

**PART VIII**  
**SEWER MONITORING AND ALARM EQUIPMENT**  
**BID #20-2014**  
**TECHNICAL SPECIFICATIONS**

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**TECHNICAL SPECIFICATIONS**  
**SECTION 1**  
**GENERAL SCOPE & SPECIAL PROVISIONS**

The Lexington Fayette Urban County Government (LFUCG) is accepting bids from Equipment Suppliers to provide Sewer Monitoring Equipment at select LFUCG sanitary sewer manholes.

LFUCG provides wastewater collection and conveyance services to the general LFUCG Urban Services Area (USA), as well as limited areas outside the USA. LFUCG has established operational procedures for the continued operation of its wastewater collection system during wet weather periods. LFUCG's operational procedures identified fourteen (14) sanitary sewer manholes in which monitoring and alarm equipment will be installed in accordance with the Contract Documents.

**1.01 GENERAL DESCRIPTION OF SERVICES TO BE PERFORMED UNDER THIS CONTRACT**

- A. The purpose of this section is to define the manholes in which the monitoring and alarm equipment will be installed to allow continual monitoring of LFUCG's wastewater collection system during wet weather periods.
- B. The Equipment Supplier shall be required to furnish all materials, labor, and equipment, for installation of the monitoring and alarm equipment.
- C. These Contract Documents are intended to provide the basis for proper completion of the Sewer Monitoring and Alarm Equipment for LFUCG. Anything not expressly set forth but which is reasonably implied or necessary for proper performance of these services shall be included.
- D. Installation of the Sewer Monitoring and Alarm Equipment shall be scheduled with the Owner seven (7) days in advance at each site.
- E. LFUCG will be represented by a representative of the Division of Water Quality (DWQ) including the Wastewater Collection and Conveyance Manager, the Sewer Line Maintenance Superintendent, the Municipal Engineer Senior, the Construction Manager, or designated representative (Engineer or On- Site Supervisor), said representative shall be authorized to initiate and/or oversee services under this Contract.
- F. Section 2 of these Specifications lists the address of each manhole, a general description of the installation required, and a summary of the main components necessary for the installation. Any item or material not listed in the Bid Schedule shall be considered incidental to the Work.
- G. Field Verification: Equipment Supplier shall field verify existing conditions prior to ordering materials.

## 1.02 SCOPE OF WORK

This Contract provides for the following Sewer Monitoring and Alarm Equipment:

- A. Furnishing and installation of items as listed in the Bid Schedule of this document. The installation shall be in accordance with the intent and direction of the Specifications, allowing for field modifications as site conditions dictate.
- B. The Equipment Supplier shall submit a unit price bid which shall include all aspects of site specific installation of the monitoring and alarm equipment and performance testing of the installed equipment.

## 1.03 GENERAL CONDITIONS

- A. The scope of the Sewer Monitoring and Alarm Equipment described in this Specification does not guarantee the amount of work or quantities of work to be performed.
- B. LFUCG may add or remove Sewer Monitoring and Alarm Equipment from the list at any time during the term of this Contract by notifying Equipment Supplier of said changes.
- C. Payment for furnishing and installation services provided on this Contract shall be by unit price.
- D. The Equipment Supplier is responsible for providing all labor, tools, and equipment necessary to perform the work described.
- E. LFUCG inspectors shall monitor the work performed by Equipment Supplier.

## 1.04 DESIGNATION OF PARTIES

All references in the Specifications and Contract Documents to “Owner” shall mean the Lexington-Fayette Urban County Government (LFUCG); all references to “Engineer” shall mean the LFUCG Division of Water Quality (DWQ) or authorized DWQ representative.

## 1.05 ACCESS TO AND INSPECTION OF WORK

The Owner and/or Owner’s representatives shall at all times have full access to the sites for inspection of the work accomplished under this Contract.

## 1.06 UTILITIES REQUIRED BY EQUIPMENT SUPPLIER

All water, electric current and/or utility service required by the Equipment Supplier in performance of these services shall be furnished at his own expense.

