桩承台计算\_序号98

# 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

| 【4】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=5536.6kN =-76.6kN.m =-8.8kN.m =-20.1kN =160.6kN

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 | 1889.74 | 1934.52 | 满足 |
| 2 | -1000.0 | -577.4 | 1827.83 | 1872.61 | 满足 |
| 3 | 1000.0 | -577.3 | 1819.05 | 1863.84 | 满足 |

桩总反力= 5671.0 kN; 桩均反力= 1890.3 kN

当前荷载组合

| 【12】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=5542.2kN =-64.6kN.m =2.1kN.m =-14.0kN =151.8kN

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 | 1884.69 | 1929.47 | 满足 |
| 2 | -1000.0 | -577.4 | 1827.72 | 1872.50 | 满足 |
| 3 | 1000.0 | -577.3 | 1829.84 | 1874.63 | 满足 |

桩总反力= 5676.6 kN; 桩均反力= 1892.2 kN

当前荷载组合

| 【19】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=7205.0kN =-37.1kN.m =-12.4kN.m =-29.4kN =142.0kN

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 | 2423.10 | 2467.89 | 满足 |
| 2 | -1000.0 | -577.4 | 2397.17 | 2441.95 | 满足 |
| 3 | 1000.0 | -577.3 | 2384.72 | 2429.51 | 满足 |

桩总反力= 7339.3 kN; 桩均反力= 2446.4 kN

当前荷载组合

| 【35】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=7201.6kN =-44.3kN.m =-19.0kN.m =-33.1kN =147.2kN

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 | 2426.13 | 2470.91 | 满足 |
| 2 | -1000.0 | -577.4 | 2397.24 | 2442.02 | 满足 |
| 3 | 1000.0 | -577.3 | 2378.25 | 2423.03 | 满足 |

桩总反力= 7336.0 kN; 桩均反力= 2445.3 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=5864.3kN =-146.4kN.m =-6.0kN.m =-21.7kN =216.2kN

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 | 2039.29 | 2084.07 | 满足 |
| 2 | -1000.0 | -577.4 | 1915.54 | 1960.32 | 满足 |
| 3 | 1000.0 | -577.3 | 1909.51 | 1954.29 | 满足 |

桩总反力= 5998.7 kN; 桩均反力= 1999.6 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=6949.6kN =43.9kN.m =-15.3kN.m =-28.0kN =78.2kN

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 | 2291.21 | 2335.99 | 满足 |
| 2 | -1000.0 | -577.4 | 2336.85 | 2381.64 | 满足 |
| 3 | 1000.0 | -577.3 | 2321.56 | 2366.35 | 满足 |

桩总反力= 7084.0 kN; 桩均反力= 2361.3 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=5868.6kN =-41.7kN.m =81.1kN.m =29.9kN =139.7kN

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 | 1980.27 | 2025.06 | 满足 |
| 2 | -1000.0 | -577.4 | 1903.64 | 1948.42 | 满足 |
| 3 | 1000.0 | -577.3 | 1984.73 | 2029.52 | 满足 |

桩总反力= 6003.0 kN; 桩均反力= 2001.0 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=6945.3kN =-60.8kN.m =-102.4kN.m =-79.6kN =154.7kN

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 | 2350.22 | 2395.01 | 满足 |
| 2 | -1000.0 | -577.4 | 2348.75 | 2393.54 | 满足 |
| 3 | 1000.0 | -577.3 | 2246.34 | 2291.12 | 满足 |

桩总反力= 7079.7 kN; 桩均反力= 2359.9 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=8791.6kN =-65.7kN.m =-15.4kN.m =-36.7kN =187.8kN

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 | 2968.48 | 3022.22 |
| 2 | -1000.0 | -577.4 | 2919.25 | 2973.00 |
| 3 | 1000.0 | -577.3 | 2903.82 | 2957.56 |

桩总反力= 8952.8 kN; 桩均反力= 2984.3 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

> = 2968.48×1.00 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

> = 2968.48×1.00 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

> = 2968.48 (\* 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

> = 2968.48 (\* 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

> = 2968.48 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2968.48 = 2000. c = 700.

M = (-0.433\*c)/3 = 1679.07 kN.m

= 3048.42

= 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=9070.0kN =-70.8kN.m =-15.4kN.m =-36.2kN =203.0kN

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 | 3064.22 | 3124.67 |
| 2 | -1000.0 | -577.4 | 3010.59 | 3071.05 |
| 3 | 1000.0 | -577.3 | 2995.20 | 3055.66 |

桩总反力= 9251.4 kN; 桩均反力= 3083.8 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

> = 3064.22×1.00 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

> = 3064.22×1.00 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

> = 3064.22 (\* 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

> = 3064.22 (\* 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

> = 3064.22 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=3064.22 = 2000. c = 700.

M = (-0.433\*c)/3 = 1733.22 kN.m

= 3146.74

= 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 | 2470.91 (35) | 1929.47 (12) | 2395.01 (47) | 2025.06 (46) |
| 2 | 2442.02 (35) | 1872.50 (12) | 2393.54 (47) | 1948.42 (46) |
| 3 | 2429.51 (19) | 1863.84 (4) | 2366.35 (45) | 1954.29 (44) |

桩平均反力最大值2446.45 (非震)(Load 19)

桩平均反力最小值1890.32 (非震)(Load 4)

桩平均反力最大值2361.33 (震)(Load 45)

桩平均反力最小值1999.56 (震)(Load 44)

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3064.22 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力3064.22 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力3064.22kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力3064.22kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1733.22 kN.m 计算钢筋面积3147 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3147. 钢筋级别: HRB400