桩承台计算\_序号105

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1750mm

承台x方向移心：0mm

承台y方向移心：0mm

2、桩截面信息

桩截面宽：500mm

桩截面高：0mm

单桩承载力：2500.00kN

3、承台混凝土信息

承台混凝土等级：C30

4.桩位坐标:

桩位表

| 桩序号 | 桩X坐标 | 桩Y坐标 |
| --- | --- | --- |
| 1 | -0 | 1155 |
| 2 | -1000 | -577 |
| 3 | 1000 | -577 |

5.柱信息:

柱信息表

| 序号 | 截面宽 | 截面高 | 沿轴偏心 | 偏轴偏心 | 相对转角 |
| --- | --- | --- | --- | --- | --- |
| 柱1 | 700 | 700 | 0 | 0 | 0 |
| 外接柱 | 700 | 700 | 0 | 0 | 0 |

6.设计时执行的规范：

《建筑桩基技术规范》 （JGJ 94－2008） 以下简称 桩基规范

《混凝土结构设计规范》 （GB 50010－2010） 以下简称 混凝土规范

# 二、计算结果

1、桩承载力验算

承台及覆土重:

采用公式：

=±±

= Area×H×γ

= 5.6× 24.0

= 134.4 kN

∑ = 2000000.1 ∑ = 2000000.0

当前荷载组合

| 【5】SATWE标准组合:1.00\*恒-1.00\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5458.3kN =62.6kN.m =59.9kN.m =184.4kN =-127.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 1783.30 | 1828.09 | 满足 |
| 2 | -1000.0 | -577.4 | 1807.52 | 1852.31 | 满足 |
| 3 | 1000.0 | -577.3 | 1867.44 | 1912.22 | 满足 |

桩总反力= 5592.6 kN; 桩均反力= 1864.2 kN

当前荷载组合

| 【13】SATWE标准组合:1.00\*恒-1.00\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5465.7kN =52.4kN.m =48.6kN.m =177.7kN =-119.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 1791.65 | 1836.44 | 满足 |
| 2 | -1000.0 | -577.4 | 1812.71 | 1857.50 | 满足 |
| 3 | 1000.0 | -577.3 | 1861.30 | 1906.08 | 满足 |

桩总反力= 5600.0 kN; 桩均反力= 1866.7 kN

当前荷载组合

| 【18】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7133.1kN =20.8kN.m =75.0kN.m =230.1kN =-104.9kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2365.68 | 2410.46 | 满足 |
| 2 | -1000.0 | -577.4 | 2346.21 | 2391.00 | 满足 |
| 3 | 1000.0 | -577.3 | 2421.20 | 2465.98 | 满足 |

桩总反力= 7267.4 kN; 桩均反力= 2422.5 kN

当前荷载组合

| 【34】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7128.6kN =26.9kN.m =81.8kN.m =234.2kN =-109.3kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2360.66 | 2405.45 | 满足 |
| 2 | -1000.0 | -577.4 | 2343.10 | 2387.88 | 满足 |
| 3 | 1000.0 | -577.3 | 2424.88 | 2469.67 | 满足 |

桩总反力= 7263.0 kN; 桩均反力= 2421.0 kN

当前荷载组合

| 【44】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6845.6kN =-57.1kN.m =74.0kN.m =220.4kN =-44.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2314.81 | 2359.59 | 满足 |
| 2 | -1000.0 | -577.4 | 2228.38 | 2273.16 | 满足 |
| 3 | 1000.0 | -577.3 | 2302.38 | 2347.17 | 满足 |

桩总反力= 6979.9 kN; 桩均反力= 2326.6 kN

当前荷载组合

| 【45】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5815.7kN =129.3kN.m =61.5kN.m =195.8kN =-179.2kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 1863.90 | 1908.68 | 满足 |
| 2 | -1000.0 | -577.4 | 1945.17 | 1989.95 | 满足 |
| 3 | 1000.0 | -577.3 | 2006.64 | 2051.42 | 满足 |

桩总反力= 5950.1 kN; 桩均反力= 1983.4 kN

当前荷载组合

| 【46】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风x左+1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6796.2kN =21.4kN.m =165.0kN.m =275.4kN =-100.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2253.07 | 2297.85 | 满足 |
| 2 | -1000.0 | -577.4 | 2189.06 | 2233.84 | 满足 |
| 3 | 1000.0 | -577.3 | 2354.08 | 2398.87 | 满足 |

桩总反力= 6930.6 kN; 桩均反力= 2310.2 kN

当前荷载组合

| 【47】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风x左-1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5865.1kN =50.9kN.m =-29.5kN.m =140.8kN =-123.1kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 1925.64 | 1970.42 | 满足 |
| 2 | -1000.0 | -577.4 | 1984.49 | 2029.27 | 满足 |
| 3 | 1000.0 | -577.3 | 1954.94 | 1999.72 | 满足 |

桩总反力= 5999.4 kN; 桩均反力= 1999.8 kN

2、承台内力配筋计算

当前荷载组合

| 【54】SATWE基本组合:1.20\*恒+1.40\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=8712.9kN =45.5kN.m =91.5kN.m =281.1kN =-142.3kN

承台及覆土重:

= 134.4×1.20= 161.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2878.00 | 2931.74 |
| 2 | -1000.0 | -577.4 | 2871.69 | 2925.43 |
| 3 | 1000.0 | -577.3 | 2963.20 | 3016.94 |

桩总反力= 8874.1 kN; 桩均反力= 2958.0 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 2963.20×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 2963.20×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 2963.20 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 2963.20 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 2963.20 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2963.20 = 2000. c = 700.

M = (-0.433\*c)/3 = 1676.08 kN.m

= 3043.00

= 727.

当前荷载组合

| 【55】SATWE基本组合:1.35\*恒+0.98\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=8971.9kN =49.6kN.m =95.3kN.m =292.9kN =-154.2kN

承台及覆土重:

= 134.4×1.35= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2961.98 | 3022.44 |
| 2 | -1000.0 | -577.4 | 2957.28 | 3017.74 |
| 3 | 1000.0 | -577.3 | 3052.62 | 3113.08 |

桩总反力= 9153.3 kN; 桩均反力= 3051.1 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 3052.62×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 3052.62×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 3052.62 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 3052.62 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 3052.62 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=3052.62 = 2000. c = 700.

M = (-0.433\*c)/3 = 1726.66 kN.m

= 3134.83

= 727.

# 三、结果汇总

标准组合下桩反力:

最大最小桩反力及对应的标准组合

| 桩号 | 最大反力（非震）(Load) | 最小反力（非震）(Load) | 最大反力（震）(Load) | 最小反力（震）(Load) |
| --- | --- | --- | --- | --- |
| 1 | 2410.46 (18) | 1828.09 (5) | 2359.59 (44) | 1908.68 (45) |
| 2 | 2391.00 (18) | 1852.31 (5) | 2273.16 (44) | 1989.95 (45) |
| 3 | 2469.67 (34) | 1906.08 (13) | 2398.87 (46) | 1999.72 (47) |

桩平均反力最大值2422.48 (非震)(Load 18)

桩平均反力最小值1864.21 (非震)(Load 5)

桩平均反力最大值2326.64 (震)(Load 44)

桩平均反力最小值1983.35 (震)(Load 45)

基本组合下承台冲切、剪切、配筋计算:

角桩冲切计算：

桩 1: 抗力4029.30 kN 冲切力3052.62 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力3052.62 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力3052.62kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力3052.62kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1726.66 kN.m 计算钢筋面积3135 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3135. 钢筋级别: HRB400