat Line data as shown in Figure 2.
 - c. Drifts Data as shown in Figure 3.
 - d. Spiked Data as shown in Figure 4.
- 7.4 Within any month when the meter is removed in accordance to Section 4.5 as determined by the City, the Contractor is still responsible to provide 90% uptime data. The uptime period will be thirty (30) days of data outside the period the flow meter has been removed for cleaning the sewer main of large debris or trash.
- 7.5 The Contractor shall provide to the City "clean up" data using the following method:
- a. Trace Balancing using verification points. To support any effort in "trace balancing" the data, the Contractor shall collect four (4) verification points and review the data for a minimum period of three (3) months to justify that the amount of "tracing" is correct and justifiable. A single verification point per month shall be required for each metering site to show that the flow stream has remained stabilized.

- b. The Contractor may present to the City an alternate method of producing “clean up” data. However, the City reserves the right to reject the method and require the Contractor to use the method described above.

7.6 At each monthly payment request, the Contractor shall include, at a minimum:

- a. A report which identifies which sewer meter locations that have not achieved 90% “up time” and accurate data.
- b. Verification points for each of the FMS location collected during the month in an excell format.
- c. Polished data for 100% in Telog EDF format transferred to the FTP site.
- d. Provide a report identifying the raw and polished data explaining what has been performed to obtain this data.

7.7 The Contractor will only be paid for the percentage of “up time” or accurate raw data. Verification points and “clean up data” are subsidiary to the raw data. For example, during any month in the contract period, there is only 80% of the flow meter sites with 90% “up time” raw data for each of the individual site, then the Contractor shall invoice only 80% of the cost for the month. The Contractor will still have to provide the necessary verification points and the “clean up data” for the sites eligible for invoicing. Please note that the reduced invoice amount shall not relieve the Contractor of the contractual responsibility to meet the required “up time.”

7.8 The modelers (system planning) needs large amount of accurate raw data and the polished data will be used for “Quality Control” purposes. The Contractor must demonstrate to the City that every attempt has been made to achieve 90% up time data for every metering site.

8.0 PROGRESS REPORTS

8.1 The Contractor shall submit to the City an “up time” data table along with the monthly payment request to demonstrate that they are in compliance with the uptime requirement, including a thorough explanation of the reasons for not meeting the up-time requirement at any site. Uptime shall be defined as the number of measurement intervals where a flow value can be calculated from a measured depth and a measured or inferred velocity for a common time interval divided by the total number of measurement intervals in the reporting period.

8.2 The Contractor shall submit monthly and quarterly, or as otherwise agreed upon by the City and Contractor, progress reports to the City. The reports shall describe significant achievements and problems which have potential effect on schedule and/or costs. The progress reports shall be sufficiently detailed to assure that directions being pursued are in compliance with established and/or projected systems.

8.3 The flow data shall be submitted to the FTP site shall include the following information:

- a. Meter Name
- b. Date and Time
- c. Velocity (feet per second) – TV
- d. Flow Depth (inches) – TD
- e. Flow (gallons per minute)* - TQ (*Contractor shall provide the Continuity Equation used in the flow calculation).
- f. Flow (gallons per minute)** Q Manning (** Contractor shall provide the Manning equation used in the flow calculation).

8.4 At the initial progress meeting the Contractor shall submit a preliminary schedule within three (3) business days that shall include critical milestones for review and approval. The approved schedule shall serve as the baseline for this contract. At each monthly payment request, the Contractor shall submit an updated project schedule indicating progress achieved to date for each task.

9.0 CONTRACTOR ADMINISTRATIVE REQUIREMENTS (Unless specified otherwise, the Contractor shall provide distinct personnel for each of the roles listed below.)

9.1 Contractor Employees

The Contractor shall utilize an experienced project manager and experienced field crews to conduct the work. Contractor field crews shall consist of a minimum of two (2) employees. However, in confined space entry in order to comply with OSHA, State and City regulations, additional employees may be required. The field crew shall wear easily recognizable uniforms containing prominently displayed picture identification badges with the Contractor's name and employee name. Field crews shall carry a letter describing the project and work to be performed. The Contractor shall complete a background investigation on employees who will be on City property. A complete list of employees and their duties, along with documentation of background investigation shall be submitted prior to beginning work.

