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## **1.0 General (excerpt taken from SPU Wastewater Systems Plan<sup>1</sup>)**

### 1.1 General Overview of SPU Rain Gauge System

**Monitoring:** The City of Seattle's 2005 CSO NPDES permit requires the City to install, operate, and maintain automatic flow monitoring equipment on combined sewer outfalls to measure the time, duration, and volume of overflows at each site and precipitation and storm duration. The City has operated and maintained flow monitoring equipment at all CSO sites since the spring of 2000.

**Reporting:** The City's 2005 CSO NPDES permit also requires the City of Seattle to submit monthly and annual reports of CSOs to Ecology. The City has submitted both monthly and annual reports since May of 1998.<sup>2</sup>

### 1.2 Rainfall Monitoring Program

Data from 17 existing rain gauges and eight proposed rain gauges will be maintained and serviced for the purpose of collecting rainfall data that is time synchronized with the NPDES CSO system wastewater flow data.

The major functions for the rain gauge program are:

- Rainfall data collection
- Rain gauge maintenance and calibration
- Rainfall data analysis (QA/QC review)
- Online rainfall data access and reporting (tables, graphics)
- Online rainfall data warehousing

ADS shall provide rain gauge equipment, maintenance services, software, data analysis, and reporting in support of these functions. Additionally, ADS shall follow all equipment manufacturers' recommendations when performing these tasks.

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<sup>1</sup> Seattle Public Utilities Wastewater Systems Plan, March 2006, Brown & Caldwell

<sup>2</sup> Seattle Public Utilities Wastewater Systems Plan, March 2006, Brown & Caldwell

City of Seattle Permanent Rain Gauge Comprehensive Maintenance and Data Analysis  
Scope of Work 2009-2010 Sections 1 thru 8 effective December 1, 2008

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ADS shall provide adequate staff to ensure all requirements of this scope are accomplished. On holidays listed below, ADS will maintain the operation and maintenance duties for the installed equipment and the responsibility responding to alarms from IntelliServe™ to Seattle Public Utilities for automated monitoring. Additionally, ADS field crews will be available to respond to equipment work orders.

<u>Date</u>	<u>Holiday</u>
11/11/2008	Veteran's Day
11/26/2008	Thanksgiving Day
11/28/2008	Day Following Thanksgiving Day
12/25/2008	Christmas Day
01/01/2009	New Year's Day 2009
01/19/2009	Martin Luther King Jr Birthday
02/16/2009	President's Day
05/25/2009	Memorial Day
07/04/2009	Independence Day (observed July 3, 2009)
09/07/2009	Labor Day
11/11/2009	Veteran's Day
11/26/2009	Thanksgiving Day
11/27/2009	Day Following Thanksgiving Day
12/25/2009	Christmas Day
01/01/2010	New Year's Day for 2008
01/18/2010	Martin Luther King Jr Birthday
02/15/2010	President's Day
05/31/2010	Memorial Day
07/04/2010	Independence Day (observed July 5, 2010)
09/06/2010	Labor Day
11/11/2010	Veteran's Day
11/25/2010	Thanksgiving Day
11/26/2010	Day Following Thanksgiving Day
12/25/2010	Christmas Day (observed December 24, 2010)

1.3 Locations of the Rain Gauges

The rain gauges are located throughout the City of Seattle. Transmission of data and signals from the rain gauges may utilize telephone service connections, cellular phone systems or dedicated lines required to transit MODBUS for future integration into the City's SCADA system.

## **2.0 Safety**

### **2.1 Safety Requirements**

ADS is committed to providing a safe working environment for its employees.

ADS shall comply with the requirements of the Washington State Department of Labor and Industries (WSDLI) safety requirements.

ADS identifies Mike Pina (Project Manager), who is located on a full time basis in Seattle, as ADS's primary safety representative who is located at Seattle to manage compliance with safe working procedures. Written notification of any change, either temporary or permanent, of the primary contact must be provided to the City at least 5 working days in advance of the change.