## 1.07 WORK ON PRIVATE PROPERTY

- A. Private property is defined as property other than that belonging to LFUCG. Highway rights-of-way, public parks, schoolyards, and other such properties shall be considered public access areas for the purpose of this paragraph.
- B. In connection with this Contract, the Equipment Supplier shall confine his equipment and operations of his workmen to public access areas and rights-of-way provided by the Owner, and shall take every precaution to avoid damage to the buildings, grounds, and facilities of the owners of private property. The Equipment Supplier shall be responsible for any damages to public and/or private property resulting from any work under this Contract. Other responsibilities involving access to work shall be as provided for in the General Conditions.
- C. Fences, walls, hedges, shrubs, i.e. any and all landscaping etc., shall be carefully preserved, and/or replaced if damaged when work is completed. Grassed areas, if damaged, shall be graded, fertilized, seeded, and covered with straw when work is completed.
- D. A representative of the contractor shall notify private property owners via a letter of impending work on private property five (5) days in advance of equipment installation. The Equipment Supplier must give LFUCG seven (7) days advance notification of when work is to begin on private property. The Contractor shall provide LFUCG with a copy of all notification letters sent to private property owners.

#### 1.08 RIGHT-OF-WAY REQUIREMENTS

It shall be the Equipment Suppliers responsibility to notify the LFUCG Police Department's Safety Officer at (859) 258-3600 prior to performing any work which might interfere with traffic or compromise public welfare or safety. The Equipment Supplier shall also be responsible for notifying the Division of Public Information and the Division of Traffic Engineering of any roadway blockages or traffic delays. Access to all existing subdivisions and private residences shall also be maintained unless otherwise directed.

#### 1.09 MAINTENANCE RECORDS

The Equipment Supplier shall keep accurate records on the Sewer Monitoring and Alarm Equipment. The Equipment Supplier shall document all work on as-built drawings and/or material lists.

#### 1.10 COMPLIANCE WITH SAFETY REGULATIONS

The equipment items furnished shall comply with all governing federal and state laws regarding safety, including all requirements of the Occupation and Safety Act of 1970 (OSHA). It shall be the Equipment Supplier's responsibility to provide signs, traffic control devices, and obtain any required permits throughout the duration of this Contract and is to be included in the cost of work to be done. Equipment Supplier shall abide by county and state regulations governing utility work. Traffic control shall be provided according to the Kentucky Department of Highways Manual on Uniform Traffic Control devices for Streets and Highways.

#### 1.11 IDENTIFICATION REQUIREMENTS

- A. The Equipment Supplier shall be required to have workers and all equipment clearly identified.
- B. It shall be the Equipment Supplier's responsibility to provide identification (ID) cards for all employees. The ID cards must have a photo of the employee, the company name, emergency phone number and Contract expiration date. The ID cards shall be exposed at all times.
- C. All company equipment and vehicles shall have the company name and an emergency number clearly displayed.

#### 1.12 EMERGENCIES

The Equipment Supplier shall provide the Engineer with an emergency telephone number where he or his representative may be reached on a twenty-four (24) hour, daily basis.

#### 1.13 COMMUNICATIONS

The Equipment Supplier shall provide, for the duration of the Contract, for the Engineer and/or the Owner's representative(s) a means of direct communication acceptable to the Owner. The Owner will provide the Equipment Supplier with the Sewer Line Maintenance Superintendent cell phone number, as well as an on call list for after regular work hours in case of an emergency and/or if assistance is needed from the LFUCG on call personal.

#### 1.14 DAILY CLEAN UP

At the end of each day, the Equipment Supplier shall ensure that the individual work sites where he has performed services are free of trash and miscellaneous debris, as directed by the Owner or Engineer. Any wastewater spills shall be reported and cleaned in accordance with Section 4.

#### 1.15 FEDERAL, STATE, AND LOCAL LAWS

Equipment Supplier shall procure all necessary permits and/or certifications to provide the Sewer Monitoring and Alarm Equipment. Further, it shall be the Equipment Supplier's responsibility to research, understand, and comply with all federal, state, and local laws, codes, regulations, ordinances, etc., which relate to performing the work as described within this Contract.

#### 1.16 LOCATION OF WORK SITES

In general, the work sites contained in this Contract are separated by moderate to large distances. It shall be the Equipment Supplier's responsibility to locate all work sites.

Generally, a DWQ representative will allow initial entry at manhole sites for work. The Equipment Supplier shall verify his locations with the Owner and Engineer prior to commencement of any work.

**END OF SECTION**

**TECHNICAL SPECIFICATIONS  
SECTION 2  
DETAILED SERVICE DESCRIPTIONS**

2.01 GENERAL INFORMATION

The intent of this Sewer Monitoring and Alarm Equipment Contract is to ensure that the listed manhole locations are equipped with fully functional sewer monitoring and alarm equipment.

