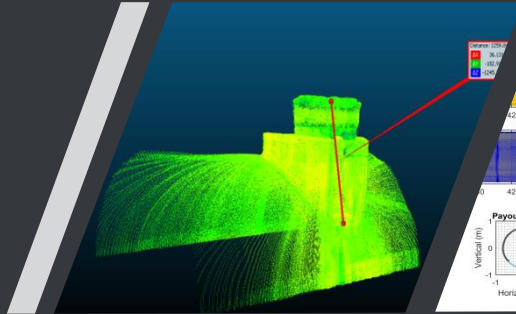
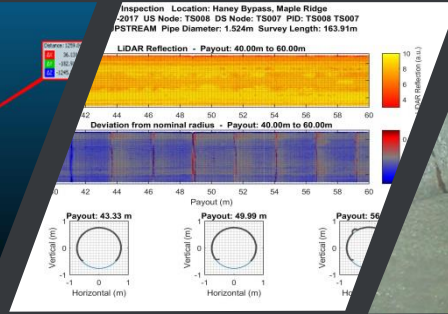




## INTEGRATED SENSOR SURVEYS



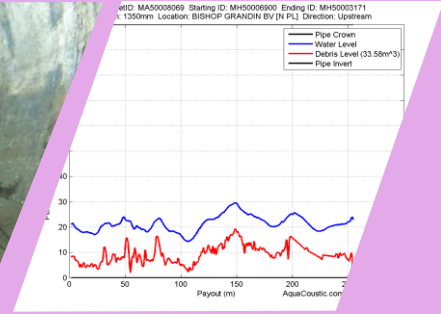
MH LiDAR Survey



Pipe LiDAR Data



1080p Frame Grab

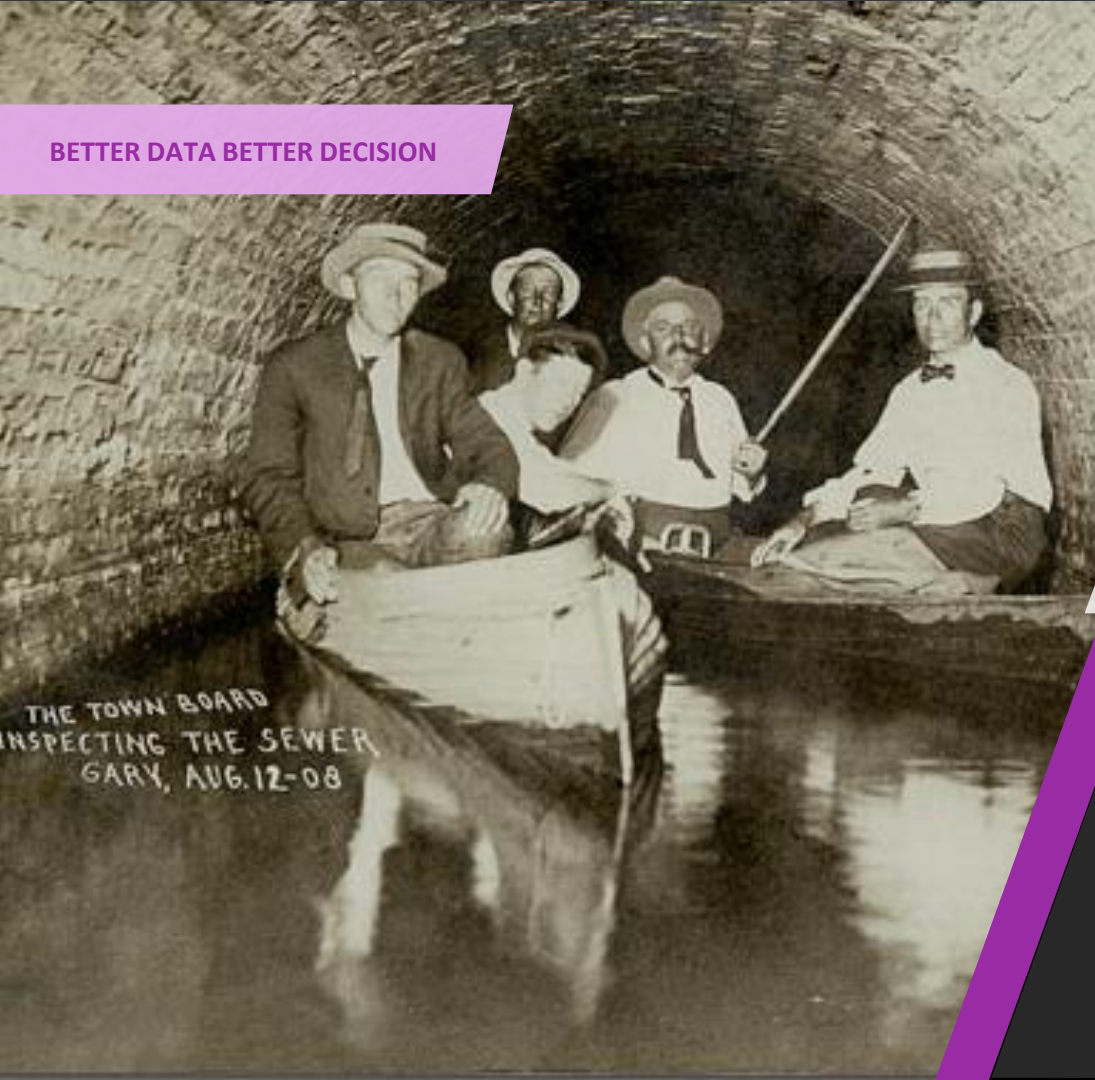


Sediment Volume Graph

WE ARE AN INFRASTRUCTURE PRE-ENGINEERING FIRM  
WE PROVIDE UNIQUE DATA & SURVEY SOLUTIONS

ESSENTIAL DATA FOR INTELLIGENT DECISIONS

**BETTER DATA BETTER DECISION**



THE TOWN BOARD  
INSPECTING THE SEWER  
GARY, AUG. 12-08

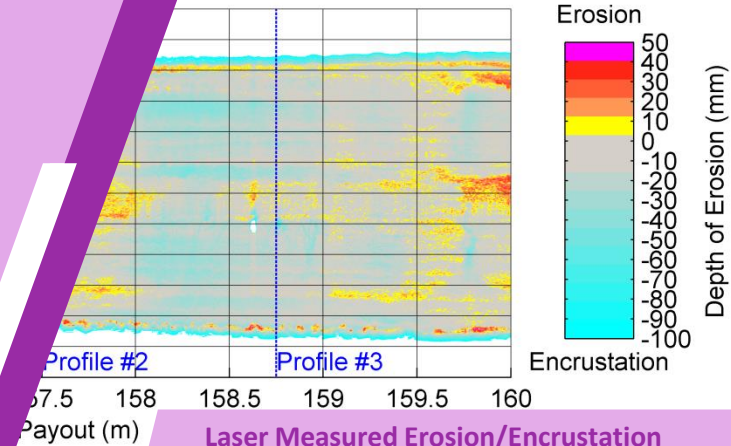
- MANHOLES
- LARGE DIAMETER SEWERS
- CULVERTS
- SIPHONS
- OUTFALLS
- VAULTS AND CHAMBERS
- PIPE MEANDER
- OVALITY MEASUREMENTS
- RIVER CROSSINGS
- IN PIPE H<sub>2</sub>S GAS VALUES
- WATER TEMPERATURE SENSOR
- WASTEWATER TREATMENT PLANTS

SINCE 1993 OUR GOAL HAS BEEN TO PROVIDE  
EASILY UNDERSTOOD DIGITAL SURVEY REPORTS

# WE DELIVER THE DATA YOU NEED

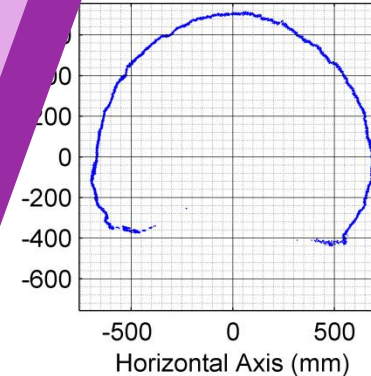
- Multi-sensor data collection technology provides new and unrivalled definition of your fixed assets
- Our design team build innovative robotic systems to help position the sensors and solve challenging inspection and survey issues
