TECHNICAL MEMO

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
322 E. FRONT STREET, P.O. BOX 83720, BOISE, IDAHO 83720-0098
PHONE: (208) 287-4800 FAX: (208) 287-6700

DATE: AUGUST 13, 2009

TO: Liz Cresto

FROM: Mat Weaver MW

SUBJECT: SEAPAC HATCHERY – BRIDAL VEIL SPRINGS COMPLEX: TECHNICAL RECOMMENDATION REGARDING A PERMANENT WATER MEASUREMENT DEVICE.

It is recommended that a pair of acoustic Doppler velocity meters should be used in conjunction with a shared data logger, radio telemetry, and a remote power supply to provide a means of continuous flow rate measurement of the Bridal Veil Spring complex. This memo represents a brief summary of the considerations that influenced this water measurement recommendation.

BACKGROUND

The Bridal Veil Spring complex issues forth from a series of springs located in the southeast corner of the Seapac Hatchery. The spring flows combine into a common natural channel, which is collected and diverted into the hatchery's "O" and "P" raceways. The disparate spring flows are collected in a large pool that drains into the hatchery raceways by means of a pair of 36" diameter corrugated steel pipes. Both pipes flow full with approximately 6.5 inches of head at the inlet. Just upstream of the collection pool (above the water fall) flow is sometimes diverted from the ABC spring system into the Bridal Veil spring system, the ABC flows are diverted just downstream of the "A", "B", and "C" raceways and just upstream of the "D", "E", and "F" raceways. Refer to the attached exhibit for a plan view of the hatchery and Bridal Veil Springs area.

Due to the conditions of the natural channel and the configuration of the outlet from the collection pool, there is no existing point that is ideal for the location of a weir or flume, without significant alteration to existing improvements. An ADFM system is recommended primarily for this reason.

Bridal Veil spring flows were measured on two separate occasions in 2009. On April 9, a flow rate of 34.1 CFS and a mean velocity of 0.96 FPS was observed at the inlet of the

corrugated steel pipes. A signal-to-noise ratio of 28.8 dB[1] was also measured during the first visit. During the second visit on July 15th, a flow rate of 23.5 CFS and a mean velocity of 1.65 FPS was observed at the outlet of the corrugated steel pipes. During the second visit an acoustic Doppler velocity meter similar in make and model to the one recommended in this memo was used to measure flow. During both site visits, water quality and flow conditions were observed that appear to be well suited for ADFM technology.

RECOMMENDATION

It is recommended that a single MACE velocity depth sensor be installed in each of the two existing 36" diameter corrugated steel pipes. The velocity depth sensors should be located approximately 2-3 feet upstream from the outlet end of the pipes. Both sensors should tie into a common MACE FloSeries 3 Agri-Flo data logger that is capable of reading and recording depth of flow, velocity, and flow rate measurements from the sensors. A stand-alone power supply system should be provided so that the velocity meters and data logger are not reliant on the Seapac Hatchery for power. A photovoltaic cell, voltage regulator, and dedicated battery are recommended to meet this requirement. A quote was submitted to IDWR on July 15, 2009 by Searle Technologies that includes all materials[2] recommended in this memo to start the continuous measurement of the Bridal Veil Spring complex.

CONSIDERATIONS

There are at least three items that should be considered prior to the ordering of the ADFM system, they represent details of the recommendation that will require further thought and consideration and include the following:

1. Eliminating or accounting for the intermittent cross connection between the ABC springs and the Bridal Veil springs that occurs periodically as a function of the current operating procedures at Seapac Hatchery.