2.02 DETAILED SERVICE DESCRIPTIONS

The designated manhole locations on Table 2-1 shall be installed to the following descriptions and Specifications.

Table 2-1 SSO Alarm Sites

Address	Manhole #
1502 Russell Cave Rd	CR4_15
3297 Featherston Dr	EH3_377
Gardenside Park(Yorktown Rd)	WR2_102
Wolf Run Park – Maywick View Lane	WR2_91
787 Tyrus Ct	WH1_16
3665 Niles Ct	WH2_419Z
3402 Greentree Rd	WH3_658
2309 The Woods Lane	WH6_645
3544 Creekwood Dr	WH6_98
3501 Kirklevington Dr	WH3_56
3501 Laredo Dr	WH2_181
3134 Montavesta Rd	WH5_45A
2300 Richmond Rd	WH7_35A
204 St Ann Dr	WH7_280A

Additive Alternates

Address	Manhole #
722 N. Broadway	CR3_51
441 Park Ave.	TB5_14
1100 Nicholasville Rd.	TB5_102A
782 Allendale Dr.	WR5_9

**END OF SECTION**

**TECHNICAL SPECIFICATIONS**  
**SECTION 3**  
**BASIS OF MEASUREMENT AND PAYMENT**

3.01 SCOPE

- A. The Equipment Supplier shall furnish all necessary labor, machinery, tools, apparatus, materials, equipment, service, other necessary supplies, and perform any work without additional compensation, except where specifically set out in these Specifications, at the not-to-exceed unit prices.
- B. It shall be the Equipment Supplier's responsibility to provide signs, traffic control devices during the performance of installing Sewer Monitoring and Alarm Equipment and is to be included in the cost of work to be done.
- C. It shall be the Equipment Supplier's responsibility to repair any damage to public and/or private property caused by the Equipment Supplier and said repairs shall be included and are not a separate pay item.
- D. All Sewer Monitoring and Alarm Equipment bid items shall be per unit prices as set forth in the Bid Schedule.
- E. Section 2 of these Specifications lists a general description of the Work required and a summary of the main components necessary for the Work. Any item or material not listed in the Bid Schedule shall be considered incidental to the Work.
- F. This Section (Section 3) describes measurements and payments of bid items only. For detailed Specifications refer to appropriate sections of the Specifications.

**END OF SECTION**



**TECHNICAL SPECIFICATIONS**  
**SECTION 4**  
**SEWAGE SPILL PROCEDURES**

4.01 SEWAGE SPILL PROCEDURES

The following list is a chronological checklist of things that need to be completed when experiencing a sewage overflow or spill. Understand that this checklist is intended only to provide **minimal** procedures for a general sanitary sewer overflow occurrence. Each overflow occurrence is situation-dependent and additional steps may be required to ensure proper cleanup.

- A. **Immediately** call Environmental Response Team (ERT), Pump Station Supervisor, Collection and Conveyance Manager (CCM), Fire Non-Emergency Dispatch, Health Department, and Kentucky Division of Water (KDOW):
  - 1. **ERT:** 1 (800) 928-2380 or (502) 564-2380 – ERT will assign an Incident Number that you will need to record.
  - 2. **Sewer Line Maintenance Superintendent:** Robert Clay – (859) 425-2448 or (859) 983-0616 (cell)
  - 3. **CCM:** Rod Chervus – (859) 425-2408 or (859) 983-8402 (cell)
  - 4. **Health Department Officer:** (859) 335-7071 – You will need to report the following regarding the incident:
    - a. Estimated spill volume (in gallons)
    - b. Time of the spill and duration
    - c. Location (street address)
  
- B. The Environmental and Public Protection Cabinet (EPPC) of the Commonwealth of Kentucky must be notified via email within 24-48 hours. Be sure to include the Incident Number. Electronic Submittal address is:  
<https://dep.gateway.kygov/eportal/default.aspx>.
  
- C. Immediate notification of the situation to Fire Non-Emergency Dispatch at (859) 231-5600. Inform the Haz Mat Platoon Leader for Unit 220 that there is a sewer bypass that “may” present an environmental hazard and whether DWQ is handing or DWQ needs help from Haz Mat.
  
- D. **Immediately** contain the overflow and prevent untreated sewage from entering waterways (i.e. creeks, rivers, lakes, stormwater system, etc.) by building a temporary barrier or containment using sandbags, soil, metal or wood curbing, etc.
  
