

ENERGY

Set-up effects for axial loaded piles

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Set-up effects for axial loaded piles

Content

- Evaluation and interpretation of dynamic pile tests with three methods (CAPWAP, Case, Kolymbas)
- Re-calculation of pile capacity with CPT-based methods and with the API method
- Comparison of measured and calculated pile capacity
- Evaluation of possible influence of embedded pile length and pile diameter
- Developing a model for predicting the set-up effect



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Data pool

- 10 projects in the North Sea
- 25 test piles
- 12 Restrikes after 1.5 till 10 days

Pile dimensions

Outer diameter	D	1.83 – 3.35 m
Wall thickness	T	33 – 80 mm
Pile length	L	30 – 118 m
Embedded length	L_e	30 – 69 m

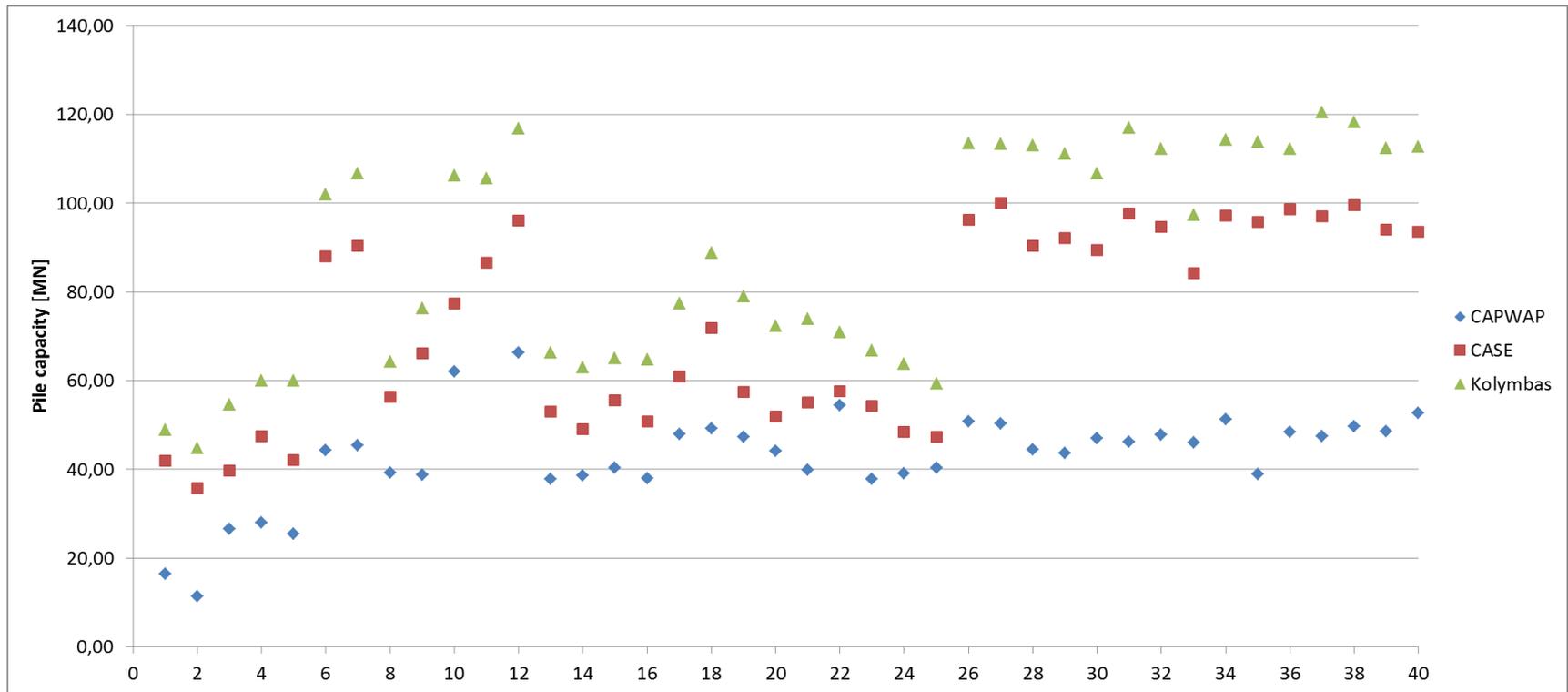
Soil parameter

Buoyancy weight	γ'	8 – 11.5 kN/m ²
Friction angle	ϕ'	30 – 42°
Bulk density	D_r	30 – 125 %
Cone resistance	q_c	5 – 130 MN/m ²

