

# BLACK & VEATCH CORPORATION

## TECHNICAL MEMORANDUM

**Fountain Sanitation District  
Master Plan Enhancement Study  
Task 300 - Flow and Rainfall Monitoring Program**

**B&V Project 137033  
November 22, 2004**

**To:** Jim Heckman  
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**Reviewed By:** John Snitzmier

### Introduction

The District is considering the implementation of a long term flow and rainfall monitoring program. A review of rain gauge information was conducted as well as a review of locations for installing rain gauges in the District's service area. The results of the review are discussed below. At this time, the District is collecting flow data to assess if a long term monitoring program is needed.

### Number and Location of Rain Gauges

The Fountain geographical area and the prevalent rain patterns were reviewed to determine the location and number of rain gauges necessary to give a representative sample of rainfall over the District service area. To obtain an appropriate spatial resolution it was determined that rain gauges at a minimum of three locations are necessary which would result in a rain gauge every 5 square miles. The rain gauges would be located in the north, central, and south portions of the District. If possible, the site location should be readily accessible and have access to power and communication lines. Information about three recommended sites is included in Table 1-1.

<b>Location</b>	<b>Site</b>	<b>Facilities</b>	<b>Comments</b>
North	Conley Pump Station	Power available Telephone available	
Central	617 Del Norte (FSD Board Member Bobby Phillips)	120V power available Telephone needed but accessible	Nearest trees 50' Top of patio roof
South	Little Ranches Pump Station	Power available SCADA available	

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### **Rain Gauge Equipment Analysis**

Rain gauge equipment from various manufacturers was investigated and price quotes were requested from suppliers. A list of the rain gauges investigated is presented in Table 1-2. Prices do not include installation, communication, or electricity costs. A copy of the information received on the rain gauges is attached in the Appendix 1-A at the end of this section.

Equipment suitable for use in should have features able to withstand winters or allow for quick removal for winter storage. Equipment able to withstand winters should be weatherized and watertight and able to withstand temperature extremes. Remote data access capabilities include telephone modems, cellular modems, radio and SCADA.

It should be noted that prices for options 2 and 3 are not complete quotes. Both options are without the necessary software for data processing. In addition, option 3 will need a watertight case for the recorder.

Option 2 is suitable for temporary monitoring. It has no remote communication capabilities. Option 2 and option 3 both run on battery, not AC power.

Option 1 with A or B is more suitable for long-term monitoring. Depending on whether A or B is selected, it can run on AC power with remote communication by telephone modem or solar power with remote communication by cellular modem. The solar power/cellular modem option is more suited to a remote location, while the AC power/telephone modem option is suited to locations with access to telephone and electric utilities.

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<b>Table 1-2. Rain Gauge Equipment Option Summary</b>						
<b>Option</b>	<b>Manufacturer</b>	<b>Equipment</b>	<b>Description</b>	<b>Power</b>	<b>Communication</b>	<b>Price each</b>
<b>1</b>	Telog	GR-6 rain gauge with support software and data transfer cable	Tipping bucket rainfall sensor, 6" collector, 0.01"/tip, accuracy 1% @ 1"/hour		(see A or B)	
With (A or B required)						
<b>A</b>	Telog	RS-3303-T24-AC12	3-channel recorder, watertight	AC or 12V DC	2400 baud telephone modem	\$2,270
Or						
<b>B</b>	Telog	RS-3303-1x-RTT-S5/4	3-channel recorder, watertight	5W solar with 4 amp-hr rechargeable battery	Cellular digital modem	\$3,085
<b>2</b>	Rainger	RL1	Recorder w/ interface cable, collector, tripod mount, software not included	2-year battery	Manual w/ computer	\$925
<b>3</b>	Data Elec-tronics	RG400	Tipping bucket rainfall sensor, 8 or 10" collector, 0.01"/tip, accuracy 0.5% @ 1"/hr, (heater extra)	NA (extra heater needs 115V AC)	See DT-300	
With (required)						
	Data Elec-tronics	DT300	Recorder, software not included, needs watertight case	1-year battery	Manual w/ computer or modem	\$1,070

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### **Additional Option**

The District received a letter from GMS, Inc. specifying information on a rain gauge setup different from the three reviewed above. A copy of the letter is included in Appendix 1-A at the end of this section.

### **Recommendations**

It is recommended that three rain gauge locations in the north, central, and south portions of the service area at the sites indicated in Table 1-1 be equipped with a rain gauge. In addition, the District should establish procedures for retrieval, organization and storage of the rainfall data. These procedures should include the retrieval, organization and storage of some of the wastewater treatment plant (WWTP) and the Little Ranches Pump Station flow data so flow and rainfall analysis can be performed if necessary.

It is our understanding that the District has already selected the Davis Instruments rain gauge for purchase. This rain gauge appears to not have remote data download capability so the addition of a phone line at the central site will not be required. The installation of the rain gauges will occur once they have been received by the District. It is also recommended that the District establish procedures for:

1. Data retrieval from rainfall monitoring devices
2. Data storage and organization
3. Data use and analysis in coordination with the wastewater treatment facility and the Little Ranches Pump Station flow data