- E. Remove sewage from containment area. This can be done numerous ways, see below for examples of how to remove sewage:
  - 1. Use vacuum truck to remove water from containment area
  - 2. Using barrier, direct flow back into sanitary sewer manhole

- F. Remove any visible debris (e.g. toilet paper, condoms, etc.) from area and properly dispose of by transferring to the on-site pump station maintenance personnel.
- G. Use lime or some type of disinfectant in pervious areas such as soil, mulch, and grass.
- H. Once sewage has been contained and removed, the impervious areas (pavement, concrete, etc.) should be rinsed. The water used to rinse the impervious area will also need to be removed by the previous methods described.
- I. A copy of the Electronic Submittal should be faxed to the Division of Fish and Wildlife at (502) 564-3178.
- J. An “after the event” summary should be electronically provided to LFUCG’s Division Director, Charles Martin ([chmartin@lfucg.com](mailto:chmartin@lfucg.com)).

**END OF SECTION**

**TECHNICAL SPECIFICATIONS  
SECTION 5**

**02680 – SEWER MONITORING AND ALARM EQUIPMENT**

**PART ONE – GENERAL**

1.0 GENERAL SUMMARY

The intent of this Equipment Supplier Contract is to ensure Sanitary Sewer Overflows (SSOs) Alarm Systems within the LFUCG Collection System are installed per the directions specified, maintained during the term of this Contract, and hosting of a website that is available for LFUCG personnel to log onto to monitor, receive alarms, and download data. The equipment provided will become the property of LFUCG. The Equipment Supplier shall provide and install all equipment on a per unit price. Additionally, the Equipment Supplier shall maintain the equipment, provide cellular service, and host a website where LFUCG personnel can log on to monitor the equipment, receive alarms, and download the data specified. This service shall be based on an annual price per unit.

1.01 GENERAL REQUIREMENTS

- A. Equipment – General. The equipment supplied for this project shall consist of a durable wireless monitor / data logger equipped to connect to up to two industry standard float switch devices and a pressure transducer.
- B. A depth sensor which records actual depth readings for level calculation. The wireless communications platform instantly notifies LFUCG personnel and their designees of high depth conditions and system overflows via email and/or text messaging without the need for any special software.
- C. The equipment shall be equipped with a rugged, light-weight submersible housing and be capable be housed in a NEMA 4X box mounted outside the manhole with the cables installed in the manhole. The length of cable required for each installation shall be determined by the Equipment Supplier.
- D. The equipment shall incorporate a wireless monitoring system that is scalable and expandable. The systems shall operate automatically without user assistance and no software programming or development required.
- E. The equipment provided under these Contract Documents shall be on a unit price basis including installation and an annual fee per unit for maintenance, cellular service, and website hosting and maintenance. All equipment shall become the property of LFUCG. The maintenance portion of this Contract shall be for one (1) year with two (2) additional renewals at the discretion of LFUCG.

- F. The equipment provided shall be warrantied for the life of the Contract (1 year).
- G. Equipment shall be able to continuously determine depth of liquid level in the manhole via a pressure transducer and support up to two floats for system overflow determination.
- H. Equipment shall have the ability to add flow rate determination at a later date if requested by LFUCG, using LFUCG supplied formula or adding additional area velocity sensor to system.
- I. Equipment must have the ability to alarm at surcharge, via the pressure transducer, (2' over the crown of the pipe or 3' below the manhole cover) and at overflow of the manhole, via the float(s).
- J. Equipment must be able to be interrogated using the web-based software for up to the minute reporting on conditions.
- K. Equipment to have the ability to add rain gauge collection (either integrated or a separate unit).
- L. Equipment must be able to transmit via cellular communication with the antenna submerged or elevated out of the water in a protective enclosure.
- M. Equipment must be able to send out alarms both by text messages and email notification.
- N. Equipment must have a battery life of a minimum of 12 months.
- O. Equipment must have the ability to operate with both either AC current or DC current.

## 1.02 SERVICES REQUIRED

- A. All tests shall be performed in accordance with the requirements of the General Conditions and LFUCG Standards and Specifications. The following pre-qualifications are required:
  1. Pilot Study Program: Equipment Supplier shall have participated in a Pilot Study Program with LFUCG with a 95% success rate of functionality and reporting.
  2. Equipment Supplier must be able to sell LFUCG the equipment specified and provide a warranty for the life of the Contract on the equipment.
  3. Equipment Supplier must be able to install the equipment in locations designated by LFUCG per the Specifications provided on a per unit basis.
  4. Equipment Supplier must provide cellular service for transmission of the alarm system data back to the Equipment Suppliers hosting facilities for storage, alarming, and retrieval of the data thru a web-based system for LFUCG.

