桩承台计算\_序号25

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：300mm

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 | 1983 |
| 2 | 1414 | 569 |
| 3 | 2828 | -845 |
| 4 | -1414 | 569 |
| 5 | 0 | -845 |
| 6 | -2828 | -845 |

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 | 2 | 300 | -1004 | 2857 | 90 |
| 柱2 | 100 | 100 | -383 | 1475 | 0 |
| 外接柱 | 2673 | 2530 | -1669 | 260 | 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

= 0.0× 24.0

= 0.0 kN

∑ = 19999998.0 ∑ = 6723858.5

当前荷载组合

| 【2】SATWE标准组合:1.00\*恒+1.00\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7081.0kN =-5488.6kN.m =-7666.0kN.m =0.0kN =0.0kN

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 | 1983.2 | 2595.16 | 2595.16 | 满足 |
| 2 | 1414.2 | 569.0 | 1044.09 | 1044.09 | 满足 |
| 3 | 2828.4 | -845.2 | -506.98 | -506.98 | >R |
| 4 | -1414.2 | 569.0 | 2128.22 | 2128.22 | 满足 |
| 5 | 0.0 | -845.2 | 577.15 | 577.15 | 满足 |
| 6 | -2828.4 | -845.2 | 1661.29 | 1661.29 | 满足 |

桩总反力= 7498.9 kN; 桩均反力= 1249.8 kN

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=7555.2kN =-4138.8kN.m =-9891.9kN.m =0.0kN =0.0kN

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 | 1983.2 | 2262.41 | 2262.41 | 满足 |
| 2 | 1414.2 | 569.0 | 847.58 | 847.58 | 满足 |
| 3 | 2828.4 | -845.2 | -567.25 | -567.25 | >R |
| 4 | -1414.2 | 569.0 | 2246.51 | 2246.51 | 满足 |
| 5 | 0.0 | -845.2 | 831.68 | 831.68 | 满足 |
| 6 | -2828.4 | -845.2 | 2230.61 | 2230.61 | 满足 |

桩总反力= 7851.5 kN; 桩均反力= 1308.6 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=7564.8kN =-6524.6kN.m =-7530.8kN.m =0.0kN =0.0kN

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 | 1983.2 | 2967.43 | 2967.43 | 满足 |
| 2 | 1414.2 | 569.0 | 1217.96 | 1217.96 | 满足 |
| 3 | 2828.4 | -845.2 | -531.50 | -531.50 | >R |
| 4 | -1414.2 | 569.0 | 2282.98 | 2282.98 | 满足 |
| 5 | 0.0 | -845.2 | 533.52 | 533.52 | 满足 |
| 6 | -2828.4 | -845.2 | 1598.54 | 1598.54 | 满足 |

桩总反力= 8068.9 kN; 桩均反力= 1344.8 kN

当前荷载组合

| 【15】SATWE标准组合:1.00\*恒+1.00\*活-0.60\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9979.4kN =-7008.5kN.m =-11528.5kN.m =0.0kN =0.0kN

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 | 1983.2 | 3443.07 | 3443.07 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 1358.72 | 1358.72 | 满足 |
| 3 | 2828.4 | -845.2 | -725.64 | -725.64 | >R |
| 4 | -1414.2 | 569.0 | 2989.10 | 2989.10 | 满足 |
| 5 | 0.0 | -845.2 | 904.74 | 904.74 | 满足 |
| 6 | -2828.4 | -845.2 | 2535.12 | 2535.12 | 满足 |

桩总反力= 10505.1 kN; 桩均反力= 1750.9 kN

当前荷载组合

| 【20】SATWE标准组合:1.00\*恒+1.00\*风y+0.70\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9339.4kN =-8107.6kN.m =-9245.1kN.m =0.0kN =0.0kN

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 | 1983.2 | 3679.02 | 3679.02 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 1511.82 | 1511.82 | 满足 |
| 3 | 2828.4 | -845.2 | -655.38 | -655.38 | >R |
| 4 | -1414.2 | 569.0 | 2819.27 | 2819.27 | 满足 |
| 5 | 0.0 | -845.2 | 652.07 | 652.07 | 满足 |
| 6 | -2828.4 | -845.2 | 1959.52 | 1959.52 | 满足 |

桩总反力= 9966.3 kN; 桩均反力= 1661.1 kN

当前荷载组合

| 【37】SATWE标准组合:1.00\*恒-1.00\*风y右+0.70\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9329.8kN =-5721.9kN.m =-11606.2kN.m =0.0kN =0.0kN

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 | 1983.2 | 2974.00 | 2974.00 | 满足 |
| 2 | 1414.2 | 569.0 | 1141.44 | 1141.44 | 满足 |
| 3 | 2828.4 | -845.2 | -691.13 | -691.13 | >R |
| 4 | -1414.2 | 569.0 | 2782.80 | 2782.80 | 满足 |
| 5 | 0.0 | -845.2 | 950.23 | 950.23 | 满足 |
| 6 | -2828.4 | -845.2 | 2591.59 | 2591.59 | 满足 |