- We collect video & xyz point cloud data above and below water using time of flight (ToF) laser and digital sonar
- All our data and deliverables can be accessed or viewed with widely available software
- Since 1993, civil engineers have used our data to prioritize remedial work for their fixed assets.

Position: HULL AV Map Length: 164.61m  
Section: Upstream Pipe Diam: 1375mm

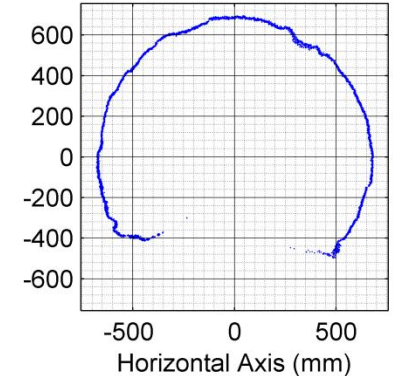


Laser Measured Erosion/Encrustation  
Map of a Concrete Sewer Pipe

Profile #2 at 157.50m



Profile #3 at 158.75m



# INSPECTION SENSORS TO FIT YOUR NEEDS

- High resolution digital marine cameras (1080p)
- Time of Flight profiling lasers used to create above water AutoCAD drawings
- Time of Flight 3D lasers create CAD ready data around a fixed point
- Digital profiling sonars create CAD ready data below water
- 3D sonar system
- Digital scanning sonars image underwater trends
- MH to MH gas and temperature sensors
- RTK GPS for terrestrial surveys with 2 cm –  $\frac{3}{4}$ " accuracy
- Additional sensors are easily incorporated