5. Equipment Supplier must be able to provide hosting capabilities for alarming, collection of data, sending text messages and email notifications, and providing reports to LFUCG.
6. Equipment Supplier must be able to provide a software package that is web-based for LFUCG to log on to, monitor, receive alarms from, and retrieve data.
7. Equipment Supplier must be able to respond within 48 hours after notification of maintenance issues to correct problems.
8. Equipment Supplier must be able to perform quarterly field inspections of the equipment and provide a written report to LFUCG.

### 1.03 SUBMITTALS

- A. In addition to the procedures and requirements set forth in the General Conditions the Equipment Supplier shall obtain from the equipment manufacturer and submit the following:
  1. Shop Drawings
  2. Reports of any Certified Shop and Field Maintenance report forms
  3. Operation and Maintenance Manuals
- B. Each submittal shall be identified by the applicable Specification section.

### 1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete, or illegible submittals will be returned to the Equipment Supplier without review for resubmittal.
- C. Shop Drawings for each equipment component selected shall include but not be limited to:
  1. Standard manufacturers printed Specification sheet(s) showing critical Specifications including the following:
    - a. Monitor housing
    - b. Connectors
    - c. Sensors
    - d. Mounting
    - e. Power supply
    - f. Communication
    - g. Remote (telemetered) data access
    - h. Antenna

- i. Memory
  - j. Clock
  - k. Data recording
  - l. Alarming
  - m. Status and diagnostics
  - n. Firmware upgrades
  - o. Monitor temperature range
2. Standard manufacturer's printed warranty statement of the equipment showing single source responsibility by the equipment manufacturer.
  3. Phone numbers of products support contacts and locations.
- D. The Shop Drawing information shall be complete and organized in such a way that LFUCG / Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is highlighted or somehow identifies the specific equipment items the Equipment Supplier intends to provide are acceptable and shall be submitted.

#### 1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Equipment Supplier shall submit operation and maintenance (O&M) manuals in accordance with the procedures and requirements set forth in the General Conditions.
- B. Furnish five (5) sets of identical bound instruction manuals covering operating procedures, lubrication, and maintenance requirements of all equipment furnished under this Specification. Include wiring diagrams, drawings, product data sheets, parts lists, and other necessary data. Number or otherwise clearly identify all parts to facilitate ordering of replacements. Exclude data not pertinent to this installation.

#### 1.06 TOOLS, SUPPLIES, AND SPARE PARTS

- A. The Equipment Supplier shall have sufficient parts inventory to maintain over-the-counter availability of at least 90% of any required part and 100% availability within 48 hours.

#### 1.07 SERVICE OF MANUFACTURER'S REPRESENTATIVE

- A. The Equipment Supplier shall provide training for LFUCG personnel. Training shall be conducted by the manufacturer's factory trained specialists who shall instruct LFUCG's personnel in operation and maintenance of all equipment provided under this Specification.
- B. Training for the equipment shall be performed at a site to be specified by LFUCG. Training shall include thorough explanation and demonstration of how to configure the equipment within the collection system.
- C. Training shall be conducted in Lexington, Fayette County, Kentucky at a location determined by the LFUCG. Training shall be bid as one day training from 9 am until 4 pm with one hour lunch break.

- D. Training shall consist of one typical installation with no less than a standard manufacturer's crew that would be required to install a typical installation.
- E. At a minimum, software training shall also include data retrieval, standard maintenance, typical trouble shooting, and proper procedures.
- F. The equipment manufacturer shall have a local authorized dealer who can provide factory trained service, the required stock of replacement parts, technical assistance, and warranty administration for all components supplied by the Equipment Supplier.

#### 1.08 IDENTIFICATION

- A. Each set of equipment shall be identified with the identification number specified by LFUCG. A unique number such as a serial number shall be securely affixed in a conspicuous place on the unit and easily identified.

#### 1.09 WARRANTY TERMS

- A. The equipment manufacturer's and Equipment Supplier's standard warranty shall in no event be for a period of less than one (1) year from date of initial start-up of the system and shall include repair labor, travel expense necessary for repairs at the jobsite, and expendables (service items made unusable by the defect) used during the course of repair. Submittals received without written warranties as specified shall be rejected in their entirety.

