

Prediction of the Bearing Capacity of Piles under Axial Load Based on the Results of SPT Tests

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Abstract: With increasing technology advances, methods of geotechnical analysis and design of buildings, such as deep as the following new features and get more precise. The old ways slowly being replaced by new and innovative ways to finally see what today's data more complete, more affordable and faster process of analysis and design of the following, we. The deep application-specific projects with specific and important, and if soil conditions are bad in bed. The foundation of the building industry, increased speed, increased confidence in the reversal, and increase the useful life of the structure of investments is guaranteed. Since the implementation of the objectives sought through deep layers of the surface possible, reliance on the foundation layer for the topside control is tight and dense and, therefore, not seek to follow the calculations of surface or deep pile compared with the same capacity or structural design is of less importance.

Key words: Bearing, SPT, Candles, Central Time, Capacity.

Pile Bearing Capacity:

Because of the uncertainty in the analysis and design of numerous candles, candles in experiments on the actual dimensions of the most important projects has become necessary. In such cases because the actual conditions prevailing in soil systems - candles, candles on the load on the system, similar to real conditions. For projects that actually contains the following deep soil in question was implemented, the project area and excessive pile of little importance or experiences from similar projects in the area is available for experiments in this project to avoid is inevitable. Loaded by a hydraulic jack and the system dead time can be used in the hydraulic jack, a stretching system reaction consisting of a few candles, the reaction of one or two jacks to cross the Persian month Tir that are transferred, provided be. According to ASTM-D 1143, the capacity of the system controller to react at least 25 percent more than the amount of load on the jack plug should be.

Assuming that during the strike, the energy applied by the hammer to the pile as a rigid body simultaneously to the bottom of the pile, and dynamic formula for determining the pile bearing capacity is provided.

$$R_u * S = E_h = W_h \quad (1)$$

W = weight of hammer

H = height of hammer fall

E_h = energy to the nominal head of the pile

R_u = ultimate bearing capacity of piles

S = rate of penetration per blow

The next release of a wave packet method, the total resistance against static and dynamic Koubesh be calculated. This value is calculated based on the Case Method is:

$$RTL = (FT1 + FT2) / 2 + (VT1 - VT2) MC / 2L \quad (2)$$

RTL, in which the total resistance (including resistance to static and dynamic), FT1 amount of force at a time (the time), FT2 is equal to the amount of force in time 2:

$$FT2 = 2L / C \quad (3)$$

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After the time), VT1 the speed at 1, VT2 at a speed of 2, M the mass of the candle, C and L wave velocity along the candles are candles.

$$\text{Damping} = J_c (MC / L) V_t \tag{4}$$

J_c Case damping factor and the dimensionless speed V_t is the tip of the pile. With estimates of the dynamic resistance, bearing capacity of piles, RSP, is calculated from the relationship:

$$\text{PSP} = \text{RTL} - \text{Damping} \tag{5}$$

PDA is a very useful method for estimating the bearing capacity by the accuracy of the results of this method to select the appropriate Case damping factor is the soil in place. Case damping factor, choose the best correlation between the results of a PDA and static load testing (which is done to rupture) or using the CAPWAP analysis.

The deep foundations (piles) in reducing the size of the lower layers of soil, is due to increased stress. Annie's foundation will be created immediately after load causing rapid changes in the forms attached to the structure and eventually cause their destruction. structures are, therefore, calculate the bearing capacity predicted by candles and the candles will be a factor in the design.

Since the implementation of the objectives sought through deep layers of the surface possible, reliance on the foundation layer for the topside control is tight and dense and, therefore, not seek to follow the calculations of surface or deep pile compared with the same capacity or structural design is of less importance.

Mechanisms of power distribution in the soil and piles and piles are tied together, and interaction. Because the load on the pile location page and change the location of this neutral-neutral change, the maximum power load distribution in piles and permanent changes to the meeting.

In total for a meeting of the candles have the following step: A - Locate the page that can offset the balance of the total dead load and friction and negative sides of a friction-resistant floor and think positive. Homogeneous soil conditions, usually 3 / 1 instead of the height of the floor can be considered (model Terzaghi and pack). B - widespread distribution of permanent loads of intensity Q_0 Neutral with respect to depth of approximately 2 to 1 or the theoretical dimension of the pile to be Westergard Bosinesk or B and L and $BXL / (\text{constant load}) = q_0$ is. C - calculated using the conventional relationship in Soil Mechanics and Foundation Engineering or Janbo proposed method to the layer where the effects of stress can be ignored (10 percent neutral and q_0 at depths below the page or equal to 5% effective stress). D - to determine where the page is neutralized with a full mobilization was to end the resistance. The displacement is controlled in the bottom of the pile if the pile diameter is less than 5% and repeat the calculations for the less resistance will be considered late. Rather than repeat the calculations to be neutral to the new page.

5 - the total amount of the pile group to the summit of this pile is the elastic compression plus neutral.

$$\delta_T = PD_f / EA \tag{6}$$

N Values:

Power tools used in North America and therefore this ratio is close to 70% of energy as the energy standard is introduced. The draft guidelines prepared by the ratio of 60% is proposed.

$$N'_{70} = C_N \times N \times \eta_1 \times \eta_2 \times \eta_3 \times \eta_4 \tag{7}$$

$$E_{r1} \times N_1 = E_{r2} \times N_2 \tag{8}$$

$$C_N = \left(\frac{95.76}{P'_0} \right)^{0.5} \tag{9}$$

If applying the correction factor, the relative density of less than 5 / 0, it is not necessary to apply this correction. In the circumstances, this amount should be much larger or smaller than 1 and 2. ($0.5 \leq C_N \leq 2$).