Set-up effects for axial loaded piles

Pile capacity of test piles (End of Driving)

- Calculated with CAPWAP, CASE and Kolymbas method
- Results without safety and correlation factors

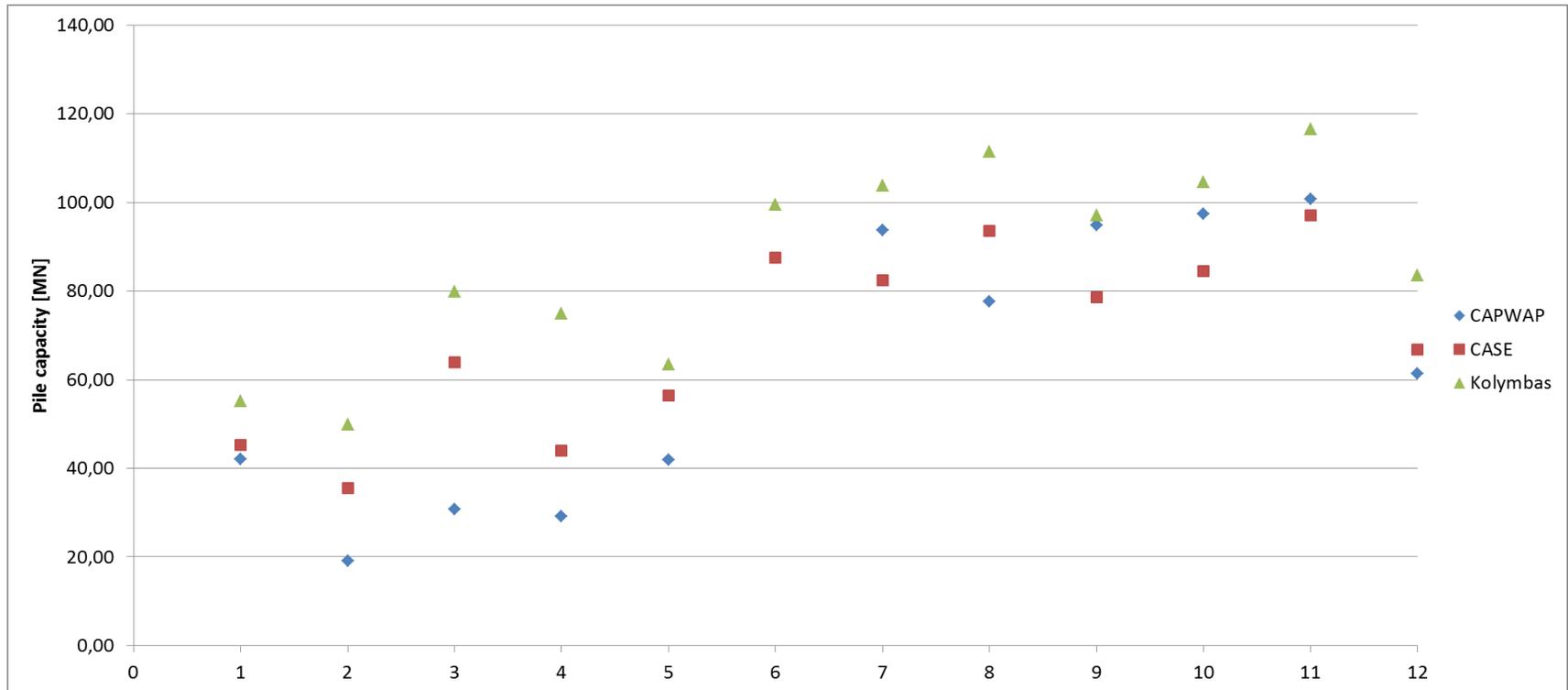


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Pile capacity of test piles (Restrike)

