

## Handheld Pipe Locator

**Description:** A construction crew check tool that can provide real-time capability to mark out underground pipes and facilities including plastic pipe.

**Status:** Proof-of-Concept Achieved. Prototype field tests successful. Commercial discussions are underway.

### BENEFITS

The handheld pipe locator offers significant benefits related to the costs of third party damage, the costs for repeat locates and excavations to verify the presence or absence of substructures and improved safety.

Specific areas of potential benefit include:

1. Reduced number of hits and costs to repair damaged pipe
2. Reduced repeat locates
3. Savings over current pipe location surveys; improved productivity
4. Savings regarding reduction in personnel for traffic management (for some areas)
5. Reduced test pits for new construction (stakeouts for new construction)
6. Reduction of construction costs due to more accurate pre-engineering
7. Avoidance of damage penalties
8. Reduced system downtime and customer disruption; ability to use keyhole over full size excavation
9. Increased safety

A conservative and rough estimate of savings from deployment of the handheld pipe locator for the group of NYSEARCH member companies is approximately \$3.0 million per year.



Initial Antennas in Lab

### BACKGROUND

Following a technology scan and visioning and brainstorming sessions that NYSEARCH and others conducted for long-term research needs in 2000, NYSEARCH developed a project that sought a low-end construction crew check tool used strictly for on-site markout of facilities. The tool is targeted to be portable, operable by one field person, address facilities of wide range of materials ranging in diameter size of ½” to 30” and provide high accuracy. Through its prior work and evaluation of ongoing projects, the committee acknowledged that unlike current and recently commercialized pipe location devices, a handheld tool must make a quantum leap and overcome a collection of techni-

cal barriers such as use of a free floating antenna that does not require contact to the ground, low cost, low weight and low power requirements, and data that is easily useable by a technician.

### TECHNICAL APPROACH

NYSEARCH, the research, development, and demonstration organization within the Northeast Gas Association retained PipeHawk plc to develop a low-end construction crew check tool that can be widely distributed among utilities, construction companies and other companies who excavate near underground facilities.

In the first phase of work, working with the NYSEARCH sponsors and a prospective commercial partner, detailed product specifications were established. Then, PipeHawk plc set out to establish proof-of-concept for an air coupled antenna, define a position sensing system, establish a processing and software approach that would provide target identification in real time and establish that power and cost targets could be met. PipeHawk plc researched and tested several

antennas and selected the most promising for use. Proof-of-concept was achieved with demonstration using a benchscale prototype.

In Phase II, the work included design, assembly and functional tests on two “demonstrator” prototypes. Design constraints were identified by sub-component. Detailed analysis was performed to fully address functional, mechanical, power, and software requirements.

Field tests were conducted by several project sponsors and were deemed successful. The demonstrator prototype was used by typical locating personnel with very little training.

In an extension to Phase II, FCC issues pertaining to radiation limitations for new GPR antennas were addressed. In addition, a second antenna design, a Monostatic head with the receiver and transmitter in one unit instead of two, was designed and lab and field tested. It not only met FCC requirements but it demonstrated sufficient performance

compared to the bistatic antenna design.

to be conducted or overseen by the commercial partner.



Testing at PSEG over gravel

### PROJECT STATUS

The field tests in two consecutive years of two different generations of the bistatic antenna design and then the first generation of the monostatic antenna design indicated that the product is meeting its targets and that the users are accepting this tool. Further engineering work to make the tool more ergonomically acceptable and durable are necessary. At present, these improvements are being planned

### Sample target specifications for the Handheld Pipe Locator include:

- Light weight: 15 lbs or less
- Real-time mark-out
- Survey perpendicular OR parallel to the pipe
- Locate plastic, steel, cast iron and other facilities as small as 1/2” to as large as 24” in diameter
- Battery-operated device with a minimum of 4 hours of use without re-charging
- For an air-coupled antenna, plan position accuracy of +/- 6” for pipe depths up to 24”, +/- 9” for pipe depths from 24” to 6’
- Low cost and easy to use



Handheld Prototype and other Commercial Locators under test

### FOR ADDITIONAL INFORMATION

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