advanced sensing and monitoring technology that enables our clients to optimize the design, construction and operation of the nation’s transportation infrastructure.
What is the SmartPile® EDC System?

• Electronics/Sensors embedded in the pile core at both pile ends
• Wireless communication and data transmission from the pile
• Ruggedized Workstation to collect sensor data in Real Time
• Software to Analyze, Present, and Report
• Data Portal to organize and share results
Benefits

✓ Owner Confidence – *Measuring* vs. Estimates/Assumptions

✓ *Job Site Safety* – Wireless, Operation Transparent

✓ Saves money – *Improves Quality*
Benefits
Unique Advanced Damage Detection (early detection saves $$)

Collision Avoidance  — vs. —  Costly Recovery/Replacement
The theoretical review of the method showed clearly that the Beta Method cannot be a reliable indicator of pile toe damage… …the Beta method should not be used to protect against pile toe damage.”

Verbeek, G.E.H. / Goble, G.

It’s not about damage being detected, but rather real damage going undetected!
Limitations of damage detection measured at pile top only well documented

MPI – change in static pre-stress tracking aids in pile damage detection
  Numerous pile extractions have confirmed results

Measured wave speed w/o pile end location assumptions – detect onset of / monitor material fatigue during driving
  Ability to confirm wave speed used for key calculations at the end of drive – Sensitivity on ultimate capacity results!

Ability to assess proper load transfer at pile toe in cases of damage detection – confirm vs. assume performance
Composite Capacity Realization  
(tip and skin)

- Understanding driving resistance contribution by **direct measurement** (%tip vs. %skin)
  - Need to know in two places? Measure in two places!
- Measured static tip resistance - EOID
- Soil Freeze - understanding true skin contribution (only) during restrike – knowing through confirming un-mobilized pile tip (*total capacity = skin capacity with un-mobilized pile tip*)
- Improves quality by preventing potentially damaging and unnecessary overdriving of piles
Comprehending Composite Capacity (EOD/BOR)

Similar tip resistance before and after re-strike.

14 day re-strike

EOD

BOR
Beyond Sensors ... Advanced Software Modeling and Analysis Environment

- Fully Integrated
- Common / electronically portable file formats
- Closed loop system provides for checks and balances during analysis
- Validated Signal Matching (using tip data)
- Driving Criteria for Test Piles
Eliminates estimates, assumptions, and subjective interpretation – measured data driven!

Signal match performed at pile top, and results validated using pile tip data

- Validated solution for given pile top and pile tip boundaries
- Soil model provides initial conditions
- Results used to better understand and characterize soil properties and behavior

- No other approach provides for tip validated results

Provides ability to audit capacity results derived from the UF Method
A new approach to dynamic testing enabling all structural elements to be efficiently tested during installation

Owner Advantages over “Top Only” Dynamic Testing:

- Ability to confirm correct wave speed at the end of drive!
- Best-in-class damage detection/prevention - It’s not about damage being detected, but real damage going undetected!
- Skin capacity = Total Capacity (with a measured as un-mobilized pile tip)
- Signal Matching results validated using pile tip data!
- Estimates, assumptions, and subjective interpretation replaced with measured data!

It’s not about more data, but more reliable data, providing for checks and balances, to improve owner confidence