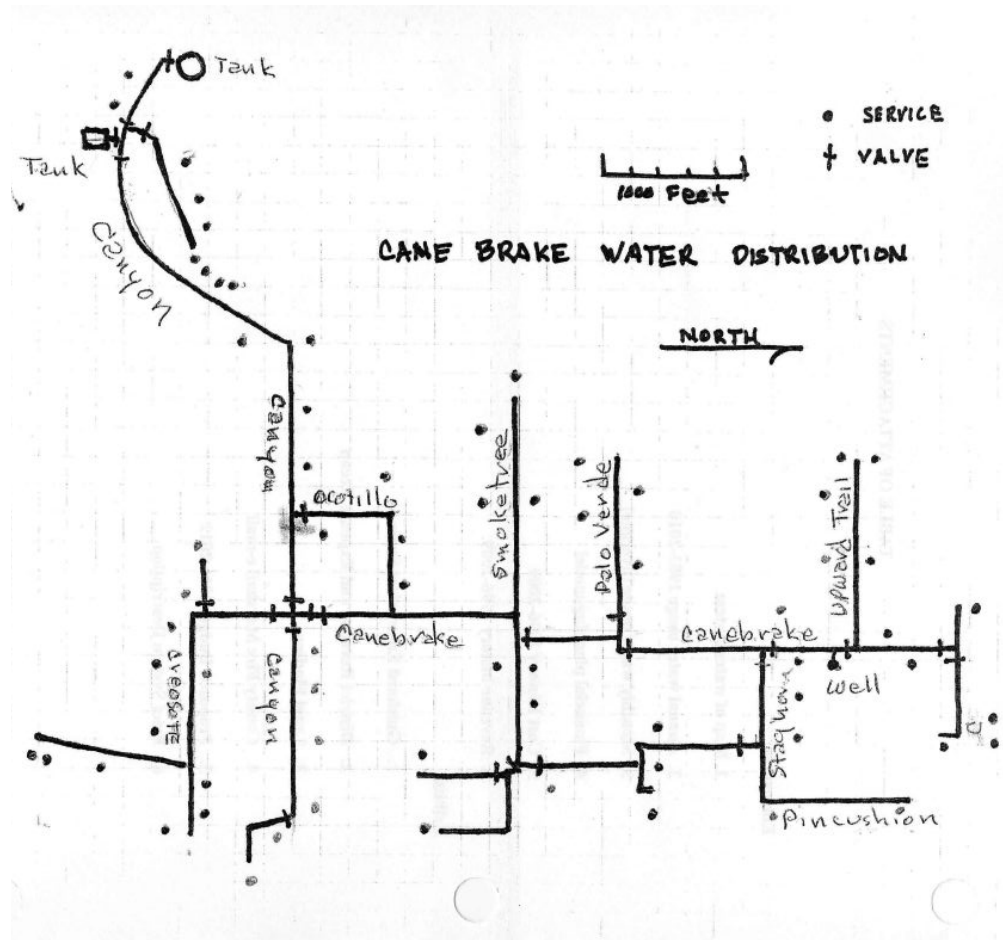


Distributed Water Flow Monitoring

June 10, 2023



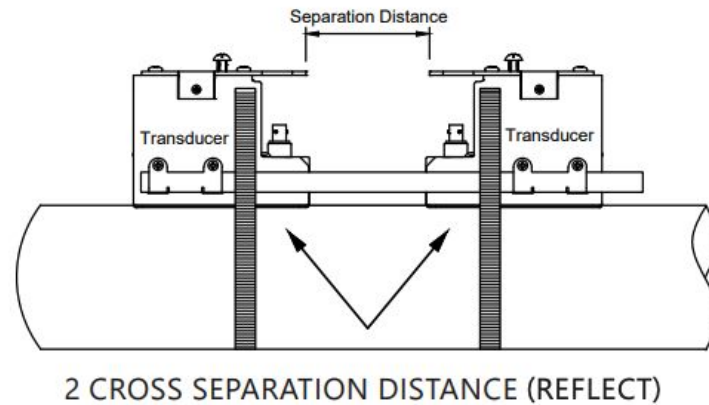
Ultrasonic Flow Meters

How they work

Two clamp on Transducers are placed on the outside of the pipe.