9.2 Project Manager

The Contractor's project manager shall manage the entire project on a day-to-day basis on behalf of the Contractor and ensure that assessments are carried out in a professional manner and in compliance with the assessment. The project manager shall have a minimum of five (5) years of experience managing similar contracts, and shall be familiar with the applicable regulations and safe and proper flow meter operation procedures. The Contractor's project manager shall be the primary point of contact and shall be available to meet with the City on a monthly or more frequent basis to update progress against the assessment schedule and discuss any issues.

9.3 Field Operation Manager

Each field crew shall be led by the Contractor's field operations manager. The field operations manager shall be onsite continuously when FMS are being installed, maintained, worked on, removed, etc., except for City observed holidays and vacations during which the Contractor shall provide a qualified substitute pre-approved by the City. The field operations manager shall have a minimum of three (3) years of experience as a crew leader overseeing installation, operation and maintenance of flow meters in large diameter wastewater mains and be familiar with applicable regulations and proper flow meter operations procedures.

9.4 Field Technicians

Each field crew shall include one or more Contractor's field technicians. Field Technicians shall be onsite continuously when flow meters are installed, maintained, operated, removed and other field work is being performed. Field technicians shall have a minimum of one (1) year of experience with installation, operation and maintenance of flow meters in large diameter wastewater mains and be familiar with applicable regulations and safe and proper flow meter operations procedures.

Note: One individual may simultaneously serve as Project Manager and Field Operations Manager providing the above qualifications are met.

9.5 Data Analyst

The Contractor's data analyst performing quality control of the data including "trace balancing" of the data must have a minimum of five (5) years of direct experience in flow monitoring data analysis and management.

9.6 Site Conditions

The Contractor, by submitting their bid, agrees that they have evaluated site conditions and incorporated such impacts into their bid. The Contractor shall expect some variation of information presented in the Tables. The prices on the Bid Sheet (Section 0600) for Installation and Removal of the meters are for meters of all depths and all sizes of pipes.

9.7 Job Site Management

The Contractor shall set up, manage, and restore each job site in a responsible manner that includes but is not limited to maintenance of traffic, pedestrian safety, and property protection. At no time during active progress of work shall the Contractor leave the job site unattended. The

Contractor shall request and gain approval from the City for any specific job site work that may extend past one (1) work day.

9.8 Scheduling

The Contractor shall develop an overall schedule of work to be approved by the City prior to the commencement of work. The City will review and approve the work schedule prior to Contractor beginning work. The Contractor shall provide to the City the general locations of the planned work within at least three (3) business days in advance. Changes requested by the City shall be made at no additional cost to the City. The City will be the final judge as to the schedule, planned work and completion of work.

9.9 Professionalism

The Contractor shall insure activities are conducted in a professional manner. At a minimum, the Contractor shall insure personnel are in an approved uniform and nametag, field equipment is maintained clean and neat, and trucks are clearly identified with the Contractor's name, contact phone number, and "Under Contract with the City of Austin" on both sides of the truck. The Contractor shall maintain written procedures for field operations and information management process.

9.10 Hours of Work

The Contractor shall perform work in the field within standard working hours of 7:00 a.m. to 6:00 p.m. Monday through Friday (except City observed holidays). The Contractor shall request prior approval from the City for alternate work hours so that installation and removal of FMS can be installed in low flow conditions.

9.11 Security Access

One of the flow metering sites is located within the property of Camp Mabry Texas National Guard. The City will coordinate with the officials at Camp Mabry to allow access to the flow metering site. It is the responsibility of the Contractor to comply with all the requirements to work in such an area.

10.0 OMISSIONS

- 10.1 It is the intent of this specification to acquire complete wastewater flow monitoring services for the City of Austin, AWU. Any services that have been omitted from this specification, which are clearly necessary for the complete and legal operation of this service are to be considered a requirement, although not directly specified or called for in this specification. These omissions shall be brought to the immediate attention of the Buyer listed in the solicitation documents and a determination will be made as to whether the requirements are to be incorporated into the solicitation by means of an addendum to the Invitation for Bid.

