

***Reliable depth to fully mobilize the end bearing capacity of drilled shafts in layered soils: the case of sand overlying clay***

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**ABSTRACT**

In this paper, a modeling procedure is carried out to numerically investigate the end bearing capacity of drilled shafts in layered soils. For the case of sand overlying clay, the reliable depth for full mobilization of the end bearing capacity of drilled shafts is also discussed. The modeling procedure in homogenous soil and the constitutive law are first described. The modeling procedure in layered soils is explained next. Numerical analyses show that when the pile tip is located in the sand and close to the clay layer below, the distance that pile tip senses the presence of the clay layer depends on the ratio of the fully mobilized end bearing capacity of clay to the fully mobilized end bearing capacity of sand. Finally, numerical results are compared with experimental data suggested by other researchers.

**KEYWORDS**

Layered Soils, Clay, Drilled Shafts, End Bearing Capacity, Sand, Numerical Modeling.

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( $q_{lw}$ )

( $q_{ls}$ )

$$/ \quad q_{lw}/q_{ls} = /$$

[ ] [ ]

$$q_{lw}/q_{ls} = /$$

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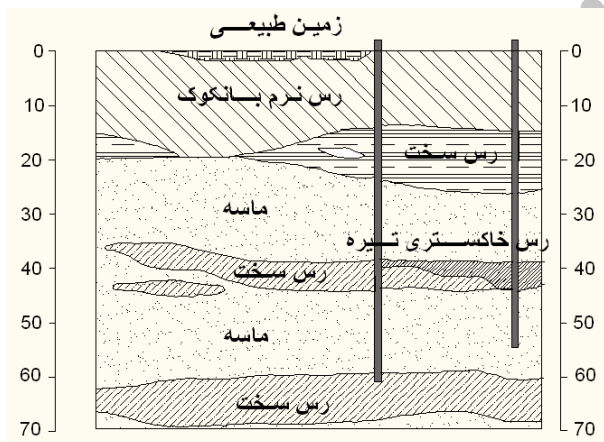
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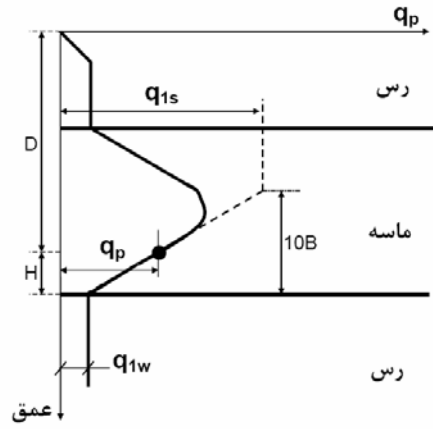
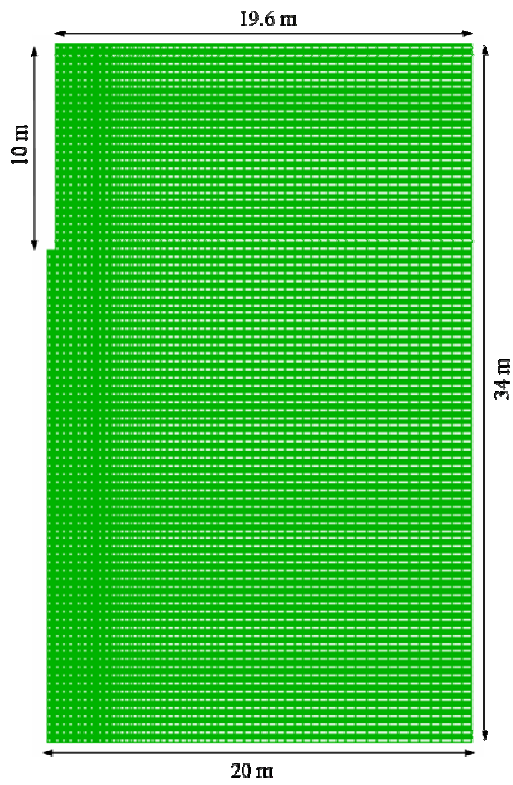
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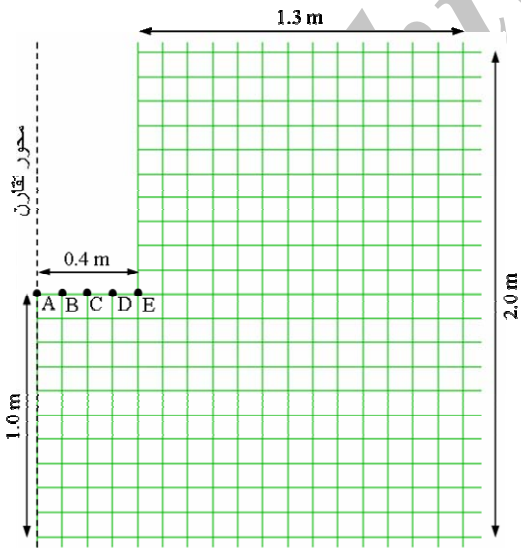
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$$q_p = q_{lw} + (q_{ls} - q_{lw}) \cdot \frac{H}{\gamma \cdot B} \leq q_{ls} \quad (1)$$