### **PART TWO – PRODUCTS**

#### 2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by a reputable manufacturer. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily.
- B. Consideration will be given only to the equipment of those manufacturers who have met the stipulations of Paragraph 1.02 above and have furnished comparable sewer monitoring equipment for at least two similar installations that have been in regular successful operation for not less than five (5) years.
- C. The Equipment Supplier shall furnish evidence of this experience and data on the equipment's operation at these installations to the LFUCG / Engineer upon request.

#### 2.02 GENERAL DESCRIPTION

- A. In addition to the aforementioned criteria, the equipment utilized for this project shall consist of a durable wireless monitor / data logger equipped to connect to up to two industry standard float switch devices and a pressure transducer.

## 2.03 SEWER DEPTH MONITOR

The sewer monitoring equipment shall be installed inside sewer manholes (or other designated chambers) and conform to the following minimum specifications:

- A. Monitor Housing: Must be IP 67 rated Waterproof and submersible up to 10 feet. Weight shall not exceed 22 pounds (monitor and battery).
- B. Connectors: U.S. MIL-C-26482 Series 1 Type hard anodized aluminum (or equivalent) with interfacial seals to afford maximum corrosion protection and life expectancy.
- C. Sensors: Pressure sensor shall be constructed of solid machined PVC/ stainless steel, shall have an operating range of 0.25 feet to 34.5 feet, accurate to +/- 0.5% of full scale, and have a resolution of 0.025% of full scale. Float switches shall be Connery™ Control Duty 2900 Mercury Series, or equivalent, single pole/ double throw with a temperature range of 32 to 170° F and an actuation point of 5 degrees above/ below horizontal.
- D. Mounting: Integral mounting flange or suspension brackets on top of canister, with holes sufficient to attach to a wall or other metal mounting handle.
- E. Power Supply: Complete unit (fitted with floats, pressure sensor and wireless modem) shall operate on nominal 6 volt supply or extended alkaline battery provided by Equipment Manufacturer and consume less than 6ma under normal (standby) operation. Normal operation will be to use a non-rechargeable alkaline battery pack. Battery life shall be a minimum of 12 months under continuous operation and up to 24 months under extended (power saving) operation mode.
- F. Communications: Each unit shall be delivered with one standard RS232 serial port for local on-site communication. For remote (telemetered) access, each unit shall be fitted with either an internal CDMA 1XRTT or GSM/GPRS modem manufactured by the Equipment Supplier. To reduce battery use, the equipment shall support a power saving mode whereby the equipment can be programmed to shut down the wireless modem during non-data transmitting intervals. During the power saving mode, the equipment shall ignore incoming connect requests, however shall continue to perform all measurement and alarming functions.
- G. Remote (Telemetered) Data Access: The equipment shall continuously be online and available to answer incoming requests (unless power savings are implemented). Equipment fitted with wireless modems shall remain connected to the GSM/GPRS or cellular network, and shall self-monitor their connection and perform connection refreshes as required to be ready to service incoming connection requests.
- H. Antenna: The antenna shall be a ruggedized and suitable for direct burial into a road surface or under grass or other fill materials. No special equipment shall be required for installation. Under no circumstances shall the roadway or surface be penetrated more than 3” for antenna installation.
- I. Memory: Minimum 512 Kbytes memory. Memory shall support a circular buffer with the oldest data only being written over once the memory is filled. Capacity shall be sufficient to retain up to sixty (60) days of un-transmitted data before being overwritten.(using 15 minute sample rate and all sensors configured)



- J. Clock: Equipment shall employ a battery backed crystal controlled real-time clock.
- K. Data recording: Shall support data recording rates at standard intervals of 1, 2, 2.5, 5, 15 and 30 minutes or 1, 2, 12 or 24 hours.
- L. Alarming: Shall support user definable dual depth thresholds for the purpose of remote alarming. Alarms shall be based on float triggers and/or set points based on pressure sensor readings. Float inputs shall be configurable to mitigate false alarms caused by waves through the use of user defined dwell times. Equipment shall automatically generate and notify up to 3 different addresses via SMS text message and/or email immediately upon exceeding alarm threshold(s), and also on Return to Normal. Alarm acknowledgements must be available to the web view and allows electronic signatures (or equivalent) to identify respondent.
- M. Status and Diagnostics: The equipment shall be capable of automatically sending in daily status messages as well as annunciating low battery and other diagnostic information. Status and sensor based diagnostics can also be performed by contacting the monitor using manufacturers field software. Readout shall be provided online and in the field to display wireless signal strength, battery voltage, and IP address.
- N. Firmware Upgrades: All upgrades can be done remotely, either via wireless or land line. Upgrades can also be done locally using serial connection.
- O. Monitor Temperature range: Shall function within specifications between 0 and 60° C (32° and 140° F).

