

NJWEA Excavation, Safety & Proper Pipe Installation, Winter 2024





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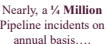
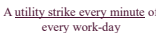


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- 'The' Problem
- Technology Overview
- Features & Capabilities
- Value Proposition & Benefits
- CASE STUDY
- Summary & Conclusions

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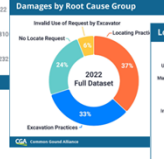
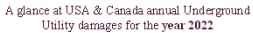




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PATH FORWARD..

GIS Mapping is Key for Future Utilities

- Cities, Municipalities, Utility Owners & DOTs are proactively adopting new technologies for protecting Underground Pipeline Assets

DRIVING FORCES

AGING	NEW RUSTH
Due to <u>aging infrastructure</u> , contractors need to handle significant challenges with underground congestion during infrastructure upgrades	Manage risk mitigation during <u>new infrastructure builds</u> and enable contractors to operate under safe conditions
Strategic objective to prevent excavation accidents caused by damaged underground utilities and <u>avoid expensive utility relocations</u>	Able to mitigate these risks by providing <u>accurate digital as-built positional data</u> at trenchless crossings, constructed via HDD methods.

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PRODUCT SOLUTIONS & SERVICES		
Accurate Utility Locating - GEO-Probe - GEO-Caliper  1" – 36" Pipeline XYZ Accuracy – 0.1 Inches	Pipeline Geometry Inspections - RS-HQ Caliper - RS-DEF Hi-Resolution Inspection  3" – 48" Pipeline Quality Accuracy – 0.5 PPM POI	Corrosion Assessments - RS-MFL (Magnetic Flux) - RS-Combo  6"-12" Pipeline Accuracy – ± 10% of W.T. (+/- 15%)



***** Ultra High resolution TMFLC probe rods

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UTILITY INVESTIGATION, WHAT IF ..

- The utilities are:
 - Non-Traceable
 - Abandoned Pipeline
 - Unlocatable Utility
 - Trenchless Deep Utilities
 - Under River Crossing & Near Railways
 - In Urban areas with No Satellite reception

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The slide features a dark blue background. On the left, the GEOCal logo is displayed, consisting of a circular icon with a stylized 'G' and the text 'GEOCal' in white and blue. To the right of the logo, the text 'GYRO MAPPING SOLUTIONS' is written in large, white, serif capital letters. Below this, the text 'IMU TECHNOLOGY, ACCURATE LOCATING' is written in smaller, white, sans-serif capital letters. A thin white horizontal line is positioned above the text 'GYRO MAPPING SOLUTIONS'.

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COMPANY INTRODUCTION

- EnviroCal headquartered in Houston, Texas
- Established in 2007, developing latest technological solutions to complex pipeline inspections
- Well renowned for unbeatable cost savings and providing simple solutions to complex pipeline challenges
- Enhanced the asset life in Utility & Energy Industry with accurate As-Built 3D Mapping capabilities through GeoCal.



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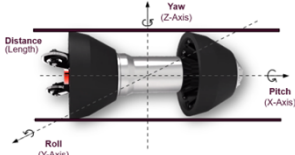
 

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TECHNOLOGY OVERVIEW – INERTIAL MEASURING UNIT

- IMUs measures angular acceleration/rate of change in position of an object, relative to a local inertial reference frame
- IMUs determine an object's orientation within 3D space about three axes:
 - Pitch (X-axis),
 - Roll (Y-axis),
 - Yaw (Z-axis)
- Ultra-high accurate and precision IMUs provide low drift and low bias instability



The diagram illustrates an Inertial Measuring Unit (IMU) as a cylindrical device with two hemispherical end caps. It is shown between two horizontal parallel lines representing a reference frame. Three axes of rotation are indicated: Yaw (Z-axis) around a vertical axis, Pitch (X-axis) around a horizontal axis pointing to the right, and Roll (Y-axis) around a diagonal axis pointing towards the bottom-left. A dashed line through the center represents the distance (length) of the unit.

