

ESTUDIOS BÁSICOS DE SELECCIÓN DEL TIPO DE PRESA EN LA MICRO CUENCA HUAYLLUMAYO - ESPINAR

| CAPACIDAD PORTANTE ADMISIBLE MEYERHOF | | | | | | | | | |
|---------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| kN/m ² | | | | | | | | | |
| Fs = 3 | | | | | | | | | |
| D | B =1.0 | B =1.5 | B =2.0 | B =2.5 | B =3.0 | B =3.5 | B =4.0 | B =4.5 | B =5.0 |
| | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |
| 1.0 | 109.737 | 111.029 | 112.321 | 113.613 | 114.905 | 116.197 | 117.489 | 118.780 | 120.072 |
| 1.5 | 119.614 | 120.906 | 122.198 | 123.490 | 124.782 | 126.074 | 127.366 | 128.658 | 129.950 |
| 2.0 | 129.492 | 130.784 | 132.076 | 133.368 | 134.660 | 135.952 | 137.244 | 138.536 | 139.828 |
| 2.5 | 139.369 | 140.661 | 141.953 | 143.245 | 144.537 | 145.829 | 147.121 | 148.413 | 149.705 |
| 3.0 | 149.247 | 150.539 | 151.831 | 153.123 | 154.415 | 155.707 | 156.999 | 158.291 | 159.583 |
| 3.5 | 159.124 | 160.416 | 161.708 | 163.000 | 164.292 | 165.584 | 166.876 | 168.168 | 169.460 |
| 4.0 | 169.002 | 170.294 | 171.586 | 172.878 | 174.170 | 175.462 | 176.754 | 178.046 | 179.338 |
| 4.5 | 178.879 | 180.171 | 181.463 | 182.755 | 184.047 | 185.339 | 186.631 | 187.923 | 189.215 |
| 5.0 | 188.757 | 190.049 | 191.341 | 192.633 | 193.925 | 195.217 | 196.509 | 197.801 | 199.093 |
| 5.5 | 198.634 | 199.926 | 201.218 | 202.510 | 203.802 | 205.094 | 206.386 | 207.678 | 208.970 |
| 6.0 | 208.512 | 209.804 | 211.096 | 212.388 | 213.680 | 214.972 | 216.264 | 217.556 | 218.848 |

MARGEN DERECHA RIO HAUAYLLUMAYO

| CAPACIDAD PORTANTE ADMISIBLE MEYERHOF | | | | | | | | | |
|---------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| kg/cm ² | | | | | | | | | |
| Fs = 3 | | | | | | | | | |
| D | B =1.0 | B =1.5 | B =2.0 | B =2.5 | B =3.0 | B =3.5 | B =4.0 | B =4.5 | B =5.0 |
| | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |
| 1.0 | 1.12 | 1.13 | 1.15 | 1.16 | 1.17 | 1.19 | 1.20 | 1.21 | 1.22 |
| 1.5 | 1.22 | 1.23 | 1.25 | 1.26 | 1.27 | 1.29 | 1.30 | 1.31 | 1.33 |
| 2.0 | 1.32 | 1.33 | 1.35 | 1.36 | 1.37 | 1.39 | 1.40 | 1.41 | 1.43 |
| 2.5 | 1.42 | 1.43 | 1.45 | 1.46 | 1.47 | 1.49 | 1.50 | 1.51 | 1.53 |
| 3.0 | 1.52 | 1.54 | 1.55 | 1.56 | 1.58 | 1.59 | 1.60 | 1.61 | 1.63 |
| 3.5 | 1.62 | 1.64 | 1.65 | 1.66 | 1.68 | 1.69 | 1.70 | 1.72 | 1.73 |
| 4.0 | 1.72 | 1.74 | 1.75 | 1.76 | 1.78 | 1.79 | 1.80 | 1.82 | 1.83 |
| 4.5 | 1.82 | 1.84 | 1.85 | 1.86 | 1.88 | 1.89 | 1.90 | 1.92 | 1.93 |
| 5.0 | 1.93 | 1.94 | 1.95 | 1.96 | 1.98 | 1.99 | 2.00 | 2.02 | 2.03 |
| 5.5 | 2.03 | 2.04 | 2.05 | 2.07 | 2.08 | 2.09 | 2.11 | 2.12 | 2.13 |
| 6.0 | 2.13 | 2.14 | 2.15 | 2.17 | 2.18 | 2.19 | 2.21 | 2.22 | 2.23 |

GEOTECNIA Y LABORATORIOS CUSCO E.I.R.L.