Table 1: Crosstown Flow Meter Sites

No	Flow Meter Name	Pipe Diameter	Manhole No	Manhole Depth (Feet)
		(Inches)		
1	CT C01 WLN MH 80572 84 Main	84	80572	28
2	CT C02 FOU MH 98780 18 Scottsdale	18	98780	15
3	CT C03 TAU MH 238456 30 Morris Williams	30	238456	12
4	CT C04 TAU SH 73543 96 XT Morris Williams	96	73543	85
5	CT C05 BOU MH 204164 24 Manor	24	204164	21
6	CT C06 WLU MH 50791 24 Leonard	24	50791	16
7	CT C07 WLU MH 52306 30 Adams Park	30	52306	22
8	CT C08 WLU SH 52153 96 XT Adams Park	96	52153	101
9	CT C09 SHU MH 253164 66 29th @ Lamar	66	253164	65
10	CT C10 TYN MH 95340 30 Camp Mabry	30	95340	16
11	CT C11 DRN MH 19348 18 Mt. Bonnell	18	19348	10
12	CT C12 BUL SH 20894 42 Lakewood	42	20894	22
13	CT C13 WLN MH 80887 72 Loyola	72	80887	30
14	CT C14 WLN MH 90923 60 Sprinkle	60	90923	31
15	CT C15 WLN MH 70423 30 Danny	30	70423	16
16	CT C16 LWA MH 76617 42 Cross Park	42	76617	25
17	CT C17 SHU MH 34523 42 Jefferson	42	34523	14
18	CT C18 SHU MH 37203 48 Northwest Park	48	37203	20
19	CT C19 LWA MH 195695 60 Springdale	60	195695	65
20	CT C20 MH 73642 96 MLK	96	73642	55
21	CT C21 LWA MH 240949 42 Spring	42	240949	20
22	CT C22 BUL MH 40389 30 Bluffst	30	40389	12
23	CT C23 BUL MH 40115 21 Old Spi	21	40115	7
24	CT C24 LKC MH 43709 45 Harrier	45	43709	10
25	CT C25 MH 33946 West 35 th St	84 w cunette	33946	67
26	CT 26 MH 198975 36 Johnny Morris	36	198975	15

Table 2: Set 1 Temp Meter Sites for 6 months contract term

No	Flow Meter Name	Pipe Diameter (Inches)	Manhole No	Manhole Depth (Feet)
1	Lake Creek Meter 1	30	113088	10
2	Lake Creek Meter 2	21	23783	15
3	Lake Creek Meter 3	15	23468	11
4	Lake Creek Meter 4	18	124304	11
5	Lake Creek Meter 5	15	125113	5
6	Upper Walnut Meter 1	24	85502	10
7	Upper Walnut Meter 2	30	71163	15
8	Upper Walnut Meter 3	24	86437	15
9	Upper Walnut Meter 4	18	115272	14

Table 3: Set 2 Temp Meter Sites for 6 months contract term

No	Flow Meter Name	Pipe Diameter (Inches)	Manhole No	Manhole Depth (Feet)
1	Walnut Temp Meter 1	48	115788	60
2	Walnut Temp Meter 2	24	78129	25
3	Walnut Temp Meter 3	27	115840	12
4	Walnut Temp Meter 4	18	77501	26
5	Shoal Temp Meter 1	24	93856	9
6	Shoal Temp Meter 2	24	196230	9
7	Shoal Temp Meter 3	36	90378	11
8	Little Walnut Upper	36	197171	19
9	Johnny Morris	36	198975	15

Table 4: Typical Site Sheet

Site ID (Manhole #)		Site Name										Meter City Tag #		Meter Serial #		Probe Length										
Pipe Size	Telog Coa#	Modem #								Meter Model		Probe City Tag#		Probe Serial #												
Pipe Type	Telog SN#	Modem HEX										Meter Model		Probe City Tag#		Probe Serial #										
Basin	Telog Type	All meters internal clocks are to be set to standard time																								
Installed By		BEFORE MAINTENANCE										AFTER MAINTENANCE														
Date	of 10 minute window	DEPTH (inches)	VELOCITY (ft/sec)					Time End of 10 minute window	Silt Level	Probe position	Entrant	Time Start of 10 minute window	Measur ed Depth	1st Peak	Profile	2nd Peak	Reading Velocity	DEPTH (inches)	Measur ed Depth	Reading Depth	End of 10 minute window	Silt Level	Probe Position	Battery (Volts)	and Calibra te?	Comments
10/19/00	0:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
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Figure 1: Flow Meter System Communication