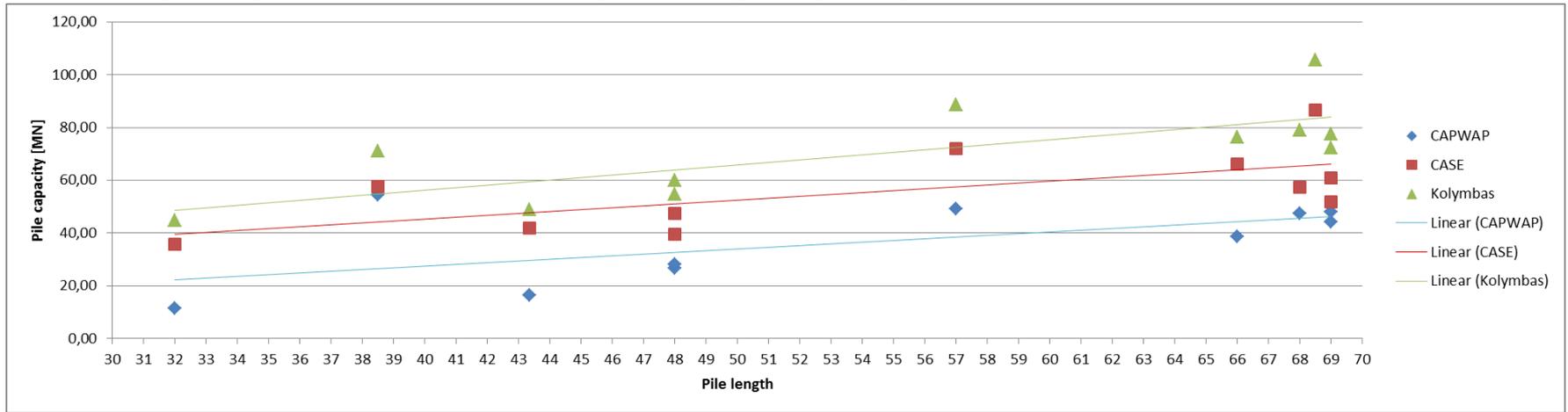
- Calculated with CAPWAP, CASE and Kolymbas method
- Results without safety and correlation factors