These duties the safety representative is responsible for shall include but not be limited to: site inspections, incident investigation, employee training, preparation and updating site specific safety and health plans, preparation of Job Safety Analysis (JSA), enforcement of safety requirements, and reports as required by WSDLI. ADS shall provide Safety Plans on an annual basis to the designated SPU Project Manager.

## **3.0 Training**

### **3.1 Training for Online Access to IntelliServe™**

ADS shall provide training at the City facilities for City staff, which will allow staff to access, download and analyze rainfall data from the rain gauge sites. ADS shall provide an outline and handouts for use during a total of 8 hours per year of training specifically for rain gauges. This training may be completed simultaneously with the IntelliServe™ training for CSO monitoring sites.

## **4.0 Service and Software Requirements**

For the purpose of collecting quality rainfall data ADS shall provide to the City service and software's that meet the requirements detailed in Sections 4.1, 4.2 and 4.3.

### **4.1 Comprehensive Rain Gauge Service Program**

ADS shall provide a comprehensive service program for the equipment provided under this contract detailed in Section 5.0.

The program shall include:

- Onsite inspection of the rain gauge equipment and onsite and remote diagnosis of the data being collected by the equipment to determine service required.
- Preventive maintenance, cleaning, repair, calibration, replacement and services as necessary to keep the equipment operating in accordance with the manufacturer's specifications and the requirements of this contract.
- SPU will conduct monthly routine inspections of the rain gauges to identify clogging and vandalism issues and notify the ADS Project Manager if ADS should respond to any problems.
- Field service shall be performed in accordance with Section 6.0 of this Scope of Work.

#### 4.2 Profile™ Software Requirements

ADS shall provide the use of Profile™ software for data acquisition and analysis of rainfall data under this contract.

The purpose of the Profile™ software is to provide the user with the ability to download data on demand from the rain gauge via user query, review it in a hyetograph, edit and export the data. This software is installed on a users PC. The rain data viewed in Profile™ is both raw and final data meaning it can be viewed raw in "edit mode" and as final data in "report mode". Raw data has been directly uploaded from the rain gauge with no QAQC review of the data, and final data has had a QAQC review (per Section 6.1).

The functionality of Profile™ shall include:

- a) ADS shall provide the specifications for desktop computers stationed at the City's offices to use the software.
- b) Upgrades to the software will be provided to the City free of charge for the duration of the contract.
- c) The software shall be capable of providing data access and processing capability to City staff (up to 10 users).
- d) The software shall be capable of providing data in English measurement units.
- e) Software shall provide the ability to query the rain gauges at user designated intervals.
- f) Software shall be capable of rain gauge set up and parameter adjustment, specifically with the ability to:
  - i. Set up a location information file for each rain gauge site.
  - ii. Define and change site parameters such as but not limited to; devices, sample rate, entities, serial, landline or cellular connection.
  - iii. Store a record of site description, GPS coordinate location and elevation.

- g) Software shall be capable of editing and data analysis and specifically with the ability to:
  - i. Review data in edit mode in graphical and tabular formats. In edit mode the data sample rate will be all data (1 minute) and time periods of daily, weekly, monthly, quarterly, annual and manually determined time periods can be selected.
  - ii. Print onscreen, hardcopy or pdf format graphs and tables in edit mode. In edit mode the data sample rate will be all data (1 minute) and time periods of daily, weekly, monthly, quarterly, annual and manually determined time periods can be selected.
  - iii. Review data in report mode in graphical and tabular formats. In report mode the data sample rate can be all data (1 minute), 5 minute, 15 minute, hourly, or daily and time periods of daily, weekly, monthly, quarterly, annual and manually determined time periods can be selected.
  - iv. Print onscreen, hardcopy or pdf format graphs and tables in report mode. In report mode the data sample rate can be all data (1 minute), 5 minute, 15 minute, hourly, or daily and time periods of daily, weekly, monthly, quarterly, annual and manually determined time periods can be selected.
  - v. Electronically produce graphs and tabular reports from report mode (i.e. “batch mode” reports for multiple sites using the same entities and format),
  - vi. “Flag” (toggle off/on) any rainfall data that is identified as invalid or questionable (without deleting any original data points).
  - vii. Allow visibility of all raw data points including the edited data points (edit mode).
  - viii. View a log of events for each rain gauge that includes data collection, data edits, data imports/exports.
  - ix. Obtain a data uptime report that calculates and displays percentage data points available for a user defined period.
  - x. Export data to Excel and csv in ADS predefined or user defined formats.

