United Nation World Geospatial Information Congress
The Geospatial Way To A Better World
Spatially Enabled Future Cities

- **DGNSS**-Assisted Piling System

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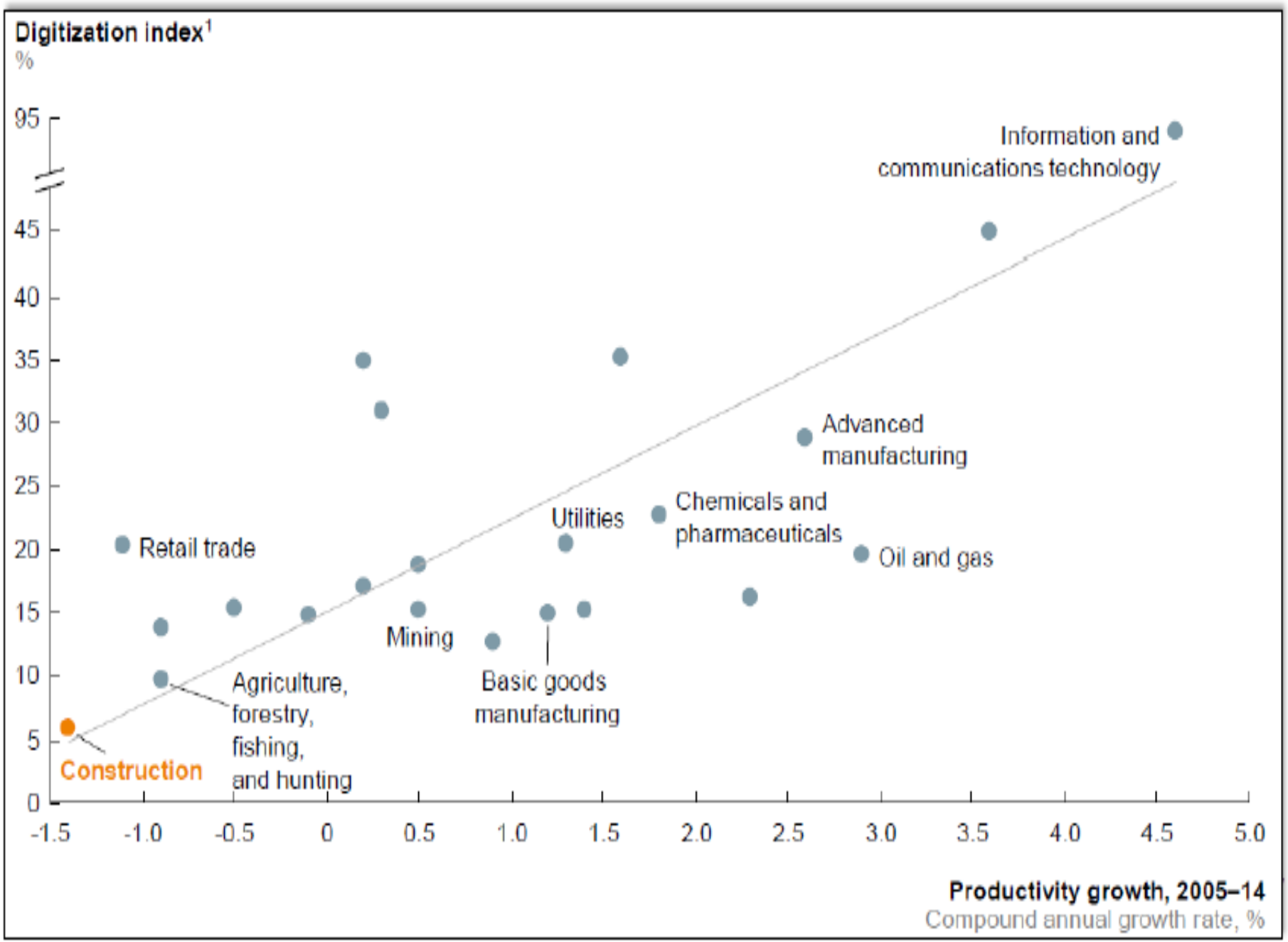
S C ANG
CONSORTIUM PTE LTD