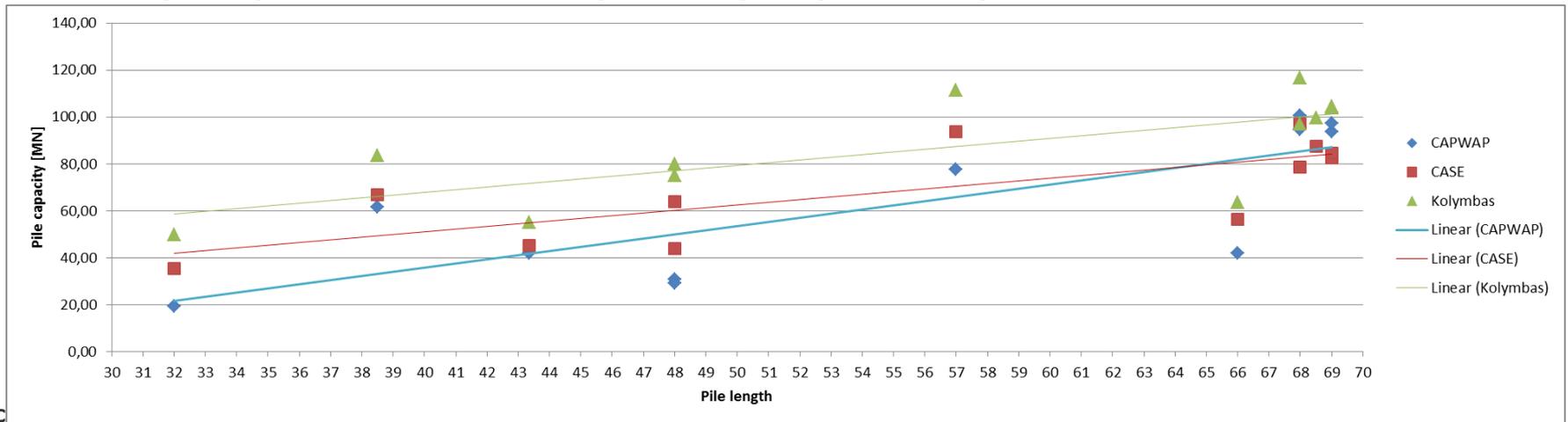
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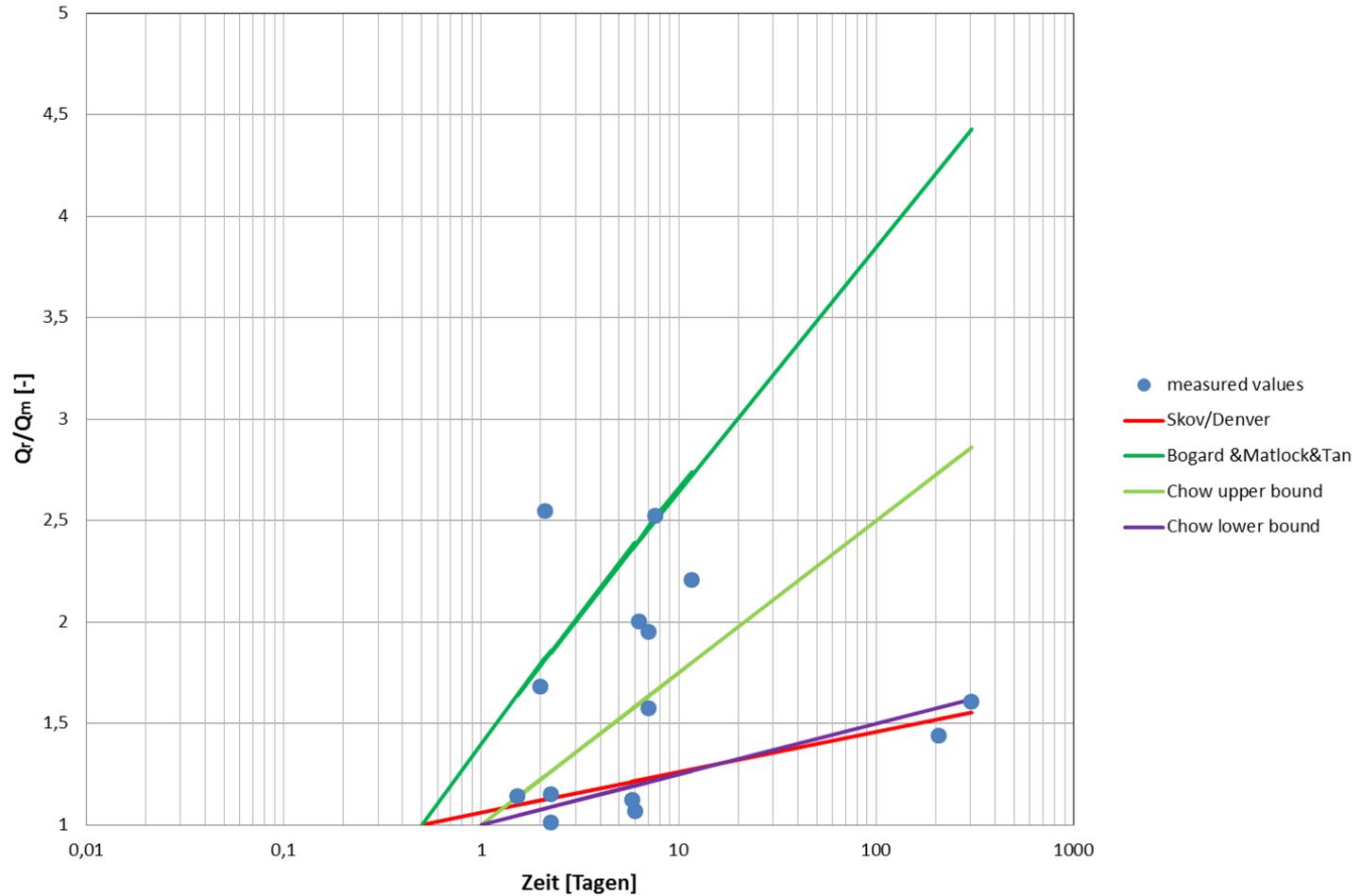
Pile capacity over embedded pile length (EoD)