Ing. Ronald Lopez Zapana
GERENTE

CAPACIDAD PORTANTE ADMISIBLE

| PROYECTO | | ESTUDIOS BÁSICOS DE SELECCIÓN DEL TIPO DE PRESA EN LA MICRO CUENCA HUAYLLUMAYO - ESPINAR | | | | |
|--|------------|--|---|---------------------------------|---------------------------------|-------------|
| UBICACION | | Distrito: Coporaque; Provincia: espinar; Region: Cusco | | | | |
| SOLICITADO | | CONSORCIO SEÑOR DE HUANCA | | | | |
| FECHA | | Agosto del 2016 | | | | |
| POZO EXPLORA | | CALICATA N° 4 | | MARGEN DERECHA RIO HAUAYLLUMAYO | | |
| Ancho o diametro de cimentacion(B) | 1.00 | m | Profundidad (D) | 1.00 | D/B | 1.0 |
| ϕ | 10.6 | ° | | 3 | π | 3.141593 |
| C | 0.19 | kg/cm2 | C= | 18.82 | | kN/m2 |
| γ | 17.059 | kN/m3 | (45°+ $\phi/2$) | 50.3 | $e^{\exp(\pi \cdot \tan \phi)}$ | 1.800263575 |
| tg ϕ | 0.18714491 | | tan2(45°+ $\phi/2$) | 1.45 | ° | |
| Nq = | 2.61 | | Capacidad portante - Formulas Meyerhof | | | |
| Nc = | 8.61302651 | | $q_0 = cN_c s_c i_c d_c + qN_q s_q i_q d_q + 0.5\gamma BN_y s_y i_y d_y$ | | | |
| N γ = | 1.35189147 | | Factores de forma Meyerhof y Vesic-De Beer | | | |
| Factor de inclin y prof | 1 | | $N_q = e^{\pi \tan \phi} \tan^2(45 + \phi/2)$ $N_c = (N_q - 1) \cot \phi$ $N_y = 2 * (N_q + 1) \tan \phi$ | | | |
| Sc = | 1.30324812 | | $s_q = 1 + \frac{e}{L} * \tan \phi$ $s_c = 1 + \frac{e}{L} * \frac{N_c}{c}$ $s_y = 1 - 0.4 \frac{e}{L}$ | | | |
| Sq = | 1.18714491 | | Factor de profundidad-Meyerhof | | | |
| Sy = | 0.6 | | $d_c = 1 + 0.2 \sqrt{N_q} \frac{d_c}{B}$ $d_q = d_y = 1$ $\phi = 0^\circ$ | | | |
| dc = | 1.24090116 | | $d_q = d_y = 1 + 0.1 \sqrt{N_q} \frac{d_q}{B}$ $\phi > 10^\circ$ | | | |
| dq = | 1.12045058 | | Factor de inclinación-Meyerhof | | | |
| d γ = | 1.12045058 | | $i_c = i_y = (1 - \alpha/90^\circ)^2$ | | | |
| ic = iq = | 1 | | $i_y = (1 - \alpha/\phi)^2$ $N_q = \tan^2(\pi/4 + \phi/2)$ | | | |
| i γ = | 1 | | capacidad de carga última | | | |
| q = | 48.7194118 | | $q_u = q_0 - q$ $q = D_1 \gamma + D_2 (\gamma_{sat} - \gamma_w)$ | | | |
| ysat = | 15.882 | kN/m3 | Factor de seguridad | | | |
| γ_w = | 9.81 | kN/m3 | $q_a = \frac{q_u}{FS}$ $c_d = c/F_c$ | | | |
| | | | para c=0 $q_a = 1.3cN_c + qN_q + 0.4\gamma BN_y$ $\phi_d = \tan^{-1}[(\tan \phi)/F_c]$ | | | |
| | | | α = inclinación de la resultante en la vertical | | | |
| | | | D1 Nivel freatico | 2.5 | m | |
| | | | D2 prof de cim | 1.0 | | |
| Capacidad Portante (q ₀) = | | 329.210 | kN/m2 | | 1.74 | 1.62 |
| Capacidad portante ultima (q _{ult}) = | | 347.240 | kN/m2 | | gr/cm3 | gr/cm3 |
| Capacidad portante admisible (q _a) = | | 109.737 | kN/m2 | | | |