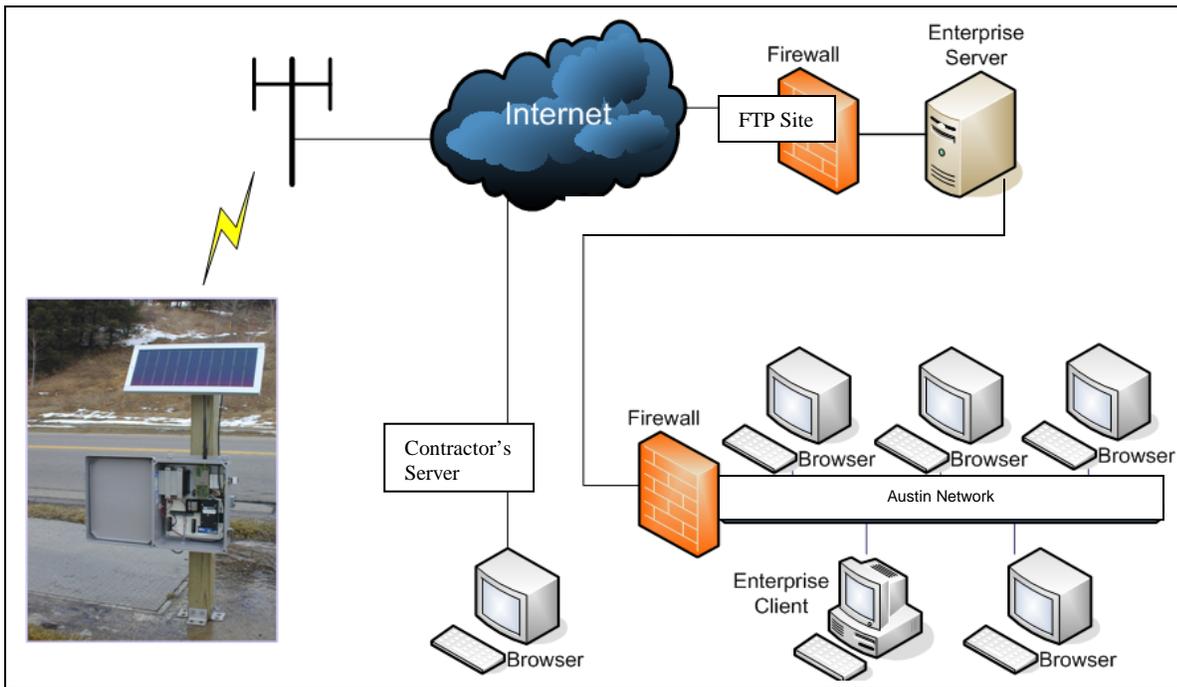


Figure 2: Missing Data

