



ISM Workshop, Toronto

Static Load Testing in Restricted Access

Speaker: Stuart Bradshaw – Managing Director.

Consultancy Services

- ✓ Foundation engineering Design of pile foundations and deep excavation support, inc. temp. works
- ✓ Geotechnical engineering Soil nails, slope remediation, anchors, ground improvement, reinforced earth, earthworks
- ✓ Structural engineering Superstructure design in steel, concrete, masonry, timber
- ✓ Foundation testing Pile integrity & restricted access static load testing

Static Load Testing in Restricted Access – Catalysts for Change

- Current situation implies only dynamic testing is possible due to access constraints
- Dynamic testing not universally accepted
- Reduction of factor of safety not acceptable with dynamic testing alone
- Restricted access piling has typically lower production rates than conventional large rig piling = comparatively high **COST**(£, \$, €) per Kilonewton
- Economics, sustainability and technology advances calls for greater micropile capacities year on year = **RISK**

Static Load Testing in Restricted Access – Prerequisites for Change

- Lightweight
- Modular
- Mobile
- Erectable by hand by two people
- High capacity - Strength
- High capacity - Stiffness
- Certifiable to local standards
- Scalable?



Static Load Testing in Restricted Access – Design Constraints

- Conventional beam splice using web and flange plates ideally suited to deep heavy beams
- Small section beams = high flange loadings
- Small section conventional beam splice requires a large number of large diameter bolts
- Large bolt holes results in overstressed flanges
- Large numbers of bolts produces “long joints”

Static Load Testing in Restricted Access – Design Breakthrough

- Beam split into 3 parts, a top beam in tension and 2 lower beams in compression - a quasi truss
- Bolts placed at neutral axis away from highly stressed top and bottom flanges

Static Load Testing in Restricted Access – Developments to Date

- Current (UK) capacity of 1200 kN using parallel main beam sections, 2 or 4 anchor piles
- New development for Canada capacity now increased to 2500 kN with a weight saving
- Lightweight, each complete beam section splits into 3 further sections each weighing 70 to 80 kg
- Potential for much higher capacity via further parallel beams - scalability
- Erectable in very tight spaces using manpower only
- Using preliminary or “model pile tests” can and has been used to shorten pile lengths on lower productivity mini/micro piling contracts in the UK
- Worldwide patents pending

Lightweight / Modular / Mobile



Static Load Testing in Restricted Access – Win / Win / Win / Win

- **Contractor** – provides a competitive edge, shorter piles equals lower tender price
- **Consulting Engineer** – reduces design risk by providing a way to validate designs using static techniques rather than relying on dynamic test results
- **Client** – more efficient pile design equals lower overall cost
- **Financial Institutions** – reduces overall project risk

Case History 1: Harrow-on-the-Hill



- Restricted vehicular access – narrow lane
- High value contract
- Untried piling method in London Borough
- Two piles tested, to max. test load 1150 kN
- Approving authority satisfied with FoS =2.0
- Outcome overall client saving & happy Engineer

Case History 2: Euston, London

- Tower crane, high integrity paramount
- Loss of confidence due to construction problems
- Very restricted access due to advanced stages of permanent construction
- Tested successfully to 1.5 x SWL enabling tower crane to be installed



Available under licence worldwide





www.terraingeotech.com

The End

Thank you for listening