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Duration of the Micropile Underpinning Projects in Turku

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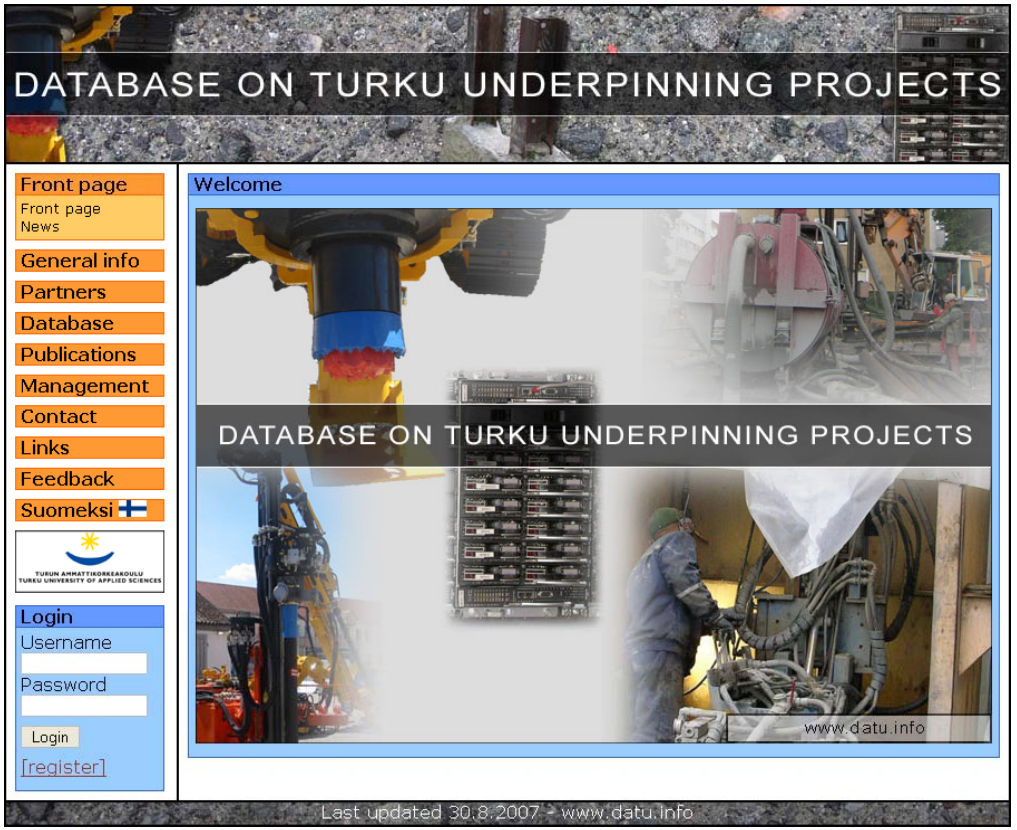
Duration of underpinning projects

Normally several months, depending on the micropile type and load transfer structure system used.

Can be considerably longer if other renovations are performed at the same time.