## 2.04 SOFTWARE GENERAL SUMMARY

- H. The Equipment Supplier shall maintain the equipment for an annual fee per unit, provide cellular service for the equipment, and provide software and hosting services for a web-based system where LFUCG personnel and their designees can log on to and monitor the alarms and download information from the system. This service shall be based on an annual fee per unit.

### 2.05.1 SOFTWARE

#### A. General

1. The Equipment Supplier shall install and maintain all software required for the scope of services.
2. The Equipment Supplier software shall be developed by a company with at least 5 years of experience manufacturing products for this application.
3. The Equipment Supplier software shall operate on a Microsoft® Windows XP or Windows Vista platform.

4. The Equipment Supplier shall be responsible for all system maintenance, data uploads, database maintenance, and software defect repairs.
5. The Equipment Supplier shall provide at least three references of other users of the proposed software, if requested.

#### Web-Based Data Management

1. The Equipment Supplier shall be responsible for purchasing any computers, third-party software licenses, hosting the application, maintaining the physical system, ensuring network security, and providing reliable access to the system.
2. The web-based software system supplied by Equipment Supplier shall meet the following minimum specifications:
  - a. Equipment Supplier shall supply a software system that is accessible using Microsoft® Internet Explorer version 6.0 or greater and available to any personnel requiring access.
  - b. The Equipment Supplier shall host all data in a central database to ensure that any modifications to the central data are available to all other users of the system.
3. User Security
  - a. The software system shall have unique password security for each user. Each user shall be permitted to perform only authorized functions.
  - b. Functions that can be restricted by permissions shall include, at a minimum, alarm acknowledgement, reporting, viewing specific data types, viewing data and information from specified locations, telecommunications, and any system configuration (such as adding new users).
4. Data Viewing
  - a. The software system shall have the ability, at a minimum, to display data for each site in the following formats:
    - 1) Hydrograph – a time series graph of multiple data types with the ability to segment data based on intervals (e.g. weekly) over the user specified time period;
    - 2) Scattergraph – a depth to velocity graph for the specified time period with the ability to select a data point to see the actual value for that data point;
    - 3) Tabular – both tables for viewing and a CSV format for download shall be available; and
    - 4) Uptime Chart – a chart to view and evaluate the amount of data available for each day for single or multiple data entities for single or multiple monitors.
5. Telecommunications
  - a. The software system shall allow an authorized user to collect data directly from

telemetered monitors via the Internet. The software system shall automatically collect data from all telemetered sites at a minimum each day and whenever an alarm occurs.

- b. The LFUCG shall have the ability to issue a data collection command in order to obtain data in near real time.

#### 6. Temporary Monitor Data Upload

- a. The system shall allow for upload of temporary (non-telemetered) flow data to the central database. Temporary flow data shall be available for each site with the same graph and tabular data viewing and export features as telemetered sites.

#### 7. Multiple Data Type Support

- a. Final and Original Data: The software system shall allow for the upload of final edited data and shall maintain a copy of both the final and the original data after upload.

#### 8. User Viewing Permissions

- a. The software system shall have the ability to configure users to only view authorized data sets. For example, a user restricted to final data viewing would not be permitted to view any original data in any graph or report.

#### 9. Automated Data Verification and Correction

- a. The software system shall automatically detect and mark or repair data anomalies (also called automated editing or data scrubbing) that are common to sewer flow data. Automatically edited data shall not replace or delete any original data.
- b. The software system shall have the ability to configure users to view data and information only from individual monitoring sites.

#### 10. Data Exports

- a. The software system shall allow the user to export data to an Excel/CSV format.
- b. One or multiple monitoring locations shall be able to be selected.
- c. The user shall be able to select the data averaging type and define whether to include time stamps for missing data.
- d. The user shall be able to have the missing time stamp data exported as a blank or a user-defined value.

