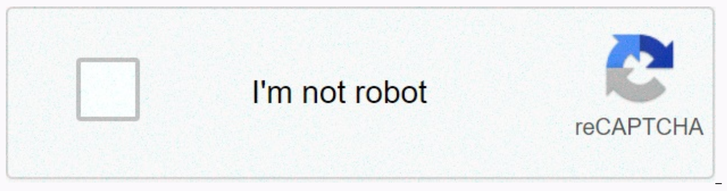

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Terzaghi bearing capacity factors table

Figure 1.1: Shear tensions based on Thezaghi soil bearing capacity theory According to the Terzaghi bearing capacity theory, column load P resists shear stresses at the edges of three zones under foot and overloaded pressure, q (=gD) above the base. The first term of the equation concerns soil cohesion. The second term concerns the depth of the legs and the excessive pressure. The third term refers to the width of the base and the length of the stress area. Bearing volume factors, Nc, Nq, Ng, is a function of the inner friction angle, f. Terzaghi's bearing capacity equation: Strip of foot qu = c Nc + g D Nq + 0,5 g B Ng [1.1] Square paws: Qu = 1,3 c Nc + g D Nq + 0,4 g B 20000Ng [1.2] Round surfaces: Qu = 1,3 c Nc + g D Nq + 0,3 g B Ng [1.3] Where: C: soil cohesion, g : soil unit weight, D: base depth, B: base width Nc, Nq, No: The volume factors of the terzaghi bearings depend on the angle of soil friction, f. Nc=cotf(Nq -1) [1.4] Nq=e2(3p/4-f/2)tanf / [2 cos2(45+f/2)] [1.5] Ng=(1/2) tanf(Kpr /cos2 f -1) [1.6] Kpr=passive pressure. (Note: from Boweles, foundation analysis and design, Terzaghi never explained.. how it got the Kpr used to calculate Ng) Table 1: Terzaghi bearing capacity factors f Nc Nq No 0 5.7 1 0 5 7.3 1.6 10 9.6 2.7 1.2 15 12.9 4.4 2.5 20 17,7 7.4 5 25 25 25.1 12.7 9.7 30 37.2 22.5 19.7 35 57.8 41.4 42.4 40 95.7 81.3 100.4 Figure 2. Cohesion: 0 (abandoned) Friction angle: 30 degrees Soil unit weight: 100 lbs/ft3 Expected base dimensions: 3-foot wide strip base, bottom of base 2 feet below ground level Safety factor: 3 Requirement: Determine the permissible capacity of soil bearing according to the Terzaghi equation. Solution: From Figure 1 or Figure 1, Nc = 37.2, Nq = 22.5, No = 19,7 f = 30 degrees Set maximum bearing capacity using terzaghi bearing capacity equation for band respect Qu = c Nc + g D Nq + 0,5 g B Ng = 0 +100x2x22.5+0.5x100x6x19.7 = 10410 lbs/ft2 Permissible bearing capacity, Qa = Qu / F.S. = 10410 / 3 = 3470 lbs/ft2 @ 3500 lbs/fts/ ft2 Example 2: Square base on clay soil Taking into account: Type: Clay soil characteristics: Cohesion:2000 lbs/ft2 Friction angle: 0 (ignored) Soil unit weight: 120 lbs/ft3 Expected base dimensions: 6 feet to 6 ft square base, bottom of base 2 feet below ground Safety factor: 3 Requirement: Set permissible soil bearing capacity using Terzaghi equation. Solution: From Figure 1 or Figure 1, Nc = 5.7, Nq = 1.0, Nr = 0 f = 0 degree Set maximum soil bearing capacity using Terzaghi capacity equation for square legs Qu = 1,3 c Nc + g D Nq + 0,4 g B Ng = 1,3x1000x5,7 +120x2*1+ 0 = 7650 lbs/ft2 Permissible bearing capacity, Qa = Qu / F.S. = 7650/ 3 = 2550 lbs/ft2 @ 2500 lbs/ft2 Example 3: Round base on sand clay Taking into account: Soil characteristics: Soil type: sand clay cohesion: 500 lbs/ft2 Friction Angle: 25 degrees soil unit weight: 100 lbs/ft3 Expected base dimensions: 10 ft diameter round base for round tank, base bottom 2 feet below ground level Safety factor: 3 Requirement: Determine the permissible soil bearing capacity according to the Terzaghi equation. Solution: From Figure 1 or Figure 1 Nc = 17.7, Nq = 7.4, No = 5,0 f = 20 degrees Set maximum bearing capacity using Terzaghi bearing equation for round Qu = 1,3 c Nc + g D Nq + 0,3 g B Ng = 1.0. 3x500x17.7