Database on Turku Underpinning Projects



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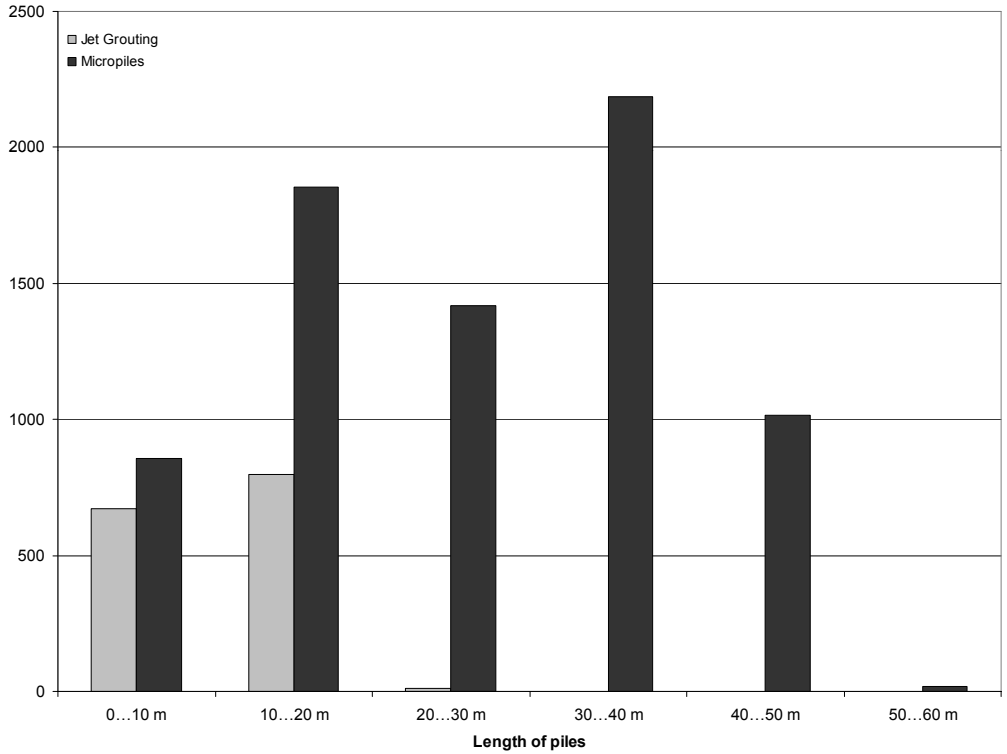
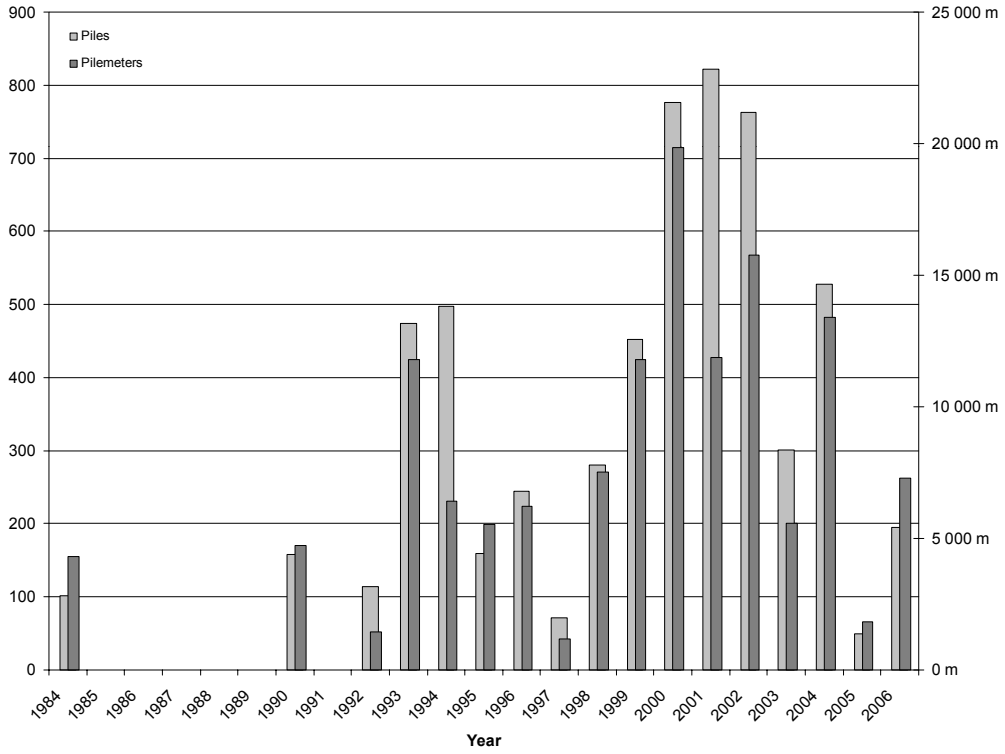
Number of piles in DATU by pile length



Number and length of piles in DATU by installation year



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Installation of micropiles in Turku