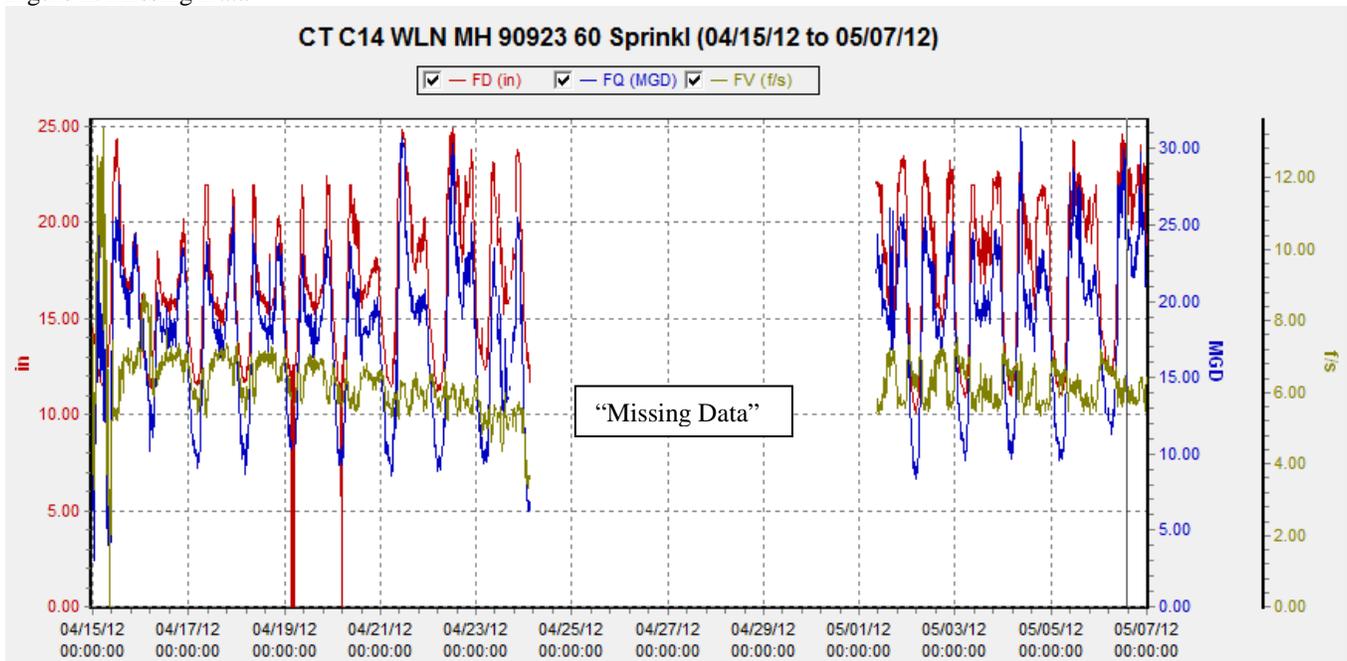


Figure 3: Flat Lines

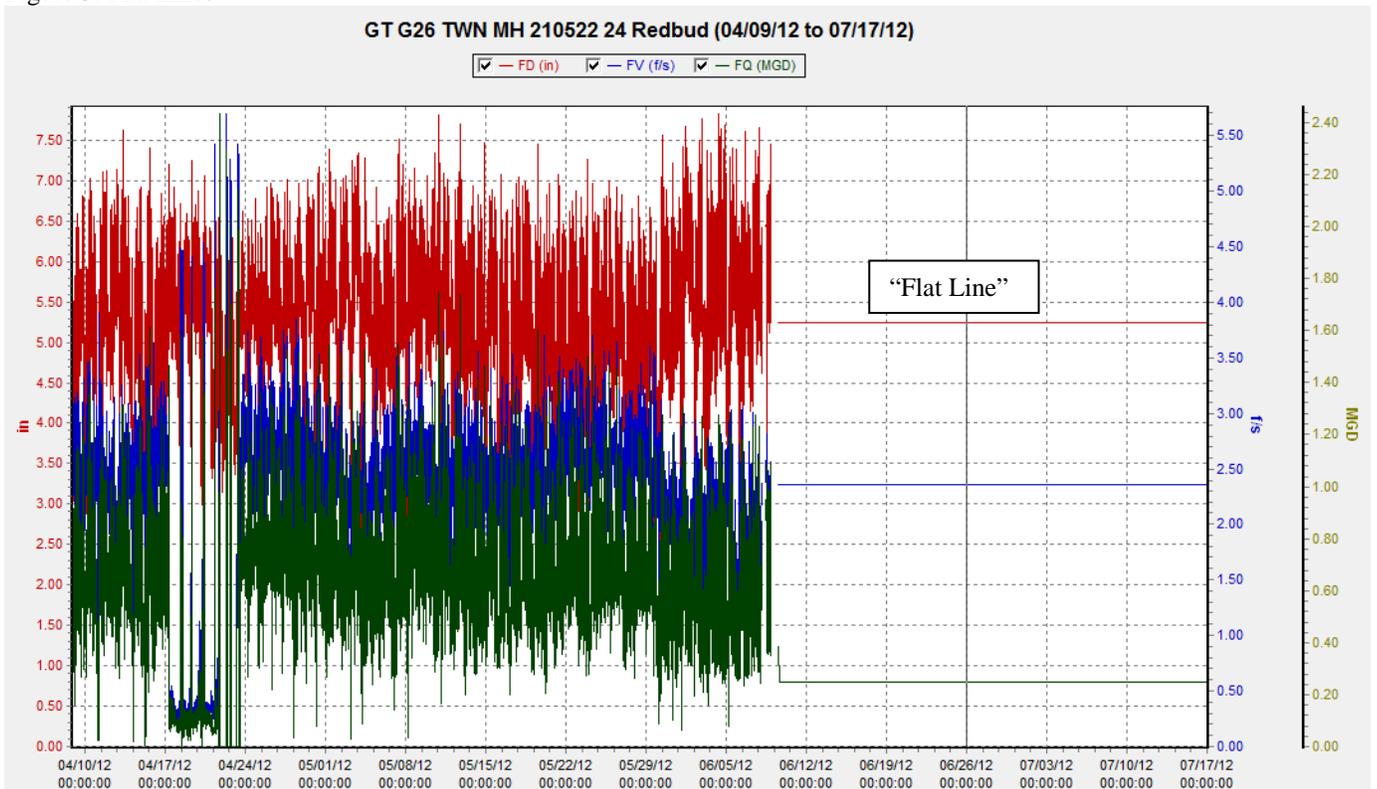


