

# Pile Installation Recorder - PIR

For Quality Control of ACIP and CFA piles



Using an Automated Monitoring Equipment for Augered Cast-In-Place (ACIP), Continuous Flight Auger (CFA) and Drilled Displacement Piles is a cost effective way to reduce the uncertainty of concrete volume.

## Real time display in the crane cab of:

- Grout volume pumped versus depth
- Grout line pressure
- Auger tip depth
- Auger torque, rotation, crowd and withdrawal rate
- Incremental drilling time / drill rate
- Start and stop times



**Immediate Feedback:** Results are printed in the cab using a small field printer, in time for corrective action while the grout is still fluid

Download data to a computer for processing and printing with PIR-PLOT software, which allows data analysis with a depth increment different than the one used in the field.

PIR-PLOT summary report includes:

- Actual and theoretical volumes
- Total length drilled
- Duration of drilling, grouting, and total installation
- Starting and return head
- Actual and required percent of neat line

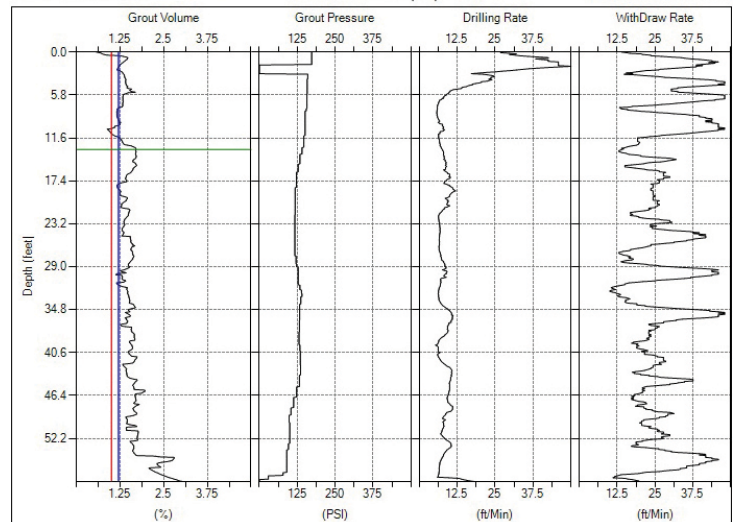
PIR-PLOT graphs the following quality control variables versus depth:

- Grout pressure
- Torque pressure
- Grout volume
- Percent of neat line
- Drilling rate
- Drilling resistance
- Withdrawal rate



- Works on any type of rig (swinging or fixed leads)
- Compatible with low headroom operations
- User selectable depth increment
- Optional PIR Viewer for simultaneous review from outside the crane cabin

Project Name: BROOKLYN  
Pile Name: 142  
Pile Date: 2013-03-21  
Shaft Volume: 69.45 (ft<sup>3</sup>)  
Pile Volume: 72.18 (ft<sup>3</sup>)  
Total Volume: 72.18 (ft<sup>3</sup>)  
Pile Length: 58.1 (ft)  
Return Depth: 13.2 (ft)  
Pile Volume Ratio: 1.58



The Pile Installation Recorder meets Deep Foundations Institute Augered Cast-in-Place Manual guidelines and complies with FHWA GEC 8 requirements for ACIP piles.

## Quality Assurance for Deep Foundations

# PIR Specifications

## Main Unit

- Size:** 60 x 180 x 228 mm
- Weight:** 1.5 kg
- Mounting:** Inside crane cabin
- User Interface:** High Visibility Color LCD with LED Backlighting
- Power:** 12 or 24 V DC (Typically uses crane battery).
- Temp Range:** 0° to 40° C, operating; -20° to 65° C storage.
- Electronics:** PC compatible processor, running Microsoft Windows® XP; 32-bit Microprocessor with 10-bit Analog to Digital Converter
- Data Storage:** Internal 40 GB Solid State Drive (SSD)
- Data Export:** USB **Printer Interface:** USB



## Wireless Rotation Measurement Unit

- Type:** Proximity switch
- Mounting:** on auger gear box
- Size:** 18mm x 50mm (diameter x length)
- Weight:** 114g
- Functionality:** Normally open
- Max Switching Frequency:** 200 Hz
- Sensing range:** 10 mm
- Repeatability:** 0.01 mm



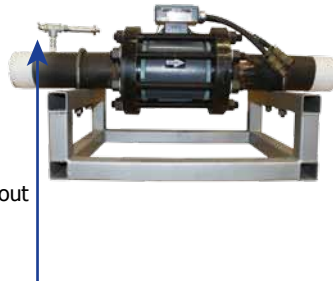
- PIR Viewer** (optional)
- Size:** 135 X 104 X 52 mm
- Weight:** 0.45 Kg
- Display:** Sunlight readable VGA color display, resolution 840 x 640 pixels, screen size 9.4 cm (3.7")
- Temperature Range:** Operating: 0 to 40° C; Storage 20 to 65° C
- Power:** Internal battery (8 hours duration)
- Microprocessor:** PXA270 @ 520 MHz
- Data Storage:** Built-in 2 GB drive
- Data Retrieval:** USB
- Wireless:** 30m range, 802.11b/g/n (WIFI) wireless link with Main Unit



Wireless Depth Measurement Unit\*

## Flow Meter

- Type:** Magnetic
- Mounting:** In line with main grout line, 76 to 152mm diameter
- Size:** 450mm x 450mm x 915mm
- Weight:** 45 kg
- Max Flow Rate:** 625gpm with 76mm grout line; 2440gpm with 152mm grout line
- Accuracy:** +2%



## Grout Pressure Measurement Unit

- Type:** Pressure transducer
- Mounting:** On magnetic flow tube
- Max Range:** Up to 1000 PSI
- Output Signal:** 4-20mA output

## Torque Measurement Unit

- Type:** Pressure transducer (hydraulic pressure applied to gear motor - "torque pressure" - relates to auger torque)
- Mounting:** On hydraulic line powering the gear box
- Max Range:** Up to 10000 PSI
- Output Signal:** 4-20mA output

Depth Measurement Unit		
	Wireless	Conventional (wired)
<b>Type</b>	Rotary encoder on spring tensioned arm assembly	Rotary encoder on a self-retracting reel
<b>Mounting</b>	Attaches to auger gear box	In boom of crane, cable attaches to gear box
<b>Size</b>	600mm x 150mm x 150mm	305mm x 910mm x 910mm
<b>Weight</b>	12kg	73kg
<b>Max Range</b>	200m	49m
<b>Resolution</b>	0.6mm	0.6mm



## Wireless Transmitter

- Size:** 60mm x 76mm x 175mm
- Weight:** 0.7 kg
- Transmission Range:** 100m
- Frequency:** 2.4Ghz
- Electronics:** 32 bit 24 MHz microcontroller, 12 bit digital to analog converter
- Mounting:** On auger gear box
- Power:** Rechargeable battery, size 60mm x 76mm x 175mm, run time at least 24hrs
- Temp Range:** 0° to 40° C, operating; -20° to 65° C storage

## Other

- Paper summary print out for each pile
- Results in SI or English units
- Technical manuals and support
- One year warranty on main unit



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