桩总反力= 9748.9 kN; 桩均反力= 1624.8 kN

当前荷载组合

| 【42】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风x+1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4722.1kN =-5164.4kN.m =-3612.3kN.m =0.0kN =0.0kN

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 | 1983.2 | 2174.30 | 2174.30 | 满足 |
| 2 | 1414.2 | 569.0 | 929.62 | 929.62 | 满足 |
| 3 | 2828.4 | -845.2 | -315.05 | -315.05 | >R |
| 4 | -1414.2 | 569.0 | 1440.48 | 1440.48 | 满足 |
| 5 | 0.0 | -845.2 | 195.81 | 195.81 | 满足 |
| 6 | -2828.4 | -845.2 | 706.67 | 706.67 | 满足 |

桩总反力= 5131.8 kN; 桩均反力= 855.3 kN

当前荷载组合

| 【43】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风x-1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=12658.2kN =-7426.1kN.m =-16082.8kN.m =0.0kN =0.0kN

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 | 1983.2 | 3935.56 | 3935.56 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1496.35 | 1496.35 | 满足 |
| 3 | 2828.4 | -845.2 | -942.85 | -942.85 | >R |
| 4 | -1414.2 | 569.0 | 3770.80 | 3770.80 | >1.5×Ra |
| 5 | 0.0 | -845.2 | 1331.60 | 1331.60 | 满足 |
| 6 | -2828.4 | -845.2 | 3606.04 | 3606.04 | 满足 |

桩总反力= 13197.5 kN; 桩均反力= 2199.6 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=9304.9kN =-11233.3kN.m =-6064.1kN.m =0.0kN =0.0kN

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 | 1983.2 | 4596.21 | 4596.21 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1995.80 | 1995.80 | 满足 |
| 3 | 2828.4 | -845.2 | -604.61 | -604.61 | >R |
| 4 | -1414.2 | 569.0 | 2853.40 | 2853.40 | 满足 |
| 5 | 0.0 | -845.2 | 252.99 | 252.99 | 满足 |
| 6 | -2828.4 | -845.2 | 1110.59 | 1110.59 | 满足 |

桩总反力= 10204.4 kN; 桩均反力= 1700.7 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=8075.4kN =-1357.1kN.m =-13630.9kN.m =0.0kN =0.0kN

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 | 1983.2 | 1513.65 | 1513.65 | 满足 |
| 2 | 1414.2 | 569.0 | 430.18 | 430.18 | 满足 |
| 3 | 2828.4 | -845.2 | -653.29 | -653.29 | >R |
| 4 | -1414.2 | 569.0 | 2357.89 | 2357.89 | 满足 |
| 5 | 0.0 | -845.2 | 1274.42 | 1274.42 | 满足 |
| 6 | -2828.4 | -845.2 | 3202.13 | 3202.13 | 满足 |

桩总反力= 8125.0 kN; 桩均反力= 1354.2 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=4810.7kN =-5297.8kN.m =-3643.6kN.m =0.0kN =0.0kN

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 | 1983.2 | 2225.88 | 2225.88 | 满足 |
| 2 | 1414.2 | 569.0 | 952.74 | 952.74 | 满足 |
| 3 | 2828.4 | -845.2 | -320.40 | -320.40 | >R |
| 4 | -1414.2 | 569.0 | 1468.02 | 1468.02 | 满足 |
| 5 | 0.0 | -845.2 | 194.88 | 194.88 | 满足 |
| 6 | -2828.4 | -845.2 | 710.17 | 710.17 | 满足 |

桩总反力= 5231.3 kN; 桩均反力= 871.9 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=12569.6kN =-7292.6kN.m =-16051.5kN.m =0.0kN =0.0kN

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 | 1983.2 | 3883.98 | 3883.98 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1473.24 | 1473.24 | 满足 |
| 3 | 2828.4 | -845.2 | -937.50 | -937.50 | >R |
| 4 | -1414.2 | 569.0 | 3743.26 | 3743.26 | 满足 |
| 5 | 0.0 | -845.2 | 1332.52 | 1332.52 | 满足 |
| 6 | -2828.4 | -845.2 | 3602.55 | 3602.55 | 满足 |

桩总反力= 13098.1 kN; 桩均反力= 2183.0 kN

2、承台内力配筋计算

当前荷载组合

| 【74】SATWE基本组合:1.20\*恒+1.40\*风y+0.98\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=11499.0kN =-10206.3kN.m =-11159.6kN.m =0.0kN =0.0kN

承台及覆土重:

= 0.0×1.20= 0.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 4595.78 | 4595.78 |
| 2 | 1414.2 | 569.0 | 1896.14 | 1896.14 |
| 3 | 2828.4 | -845.2 | -803.50 | -803.50 |
| 4 | -1414.2 | 569.0 | 3474.35 | 3474.35 |
| 5 | 0.0 | -845.2 | 774.71 | 774.71 |
| 6 | -2828.4 | -845.2 | 2352.91 | 2352.91 |

桩总反力= 12290.4 kN; 桩均反力= 2048.4 kN

3、承台板抗弯计算

X方向配筋计算：

= 2561.14\*1.00= 2561.14 X = -333. H = 850.