+100x2x7.4+0.3x100x10x5.0 = 17,985 lbs/ft2 Permissible bearing capacity, Qa = Qu / F.S. = 17985/ 3 = 5995 lbs/ft2 @ 6000 lbs/ft2 Preparing for FE or exams? Get 15% discount on PPI2PASS products with code CIVEB for a limited period of time. Use advertising or read more. Courses > Foundation for Analysis and Design > Bearing Capacity Shallow Funds > Terzaghis Method of Geotechnical Engineering, bearing is the capacity of the soil to support loads on the ground. The capacity of soil bearings is the maximum average contact pressure between the foundation and the soil, which should not lead to shear insufficiency in the soil. 'Final bearing capacity (qf)' means the theoretical maximum pressure that can be secured without failure; the permissible bearing capacity (qa) is the final bearing capacity divided by the safety factor. Sometimes in soft areas of the soil, large settlements can appear under the loaded foundations without an actual shear failure; in such cases, the permissible bearing shall be based on the maximum permissible settlement. » Try our free powerful bearing capacity online calculator «There are three ways of failure limiting bearing capacity: total shear failure, local shear failure and shear failure. Mechanism of failure of concepts and formulas: Figure 1 The shraplug emphasizes the theory based on Terzaghi's soil bearing capacity. Zone I: The relatively unformed soil wedge under the foundation forms an active rank area with corners (45º + f'/2). Zone II: transitional zones are spiral fans. Zone III: The wedge pushes the soil outwards, so passive rankine zones form in corners (45º - f'/2). Terzaghi bearing capacity theory: According to The Terzaghi Bearing Capacity Theory, column load P resists shear stresses at the edges of three zones under foot and overloaded pressure, q (=gD) above the base. The first term of the equation concerns soil cohesion. The second term concerns the depth of the legs and the excessive pressure. The third term refers to the width of the base and the length of the stress area. Bearing volume factors, Nc, Nq, Ng, is a function of the inner friction angle, f. Terzaghi's bearing capacity equations: surfaces: Qu = c Nc + g D Nq + 0,5 g B Ng square basis: Qu = 1,3 c Nc + g D Nq + 0,4 g B Ng Round surfaces: Qu = 1,3 c Nc + g D Nq + 0,3 g B Ng Where: C: Soil cohesion (apparent cohesion takeover); (g): weight of soil unit; D: foot depth (insertion depth); B: width and width of the base; Nc, Nq, No: The capacity factors for terzaghi bearing depend on the angle of soil friction, f: Kp =passive pressure factor. (Note: an analysis of the Bowles Foundation and the design bookTerzaghi never explained.. how he got kp, used ng to calculate) Table 1. Terzaghi's Bearing Capability Factors. f Nc Nq Ng 0 5.7 1 0 5 7.3 1.6 0.5 10 9.6 2.7 1.2 15 1 2.9 4.4 2.5 20 17.7 7.4 5 25 25.1 12.7 9.7 30 3 7.2 22.5 19.7 35 57.8 41.4 42.40 95.7 81.3 100 .4 45 172.3 173.3 297.5 48 258.3 287.9 780.1 Figure 2 Terzaghi bearing capacity factors. Watch videos Demonstration of soil bearing capacity insufficiency Solved sample problems Example 1: Strip base without cohesion soil (British units) In: Soil characteristics: Soil type: unstrucmpted soil. Cohesion: 0 (abandoned) Friction angle: 30 degrees Soil unit weight: 100 lbs/ft3 Expected base dimensions: 3 ft wide strip base, bottom of base 2 feet below ground level Requirement: Determine the permissible capacity of soil bearings according to the Terzaghi equation. Sprendimas: iš 1 arba 1 paveikslo Nc = 37.2, Nq = 22.5, Nr = 19,7 f = 30 laipsnių Nustatykite didžiausią dirvožemio guolių talpą naudodami Terzaghi guolių talpos lygtį juostų kojoms Qu = c Nc + g D Nq + 0,5 g B Ng = 0 +100x2x22.5+0.5x100x6x19.7 = 10410 lbs/ft Leistinas guolio guolis, Qa = Qu / F.S. = 10410 / 3 = 3470 lbs/ft2 @ 3500 lbs/ft2 Pavyzdys 2: Kvadratinis pagrindas ant molio dirvožemio (Britų vienetai) Pateikta: Dirvožemio tipas: Molio dirvožemio savybės: Sanglauda:2000 lb /ft2 Trinties kampas: 0 (nepaisoma) Dirvožemio vieneto svoris: 120 lbs/ft3 Numatomi pagrindo matmenys: 6 pėdos iki 6 pėdų kvadratinių pėdų pagrindo, pagrindo apačia 2 pėdomis žemiau žemės lygio Reikalavimas: Nustatyti leistiną dirvožemio guolių talpą pagal Terzaghi lygtį. Solution: From Table 1 or Figure 1 Nc = 5,7, Nq = 1,0, No = 0 f = the final final bearing capacity using terzaghi bearing capacity equation for square base Qu = 1,3 c Nc + g D Nq + 0,4 g B Ng = 1,3x1000x5,7 +120x2*1+ 0 = 7650 lbs/ft2 Permissible bearing capacity, Qa = Qu / F.S. = 7650/ 3 = 2550 lbs/ft2 @ 2500 lbs/ft2 Example 3: Round base on sand clay (British units) In: Soil Characteristics: Soil Type: Sand Clay Cohesion: 500 lbs/ft2 Friction angle: 25 degrees soil unit weight: 100 lbs/ft3 Expected feet high round bottom base 2 feet below ground level Requirement: Set the permissible soil bearing capacity using the Terzaghi equation. Solution: From Figure 1 or Figure 1 Nc = 17.7, Nq = 7.4, No = 5,0 f = 20 degrees Set maximum bearing capacity using Terzaghi bearing equation for round Qu = 1,3 c Nc + g D Nq + 0,3 g B Ng = 1.0. 3x500x17.7 +100x2x7.4+0.3x100x10x5.0 = 17985 lbs/ft2 Permissible bearing capacity, Qa = Qu / F.S. = 17985/ 3 = 5995 lbs/ft2 @ 6000 lbs/ft2 Download files No files for this topic. Offer one! Read also Share Follow our official Facebook page (@civilengineeringbible) and Twitter page (@CivilEngBible) and don't miss out on the best civil engineering tools and articles! Articles!