#### 4.3 IntelliServe™ Software Requirements

ADS shall implement the IntelliServe™ system for dry and wet weather alarming and to display raw rainfall data under this contract.

The purpose of the IntelliServe™ software is to provide the user with near-real time alarming when preset user defined thresholds are exceeded. In addition IntelliServe™ is a web based data warehousing system where the rain gauge data is uploaded on an hourly basis for viewing by the end user and can be downloaded on demand from the rain gauge via user query. The data can be plotted in hyetograph format and exported by the user to Excel and csv formats. The rain data viewed in IntelliServe™ is raw data meaning it has been directly uploaded from the rain gauge with no QA/QC review of the data. However, the finalized rainfall data and the finalized data editing matrix will also be uploaded to the IntelliServe™ website and displayed in the Documents sections in Excel spreadsheet format.

The functionality of the IntelliServe™ shall include:

- a) ADS shall provide the hardware and software desktop computer requirements for SPU to be able to use the IntelliServe™ software.
- b) ADS shall assign passwords to SPU staff to allow staff to access and use the IntelliServe™ system. SPU shall designate a representative to request passwords for new account set up.
- c) Upgrades to the IntelliServe™ software will be provided to the City free of charge for the duration of the contract.
- d) The IntelliServe™ software shall be capable of providing website access capability to City staff (up to 50 users).
- e) The IntelliServe™ software shall be capable of providing data in English measurement units.
- f) The IntelliServe™ software shall be capable of storing documents (for example Excel files).
- g) ADS shall implement IntelliServe™ according to the following requirements:
  - i. The ability to review the near-real time flow data collected from the rain gauges and to issue alarms via on-screen warnings, audio annunciations, pagers, e-mail and voice messaging for once a threshold is exceeded specified by SPU as described below.
  - ii. Automated QA/QC processes which will be enabled to minimize false alarms induced by erroneous data, data fluctuations, equipment malfunctions and other system defects. This is known as Monitor Level Intelligence (MLI) processing.
  - iii. Detection of rainfall events greater than a mutually agreed upon SPU and ADS specification in inches/hour in intensity at any rain gauge.

## 5.0 Field Services for Rain Gauges

Quality rainfall data is important to the City of Seattle for reliable and accurate records of rainfall and in conjunction with the flow data, for differentiating between dry weather combined sewer overflows and wet weather combined sewer overflows. ADS's maintenance program detailed in Section 5.1 shall provide to the City with 90% availability of valid raw rainfall data on a per rain gauge basis.

### 5.1 Rain Gauge Maintenance Requirements

The maintenance and services shall include the following:

- a) Access to Rain Gauge Sites; Most of the City rain gauges are located in secure areas (i.e. within fenced areas, on top of school rooftops, etc.) and some are located on property not owned or maintained by SPU. SPU will assist ADS in gaining access to all sites by providing a list of the contact persons for each site. Any questions concerning access to the sites should be directed to Brian Morgenroth (206-615-1705) or email at [Brian.Morgenroth@Seattle.gov](mailto:Brian.Morgenroth@Seattle.gov).
- b) Staffing; ADS shall maintain permanent field service staff in Seattle dedicated to the rain gauge sites identified under this contract. The service crews shall be available to service the rain gauge sites in accordance with the requirements of this contract. Mike Pina (Project Manager), who is located on a full time basis in Seattle, is ADS's primary contact for the supervision and scheduling of the field service crew. Written notification of any change, either temporary or permanent, of the primary contact must be provided to the City at least 5 business days in advance of the change.
- c) Planning; ADS's primary contact shall meet with the City on a schedule as mutually agreed by the City and ADS. If ADS field crews are required to remove the equipment and/or reinstall the equipment per City direction, 48 hours notice shall to be given by the City to ADS to schedule this task. ADS shall be provided additional compensation by the City, as mutually agreed by the City and ADS, for any removal or reinstallation work outside the normal maintenance requirements of this contract as detailed below.