Video Frame Grab from an  
Underwater ROV Culvert Survey

28.52 m

11/08/2017 15



Off Road Inspections using our  
Propane Powered Argo ATV

## WORK PLATFORMS FOR CHALLENGING AREAS

DESIGNED FOR EASE OF USE

- Propane powered six wheel drive amphibious vehicle
- ROV for outfall, culvert and submerged pipe surveys
- Four wheel drive steerable tractors, 2,000' penetration
- High flow aluminum floats
- Winches with over a mile of electro fiber cable
- Fiber optic communications for better video and higher data capacity

1080P Video Frame Grab looking up at a Manhole



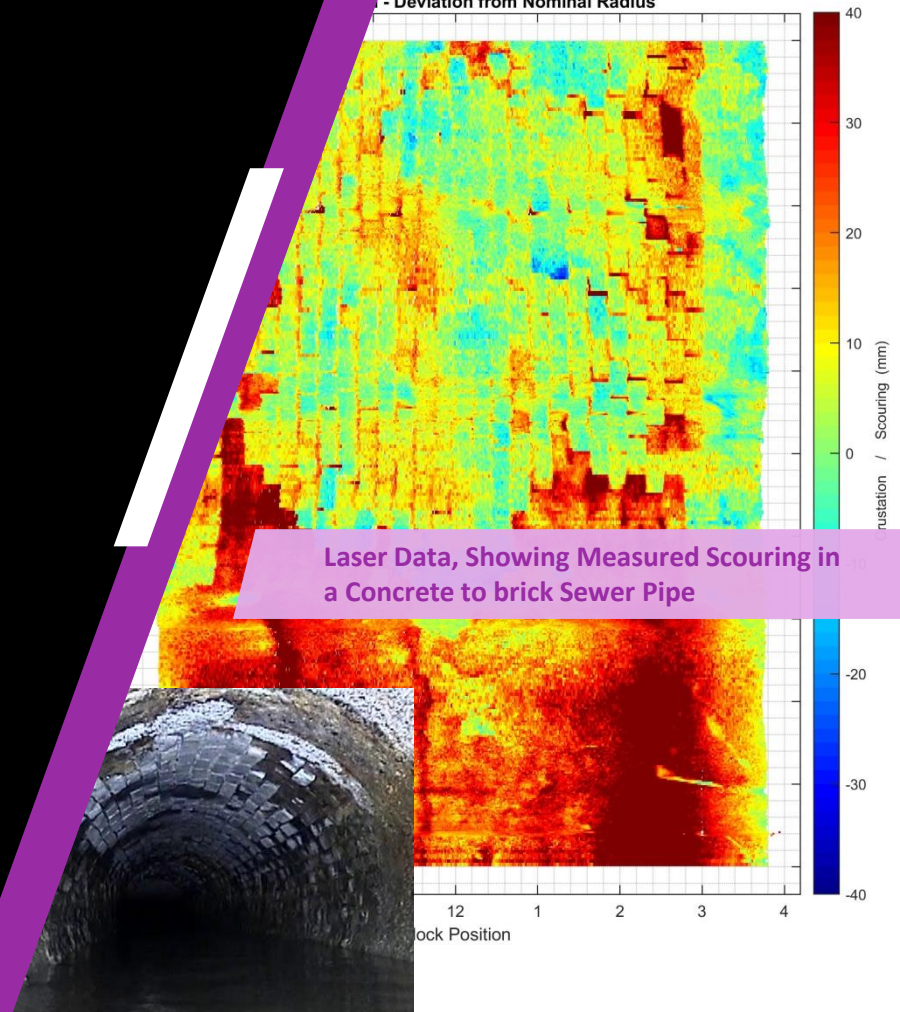
## MARINE CAMERA 10 X OPTICAL ZOOM

- Making your life easier with clear images
- Natural feel pan and tilt camera
- 10X optical zoom and auto focus
- Low light to 0.05 lux
- High-resolution frame grabs
- Natural light LEDs for natural color
- We eliminate coding errors by coding in the office not in the field