Drilling

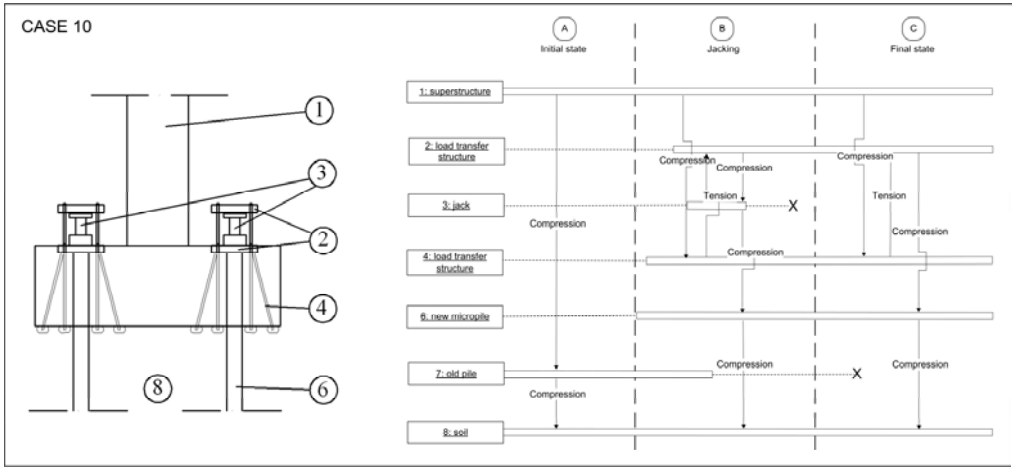
Jacking

Impact driving

Combination of jacking/drilling, jacking/driving

Post-jacking for drilled or driven micropiles

In total there are 13 different defined load transfer cases



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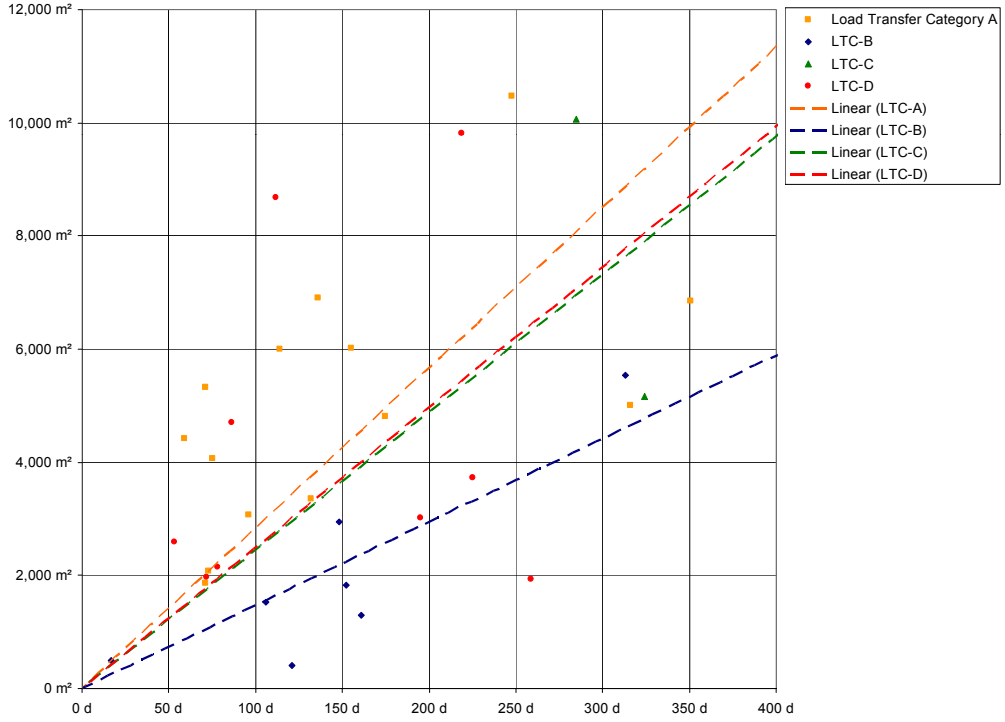
Categories of load transfer structures in underpinning

	CATEGORIES COVERING CASES OF LOAD TRANSFER STRUCTURES	
	Direct support or minor load transfer structure	**Separate load transfer structure**
Small settlement of superstructure after underpinning (no jacking during installation)	A: 1, 8	B: 2
No movement of superstructure after underpinning (installation with jacking)	C: 9, 10, 13	D: 3, 4, 5, 6, 7, 11, 12

