桩承台计算\_序号23

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：550mm

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 | -1000 | -1000 |
| 2 | -1000 | 1000 |
| 3 | 1000 | -1000 |
| 4 | 1000 | 1000 |

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

= 9.0× 24.0

= 216.0 kN

∑ = 4000000.0 ∑ = 4000000.0

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=4748.4kN =-24.9kN.m =0.1kN.m =6.5kN =7.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1180.84 | 1234.84 | 满足 |
| 2 | -1000.0 | 1000.0 | 1193.28 | 1247.28 | 满足 |
| 3 | 1000.0 | -1000.0 | 1180.91 | 1234.91 | 满足 |
| 4 | 1000.0 | 1000.0 | 1193.35 | 1247.35 | 满足 |

桩总反力= 4964.4 kN; 桩均反力= 1241.1 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=4766.1kN =-13.8kN.m =12.2kN.m =14.9kN =-0.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1185.03 | 1239.03 | 满足 |
| 2 | -1000.0 | 1000.0 | 1191.93 | 1245.93 | 满足 |
| 3 | 1000.0 | -1000.0 | 1191.11 | 1245.11 | 满足 |
| 4 | 1000.0 | 1000.0 | 1198.01 | 1252.01 | 满足 |

桩总反力= 4982.1 kN; 桩均反力= 1245.5 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=6091.2kN =17.6kN.m =-0.2kN.m =7.2kN =-20.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1527.24 | 1581.24 | 满足 |
| 2 | -1000.0 | 1000.0 | 1518.46 | 1572.46 | 满足 |
| 3 | 1000.0 | -1000.0 | 1527.16 | 1581.16 | 满足 |
| 4 | 1000.0 | 1000.0 | 1518.37 | 1572.37 | 满足 |

桩总反力= 6307.2 kN; 桩均反力= 1576.8 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=6080.6kN =10.9kN.m =-7.4kN.m =2.1kN =-15.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1524.73 | 1578.73 | 满足 |
| 2 | -1000.0 | 1000.0 | 1519.26 | 1573.26 | 满足 |
| 3 | 1000.0 | -1000.0 | 1521.04 | 1575.04 | 满足 |
| 4 | 1000.0 | 1000.0 | 1515.57 | 1569.57 | 满足 |

桩总反力= 6296.6 kN; 桩均反力= 1574.2 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=5110.2kN =-90.2kN.m =-5.1kN.m =10.5kN =51.6kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1256.26 | 1310.26 | 满足 |
| 2 | -1000.0 | 1000.0 | 1301.38 | 1355.38 | 满足 |
| 3 | 1000.0 | -1000.0 | 1253.73 | 1307.73 | 满足 |
| 4 | 1000.0 | 1000.0 | 1298.86 | 1352.86 | 满足 |

桩总反力= 5326.2 kN; 桩均反力= 1331.6 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=5773.6kN =93.8kN.m =5.0kN.m =3.1kN =-71.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1465.60 | 1519.60 | 满足 |
| 2 | -1000.0 | 1000.0 | 1418.72 | 1472.72 | 满足 |
| 3 | 1000.0 | -1000.0 | 1468.09 | 1522.09 | 满足 |
| 4 | 1000.0 | 1000.0 | 1421.21 | 1475.21 | 满足 |

桩总反力= 5989.6 kN; 桩均反力= 1497.4 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=5241.1kN =4.4kN.m =99.8kN.m =79.0kN =-14.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1286.43 | 1340.43 | 满足 |
| 2 | -1000.0 | 1000.0 | 1284.22 | 1338.22 | 满足 |
| 3 | 1000.0 | -1000.0 | 1336.32 | 1390.32 | 满足 |
| 4 | 1000.0 | 1000.0 | 1334.12 | 1388.12 | 满足 |

桩总反力= 5457.1 kN; 桩均反力= 1364.3 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=5642.8kN =-0.9kN.m =-99.9kN.m =-65.4kN =-5.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1435.43 | 1489.43 | 满足 |
| 2 | -1000.0 | 1000.0 | 1435.88 | 1489.88 | 满足 |
| 3 | 1000.0 | -1000.0 | 1385.50 | 1439.50 | 满足 |
| 4 | 1000.0 | 1000.0 | 1385.95 | 1439.95 | 满足 |

桩总反力= 5858.8 kN; 桩均反力= 1464.7 kN

2、承台内力配筋计算

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=7702.2kN =2.1kN.m =-0.1kN.m =9.4kN =-13.4kN

承台及覆土重:

= 216.0×1.35= 291.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1926.10 | 1999.00 |
| 2 | -1000.0 | 1000.0 | 1925.04 | 1997.94 |
| 3 | 1000.0 | -1000.0 | 1926.06 | 1998.96 |
| 4 | 1000.0 | 1000.0 | 1924.99 | 1997.89 |

桩总反力= 7993.8 kN; 桩均反力= 1998.4 kN

台阶1 H = 1150.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

= 450. =0.41 = 700.

= 450. =0.41 = 700.

= 1100. =0.9194 = 0.919 =0.97 = 1.433

=[( +/2)+ (+/2)]

= 2602.72 kN > = 1926.10(×1.00) kN

角桩No.=2

= 450. =0.41 = 700.

= 450. =0.41 = 700.