- d) Standard Rain Gauge Service; Sites will be serviced as determined by the ADS data analyst procedures to provide 90% raw data availability on a per rain gauge basis. Field calibrations shall be completed as needed (annually at a minimum). Results of the field calibrations shall be posted on IntelliServe™ within one week after the calibration was completed. The ADS data analyst will determine when calibration is needed and calibrations may coincide with a service call.
- e) Preventative Maintenance; ADS shall repair and/or replace and carry out preventative maintenance services needed for the reliable operation of the RG sites. The repair and maintenance services shall include but is not limited to; communication links (flow meter to external communication system), tipping bucket, cables, power sources, monitors, and all other components necessary for the meter sites to provide reliable and consistent data to the City.
- f) Unscheduled Service; ADS will provide a 72-hour repair response for sites in disrepair. Manual data collection shall be provided weekly for sites with data transmission problems where the transmission issue is within ADS's control. Manually collected data shall be posted/ reported within 2 business days of collection. Costs for repair or replacement of flow monitors or flow monitor parts, including ADS labor, due to activities out of ADS control (i.e. force majeure, vandalism, other contractors, unauthorized City activities, etc.) shall be reimbursed by the City at a fee mutually agreeable to the City and ADS, in addition to the standard monthly service fee. ADS shall stock parts locally.
- g) Data Gaps: A continuous record of flow data at all of the CSO sites is critical to SPU for accurate reporting to the Department of Ecology. Accordingly, ADS will provide SPU with all details regarding the reasons for the loss of data in excess of 72-hours and of ADS's actions to minimize a reoccurrence of a similar data loss. Subsequently, if any flow meter sites experience a time period greater than 72-hours during which data from the site is unavailable to SPU (e.g. missing data that cannot be recovered from the meter) then ADS will not invoice SPU for the field site maintenance charges, data analyst charges and IntelliServe charges for that site for the time of disrepair that the data gap occurred. This credit of charges shall not apply to sites that are affected by power or communications failures external to ADS equipment.
- h) Repair to communications external to ADS equipment; Repair and or replacement of the landline service for remote communications to the equipment is not covered under this service contract. Where it is deemed that the communication issue is not related to the ADS equipment, ADS staff shall inform the City of Seattle

- i) Documentation; Access to service and maintenance reports including site confirmation sheets for each rain gauge site, shall be available to the City in electronic format - either through an easily accessible web site or by a downloadable spreadsheet on a monthly basis for the previous month.

## 6.0 Data Analysis Services for Rain Gauges

Quality rainfall data is important to the City of Seattle for reliable and accurate records of rainfall and in conjunction with the flow data for differentiating between dry weather combined sewer overflows and wet weather combined sewer overflows. ADS's maintenance program detail in Section 6.1 shall provide to the City 90% availability of QA/QC'd rainfall data on a per rain gauge basis.

### 6.1 Data Analysis Requirements

Access to data; Data and related information must be available to the City staff. ADS shall provide the software requirements for which are detailed in Section 4.2 that permits authorized staff to view download and print raw information at anytime.

Staffing; ADS shall provide the full time services of a trained and knowledgeable full time data analyst, who shall be available during standard business hours (8-5 M-F PST) to during normal work hours to review data, resolve issues and answer questions

Diagnostics; ADS shall monitor the data being transmitted from the rain gauge sites and shall carry out a diagnostic inspection of the data on a daily basis to insure that the rain gauge site is transmitting data and that the data being recorded is reliable and consistent.

Quality Assurance; the data analyst shall use ADS Standard Operating Procedures to:

- a) Verify the rain gauges are online (daily)
- b) Issue service requests in the event that a rain gauge needs service (daily as needed)
- c) See that the field calibrations of the equipment are completed as needed (but at least annually).

IntelliServe™ Monitoring Services; The ADS data analyst shall review the IntelliServe™ user defined reports (refer to Section 7.5) and final data warehousing. ADS shall perform regularly scheduled maintenance of the IntelliServe™ software to maintain 99% system uptime and connectivity.