Pile capacity over embedded pile length (Restrike)



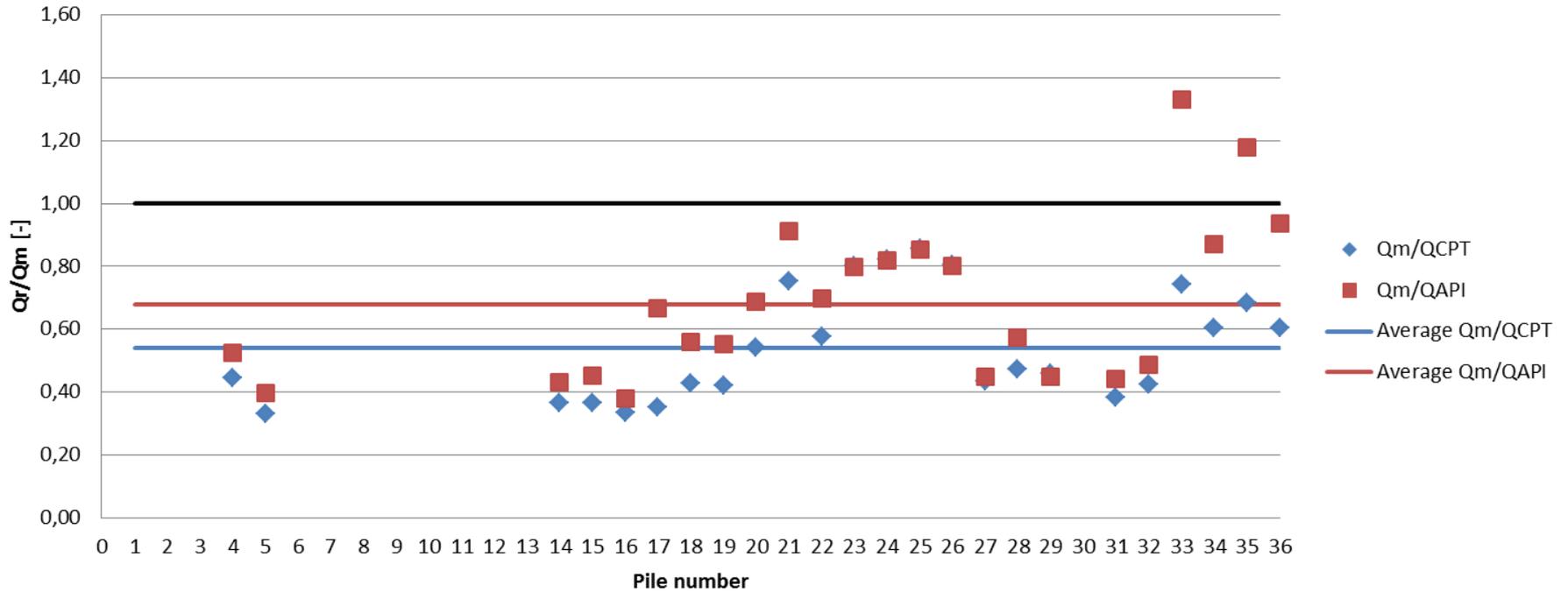
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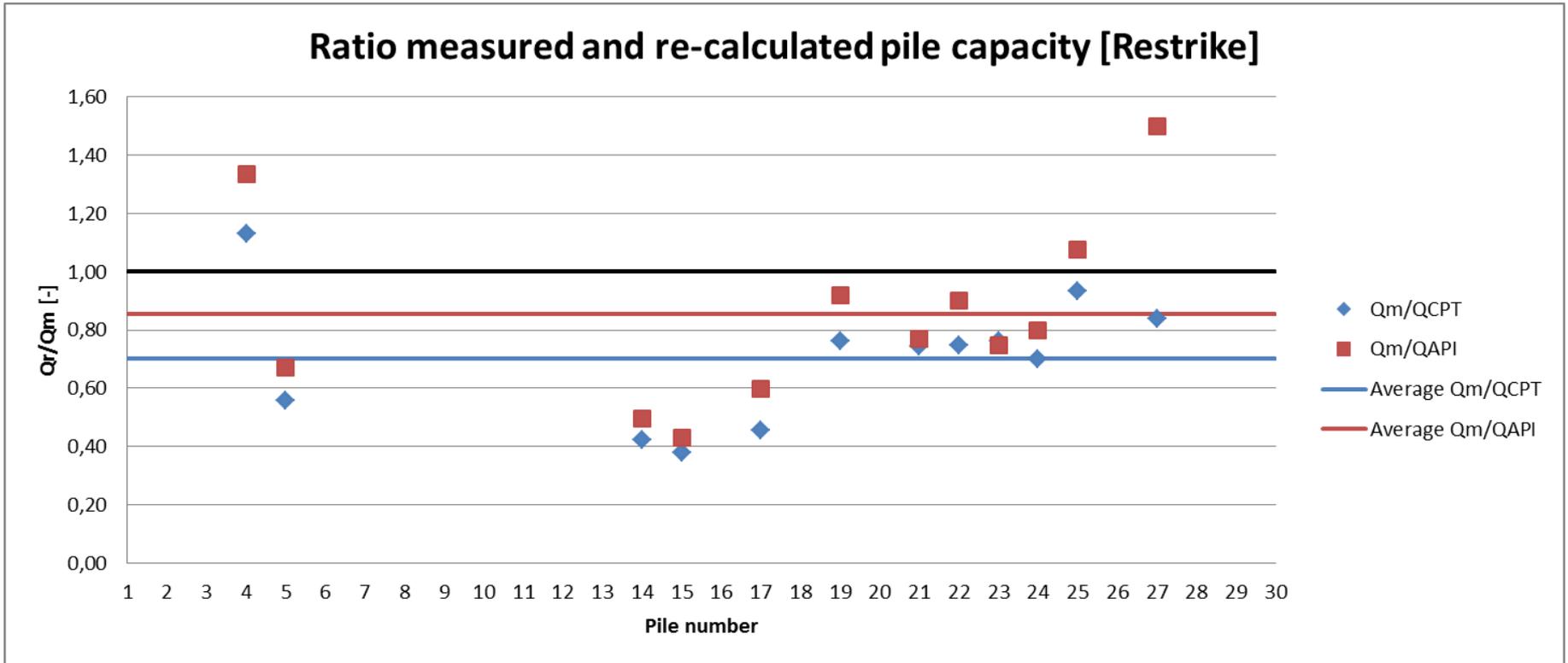
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Ratio measured and re-calculated pile capacity [EoD]



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Summary and Outlook

- No rule for set-up effect seen, except that there is one (1,2 to 2).
 - Mean deviation between measured and calculated results are smaller after restrike than after end of driving.
- => Pile bearing capacity calculated by API or CPT based methods are more reliable than dynamic pile load tests in a longer time span after end of driving.

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