桩承台计算\_序号26

# 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 | 100 | 100 | -383 | 1475 | 0 |
| 柱2 | 2 | 300 | 973 | -2771 | 269 |
| 外接柱 | 2604 | 2452 | -1635 | 299 | 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

| 【3】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=6514.5kN =-5203.2kN.m =-6919.7kN.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 | 2432.87 | 2432.87 | 满足 |
| 2 | 1414.2 | 569.0 | 982.96 | 982.96 | 满足 |
| 3 | 2828.4 | -845.2 | -466.95 | -466.95 | >R |
| 4 | -1414.2 | 569.0 | 1961.56 | 1961.56 | 满足 |
| 5 | 0.0 | -845.2 | 511.65 | 511.65 | 满足 |
| 6 | -2828.4 | -845.2 | 1490.25 | 1490.25 | 满足 |

桩总反力= 6912.4 kN; 桩均反力= 1152.1 kN

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=7069.3kN =-4002.4kN.m =-9156.0kN.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 | 2155.17 | 2155.17 | 满足 |
| 2 | 1414.2 | 569.0 | 811.10 | 811.10 | 满足 |
| 3 | 2828.4 | -845.2 | -532.98 | -532.98 | >R |
| 4 | -1414.2 | 569.0 | 2105.95 | 2105.95 | 满足 |
| 5 | 0.0 | -845.2 | 761.88 | 761.88 | 满足 |
| 6 | -2828.4 | -845.2 | 2056.73 | 2056.73 | 满足 |

桩总反力= 7357.9 kN; 桩均反力= 1226.3 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=6962.8kN =-6146.5kN.m =-6809.8kN.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 | 2772.90 | 2772.90 | 满足 |
| 2 | 1414.2 | 569.0 | 1141.58 | 1141.58 | 满足 |
| 3 | 2828.4 | -845.2 | -489.74 | -489.74 | >R |
| 4 | -1414.2 | 569.0 | 2104.63 | 2104.63 | 满足 |
| 5 | 0.0 | -845.2 | 473.31 | 473.31 | 满足 |
| 6 | -2828.4 | -845.2 | 1436.36 | 1436.36 | 满足 |

桩总反力= 7439.1 kN; 桩均反力= 1239.8 kN

当前荷载组合

| 【14】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=9483.7kN =-6822.6kN.m =-10827.3kN.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 | 3319.89 | 3319.89 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 1314.05 | 1314.05 | 满足 |
| 3 | 2828.4 | -845.2 | -691.79 | -691.79 | >R |
| 4 | -1414.2 | 569.0 | 2845.26 | 2845.26 | 满足 |
| 5 | 0.0 | -845.2 | 839.41 | 839.41 | 满足 |
| 6 | -2828.4 | -845.2 | 2370.62 | 2370.62 | 满足 |

桩总反力= 9997.4 kN; 桩均反力= 1666.2 kN

当前荷载组合

| 【21】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=8752.2kN =-7745.0kN.m =-8540.9kN.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 | 3491.10 | 3491.10 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 1437.91 | 1437.91 | 满足 |
| 3 | 2828.4 | -845.2 | -615.29 | -615.29 | >R |
| 4 | -1414.2 | 569.0 | 2645.77 | 2645.77 | 满足 |
| 5 | 0.0 | -845.2 | 592.57 | 592.57 | 满足 |
| 6 | -2828.4 | -845.2 | 1800.43 | 1800.43 | 满足 |

桩总反力= 9352.5 kN; 桩均反力= 1558.7 kN

当前荷载组合

| 【36】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=8858.7kN =-5600.9kN.m =-10887.1kN.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 | 2873.37 | 2873.37 | 满足 |
| 2 | 1414.2 | 569.0 | 1107.42 | 1107.42 | 满足 |
| 3 | 2828.4 | -845.2 | -658.53 | -658.53 | >R |
| 4 | -1414.2 | 569.0 | 2647.09 | 2647.09 | 满足 |
| 5 | 0.0 | -845.2 | 881.13 | 881.13 | 满足 |
| 6 | -2828.4 | -845.2 | 2420.80 | 2420.80 | 满足 |

桩总反力= 9271.3 kN; 桩均反力= 1545.2 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=12054.8kN =-7328.9kN.m =-15108.3kN.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 | 3823.71 | 3823.71 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1461.46 | 1461.46 | 满足 |
| 3 | 2828.4 | -845.2 | -900.80 | -900.80 | >R |
| 4 | -1414.2 | 569.0 | 3598.09 | 3598.09 | 满足 |
| 5 | 0.0 | -845.2 | 1235.83 | 1235.83 | 满足 |
| 6 | -2828.4 | -845.2 | 3372.46 | 3372.46 | 满足 |