Ultrasonic waves are sent from one transducer to the other and vice versa.

The delay sending the wave when going against water flow is proportional to water flow rate.



FAQ

- Non-invasive way to monitor water flow in pipes without having to drill into the pipe
- Can detect small flow leaks (very low rates down to 1 liter per hour)
- Can measure flow in both directions
- High accuracy
- Meters can be clamped onto varying pipe sizes (1/2" to 48")
- The portable clamp on is easily installed to different locations throughout the Distribution System
- Have no moving parts it is less affected by wear and tear (lifespan 20 years)
- Maintains accuracy throughout its entire lifetime of the product
- Can be hooked up to Telemetry systems for remote sensing

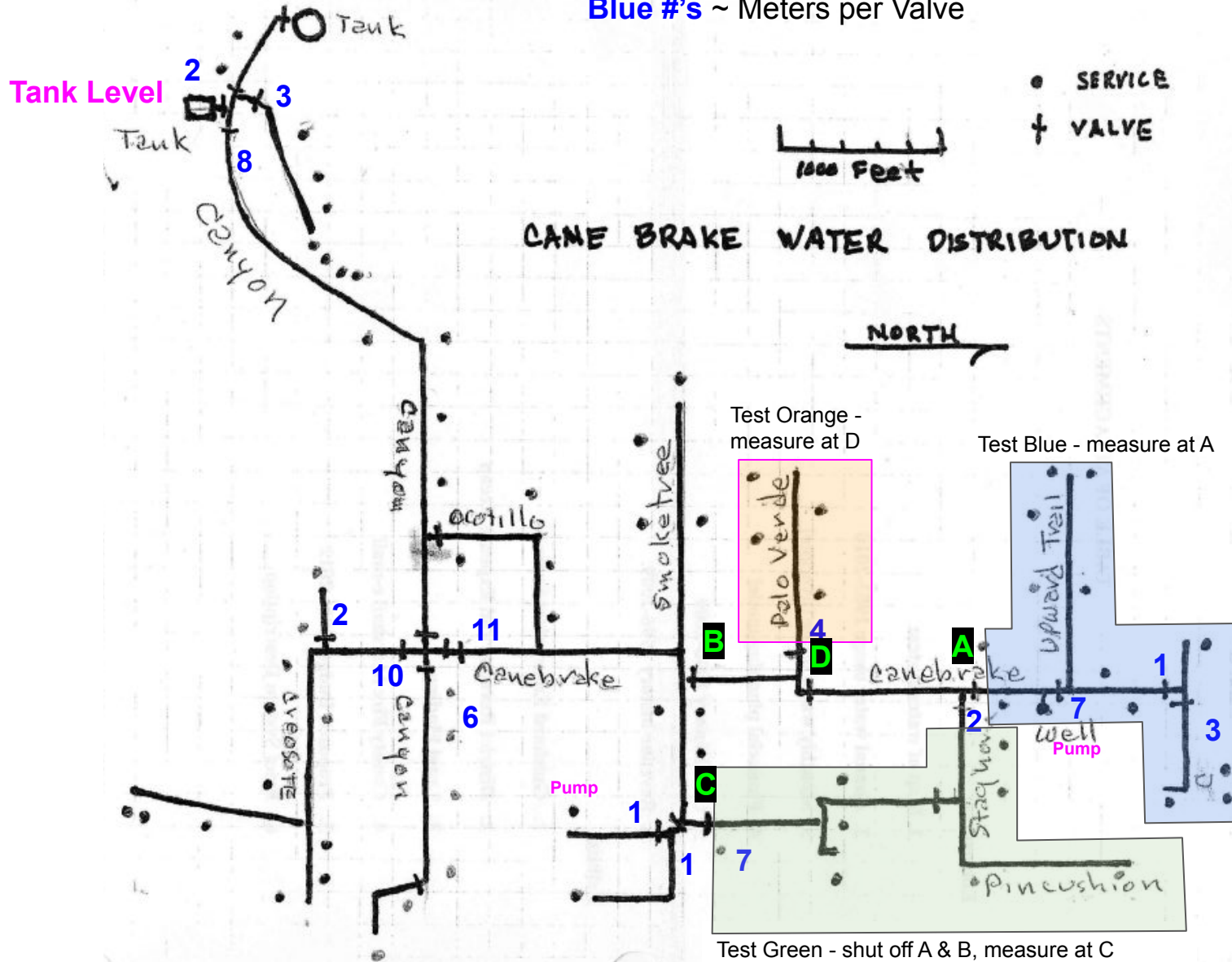
[reference](#)