The flow meters connect to the IntelliServe™ website via wireless and/or landline communications. An on-demand IntelliServe Connectivity Report detailing the connectivity rate of each site shall be available for designated SPU staff. All sites are configured to connect with IntelliServe™ twice daily. Cellular or landline communication issues that occur and are the responsibility of the independent providers of landline and cellular services to resolve, are not covered under this service contract. Where it is determined that resolution of a communication issue requires the expertise of independent provider, ADS staff shall inform the City of Seattle of the communications

issue. When connectivity at a site drops below 95% (i.e., less than 19 positive connections in the previous 20 attempts), ADS will proactively investigate and if necessary, service the site with the intention of improving connectivity.

Reviewed and flagged data; ADS will review and flag data in accordance with SPU Standard Operating Procedure HYDR Q1100 - Data Review, Assessment, Validation, & Verification.. Flagged data will be reported as indicated in Section 7.2.

## 7.0 Reporting

### 7.1 Rain Gauge Site Maintenance Report Requirements

ADS shall provide a system to record and track service records completed as outlined in Section 6.1. SPU will have on-line access to the report. The system shall provide the information generated by this system online and it should including the following details:

- a) Site name
- b) Work order number
- c) Description of the problem or service at the meter
- d) Date of site visit
- e) Date of completion for any work performed
- f) List of parts used
- g) Name of the person requesting work to be performed
- h) Name of the person who performed the work

Data Analysis Report Requirements - Monthly, the data analyst will post the finalized rainfall data in Excel format to IntelliServe™ (web based reporting system) for access by City assigned personnel. Data will be flagged and presented as outlined in SPU Standard Operating Procedure HYDR Q1100 - Data Review, Assessment, Validation, & Verification.

7.2 Users can view the raw rain data in hyetograph and tabular format and export the data/graphs to csv, pdf and xml formats for locations and durations of time they select. ADS will also provide SPU rain data on CD quarterly by the 15<sup>th</sup> of the month following the end of the quarter.

### 7.3 IntelliServe™ Report Requirements

The reports generated by IntelliServe™ shall be capable of being viewed, downloaded and printed at all times and shall include the following:

- a) An online IntelliServe™ alarm screen that shall provide the following information in chronological order:
  - i) The identification of the site in alarm with a link to data viewing tools
  - ii) Identify the type of alarm, i.e. Rain Threshold Exceeded
  - iii) Identify the time the alarm was acknowledged
  - iv) Identify the IntelliServe™ user name of the person acknowledging the alarm
  - v) Identify the date and time the alarm was cleared.
- b) An Alarm History Report shall be created to report historical alarm data. The user can configure an alarm report using the alarm template. This report can also be configured by the user to auto generate.

- c) When a rain gauge alarms, all rain data from the alarming rain gauge will be downloaded into IntelliServe™. In addition multiple rain gauges can be queried by the user and the data downloaded.
  
- d) Connectivity Reporting: An on-demand IntelliServe Connectivity Report detailing the connectivity rate of each site shall be available for designated SPU staff. All sites should connect twice daily. Cellular or landline communication issues that occur and are the responsibility of the independent providers of landline and cellular services to resolve, are not covered under this service contract. Where it is determined that resolution of a communication issue requires the expertise of independent provider, ADS staff shall inform the City of Seattle of the communications issue.

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## 8.0 Additional Services

The pricing below is for additional services that may be requested by SPU to occur outside the regular service activities for the SPU NPDES RG site locations:

### Installation Activities

Item	Unit Price
Installation of RG in Landline Configuration using External Power	\$6,517.00
Installation of IntelliServe™ for Rain Gauge	\$520.00

1. Pricing good for duration of scope.
2. Pricing does not include applicable taxes.
3. The above prices do not include any special, modified, or custom documentation or manuals that may be required. Standard ADS Environmental Services Manuals appropriate to the delivered equipment are included with the equipment.
4. Pricing does not include uninterruptable power supply
5. Sale of above equipment and services are subject to the terms and conditions of ADS's current Vendor Contract #1729 amended November 6, 2008.