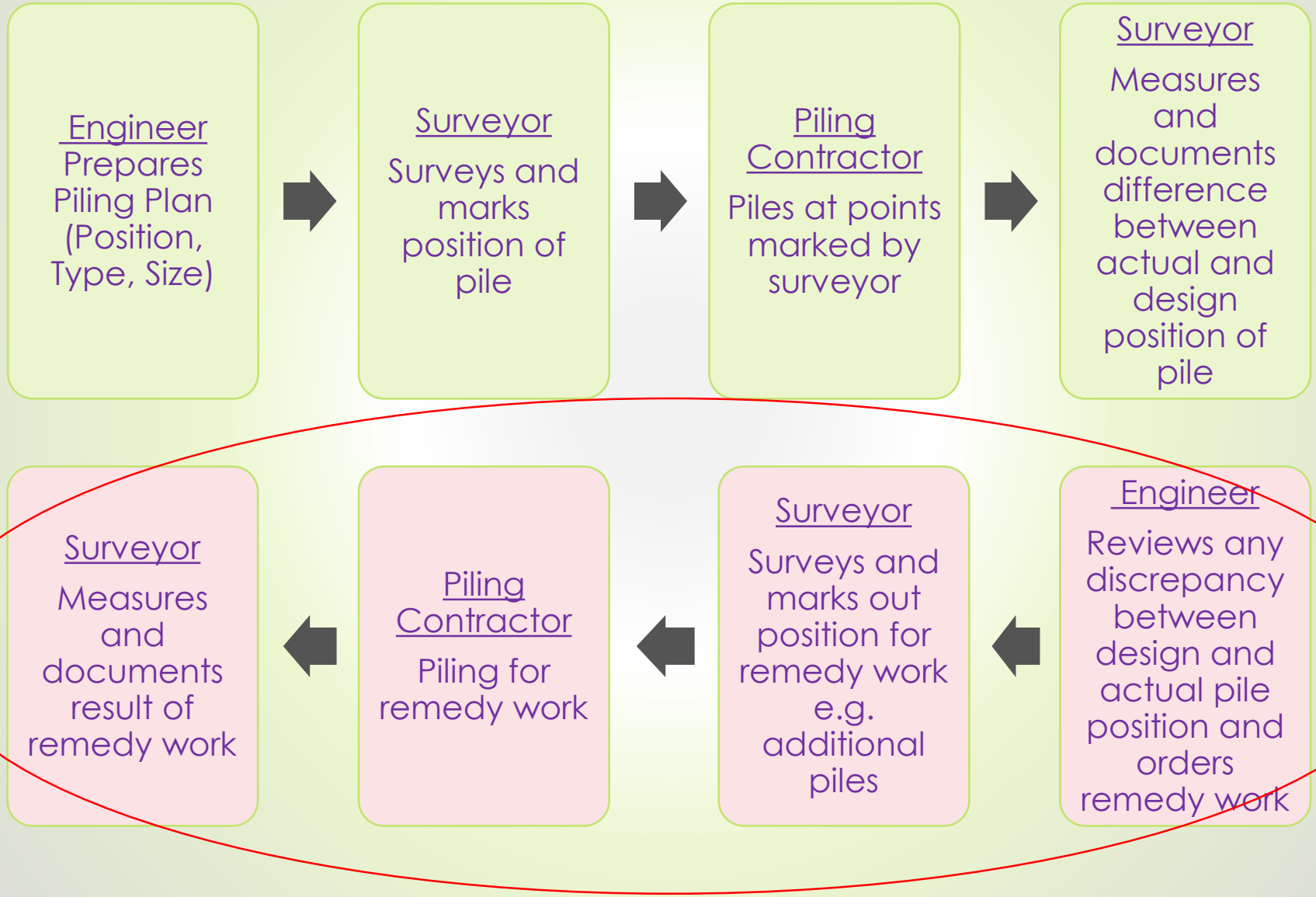
DGNSS-ASSISTED PILING SYSTEM

- Motivation
- PILING PROCESS
- CONVENTINAL SURVEY FOR PILING
- THE TRANSFORMATION
- NOW

The McKinsey report indicated that the Construction industry has huge potential for digitalization, productivity and growth



The Piling Process



Conventional Surveying and Setting Out

Two-man Team

Daily Setup (15 mins per site)

Assistant finds pile position

Found design position

Hammers in Peg

Labels Piling Peg (Marker)

CURRENT PILING METHOD

Pile positions set using total station.