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CPT

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$$G = K_G P_A \left( \frac{\sigma'_m}{P_A} \right)^n$$

$$K = K_B P_A \left( \frac{\sigma'_m}{P_A} \right)^m$$

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:  $\sigma'_m$

:  $P_A$

: n m

:  $K_B$   $K_G$

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(%)	$K_G$	$K_B$

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n m )  
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(G)

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$$\varphi' = \varphi'_{crit} + \sigma'_m / \psi$$

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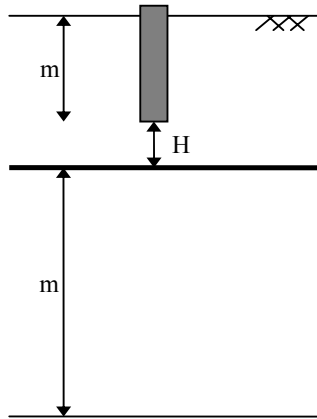
( $\varphi'$ )

( $\psi$ )

( $C_w$ )



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:  $\phi'$   
:  $\phi'_{crit}$

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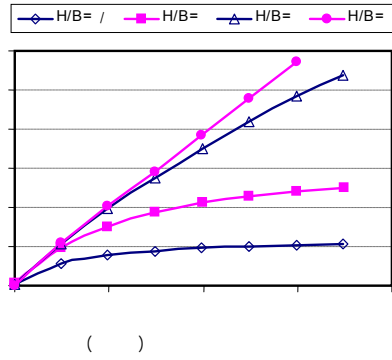
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( $\phi'$ )				
kPa ( $C_u$ )				
( $\psi$ )				
(kN/m)				
( $K_o$ )	/	/	/	/

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( $q_{lw}$ )  
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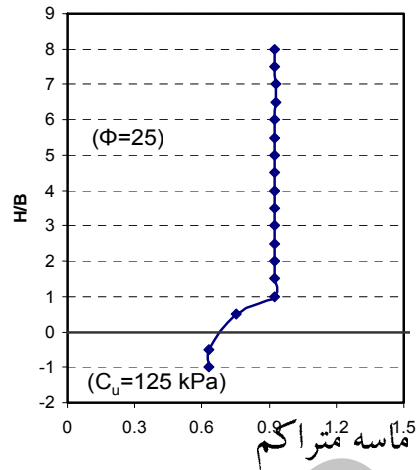
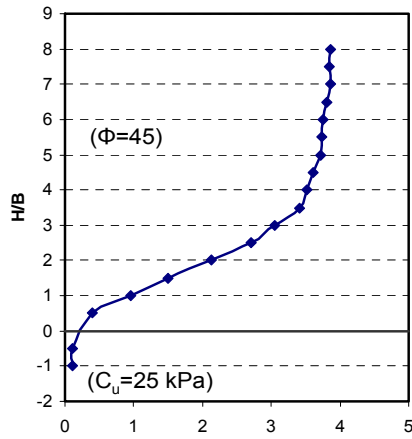
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) Cu = kPa

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$q_{1w}/q_{1s}$			$q_{1w}/q_{1s}$
$\varphi$ (°)	$C_u$ (kPa)		
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( $q_{1w}/q_{1s}$ )

/ /  $q_{1w}/q_{1s}$

ظرفیت باربری نوک شمع (MPa)  
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H  
( $q_{1H}/q_{1s}$ ) ×

$q_{1w}/q_{1s}$

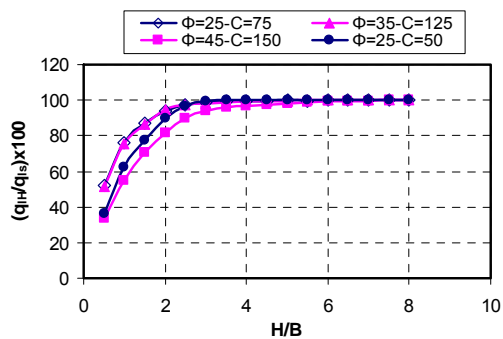
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$q_{1w}/q_{1s} \approx /$   
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$q_{1w}/q_{1s}$   
 $q_{1w}/q_{1s} \approx /$

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$q_{Iw}/q_{Is}$		
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/		/ B
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H/B

$q_{Iw}/q_{Is}$

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$q_{Iw}/q_{Is}$

( $q_{IH}/q_{Is}$ )

H/B

( $q_{Iw}/q_{Is}$ )

$q_{Iw}/q_{Is}$

H/B

$q_{Iw}/q_{Is}$

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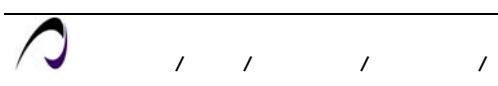
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( $q_{Iw}/q_{Is}$ )





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