# TIME OF FLIGHT LASER SURVEYS

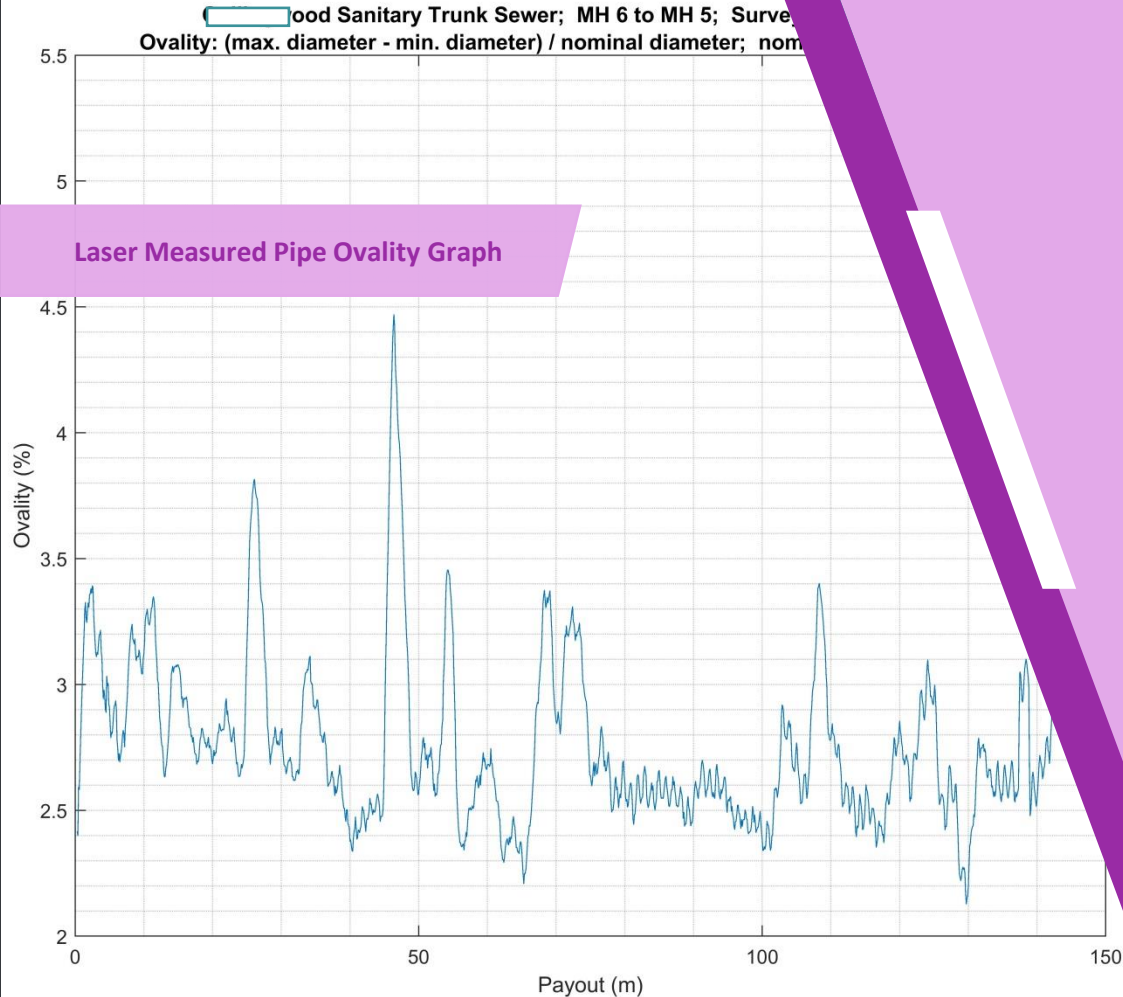
- Measure your fixed assets to 5 mm resolution. (2" to 65 ft. Range)
- Ovality tables and graphs
- Pipe restriction graphs
- Erosion / Encrustation Maps (E & E Maps)
- Storage capacity values
- Perspective views
- CAD drawings
- Our lasers produce a very dense, measurable xyz point cloud
- Various sensors are combined on our innovative in house designed robotic platforms
- Our deliverables are designed to make your life easier

E: S-MH00012545 DS NODE: S-MH00012518  
Diameter: 1100mm End Payout: 178.18m  
- Deviation from Nominal Radius



Laser Data, Showing Measured Scouring in a Concrete to brick Sewer Pipe

# LIDAR BASED OVALITY READINGS



- Time of Flight laser –range 50mm to 6 m. (2" to 60')
- Pipe cross sections to better than 5 mm accuracy
- 800 measured points per cross-section
- Calculate ovality using the complete circumference
- Identify millimeter markings; including spray painted numbers on the pipe surface
- Repeatable and automated data acquisition provides better accuracy and confidence
- Safer and faster completion



Wrap Text Merge & Center General \$ % .00 .00 Conditional Formatting Format as Table Normal 2 Normal 3 Bad Good

C	D
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ogies Inc.