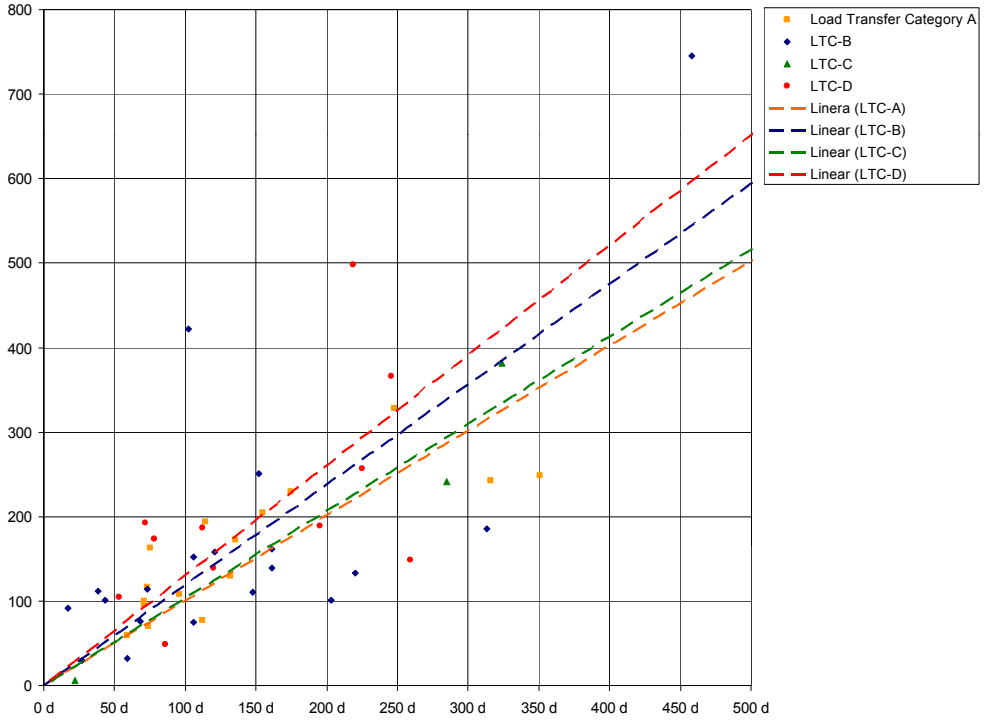
Lengths of piles and installation speeds by piletypes

PILETYPE	AVERAGE LENGTH	MEDIAN LENGTH	PILES PER DAY	PILEMETERS PER DAY
Drilled micropile	32,98 m	35,12 m	0,68 d^{-1}	25,5 m/d
Driven micropile	23,37 m	21,63 m	1,55 d^{-1}	47,4 m/d
Jacked micropile	25,10 m	30,25 m	1,22 d^{-1}	37,4 m/d
Jet Grouting	9,97 m	10,45 m	1,34 d^{-1}	16,1 m/d

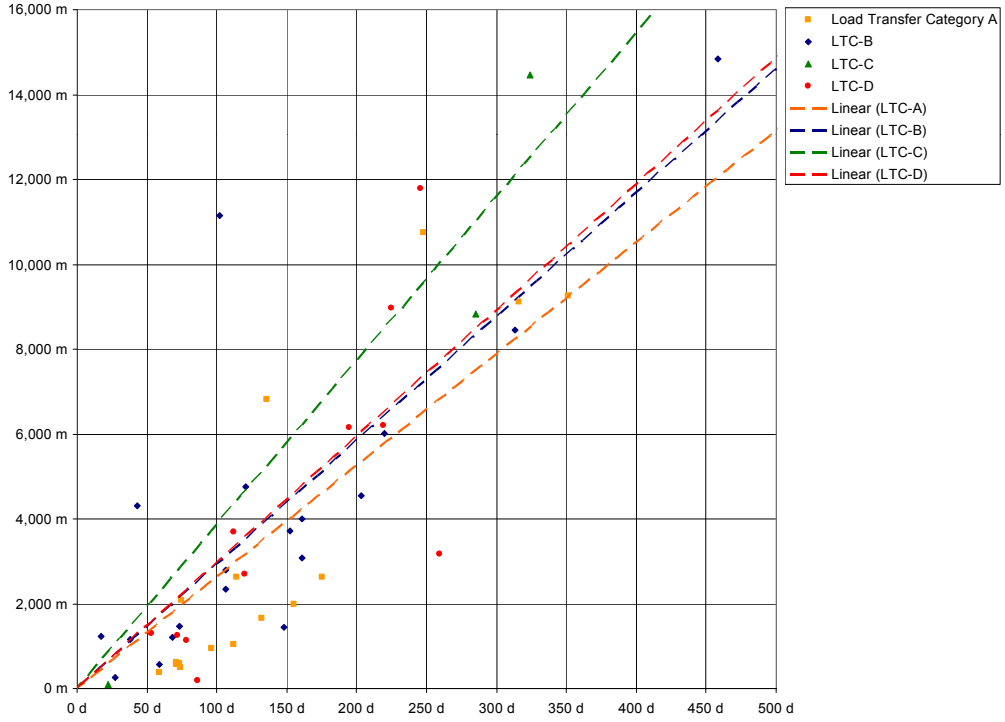
Duration of underpinning by net floor area grouped by load transfer structure