桩总反力= 12590.8 kN; 桩均反力= 2098.5 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=4268.0kN =-4791.1kN.m =-3148.8kN.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 | 2001.61 | 2001.61 | 满足 |
| 2 | 1414.2 | 569.0 | 858.88 | 858.88 | 满足 |
| 3 | 2828.4 | -845.2 | -283.84 | -283.84 | >R |
| 4 | -1414.2 | 569.0 | 1304.19 | 1304.19 | 满足 |
| 5 | 0.0 | -845.2 | 161.46 | 161.46 | 满足 |
| 6 | -2828.4 | -845.2 | 606.77 | 606.77 | 满足 |

桩总反力= 4649.1 kN; 桩均反力= 774.8 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=7710.5kN =-1647.3kN.m =-12709.3kN.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 | 1548.94 | 1548.94 | 满足 |
| 2 | 1414.2 | 569.0 | 462.10 | 462.10 | 满足 |
| 3 | 2828.4 | -845.2 | -624.73 | -624.73 | >R |
| 4 | -1414.2 | 569.0 | 2259.47 | 2259.47 | 满足 |
| 5 | 0.0 | -845.2 | 1172.64 | 1172.64 | 满足 |
| 6 | -2828.4 | -845.2 | 2970.01 | 2970.01 | 满足 |

桩总反力= 7788.4 kN; 桩均反力= 1298.1 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=8612.2kN =-10472.8kN.m =-5547.7kN.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 | 4276.38 | 4276.38 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1858.24 | 1858.24 | 满足 |
| 3 | 2828.4 | -845.2 | -559.91 | -559.91 | >R |
| 4 | -1414.2 | 569.0 | 2642.80 | 2642.80 | 满足 |
| 5 | 0.0 | -845.2 | 224.66 | 224.66 | 满足 |
| 6 | -2828.4 | -845.2 | 1009.22 | 1009.22 | 满足 |

桩总反力= 9451.4 kN; 桩均反力= 1575.2 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=11970.3kN =-7205.9kN.m =-15074.2kN.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 | 3775.76 | 3775.76 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 1440.06 | 1440.06 | 满足 |
| 3 | 2828.4 | -845.2 | -895.63 | -895.63 | >R |
| 4 | -1414.2 | 569.0 | 3571.88 | 3571.88 | 满足 |
| 5 | 0.0 | -845.2 | 1236.19 | 1236.19 | 满足 |
| 6 | -2828.4 | -845.2 | 3368.00 | 3368.00 | 满足 |

桩总反力= 12496.3 kN; 桩均反力= 2082.7 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=4352.5kN =-4914.2kN.m =-3182.9kN.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 | 2049.56 | 2049.56 | 满足 |
| 2 | 1414.2 | 569.0 | 880.27 | 880.27 | 满足 |
| 3 | 2828.4 | -845.2 | -289.01 | -289.01 | >R |
| 4 | -1414.2 | 569.0 | 1330.40 | 1330.40 | 满足 |
| 5 | 0.0 | -845.2 | 161.11 | 161.11 | 满足 |
| 6 | -2828.4 | -845.2 | 611.24 | 611.24 | 满足 |

桩总反力= 4743.6 kN; 桩均反力= 790.6 kN

2、承台内力配筋计算

当前荷载组合

| 【73】SATWE基本组合:1.20\*恒+1.40\*活-0.84\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=11346.0kN =-9472.6kN.m =-11640.8kN.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 | 4358.27 | 4358.27 |
| 2 | 1414.2 | 569.0 | 1775.78 | 1775.78 |
| 3 | 2828.4 | -845.2 | -806.71 | -806.71 |
| 4 | -1414.2 | 569.0 | 3422.03 | 3422.03 |
| 5 | 0.0 | -845.2 | 839.54 | 839.54 |
| 6 | -2828.4 | -845.2 | 2485.79 | 2485.79 |

桩总反力= 12074.7 kN; 桩均反力= 2012.5 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)]\*4526.\* 850.\*1.4329\*1.e-3

= 7600.9 kN

> = 6166.88 (\* 1.00) 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)]\*6142.\* 850.\*1.4329\*1.e-3

= 9888.8 kN

> = 4358.27 (\* 1.00) kN

承台阶梯高度：

1阶高： 300mm

当前荷载组合

| 【75】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=10787.9kN =-9755.2kN.m =-10318.2kN.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 | 4364.70 | 4364.70 |
| 2 | 1414.2 | 569.0 | 1804.81 | 1804.81 |
| 3 | 2828.4 | -845.2 | -755.07 | -755.07 |
| 4 | -1414.2 | 569.0 | 3264.03 | 3264.03 |
| 5 | 0.0 | -845.2 | 704.15 | 704.15 |
| 6 | -2828.4 | -845.2 | 2163.37 | 2163.37 |

桩总反力= 11546.0 kN; 桩均反力= 1924.3 kN

3、承台板抗弯计算

X方向配筋计算：

= 2454.22\*1.00= 2454.22 X = -333. H = 850.