Monitoring Locations

Telemetry Points - to Monitor and Manage the System remotely

BOXES - Houses between meter Flow Meters

Blue #'s ~ Meters per Valve



Ultrasonic Kit

<https://www.iothrifty.com/products/fmt-22-transit-time-ultrasonic-flow-meter>

[User Manual](#)

Desired Features

- Works with clean water (does not required sediments in water)
- Works with low flow (eg 4 gallons/hour or less!) (eg 1 cup/min)
- Portable unit that can be reattached to different locations
- Able to add additional sensors
- Works on $\frac{3}{4}$ " to 3" pipes
- Can leave sensors on pipes over air temps of 30 to 120 F

Spoke to Vendor (POC John), Kits includes

- Two pairs of sensors
 - Smaller pair for pipes OD 1" to 4"
 - Larger pair for pipes OD 3" to 27"
- Could work to $\frac{3}{4}$ " perhaps too he thinks
- Two measuring modes:
 - Flow Rate - instantaneous measurement
 - Totalization - total water flow over time period (eg 1 - 20 min). Useful to let it run for a while to help detect low flow leaks
- Return Policy - within 30 days or so, just pay for return shipping and still in good shape
- Made in China, Distributed from Connecticut



[Alibaba item](#)

Distribution Network: Comprised of piping, valves, and service connectors set out in a matrix over 650 acres. Water pressure arises from the fact that the steel tank is higher than any of the service connectors. Enclosure (1) is a diagram of this network showing service connectors and main line valves. All piping is PVC. Enclosures (2) and (3) illustrate the average annual water usage and the average monthly usage patterns respectively.

The following is an inventory of the elements of this distribution network:

3 inch piping :	16,240 feet
2 inch piping :	11,149 feet
1 inch piping :	1,250 feet
¾ inch piping :	350 feet
Main line valves:	28 ea
Blowoff/air valves:	31 ea
Service valves:	80 ea
Meters :	77 ea

The piping/distribution network contains 7,842 gallons of water when in full operation.

Well and Pump System: The well head is located at approximately 1100 feet above msl, 269 feet below the steel storage tank. Static water pressure at the well head is nominally 115 psi. According to the well log there is a 12.75" outer diameter (od) conductor casing grouted to a depth of 50 feet with 513 feet of 8.625 od production casing installed. However, Mr. T. Guishard in his survey report noted that the production casing was 6.675" od vs 8.625". How he knew that is not clear. The size of the casing could be important since one method of improving well casing integrity is to insert a smaller pvc casing inside the existing original casing.

The well is reported in some documents as 513 feet deep, in others as 534 feet. Water level is reported to be 350 feet though no evidence has been found to verify this. The pump is reportedly set at 400 feet. This would result in a total static pressure at the pump head of approximately 275 psi. It has been suggested that this pressure is excessive and contributes to pump wear-out rate but there is no evidence to support this contention.

The pump is reported to be a Goulds 10GS30 with a single phase 5 hp motor. It is reported to be on a 1-¼ inch schedule 120 PVC drop-pipe through which the water flows to the distribution network and to the storage tank. There is no dedicated tank fill line. It has been commented in previous reports that the lack of a dedicated tank fill line is undesirable but, again, I was able to find no evidence or analysis to support this contention either.