**Pipe Size (mm):** 750  
**Pipe Material:** CONCRETE

**Accumulated Volume (m³):** 0.08  
**As-built Capacity (m³):** 37.79  
**As-is Capacity (m³):** 37.72

<b>Inspection Date:</b>	9/28/2011		
<b>Inspection Time:</b>	11:43:00 AM		
<b>Cross-sectional restriction (%)</b>	<b>Volume of Debris (m³)</b>	<b>Accumulated Volume (m³)</b>	
2.0	0.07	0.07	
0.1	0.00	0.08	
		0.08	
		0.08	
0.0	0.00	0.08	
0.0	0.00	0.08	
0.0	0.00	0.08	
0.0	0.00	0.08	
0.0	0.00	0.08	
2.0	0.07	0.08	
0.2	0.01		

Tabulated Sonar Data Showing Water Level, Storage Capacity, Debris Volume

# DIGITAL PIPE PROFILING SONAR

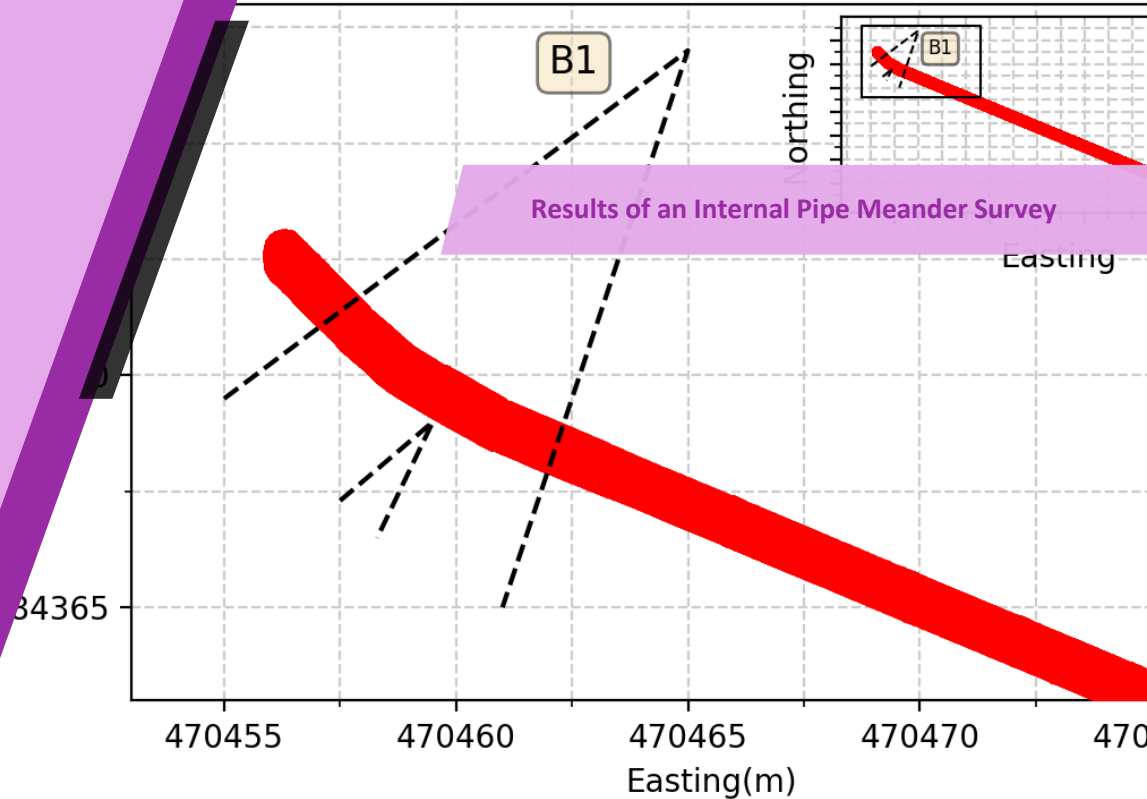
## USING 3D SONARS SINCE 1991

- If you have any questions about sonar, we have the knowledge to help you
- Pipe cross-sections showing pipe restriction, cross-sectional restrictions & debris volume
- Manhole to manhole graphs showing water level & debris as a cross-sectional percentage
- Tabulated sonar data tables of cross-section restriction, debris volumes, storage capacity & water level
- Ovality tables and graphs
- 3D models are built by using payout, sonar data and attitude sensors including accelerometer information
- The processed data is quality controlled by trained personnel