Figure 4: Drifts

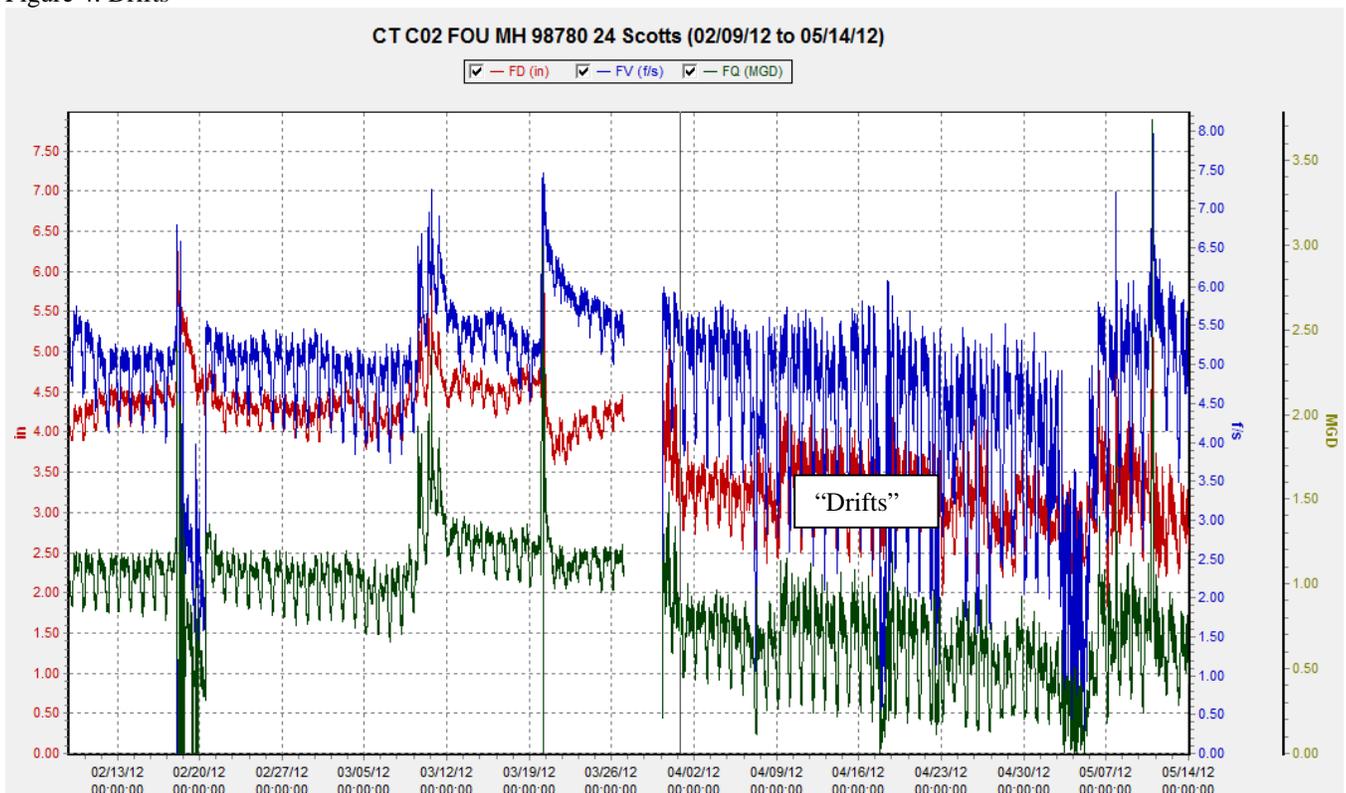


Figure 5: Spikes

