

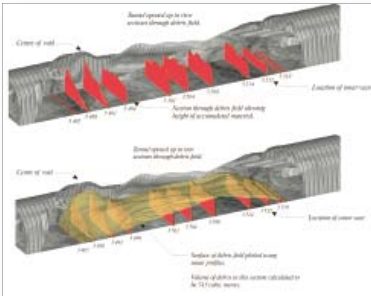


REMOTELY OPERATED VEHICLE (ROV) LONG TUNNEL INSPECTIONS

Typical Vehicle Configuration

- ♦ Sonars for tunnel profiling and navigation
- ♦ Cameras for variable light conditions
- ♦ Variable intensity lights
- ♦ Five function manipulator arm
- ♦ Flux gate compass

This basic suite of sensors is used to provide detailed visual observations, make large dimensional measurements of tunnel cross-sections and debris piles. In situ representative samples can also be collected using the manipulator arm.



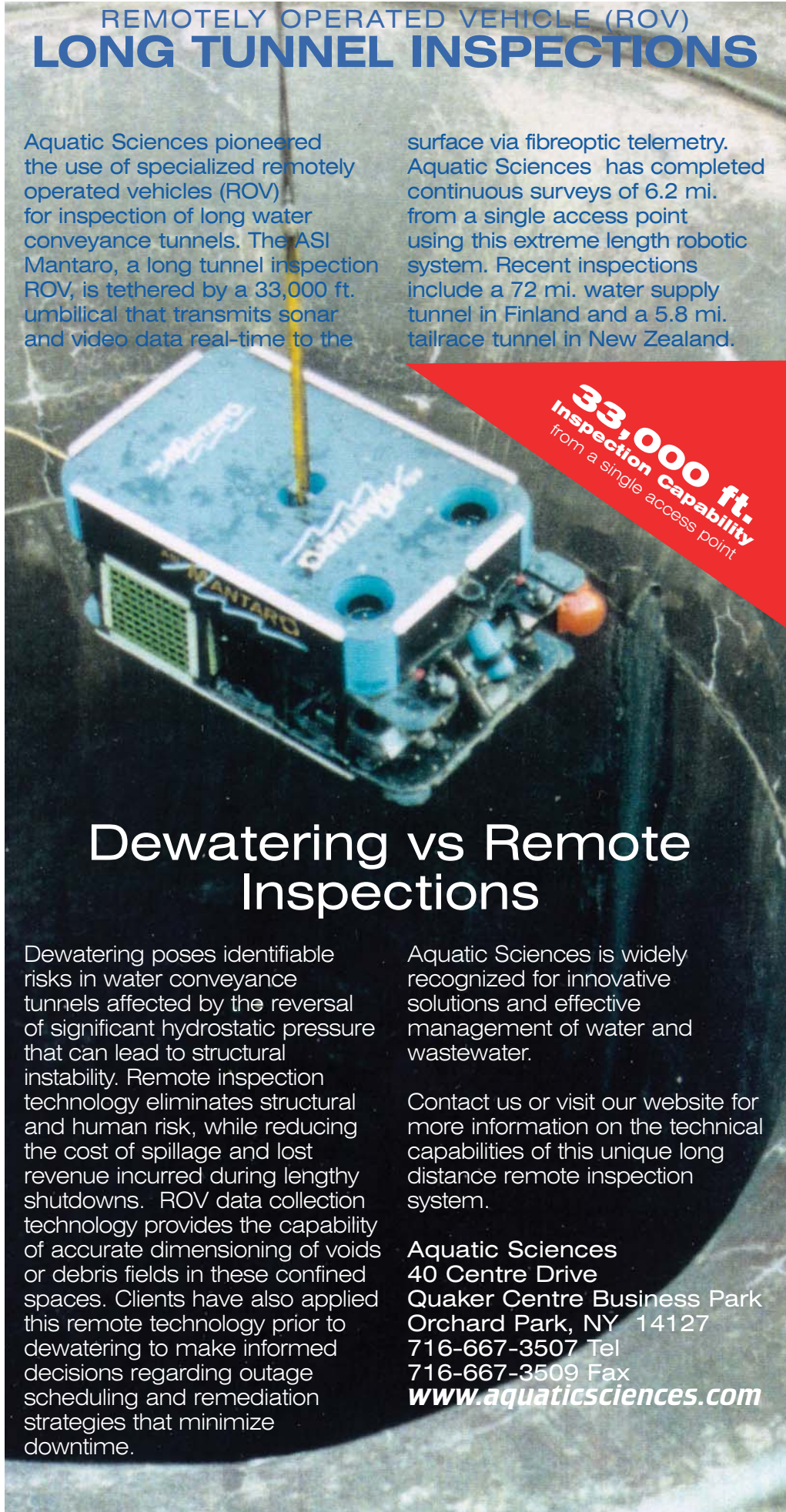
Optional Equipment

- ♦ Concrete core drill
- ♦ Suction sampler
- ♦ Acoustic Doppler Current Profiler (ACDP) for leak/flow detection
- ♦ Water temperature sensor
- ♦ Ground Penetrating Radar (GPR) for void detection
- ♦ Ultrasonic thickness (UT) probe



Aquatic Sciences pioneered the use of specialized remotely operated vehicles (ROV) for inspection of long water conveyance tunnels. The ASI Mantaro, a long tunnel inspection ROV, is tethered by a 33,000 ft. umbilical that transmits sonar and video data real-time to the

surface via fiberoptic telemetry. Aquatic Sciences has completed continuous surveys of 6.2 mi. from a single access point using this extreme length robotic system. Recent inspections include a 72 mi. water supply tunnel in Finland and a 5.8 mi. tailrace tunnel in New Zealand.



33,000 ft.
Inspection capability
from a single access point

Dewatering vs Remote Inspections

Dewatering poses identifiable risks in water conveyance tunnels affected by the reversal of significant hydrostatic pressure that can lead to structural instability. Remote inspection technology eliminates structural and human risk, while reducing the cost of spillage and lost revenue incurred during lengthy shutdowns. ROV data collection technology provides the capability of accurate dimensioning of voids or debris fields in these confined spaces. Clients have also applied this remote technology prior to dewatering to make informed decisions regarding outage scheduling and remediation strategies that minimize downtime.

Aquatic Sciences is widely recognized for innovative solutions and effective management of water and wastewater.

Contact us or visit our website for more information on the technical capabilities of this unique long distance remote inspection system.

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