= /(0.9\*\*)/YS = 2454.22/(0.9\* 850.0\*360.0)/5.7= 1575.3 /m

= 2335.90\*1.00= 2335.90 X = -433. H = 850.

= /(0.9\*\*)/YS = 2335.90/(0.9\* 850.0\*360.0)/5.7= 1499.4 /m

Y方向配筋计算：

= 2000.12\*1.00= 2000.12 Y = 1525. H = 850.

= /(0.9\*\*)/XS = 2000.12/(0.9\* 850.0\*360.0)/8.1= 899.8 /m

= 2018.59\*1.00= 2018.59 Y = 1425. H = 850.

= /(0.9\*\*)/XS = 2018.59/(0.9\* 850.0\*360.0)/8.1= 908.1 /m

计算的钢筋面积：

= 1575./m = 908./m

当前荷载组合

| 【99】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=10364.4kN =-12922.4kN.m =-6356.9kN.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 | 5240.49 | 5240.49 |
| 2 | 1414.2 | 569.0 | 2285.88 | 2285.88 |
| 3 | 2828.4 | -845.2 | -668.73 | -668.73 |
| 4 | -1414.2 | 569.0 | 3184.88 | 3184.88 |
| 5 | 0.0 | -845.2 | 230.27 | 230.27 |
| 6 | -2828.4 | -845.2 | 1129.26 | 1129.26 |

桩总反力= 11402.0 kN; 桩均反力= 1900.3 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)]\*4526.\* 850.\*1.4329\*1.e-3

= 7600.9 kN

> = 7087.91 (\* 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)]\*6142.\* 850.\*1.4329\*1.e-3

= 9888.8 kN

> = 5240.49 (\* 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：

= 3701.54\*0.75= 2776.16 X = -333. H = 850.

= /(0.9\*\*)/YS = 2776.16/(0.9\* 850.0\*360.0)/5.7= 1782.0 /m

= 3500.11\*0.75= 2625.08 X = -433. H = 850.

= /(0.9\*\*)/YS = 2625.08/(0.9\* 850.0\*360.0)/5.7= 1685.0 /m

Y方向配筋计算：

= 2401.45\*0.75= 1801.09 Y = 1525. H = 850.

= /(0.9\*\*)/XS = 1801.09/(0.9\* 850.0\*360.0)/8.1= 810.3 /m

= 2448.50\*0.75= 1836.37 Y = 1425. H = 850.

= /(0.9\*\*)/XS = 1836.37/(0.9\* 850.0\*360.0)/8.1= 826.2 /m

计算的钢筋面积：

= 1782./m = 826./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 | 3491.10 (21) | 2155.17 (4) | 4276.38 (45) | 1548.94 (44) |
| 2 | 1437.91 (21) | 811.10 (4) | 1858.24 (45) | 462.10 (44) |
| 3 | -466.95 (3) | -691.79 (14) | -283.84 (43) | -900.80 (42) |
| 4 | 2845.26 (14) | 1961.56 (3) | 3598.09 (42) | 1304.19 (43) |
| 5 | 881.13 (36) | 473.31 (13) | 1236.19 (46) | 161.11 (47) |
| 6 | 2420.80 (36) | 1436.36 (13) | 3372.46 (42) | 606.77 (43) |

桩平均反力最大值1580.62 (非震)(Load 14)

桩平均反力最小值1085.74 (非震)(Load 3)

桩平均反力最大值2009.13 (震)(Load 42)

桩平均反力最小值711.33 (震)(Load 43)

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7600.92kN 剪力6166.88kN ：850mm (Load:73)

4下边： 抗力9888.83kN 剪力4454.41kN ：850mm (Load:99)

承台高度：

承台高300

底板配筋计算：

X方向：弯矩2776.16 kN.m 计算钢筋面积1782 /m Load： 99

Y方向：弯矩2018.59 kN.m 计算钢筋面积908 /m Load： 75