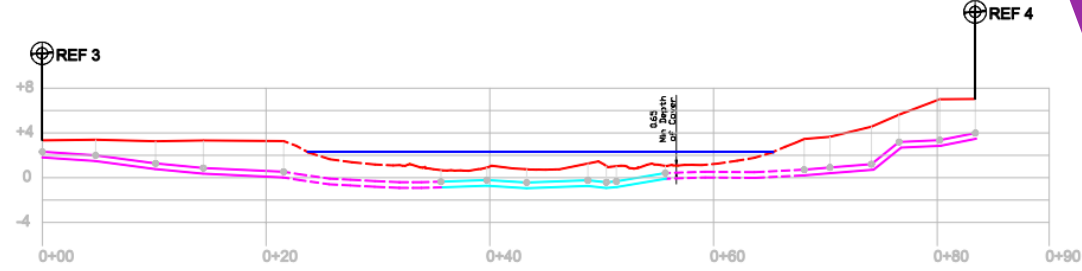
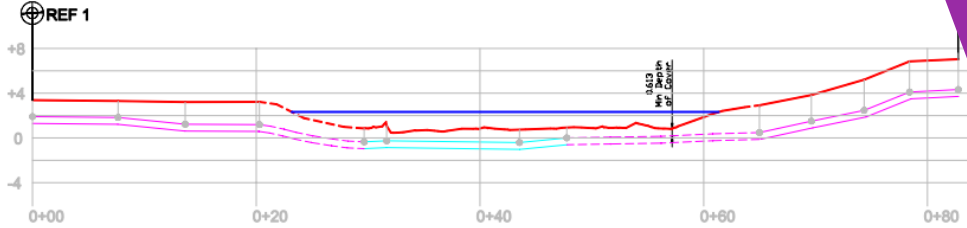
# PIPE MEANDER SIPHONS

SAMPLE DATE:01-Jan-0001 US:SAMPLE DS:S  
aterial:SP Diameter:900 mm End Payout:0.0

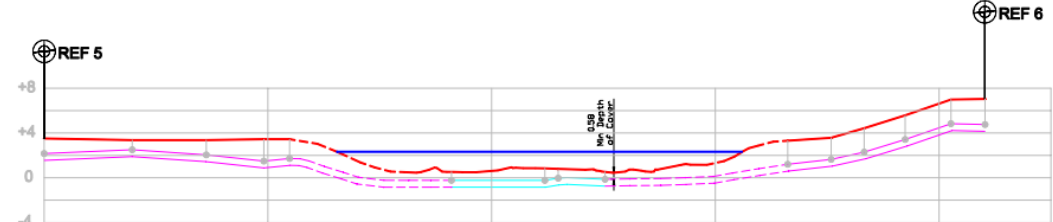
- Vertical accuracy 4" (10cm)
- Up to 3,000' runs
- Minimum diameter 12" (300 mm )
- RTK GPS elevations
- Dry or surcharged
- Ideal for pipe elevations under rivers
- Tie into river crossing bathymetry
- Simultaneous profiling sonar data



# RIVER CROSSING SURVEYS



River-Crossing Depth of Burial & Pipe Track Survey



- Depth of cover
- Identify and measure pipe spans above the river bottom
- Verify pipe track across the river
- Comparison surveys over time
- Ascertain flood damage to pipes
- Receive CAD ready data
- Angle of repose of the river banks
- Scour patterns of the river bed

601 m

Data	Deficiencies	WentHub	Summary
Tape Number: H77 Accession: H77 Downstream Mile: 5 Upstream Mile: 5	Circumferential Crack Longitudinal Crack Sand/Gravel Lateral Structural Grease Deposits Roots Size Joints Left/Right/Vertical Active/Dry/Capped Foreman		Traces of grease that 200mm above finished sewer level. Potential to clog 200mm
Chalage (Meters)	111	Photo	Tape Count

0.0 m	Joint of man hole opening	10723	
7.6	100mm AT/Dry/Mod.	10926	
22.0	Joint	11105	Visible O-Ring
25.8	150mm AT/Dry/Mod.	11205	
29.5	Joint	11235	pending to 25mm
31.2	100mm AT/Dry/Mod.	11311	Visible O-Ring
32.7	100mm AT/Dry/Mod.	11347	
47.9	end of man hole opening	11509	

**AquaCoustic** Remote Technologies Inc.

INSPECTOR REPORT

INSPECTED BY: [Name] DATE: [Date]

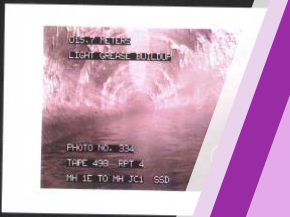
PROJECT: [Project Name]

SEGMENT: [Segment Name]

Distance (m)	Video Ref.	Code	Continuous Defect	Value Millimeters	Joint	Circ. Loc.	Image Ref.	Grade
1st	2nd					As From	To	
2.0		AMH						1
2.6		MWL		20				2
2.6		SAD	S01			9	3	3
2.6		MGO						4
2.6		FC				8	9	5
2.6		FC				3	9	6
4.6								2
7.9								2
10.9								2
12.8								2
13.8								2
52.6								2
82.0								2
151.3								2
166.3								2
176.1								2
177.5								2
190.9								2
190.9								2