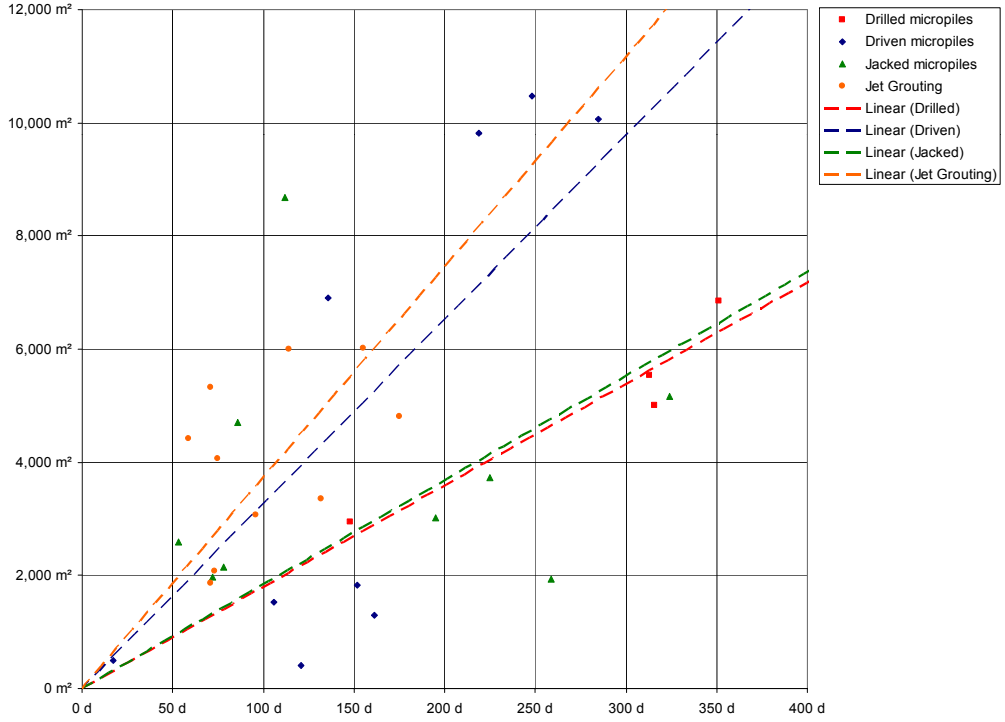
Duration of underpinning by number of piles grouped by load transfer structure



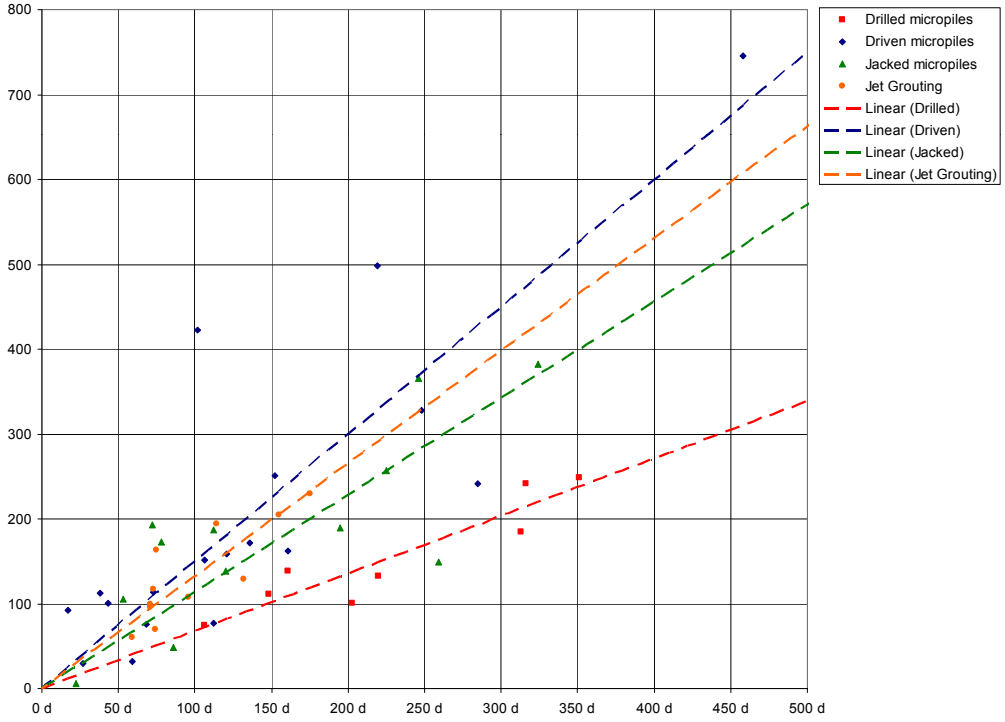
Duration of underpinning by pile length grouped by load transfer structure