Riggers place reference points

Piling rig moves in and pile is installed.

Move to next pile point.

Surveying in the Piling Process

Full-time surveyor needed if have to check peg just prior to piling.

Survey and find Pile Position

- The peg move when the piling machine move –in
- Pile displacement due to pressure from the neighboring pile
- Excavations
- Poor supervision
- Human error

BACKGROUND – PILE POSITIONING PROBLEMS

- The piling pegs get displaced from their original positions
  - due to soil movement caused by piling.
  - due to maneuvering of heavy machines.
- No independent method is used to verify peg positions
- Pile eccentricity (error in position) is recorded too late
  - towards end of piling process, at cut-off-level
  - when piling machines have already been deployed to other sites

Transformation begin:

- Set pile using conventional method.
- Check by GNSS to confirm the reliability.
- Mount the receiver on the pile.


Jet-in Machine


J621
5T
CAT

Problem:

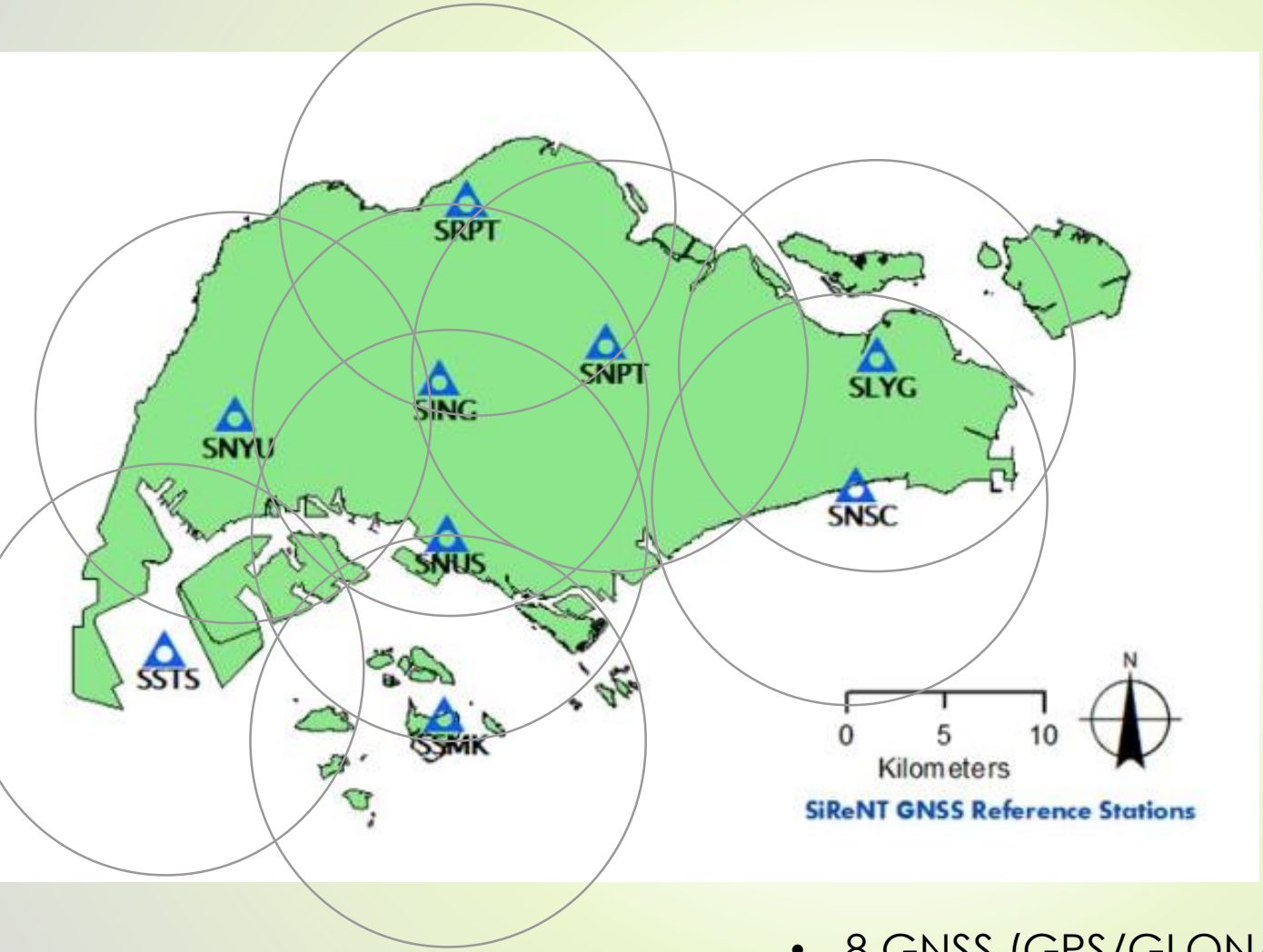
- When Jet-in pilling machine moves in, peg point will be displaced
- Worker have to go below the heavy machinery to align the peg point