SSD - MHIE TO UNDOCUMENTED MHIAE - Photo09 - 19081110

SSD - MHIE TO UNDOCUMENTED MHIAE - Photo10 - 19081110



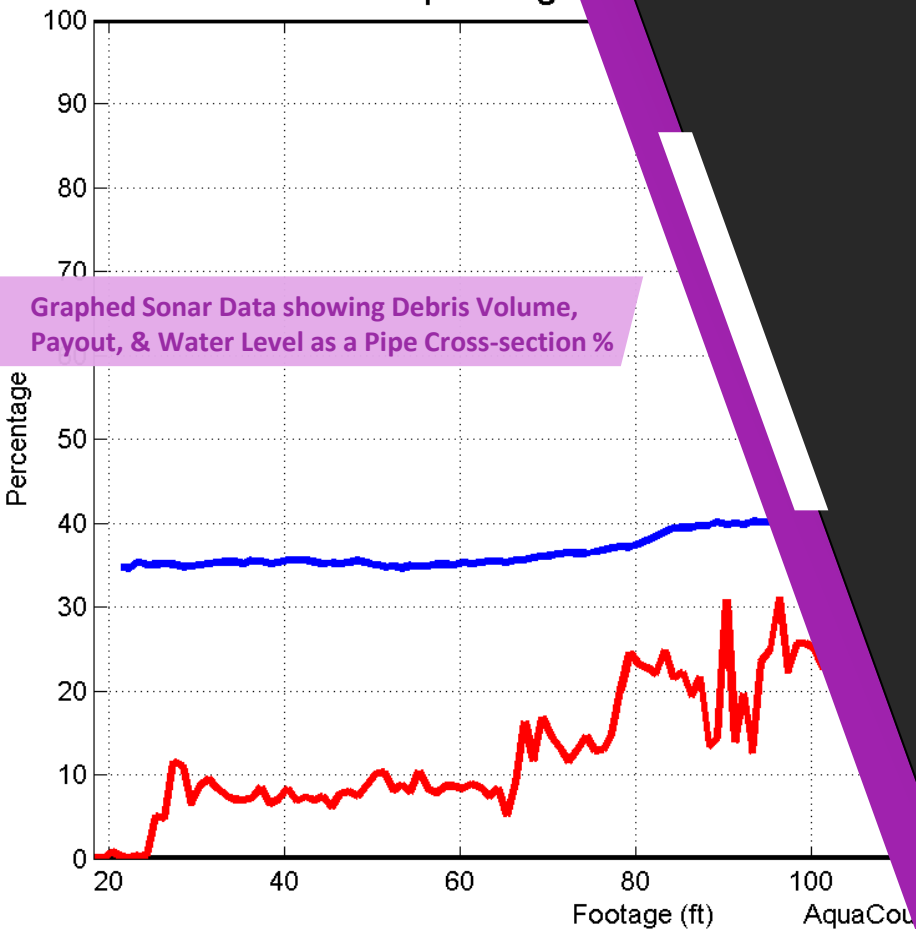
# HISTORICAL VIDEO STANDARDIZED PROCESSING

- Re-process your historic CCTV video to present day standards
- This allows for standardized coding throughout the organization
- Our software enables automatic pipe condition grading for all collected video
- Tie historic pipe condition grades to present day grades and map trends
- Re-coding of historic video allows for direct comparison with current inspections
- We can correct any coding mistakes and add missed observations
- Providing critical information that will assist in budgeting for repairs or replacement