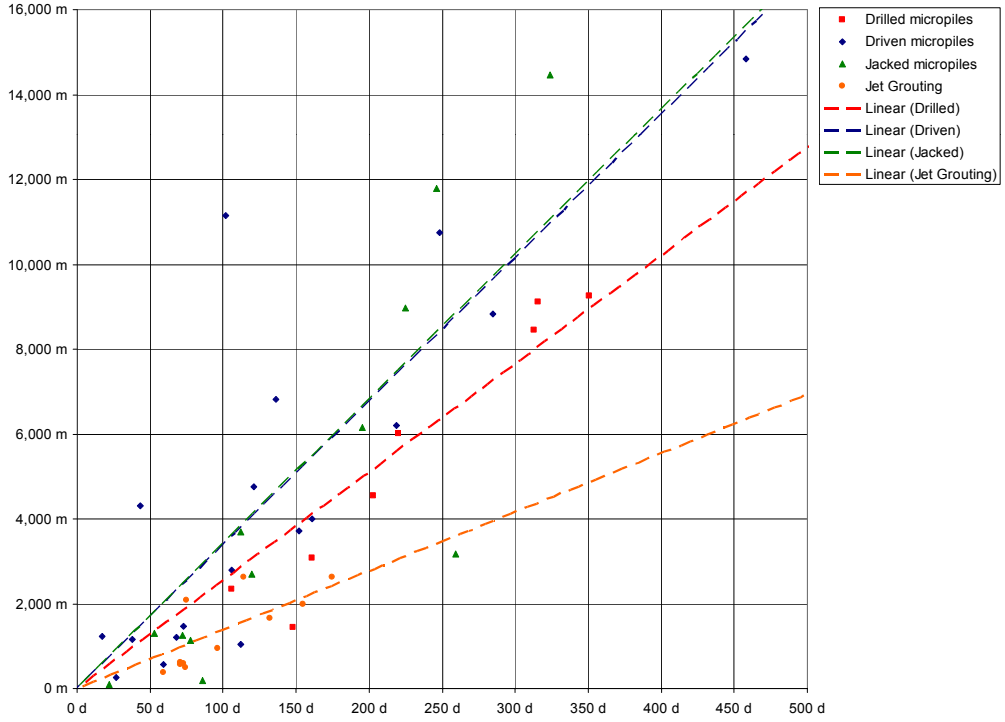
Duration of underpinning by net floor area grouped by pile type



Duration of underpinning by number of piles grouped by pile type



Duration of underpinning by pile length grouped by pile type



Observations

Only preliminary observations possible.

Differences can be observed between various load transfer structure and micropile types.

Only little can be deducted from the floor area due to extreme deviations.

Load transfer structure is much less significant than the pile type.

Observations

Pile type

Drilled micropiles require more time per pile than other pile types to install, but are faster to install than jet grouted columns when pile length becomes determining factor.

Jet grouting is by far the slowest method to install piles, when looking at the length, but they are also on average the shortest piles. In sites with small pile lengths almost as fast as driven micropiles.

Observations

Pile type

For sites with short piles driven micropiles and jet grouted columns are slightly faster than jacked micropiles.

For sites with long piles driven and jacked micropiles are significantly faster to install than drilled micropiles.

Conclusions

Study introduces an analysis on duration of different underpinning methods, based on classification of micropile types and load transfer structures.

Differences between different load transfer systems and micropiling technologies have been observed.

Further research could contribute to modeling of duration of underpinning in various site conditions, giving a new tool to a developer or an owner when making decisions on underpinning investments.