= /(0.9\*\*)/YS = 2561.14/(0.9\* 850.0\*360.0)/5.7= 1644.0 /m

= 2433.31\*1.00= 2433.31 X = -433. H = 850.

= /(0.9\*\*)/YS = 2433.31/(0.9\* 850.0\*360.0)/5.7= 1561.9 /m

Y方向配筋计算：

= 2106.02\*1.00= 2106.02 Y = 1525. H = 850.

= /(0.9\*\*)/XS = 2106.02/(0.9\* 850.0\*360.0)/8.1= 947.5 /m

= 2119.59\*1.00= 2119.59 Y = 1425. H = 850.

= /(0.9\*\*)/XS = 2119.59/(0.9\* 850.0\*360.0)/8.1= 953.6 /m

计算的钢筋面积：

= 1644./m = 954./m

当前荷载组合

| 【98】SATWE基本组合:1.20\*恒+0.60\*活+0.20\*风y+1.30\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=11207.8kN =-13878.8kN.m =-6957.1kN.m =0.0kN =0.0kN

承台及覆土重:

= 0.0×1.20= 0.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 5638.87 | 5638.87 |
| 2 | 1414.2 | 569.0 | 2457.97 | 2457.97 |
| 3 | 2828.4 | -845.2 | -722.92 | -722.92 |
| 4 | -1414.2 | 569.0 | 3441.85 | 3441.85 |
| 5 | 0.0 | -845.2 | 260.96 | 260.96 |
| 6 | -2828.4 | -845.2 | 1244.84 | 1244.84 |

桩总反力= 12321.6 kN; 桩均反力= 2053.6 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

2、右侧抗剪计算

= 850. = 133. =0.250

= [1.75/(+1.0)]

=0.985\*[1.75/(0.250+1.0)]\*4553.\* 850.\*1.4329\*1.e-3

= 7647.2 kN

> = 7634.88 (\* 0.85) kN

3、下侧抗剪计算

4、上侧抗剪计算

= 850. = 258. =0.304

= [1.75/(+1.0)]

=0.985\*[1.75/(0.304+1.0)]\*6166.\* 850.\*1.4329\*1.e-3

= 9928.0 kN

> = 5638.87 (\* 0.85) kN

承台阶梯高度：

1阶高： 300mm

3、承台板抗弯计算

X方向配筋计算：

= 3973.78\*0.75= 2980.33 X = -333. H = 850.

= /(0.9\*\*)/YS = 2980.33/(0.9\* 850.0\*360.0)/5.7= 1913.0 /m

= 3757.12\*0.75= 2817.84 X = -433. H = 850.

= /(0.9\*\*)/YS = 2817.84/(0.9\* 850.0\*360.0)/5.7= 1808.7 /m

Y方向配筋计算：

= 2584.01\*0.75= 1938.01 Y = 1525. H = 850.

= /(0.9\*\*)/XS = 1938.01/(0.9\* 850.0\*360.0)/8.1= 871.9 /m

= 2632.90\*0.75= 1974.67 Y = 1425. H = 850.

= /(0.9\*\*)/XS = 1974.67/(0.9\* 850.0\*360.0)/8.1= 888.4 /m

计算的钢筋面积：

= 1913./m = 888./m

# 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 | 3679.02 (20) | 2262.41 (5) | 4596.21 (44) | 1513.65 (45) |
| 2 | 1511.82 (20) | 847.58 (5) | 1995.80 (44) | 430.18 (45) |
| 3 | -506.98 (2) | -725.64 (15) | -315.05 (42) | -942.85 (43) |
| 4 | 2989.10 (15) | 2128.22 (2) | 3770.80 (43) | 1440.48 (42) |
| 5 | 950.23 (37) | 533.52 (12) | 1332.52 (47) | 194.88 (46) |
| 6 | 2591.59 (37) | 1598.54 (12) | 3606.04 (43) | 706.67 (42) |

桩平均反力最大值1663.23 (非震)(Load 15)

桩平均反力最小值1180.16 (非震)(Load 2)

桩平均反力最大值2109.70 (震)(Load 43)

桩平均反力最小值787.01 (震)(Load 42)

基本组合下承台冲切、剪切、配筋计算:

角桩冲切计算：

抗剪计算：

2右边： 抗力7647.16kN 剪力6489.65kN ：850mm (Load:98)

4下边： 抗力9928.04kN 剪力4793.04kN ：850mm (Load:98)

承台高度：

承台高300

底板配筋计算：

X方向：弯矩2980.33 kN.m 计算钢筋面积1913 /m Load： 98

Y方向：弯矩2119.59 kN.m 计算钢筋面积954 /m Load： 74