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Question: Hello , my question is that how can i proof the Tarzaghi equatio...

hello , my question is that how can i proof the Tarzaghi equation which is $N_c = 5.7$. I meant how it become $N_c = 5.7$?
This subject is Engineering retaining wall foundation

Expert Answer


 Sanjay Sharma answered this
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N_c is 5.7 for friction angle $\phi = 0$. Terzaghi found the bearing capacity factors N_c , N_q by extending Prandtl's (1921) solution. The equation he came out with is given in the images below. N_c changes with friction angle.

$$N_c = \cot \phi \left[\frac{a^2}{2 \cos^2 \left(\frac{\pi}{4} + \frac{\phi}{2} \right)} - 1 \right] = (N_q - 1) \cot \phi$$

$$N_q = \frac{a^2}{2 \cos^2 \left(\frac{\pi}{4} + \frac{\phi}{2} \right)}$$

$$N_r = \frac{1}{2} \tan \phi \left(\frac{K_{py}}{\cos^2 \phi} - 1 \right)$$

$$a = \exp \left(\frac{3\pi}{4} - \frac{\phi}{2} \right) \tan \phi$$

when $\phi = 0$ degrees, only then $N_c = 5.7$. For other values of ϕ it varies accordingly, see the table below.

ϕ°	N_c	N_q	N_r
0	5.7	1.0	0.0
5	7.3	1.6	0.5
10	9.6	2.7	1.2
15	12.9	4.4	2.5
20	17.7	7.4	5.0
25	25.1	12.7	9.7
30	37.2	22.5	19.7

also, these factors vary in local shear failure to those in general shear failure. However, N_c is 5.7 for both at $\phi = 0$ degrees.

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