Current methods used moderate N stress is a major influence in the region. Following a single area of interest after about half the width of the top floor looking up at about twice the width and depth are the following below. The average weight measurement using a depth component of the product in N , may be preferred over the arithmetic mean:

$$N_{av} = \frac{\sum N.Z_i}{\sum Z_i} \tag{10}$$

Cone penetration test (*CPT*) instead of the standard penetration test, especially for soft clays and silt and sand deposits, fine to medium, is widely used. This test not fit with sandy sediments are not rigid or sticky deposits. This test involves pressing a standard cone into the ground 10 to 20 mm per second speed and strength are concerned. Information recorded by the side of the cone, is the strength and depth of reinsurance. If the soil is a layering of these tests can be done with the drilling. The borehole drilling and testing is done to the weak layer, the layer next to the boreholes have been drilled and tested and do will be done again to continue the depth and layers.

Bearing candles can be determined using results of SPT Pile bearing capacity of the two aspects of the geotechnical and structural strength is important. Geotechnical strength or bearing capacity, the cargo floor and the failure of soil around the pile. Common methods for determining the pile bearing capacity can be static analysis, static analysis using in-situ test results, dynamic analysis and dynamic testing and static load testing named.

As a supplement to the static method and according to the SPT and CPT tests common place of continuous data on soil characteristics, depth is obtained, it can result in the bearing can be used candles. If you use the SPT results for pile bearing capacity, reliability and 4 is recommended. The general form of the relationship between pile bearing capacity based on SPT results are as follows:

$$r_s = AN \tag{11}$$

$$r_t = BN \tag{12}$$

R_s of candles on the wall unit KPa A: The coefficient of proportionality between the strength of a single layer in the wall of the candle, candles, and the average value of N R_t the bottom of the pile in terms of units of MPa B: coefficient of proportionality between resistance and average unit value of N in the bottom of the pile near the bottom of the pile. The average values of friction and wall plugs with increasing amounts of N SPT test, or in other words, the soil density increases. Unlike the SPT, the use of a CPT test results in determining the pile bearing capacity, especially in relatively dense and loose granular soils and fine-grained soils are very common up to the application. CPT test and the rapid economic and geological layering of information and continually evaluate the properties of the soil. According to standard test ASTM D-3441 (mechanical systems) ASTM D5778 (Electrical and electronic systems) will be done. The CPT can be tested in very soft clay to dense sands used. But this test is not suitable for sand or stone effects. And the ability to accurately measure the q_c and f_s C_pTu cone penetration device and it allows u to use the extra hole water pressure (u) in the cone penetration test to measure. The test results using C_pTu , the pile bearing capacity can be achieved on the basis of effective stress.

Confidence:

After the conclusion of the bearing piles, with the confidence of the R_u R_a allowed time pressure or tension is achieved. Time to pile the pressure, the amount of confidence in the range of 2 to 4 and for pulling loads, the amount of confidence in change is in the range of 3 to 5. Factors such as type and the topside, the consequences of failure topside, soil type, extent of geotechnical studies, the number and type of laboratory experiments and in situ, static and dynamic load testing, analysis of the wave equation, how to build and how to inspect and controls in place, the possibility of live loads on the structure and how the design of piles piling formulas based on the results, and this depends on how you interpret the test. The confidence to accept the consequences of the destruction as well as awareness and control aspects of the changes affecting the bearing capacity depends on the site. In total, using complementary techniques such as static analysis, in situ testing, dynamic analysis and testing, load testing and geotechnical studies of the experiences and engineering judgments can be reliably up to about 5 / 1 cut and save reasonable cost and time to provide.

Candles on the Load Side:

Candles for the load side, there are two types of behavior: A - short rigid B - a long flexible Of candles, intermediate and high flexibility are two of the short loin. Therefore, to evaluate and compare the two candles on the border of the short loin are long and flexible study. Be analyzed to determine the behavior of candles, which is closer to the state.

$$T = (EI / n_h)^{1/5} = 2.5 \tag{13}$$

The roughness factor, T, E and I pile characteristics (coefficient of elasticity and moment of inertia of the cross), n_h is the bed of the reaction rate constant value is based on soil type. R or T to calculate the indentation pile length (L), the behavior of piles is determined (Table 1).

Table 1: Behavior of piles in the lateral force.

| Candle Type | Short loin | Long flexible |
|--|-------------|---------------|
| Consolidation of clay soil, grain and normal | $L \leq 2T$ | $4T \leq L$ |
| In stiff clay | $L \leq 2R$ | $3.5R \leq L$ |

Conclusion:

Cargo capacity is estimated by the PDA is very useful. But the results of this approach, the Case damping factor for soil in place is the right choice. Case damping factor to choose the best correlation between the results of this test method is static or PDA and CAPWAP analysis is used. Mechanisms of power distribution in the soil and piles and piles are tied together, and interaction. Because the load on the pile location page and change the location of this neutral-neutral change, the maximum power load distribution in piles and permanent changes to the meeting. The average values of friction and wall plugs with increasing amounts of N SPT test, or in other words, the soil density increases. Unlike the SPT, the use of a CPT test results in determining the pile bearing capacity, especially in relatively dense and loose granular soils and fine-grained soils are very common up to the application. The confidence to accept the consequences of the destruction as well as awareness and control aspects of the changes affecting the bearing capacity depends on the site. Of candles, intermediate and high flexibility are two of the short loin.

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