- SiReNT is the national Differential GNSS infrastructure supporting a wide range of positioning applications;

- SiReNT is the realisation of Singapore's reference frame (SVY21) ensuring data integrity and interoperability; &

- SiReNT Differential GNSS provides sub-metre & centimetres positioning accuracy in real-time.

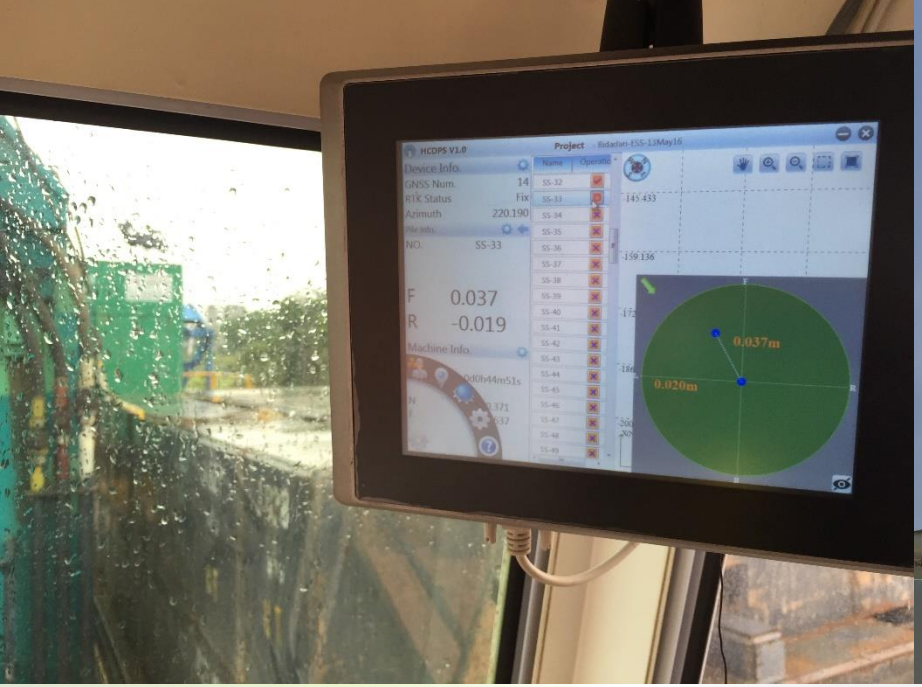
SiReNT GNSS Reference Stations



- 8 GNSS (GPS/GLONASS/QZSS/COMPASS & GALILEO) reference stations
- 1 Integrity monitoring reference station