** IMUs with sampling rate 1000 Hz (1 kHz) provides a higher resolution for detecting rapid changes in motion*

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IMU GYRO MAPPING - BENEFITS

Any Pipeline Material

- Metallic
- Non-Metallic

Any Depth

- 100' & below
- River Crossings

Any Utility

- Underground Utilities (All)

No Tracing Required

- No Electromagnetic Noise
- No Traffic Disruptions
- No Satellite reception
- No Impact of Soil Conditions

High Frequency Data

- High Sample Rate
- Autonomous Tool

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THE SMALLEST UTILITY GEO MAPPING TOOL

3D Utility Locating & Mapping

MADE - EASY

Highly Accurate & Reliable Accuracy

SURVEY GRADE QUALITY

Damage Prevention (Undermines)

SAFETY

GIS Shape file, CSV, AutoCAD

GIS COMPATIBLE

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DATA QUALITY LEVEL STANDARDS

Subsurface Utility Engineering

SUE QUALITY LEVELS

LEVEL D RECORDS / RESEARCH
(Architects, Design Drawings, Quarter Section Maps, Historical Satellite Imagery)

LEVEL C ABOVE GROUND FEATURES
(Above ground features to indicate subsurface alignment)

LEVEL B LOCATING
(Electromagnetic Locating, Audio Detection, 3D GPS, Acoustic Locating, CCTV)

LEVEL B MAPPING
(Shoring grade to locate & map)

LEVEL A POTHOLING / UTILITY DAY LIGHTING
(Shoring grade to locate & map)

- Avoid utility damages & relocations
- Cross Bore Mitigation
- Reduce Project downtime
- Overcome Project delays
- Circumvent cost of Utility re-designs
- Increased Job site Safety
- Lower overall project cost

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3D MAPPING TOOLS – PRODUCT LINE

- 4" RS CALIPER
- 6" RS CALIPER
- 8" RS CALIPER
- 10" RS CALIPER
- 12" RS CALIPER
- 14" RS CALIPER
- 16" RS CALIPER
- 20" RS CALIPER
- 22" RS CALIPER
- 24" RS CALIPER
- 26" RS CALIPER
- 30" RS CALIPER
- 32" RS CALIPER
- 36" RS CALIPER

Products Range:
Pipeline Size - 1" to 36"

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3D IMU MAPPING TOOLS

ACCURATE UTILITY LOCATING SOLUTIONS & INSPECTION SERVICES

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OPERATION METHODS

Method # 1

- Pull the Probe from Waypoint A to B with pulling equipment

Method # 2

- Push the Probe Fiber Glass Rod & Pusher mechanism

Method # 3

- Push the tool with Compressed Air

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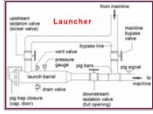
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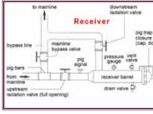
OPERATIONAL METHOD – FORCED WATER MAINS

Method # 4

Push the tool in pressurized system using Launcher & Receiver system







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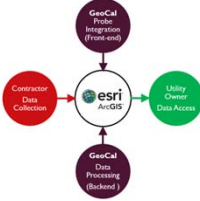
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GEOCAL & ESRI – TOTAL SOLUTIONS PROVIDER

Unprecedented Problem:

Data Visualization Platform, inconsistency

Lower-level customers are not using proven GIS platforms



Strategic Approach (Today):

GeoCal software will process the collected GYRO data & generate data formats CSV, SHP & KML

Long Term Approach (Future):

GeoCal will utilize ESRI developed API in the software to automate the process and share the final reports with Network owners

GeoCal Users will use the ESRI application to interact and preview 3D data

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CALIBRATED GUARANTEED ACCURACY

High Performance

Delivers highest performance

Trusted Reliability

Provide you with the highest reliability

Quality

Built to the highest quality standards

XYZ Location Accuracy:

Axial Location Accuracy : ± 6 Inch

Z-Depth Accuracy : ± 6

Pipeline Geometry Inspections:

Measuring internal wall loss, dents, cross-sectional changes (deflection or buckling)

Scan the entire 360-degree internal surface of the pipe

Detect internal pit corrosion anomalies as small as 5mm diameter and 2 mm deep with at

Record the relative XYZ positioning coordinates of the tool as it traverses the pipeline

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SUMMARY & CONCLUSION

IMU TECHNOLOGY BENEFITS

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ASSESSMENT DATA ANALYSIS & REPORTING



Reporting in a few hours

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IMU MAPPING – VALUE PROPOSITION

Easy to Operate

A trained crew can produce a 3D GIS result of a pipe segment within an hour

Autonomous Logging

No need to trace the probe as it travels through the underground duct or pipe

No Electromagnetic Noise

Ideal to use near live power lines, heavily urbanized areas, railways, etc.

High frequency Data

Thousand samples per second ensures the accurate measurement of bend radius, undulations

3D Results at Speed

Simplified operational process, with tool traveling at a speed up to 6" per second & faster results generation process

Accurate Maps & GIS

As-Built Mapping are critical to understand project planning & operational risk management

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NEW JERSEY DOT (NJDOT) – BRIDGE REPLACEMENT

Owner: New Jersey Dept. of Transportation
Lead Design Firm: WSP USA Inc.
General Contractor: George Harms Construction Co.

- Route 72 Manahawkin Bay Bridge Project, \$90 Million
 - Construction for the traffic, drainage and pedestrian improvements in Ship Bottom are anticipated to begin in February 2021.
 - Contract was awarded in November 2020 and anticipated to be completed in December 2024.
 - Pipeline connects Long Beach Island with mainland, Manahawkin Bay Bridge and three trestle bridges.



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SUB-SURFACE UTILITY INVESTIGATION

- Coordination with City and other agencies:
 - Utility investigation,
 - Geotechnical subsurface investigation,
 - Topographic surveying

- An in-depth subsurface investigation program was performed to develop foundation design criteria.

- In order to more accurately define the horizontal and vertical location of underground utilities, subsurface utility engineering contractor company

Route 72 Moundwacker Bay Bridge Program
Presented Fall 2009, 2010

Utility Company
Adams City Electric (Adams, Washington)
DRI Holdings LLC, (Benton, Arkansas, Tennessee)
Aqua Energy Services, Inc. (Idaho)
Columbia Gasworks
Columbia Gas of Ohio
Columbia Gas of Tennessee
Columbia Gas of Virginia
Columbia Gas of West Virginia
Columbia Gas of Wisconsin
Columbia Gas of Wyoming
Columbia Gas of the District of Columbia
Columbia Gas of the State of New York
Columbia Gas of the State of Texas
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Columbia Gas

NJWEA Excavation, Safety & Proper Pipe Installation, Winter 2024

NJ DOT PROJECT - AVOID UTILITY RELOCATION



Water Main 6" Pipeline
Purge Based Drawing
(As-Planned Map)

Old Proposed Drain 30" Pipeline
(Construction As-Planned)

Actual Water Main 6" Pipeline
Mapping Results
(As-Built)

New Proposed Drain 30" Pipeline
(New Revised)



"It was very timely and it was very accurate. It is amazing we didn't know about this service sooner."
- Mr. George Kuhn

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THANK YOU

PLEASE CONTACT, IF ANY QUESTIONS

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Santhosh SK.

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NJ DOT UTILITY DEPARTMENT



"It was very timely and it was very accurate. It is amazing we didn't know about this service sooner."
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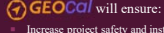
SUMMARY



Solutions provide:

- Precise mapping of underground assets in GIS Platforms regardless of ground conditions, duct type or satellite connectivity
- Verified AS-BUILT versus AS-PLANNED installations

CONCLUSION



will ensure:

- Increase project safety and installation efficiency
- Accurate GIS data - a key factor to maximize benefits applying Augment Reality to underground utility

AS-BUILT DRAWINGS

DIGITAL 3D MODELLING

AUGMENTED REALITY

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