

## INTRODUCTION:

Lateral diversions are generally deep underground with limited access and even more limited metering options. Combined with silt and trash-laden stream flows, the large pipes often associated with lateral diversions used by irrigation water-supply companies to distribute water usually mean either expensive meters or no meter at all.

The MACE AgriFlo provides a simple and cost-effective solution to the measurement of these flows. Firstly, a “strap-mount” velocity sensor can be installed inside the pipe (from 6” to 100” /150mm to 2.5 m diameter) without the need for excavation work to access the outside of the pipe wall. Alternatively, a 2” insertion sensor can be installed from the outside of the pipe. Cables are routed either underground and/or through the mounting pole to the AgriFlo electronics module, providing an extremely tamper and vermin resistant design. A solar panel is used to charge the internal battery, thus making the AgriFlo a truly remote electronic flow meter.

Many large lateral diversions monitored by irrigation districts have multiple pipes that need to be monitored. With the Series3 AgriFlo, up to three pipes can be measured with the same unit, providing even greater overall water management at an extremely affordable price.

Because the MACE velocity sensors provide very little obstruction to the flow and have no moving parts, the whole system is virtually maintenance free.

## THE PROBLEM:

Central California Irrigation District (CCID) is a large irrigation district based in Los Banos, California, USA. During periods of heavy water demand, CCID needs to transfer water from their outside canal to the main canal. This diversion is provided through two 54” (1372 mm) pipes that are each capable of delivering 150cfs (255 ML/day) and run through the O’banion bypass. Furthermore, because of the importance of these transfers and the immediate feedback required in the main control center located some 35 miles away, CCID required the ability to remotely read and control the flow of water through the two pipes.



Figure 1: CCID's "O'banion" lateral diversion, near Los Banos, CA, USA.

*The MACE solution is on the following page*

## THE MACE SOLUTION:

CCID installed a Series 3 AgriFlo at their Obanion bypass. A 2" insertion sensor was installed in each of the two 54" pipes and routed through conduit to their control "hut".

The AgriFlo was fitted with an optional MACE FloSI – telemetry interface card that allowed the diversion structure to be monitored and controlled via a Modbus SCADA package.



Figure 2: MACE 2" insert sensor suitable for full pipes between 100mm to 2.5m (4" to 100")



Figure 3: The Series3 MACE AgriFlo unit installed in the control "hut" and interfaced to a Modbus SCADA package that controls the piped off-take

## THE MACE AGRIFLO BENEFITS:

- 1 With MACE continuous wave advanced spectrum Doppler processing, each sensor "sees" velocities through the whole cross-section in each pipe and calculates the true average flow rate. This is unlike any other insertion device such as electromagnetic or mechanical, which only sense velocities in a "tennis ball" sized area and then use complex algorithms to attempt to calculate an average flow rate. Because of this technological difference, MACE Doppler technology has a shorter straight-run requirement than other devices.
- 2 The MACE insertion velocity sensor provides very little obstruction to the flow and has no moving parts. With the high trash loads in the Delta-Mendota canal the whole system is virtually maintenance free.
- 3 When fitted with a MACE FloSI telemetry interface, the Series3 AgriFlo is capable of being used with SCADA packages to control gates and allow remote reading. Furthermore, should a power failure occur that prevents the SCADA package from being operational, the AgriFlo will continue to calculate the flow and the onboard data logger can be downloaded by CCID to analyze and totalize these flows during the power outage.
- 4 The installation of the insertion sensors meant that the whole flow meter was extremely easy and economic to install as no major pipe-work was required.
- 5 Because the same insertion sensor can be used in any pipe sized from 4" to 100", should the off-take be upgraded in the future, the same flow meter can be used.
- 6 At off-takes where multiple pipes are present, the Series3 AgriFlo with the ability to accept multiple flow sensors is an extremely cost-effective solution to the monitoring problem.