= 1100. =0.9194 = 0.919 =0.97 = 1.433

=[( +/2)+ (+/2)]

= 2602.72 kN > = 1926.06(×1.00) kN

角桩No.=3

= 450. =0.41 = 700.

= 450. =0.41 = 700.

= 1100. =0.9194 = 0.919 =0.97 = 1.433

=[( +/2)+ (+/2)]

= 2602.72 kN > = 1924.99(×1.00) kN

角桩No.=4

= 450. =0.41 = 700.

= 450. =0.41 = 700.

= 1100. =0.9194 = 0.919 =0.97 = 1.433

=[( +/2)+ (+/2)]

= 2602.72 kN > = 1925.04(×1.00) kN

b、柱冲切计算：

采用“桩基规范”5.9.7条,公式如下：

≤2[

=, =

截面净高=1100.mm

X正方向:= 450. =0.409

X负方向:= 450. =0.409

Y正方向:= 450. =0.409

Y负方向:= 450. =0.409

= 700. = 700. = 1.38 = 1.38 = 1.43 =0.971

=2[( + ) + ( + )]

= 9707.46 kN > = 7702.19 × 1.00 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

=1100. = 802. =0.409

= [1.75/(+1.0)]

=0.923\*[1.75/(0.409+1.0)]\*2373.\*1100.\*1.4329\*1.e-3

= 4289.2 kN

> = 3851.14 (\* 1.00) kN

2、右侧抗剪计算

=1100. = 450. =0.409

= [1.75/(+1.0)]

=0.923\*[1.75/(0.409+1.0)]\*2373.\*1100.\*1.4329\*1.e-3

= 4289.2 kN

> = 3851.05 (\* 1.00) kN

3、下侧抗剪计算

=1100. = 450. =0.409

= [1.75/(+1.0)]

=0.923\*[1.75/(0.409+1.0)]\*2373.\*1100.\*1.4329\*1.e-3

= 4289.2 kN

> = 3852.16 (\* 1.00) kN

4、上侧抗剪计算

=1100. = 450. =0.409

= [1.75/(+1.0)]

=0.923\*[1.75/(0.409+1.0)]\*2373.\*1100.\*1.4329\*1.e-3

= 4289.2 kN

> = 3850.04 (\* 1.00) kN

承台阶梯高度：

1阶高： 550mm

3、承台板抗弯计算

X方向配筋计算：

= 2503.24\*1.00= 2503.24 X = -350. H = 1100.

= /(0.9\*\*)/YS = 2503.24/(0.9\*1100.0\*360.0)/3.0= 2341.2 /m

= 2503.18\*1.00= 2503.18 X = 350. H = 1100.

= /(0.9\*\*)/YS = 2503.18/(0.9\*1100.0\*360.0)/3.0= 2341.2 /m

= 2503.24\*1.00= 2503.24 X = -350. H = 1100.

= /(0.9\*\*)/YS = 2503.24/(0.9\*1100.0\*360.0)/3.0= 2341.2 /m

Y方向配筋计算：

= 2503.90\*1.00= 2503.90 Y = -350. H = 1100.

= /(0.9\*\*)/XS = 2503.90/(0.9\*1100.0\*360.0)/3.0= 2341.8 /m

= 2502.52\*1.00= 2502.52 Y = 350. H = 1100.

= /(0.9\*\*)/XS = 2502.52/(0.9\*1100.0\*360.0)/3.0= 2340.6 /m

= 2503.90\*1.00= 2503.90 Y = -350. H = 1100.

= /(0.9\*\*)/XS = 2503.90/(0.9\*1100.0\*360.0)/3.0= 2341.8 /m

计算的钢筋面积：

= 2341./m = 2342./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 | 1581.24 (19) | 1234.84 (4) | 1519.60 (45) | 1310.26 (44) |
| 2 | 1573.26 (35) | 1245.93 (12) | 1489.88 (47) | 1338.22 (46) |
| 3 | 1581.16 (19) | 1234.91 (4) | 1522.09 (45) | 1307.73 (44) |
| 4 | 1572.37 (19) | 1247.35 (4) | 1475.21 (45) | 1352.86 (44) |

桩平均反力最大值1576.81 (非震)(Load 19)

桩平均反力最小值1241.09 (非震)(Load 4)

桩平均反力最大值1497.40 (震)(Load 45)

桩平均反力最小值1331.56 (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2602.72 kN 冲切力1926.10 kN ：1100 mm (Load:55)

桩 2: 抗力2602.72 kN 冲切力1926.06 kN ：1100 mm (Load:55)

桩 3: 抗力2602.72 kN 冲切力1924.99 kN ：1100 mm (Load:55)

桩 4: 抗力2602.72 kN 冲切力1925.04 kN ：1100 mm (Load:55)

抗剪计算：

1左边： 抗力4289.21kN 剪力3851.14kN ：1100mm (Load:55)

2右边： 抗力4289.21kN 剪力3851.05kN ：1100mm (Load:55)

3上边： 抗力4289.21kN 剪力3852.16kN ：1100mm (Load:55)

4下边： 抗力4289.21kN 剪力3850.04kN ：1100mm (Load:55)

承台高度：

承台高550

底板配筋计算：

X方向：弯矩2503.24 kN.m 计算钢筋面积2341 /m Load： 55

Y方向：弯矩2503.90 kN.m 计算钢筋面积2342 /m Load： 55