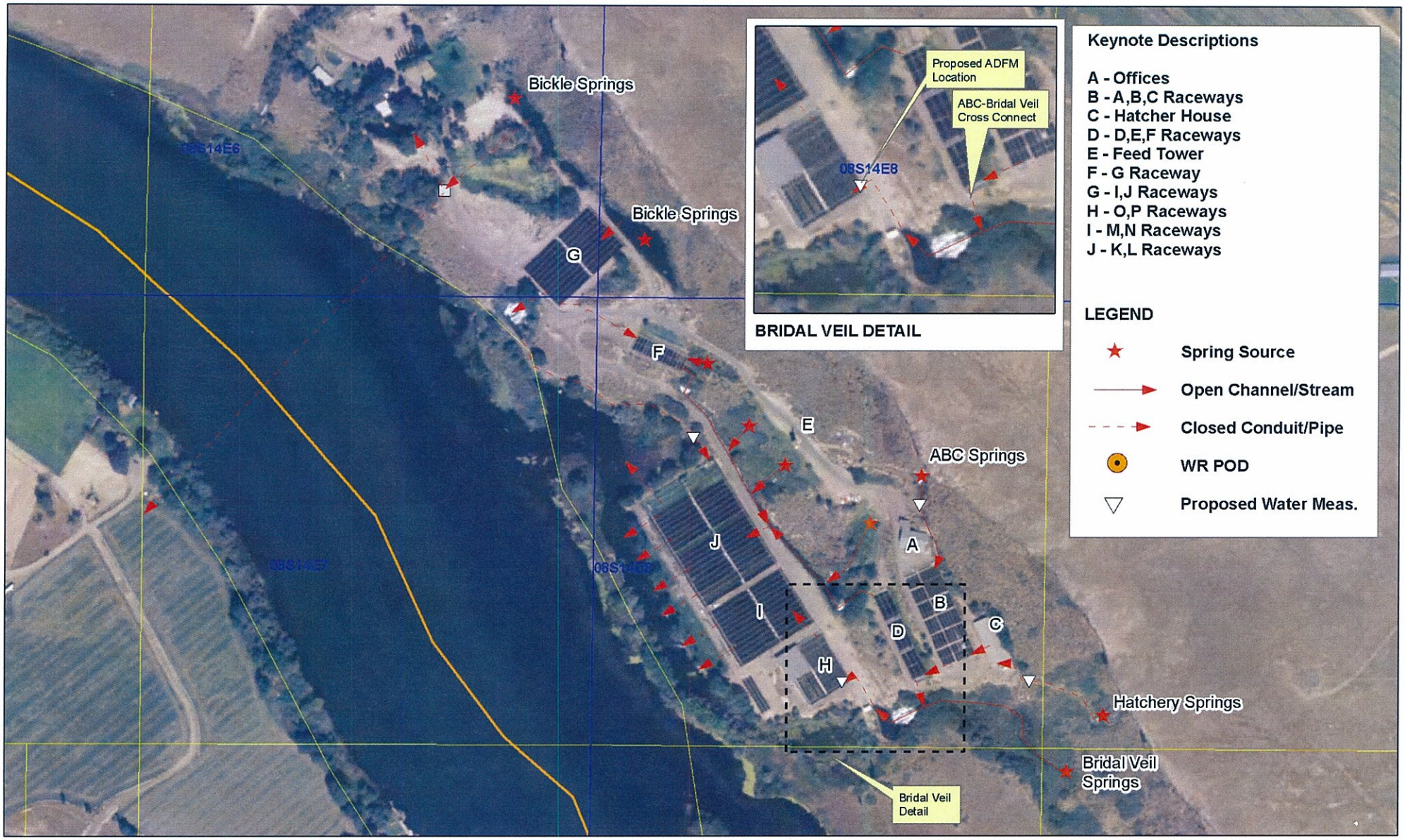
2. Devising a non-intrusive semi-permanent means of attaching or anchoring the velocity meters to the floor of the corrugated steel pipes.

3. Devising an installation method of the velocity meters that takes into account that all work will have to be performed in the "wet".

---

[1] Signal-to-noise (SNR) ratio is a measure of the strength of the reflected acoustic signal relative to the ambient noise level of the sensor and is primarily a function of water quality. For best operating conditions, SNR should be greater than 10 dB.

[2] The quote includes two acoustic Doppler velocity meters, one data logger, and a complete power supply system, plus additional accoutrements for the mounting, wiring and installation of the system. It does not include any anchoring devices for the attachment of the velocity meters to the floor of the culverts. Refer to the attached quote for pricing and details.



SEAPAC HATCHERY BRIDAL VEIL SPRING SITE MAP

0 190 380 760 1,140 1,520 Feet

QUOTATION

MACE c/o Searle Technologies
651 Park Drive
Elk Ridge, UT 84651
Ph# 801-423-2013
Fx# 801-423-2762

Quote#: 09-0715-31R1
Date: July 15, 2009
Re: Mace Flow Meter
Quoted by: Tony Searle
tony@tdma-inc.com

To: Mathew Weaver
Idaho Department of Water Resources

From: MACE
c/o Searle Technologies

Ref: Eastern Snake Plane Aquifer Monitoring Program – Bridal Veil Springs Complex

ITEM	QTY.	PART#	DESCRIPTION	UNIT PRICE	TOTAL
1	1	850-300	MACE FloSeries 3 – AgriFlo (includes battery and data logger and one Doppler card)	$1,693.12	$1,693.12
2	1	850-328	FloSeries 3 Doppler Velocity Module	455.62	455.62
3	1	850-302	Mounting Kit – FloSeries 3 – for device and solar panel	76.50	76.50
4	1	814-017	MACE Solar Panel (for FloSeries 3) 12 Volt/5 Watt	225.00	225.00
5	1	891-300	MACE FloSeries 3 – External Comms Lead (for connecting to laptop computer)	73.12	73.12
6	2	850-055	Sensor Strap-4m/s - 4m depth 10 meter cable- D9 Approximately 33 feet of cable including the velocity depth sensor	2,430.00	4,860.00
7	2	690-113	Mounting Plate (Sensor) - Polyproplene	39.37	78.74
			Total		$7,462.10
Option 8	1	850-330	MACE FloSeries 3 – FloSI Module (allows for modbus and SDI 12 output for telemetry)	433.12	433.12

Please make ensuing purchase orders to: Mace c/o Searle Technologies

FOB: Shawnee Mission KS. Freight prepaid and added.
Lead Time: 3 - 4 weeks ARO
Terms: Net 30 days on approved accounts
This quote is valid for 30 days. Signed_____