We can Export Data to Updated & Standardized Databases



Pipe ID: 112  
Starting MH: 112719M  
Pipe Length



## AQUACOUSTIC'S KEY POINTS

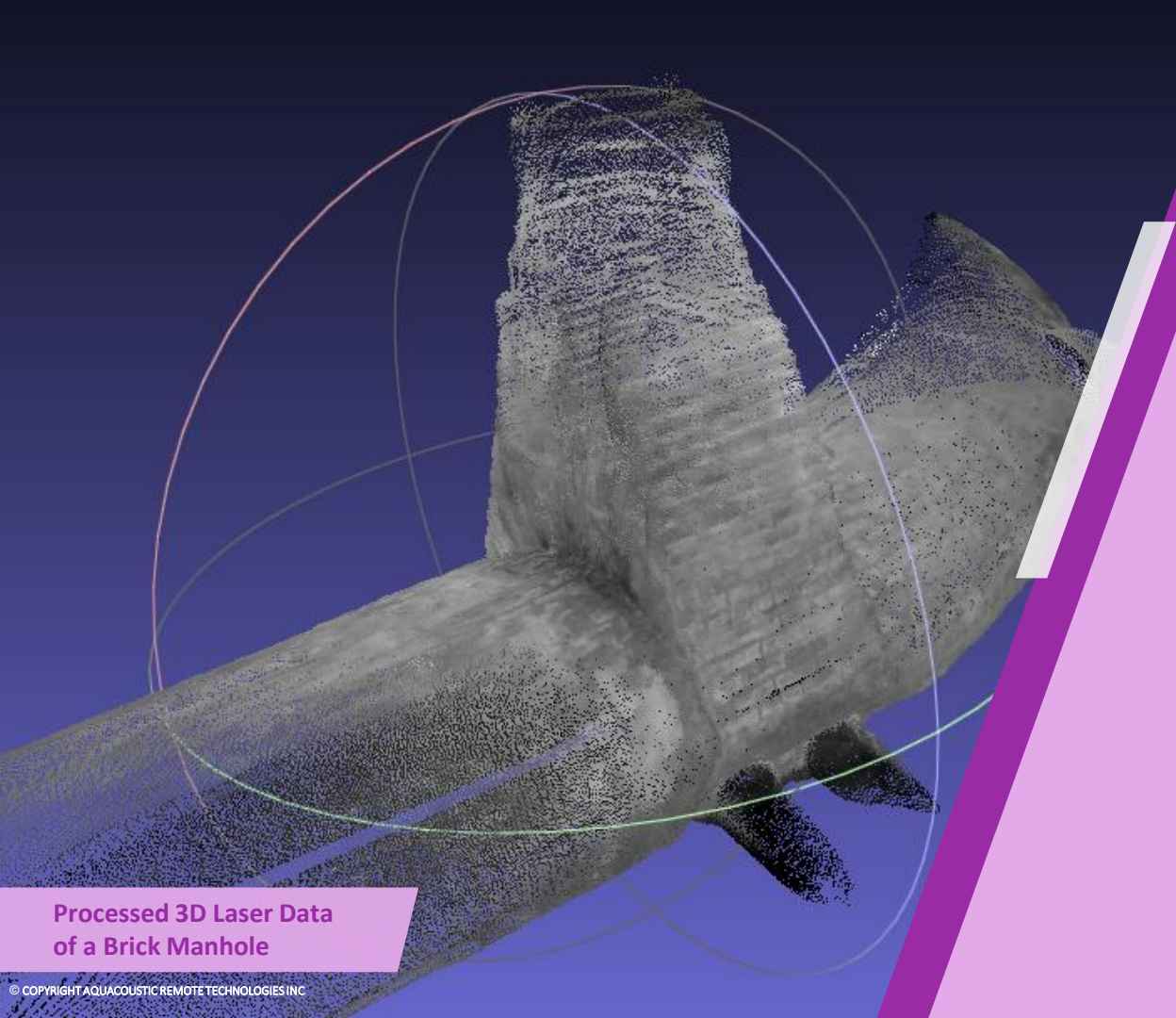
- We are an infrastructure pre-engineering firm that develops unique data gathering solutions
- Our data helps you prioritize areas of concern and can be instrumental in reducing cost of repairs
- We design and build robotic systems capable of meeting challenges and develop software that transforms data into useful information
- We control the data from collection to deliverables without outsourcing; therefore, we respond to client input directly and completely
- Our technological solutions generate actionable information that reduces your internal costs
- Unique patented technologies
- If you have any technical questions please phone or email us & we'd be happy to provide an answer

# AREAS OF INFRASTRUCTURE INSPECTIONS

IF YOU HAVE A PARTICULAR INTEREST OR CHALLENGE, WE CAN DISCUSS SOLUTIONS ON THE PHONE OR WE CAN SEND ADDITIONAL INFORMATION ON THE FOLLOWING:

- ✓ Dams
- ✓ Bridges
- ✓ Tunnels
- ✓ Culverts
- ✓ Manholes
- ✓ Mine Stopes
- ✓ Ports & Marinas
- ✓ Large Diameter Pipes
- ✓ Traffic Control Plans
- ✓ Mine Tailing Ponds
- ✓ Shafts and Boreholes
- ✓ Specialty Sonar/Laser Surveys
- ✓ Pipe and Cable River Crossing Surveys
- ✓ Internal ROV outfall surveys, minimum diameter 450mm (18")
- ✓ Historical Video Re-coding to New Standards or AI Quality Control
- ✓ Processing Client Collected Sonar & Laser Data

AQUACOUSTIC CAN PLAY A SIGNIFICANT ROLE IN YOUR RISK MANAGEMENT STRATEGY



Processed 3D Laser Data  
of a Brick Manhole

# WHAT CAN WE DO FOR YOU



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www.aquacoustic.com  
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Vancouver, BC V5Y 1K6

Phone: +1.604.730.8117  
Fax: +1.604.730.8817  
Toll free in North America: +1.888.379.7601

**AquaCooustic**   
REMOTE TECHNOLOGIES INC.