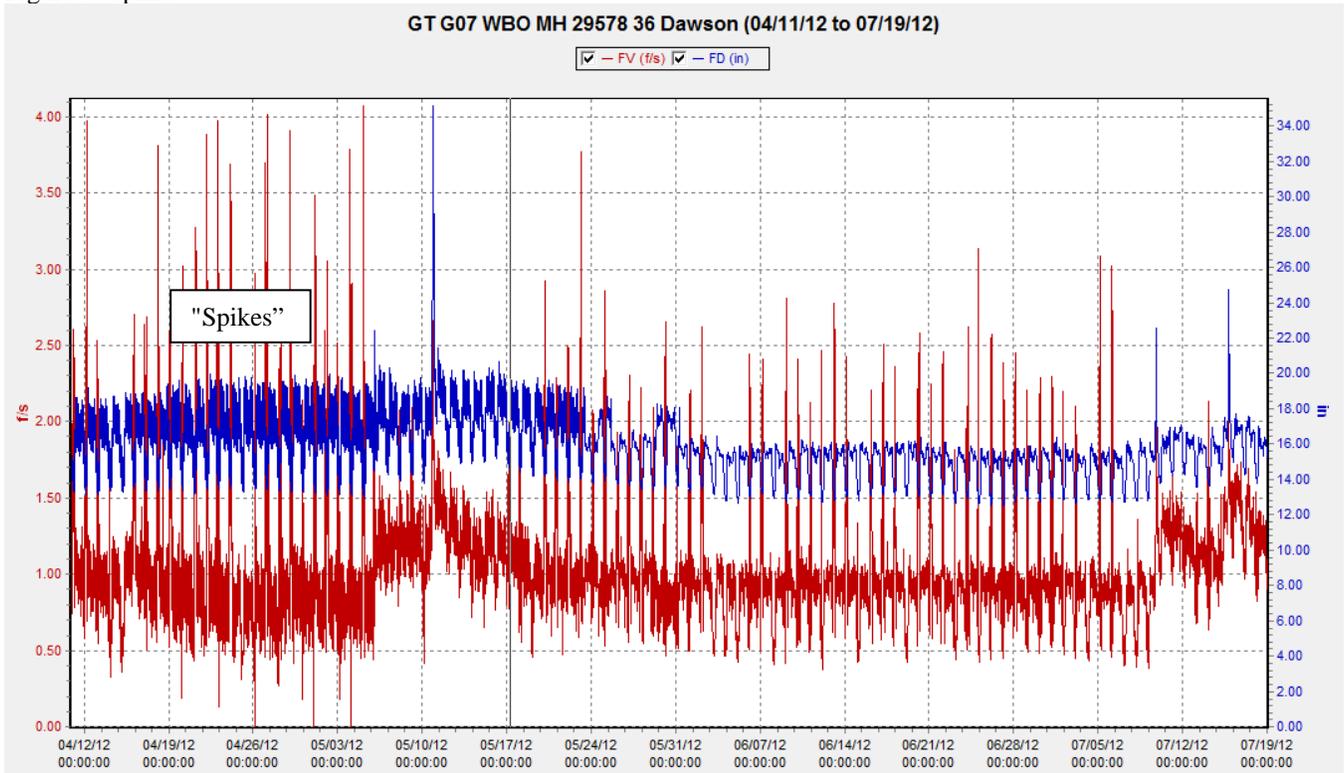


Figure 6: Verification Points