#### 11. Report Types

- a. The system shall support the following types of configurable reports:
  - 1) Alarm report providing information about all alarms generated by the monitoring system including alarm type, alarm status and users who have acknowledged the alarms;

- 2) Confirmations report providing a list of manual measurements taken at a monitoring location within a specific date range;
- 3) Data Collect Summary report providing the number of successful and failed attempts and the percentage of successful attempts to collect the data from selected monitoring locations;
- 4) Severe rain report showing which installed rain gauges had severe rain events during a user-specified time period (where rain gauges are included in the network);
- 5) Excess report showing all monitoring locations that exceeded flow rate thresholds defined by the LFUCG. Duration of time that threshold was exceeded and the volume of the excess flow on a per monitor basis shall be provided;
- 6) Capacity trend reports indicating the average and maximum capacity used for each monitoring location for the last 24 hours, compared with a user specified time range, as a percentage of the theoretical capacity for each site;
- 7) Surcharge trend reports indicating the percentage of time that each site was in a surcharge condition (depth greater than full pipe) over the last 24 hours, past 30 days or past 90 days, compared with a user specified time range; and
- 8) Percentage-full trend reports indicating percentage of full pipe trending over the last 24 hours, 30 days or past 90 days, compared with a user specified time range.

## 12. Reporting Data Types

- a. Reports shall use final data for any calculations; if final data is not available then the system shall use automatically edited data on the report to minimize possible reporting gaps.

## 13. Stored Report Preferences

- a. The system shall allow users with authorization to save report preferences by name for future use.
- b. The system shall allow a user to modify the report parameters of a named report they created. Viewing of reports shall be restricted by security permissions.
- c. Users authorized to view reports shall be able to view but not modify the named reports of another user.
- d. Named reports shall be available for automatic email generation at a user specified interval.

## 14. Alarming and Alarm Types

- a. At a minimum, the system shall provide alarming for the following types of common flow conditions:
  - 1) High depth

- 2) High-High depth
- 3) Loss of Flow
- 4) Manhole Overflow
- 5) Rain Exceeding Threshold (where rain gauges are included in the network)

#### 15. Alarm Configuration

- a. The Equipment Supplier shall submit with their bid their approach to minimize false alarms, including both software approaches and procedures for resolution of alarm related issues.
- b. The Equipment Supplier shall ensure that each site is configured and verified individually to minimize false alarms.
- c. The software shall take into account the typical diurnal pattern for each site.

#### 16. Alarm Acknowledgement –Dampening of alarms activated at less than 5 minute intervals

- a. The system shall allow authorized users to acknowledge an alarm condition.
- b. The acknowledgement time shall be recorded along with the user who acknowledged the alarm and any comments by the user.
- c. Acknowledged alarms shall be distinguished from normal conditions as well as from active alarms.

#### 17. Alarm Notification and Escalation

- a. The system shall have an audible notification when new alarms occur.
- b. The software shall provide a method for escalating alarms to pagers and email if an alarm is not acknowledged after a specified period of time.
- c. The software shall allow a user to receive alarm escalation messages for each alarm type from each site.
- d. The software shall allow escalation of alarm messages based on individual worker shifts.

#### 18. Logs and Reports

- a. The software shall log any diagnostic events, such as sensor related events or battery warnings, which are reported by the hardware.
- b. Logs shall have features allowing for queries based on type of event or alarm, time span, and location.
- c. The system shall be able to email configured event, alarm or trend reports based on the description in the Stored Report Preferences section of this document (#13 above).

19. Dynamic Geographic Information Display

- a. The system shall use GIS information supplied by LFUCG for the purpose of providing a map display of all monitoring locations.
- b. The map shall indicate the alarming condition of each alarm configured in the system. The map shall have the ability to zoom in and out to view additional details in the supplied GIS information.
- c. The flow monitor site icon on the map shall provide a direct link to flow monitor data for that site.

20. Attachments

- a. The software shall allow for files (such as images and documents) to attach to monitoring locations.
- b. Files shall either be private (restricted to authorized users) or publicly available to all users.

21. Training and Support

- a. The Equipment Supplier shall provide training on the use of the software to the LFUCG.
- b. The Equipment Supplier shall provide telephone support to the LFUCG using personnel experienced in troubleshooting problems with the specified software.

**PART 3 – EXECUTION**

3.01 INSTALLATION

- A. The Equipment Supplier shall be responsible for delivering the monitor systems to LFUCG after all testing and monitor startup.

END OF SECTION