OBSERVACIONES:

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ESTUDIOS BÁSICOS DE SELECCIÓN DEL TIPO DE PRESA EN LA MICRO CUENCA HUAYLLUMAYO - ESPINAR

| CAPACIDAD PORTANTE ADMISIBLE MEYERHOF | | | | | | | | | |
|---------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| kN/m ² | | | | | | | | | |
| Fs = 3 | | | | | | | | | |
| D | B=1.0 1.0 | B=1.5 1.5 | B=2.0 2.0 | B=2.5 2.5 | B=3.0 3.0 | B=3.5 3.5 | B=4.0 4.0 | B=4.5 4.5 | B=5.0 5.0 |
| 1.0 | 248.130 | 257.255 | 266.380 | 275.505 | 284.629 | 293.754 | 302.879 | 312.003 | 321.128 |
| 1.5 | 292.638 | 301.763 | 310.888 | 320.012 | 329.137 | 338.262 | 347.386 | 356.511 | 365.636 |
| 2.0 | 337.146 | 346.270 | 355.395 | 364.520 | 373.645 | 382.769 | 391.894 | 401.019 | 410.143 |
| 2.5 | 381.653 | 390.778 | 399.903 | 409.028 | 418.152 | 427.277 | 436.402 | 445.526 | 454.651 |
| 3.0 | 426.161 | 435.286 | 444.411 | 453.535 | 462.660 | 471.785 | 480.909 | 490.034 | 499.159 |
| 3.5 | 470.669 | 479.793 | 488.918 | 498.043 | 507.168 | 516.292 | 525.417 | 534.542 | 543.666 |
| 4.0 | 515.176 | 524.301 | 533.426 | 542.551 | 551.675 | 560.800 | 569.925 | 579.049 | 588.174 |
| 4.5 | 559.684 | 568.809 | 577.933 | 587.058 | 596.183 | 605.308 | 614.432 | 623.557 | 632.682 |
| 5.0 | 604.192 | 613.316 | 622.441 | 631.566 | 640.691 | 649.815 | 658.940 | 668.065 | 677.189 |
| 5.5 | 648.699 | 657.824 | 666.949 | 676.074 | 685.198 | 694.323 | 703.448 | 712.572 | 721.697 |
| 6.0 | 693.207 | 702.332 | 711.456 | 720.581 | 729.706 | 738.831 | 747.955 | 757.080 | 766.205 |

MARGEN DERECHA RIO HAUAYLLUMAYO

| CAPACIDAD PORTANTE ADMISIBLE MEYERHOF | | | | | | | | | |
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| kg/cm ² | | | | | | | | | |
| Fs = 3 | | | | | | | | | |
| D | B=1.0 1.0 | B=1.5 1.5 | B=2.0 2.0 | B=2.5 2.5 | B=3.0 3.0 | B=3.5 3.5 | B=4.0 4.0 | B=4.5 4.5 | B=5.0 5.0 |
| 1.0 | 2.53 | 2.62 | 2.72 | 2.81 | 2.90 | 3.00 | 3.09 | 3.18 | 3.28 |
| 1.5 | 2.98 | 3.08 | 3.17 | 3.26 | 3.36 | 3.45 | 3.54 | 3.64 | 3.73 |
| 2.0 | 3.44 | 3.53 | 3.63 | 3.72 | 3.81 | 3.90 | 4.00 | 4.09 | 4.18 |
| 2.5 | 3.89 | 3.99 | 4.08 | 4.17 | 4.27 | 4.36 | 4.45 | 4.54 | 4.64 |
| 3.0 | 4.35 | 4.44 | 4.53 | 4.63 | 4.72 | 4.81 | 4.91 | 5.00 | 5.09 |
| 3.5 | 4.80 | 4.89 | 4.99 | 5.08 | 5.17 | 5.27 | 5.36 | 5.45 | 5.55 |
| 4.0 | 5.25 | 5.35 | 5.44 | 5.53 | 5.63 | 5.72 | 5.81 | 5.91 | 6.00 |
| 4.5 | 5.71 | 5.80 | 5.89 | 5.99 | 6.08 | 6.17 | 6.27 | 6.36 | 6.45 |
| 5.0 | 6.16 | 6.26 | 6.35 | 6.44 | 6.54 | 6.63 | 6.72 | 6.81 | 6.91 |
| 5.5 | 6.62 | 6.71 | 6.80 | 6.90 | 6.99 | 7.08 | 7.18 | 7.27 | 7.36 |
| 6.0 | 7.07 | 7.16 | 7.26 | 7.35 | 7.44 | 7.54 | 7.63 | 7.72 | 7.82 |