DANGER
PILING IN
PROGRESS
Jet-in Machine

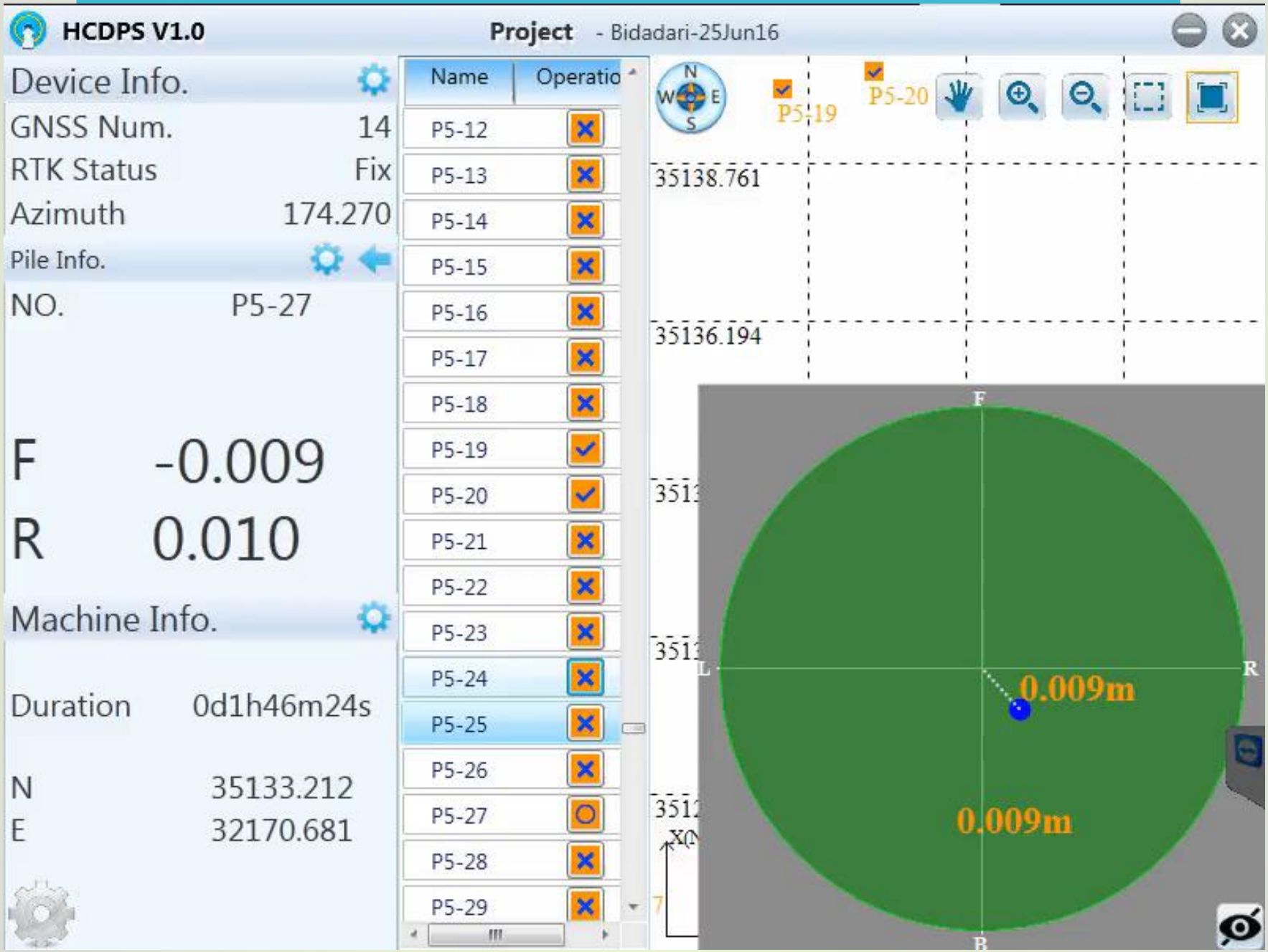
Installed on bored pile machine




Solutions:

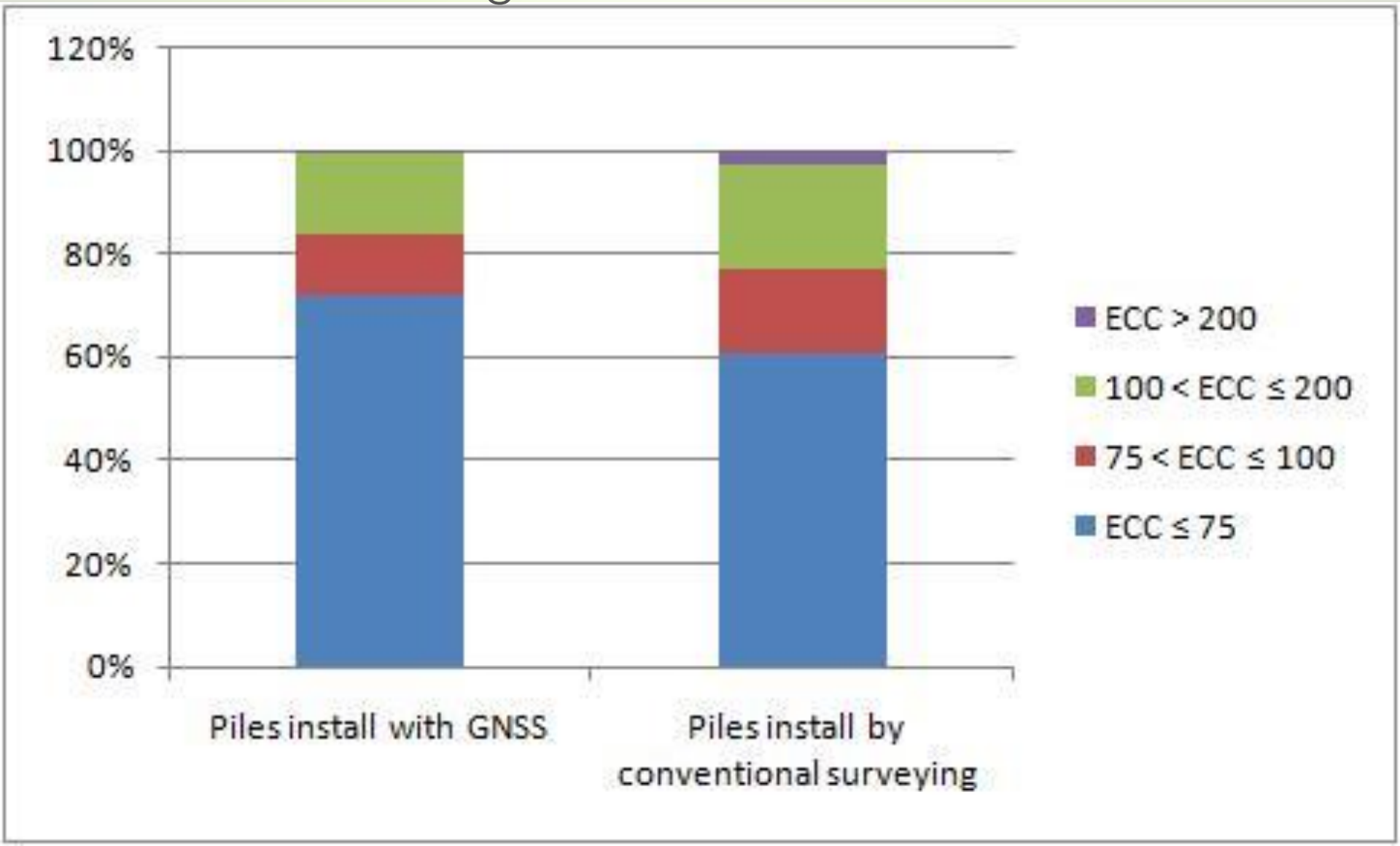
- Two antennae will be installed on the machine
- Operator will be guided to the design location from the tablet in the control cabin.
- Reduced safety risk
- Saves remedy cost
- Improved productivity

Setting Piling Pegs Using GNSS



Bidadari C4 Project

- 2 machines using conventional setting out method.
- 2 machines using dual antenna solution



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THANK YOU

谢谢