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| PROYECTO | ESTUDIOS BÁSICOS DE SELECCIÓN DEL TIPO DE PRESA EN LA MICRO CUENCA HUAYLLUMAYO - ESPINAR | | | | |
| UBICACION | Distrito: Coporaque; Provincia: espinar; Region: Cusco | | | | |
| SOLICITADO | CONSORCIO SEÑOR DE HUANCA | | | | |
| FECHA | Agosto del 2016 | | | | |
| POZO EXPLORA | CALICATA Nº 5 | | MARGEN DERECHA RIO HAUAYLLUMAYO | | |
| Ancho o diametro de cimentacion(B) | 1.00 | m | Profundidad (D) | 1.00 | D/B |
| ϕ | 24.2 | ° | | 3 | π |
| C | 0.11 | kg/cm2 | C= | 10.98 | kN/m2 |
| γ | 16.275 | kN/m3 | (45°+ $\phi/2$) | 57.1 | $e \exp(\pi * \tan \phi)$ |
| $\tan \phi$ | 0.44941782 | | $\tan 2(45^\circ + \phi/2)$ | 2.39 | ° |
| Nq = | 9.81 | | Capacidad portante - Formulas Meyerhof | | |
| Nc = | 19.5927265 | | $q_0 = cN_c s_c i_c d_c + qN_q s_q i_q d_q + 0.5\gamma BN_y s_y i_y d_y$ | | |
| Ny = | 9.71220707 | | Factores de forma Meyerhof y Vesic-De Beer | | |
| Factor de inclin y prof | 1 | | $N_q = e^{\pi \tan \phi} \tan^2(45 + \phi/2)$ $N_c = (N_q - 1) \cot \phi$ $N_y = 2 * (N_q + 1) \tan \phi$ | | |
| Sc = | 1.50045717 | | $s_q = 1 + \frac{q}{L} * \tan \phi$ $s_c = 1 + \frac{q}{L} * \frac{N_c}{N_q}$ $S_y = 1 - 0.4 \frac{q}{L}$ | | |
| Sq = | 1.44941782 | | Factor de profundidad-Meyerhof | | |
| Sy = | 0.6 | | $d_c = 1 + 0.2 \sqrt{N_q} \frac{D}{B}$ $d_q = d_y = 1$ $\phi = 0^\circ$ | | |
| dc = | 1.30915293 | | $d_c = d_y = 1 + 0.1 \sqrt{N_q} \frac{D}{B}$ $\phi > 10^\circ$ | | |
| dq = | 1.15457647 | | Factor de inclinación-Meyerhof | | |
| dγ = | 1.15457647 | | $i_c = i_y = (1 - \alpha/90^\circ)^2$ | | |
| ic = iq = | 1 | | $i_y = (1 - \alpha/\phi)^2$ $N_q = \tan^2(\pi/4 + \phi/2)$ | | |
| iγ = | 1 | | capacidad de carga última | | |
| q = | 46.7586275 | | $q_u = q_0 - q$ $q = D_1 \gamma + D_2 (\gamma_{sat} - \gamma_w)$ | | |
| ysat = | 15.882 | kN/m3 | Factor de seguridad | | |
| γw = | 9.81 | kN/m3 | $q_a = \frac{q_u}{FS}$ $c_d = c/F_c$ | | |
| | | | para c=0 $q_u = 1.3cN_c + qN_q + 0.4\gamma BN_y$ | | |
| | | | $\phi_d = \tan^{-1}[(\tan \phi)/F_c]$ | | |
| | | | $\alpha =$ inclinación de la resultante en la vertical | | |
| ysat = | | 15.882 | D1 Nivel freatico | 2.5 | m |
| γw = | | 9.81 | D2 prof de cim | 1.0 | |
| Capacidad Portante | | (qo) = | 744.391 | kN/m2 | 1.66 |
| Capacidad portante ultima | | (qukl) = | 801.384 | kN/m2 | gr/cm3 |
| Capacidad portante admisible | | (qa) = | 248.130 | kN/m2 | gr/cm3 |
| OBSERVACIONES: | | | | | |

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