桩承台计算\_序号22

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：500mm

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

| 【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=4834.5kN =15.6kN.m =-13.5kN.m =-33.7kN =12.4kN

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 | 1215.89 | 1269.89 | 满足 |
| 2 | -1000.0 | 1000.0 | 1208.10 | 1262.10 | 满足 |
| 3 | 1000.0 | -1000.0 | 1209.15 | 1263.15 | 满足 |
| 4 | 1000.0 | 1000.0 | 1201.35 | 1255.35 | 满足 |

桩总反力= 5050.5 kN; 桩均反力= 1262.6 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=4856.3kN =4.8kN.m =-25.0kN.m =-42.1kN =19.8kN

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 | 1221.52 | 1275.52 | 满足 |
| 2 | -1000.0 | 1000.0 | 1219.13 | 1273.13 | 满足 |
| 3 | 1000.0 | -1000.0 | 1209.01 | 1263.01 | 满足 |
| 4 | 1000.0 | 1000.0 | 1206.63 | 1260.63 | 满足 |

桩总反力= 5072.3 kN; 桩均反力= 1268.1 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=6426.5kN =-28.8kN.m =-15.1kN.m =-37.7kN =42.3kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1603.19 | 1657.19 | 满足 |
| 2 | -1000.0 | 1000.0 | 1617.60 | 1671.60 | 满足 |
| 3 | 1000.0 | -1000.0 | 1595.63 | 1649.63 | 满足 |
| 4 | 1000.0 | 1000.0 | 1610.04 | 1664.04 | 满足 |

桩总反力= 6642.5 kN; 桩均反力= 1660.6 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=6413.4kN =-22.3kN.m =-8.2kN.m =-32.6kN =37.9kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1599.82 | 1653.82 | 满足 |
| 2 | -1000.0 | 1000.0 | 1610.98 | 1664.98 | 满足 |
| 3 | 1000.0 | -1000.0 | 1595.72 | 1649.72 | 满足 |
| 4 | 1000.0 | 1000.0 | 1606.88 | 1660.88 | 满足 |

桩总反力= 6629.4 kN; 桩均反力= 1657.3 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=6043.1kN =-103.1kN.m =-9.5kN.m =-39.3kN =90.2kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1487.36 | 1541.36 | 满足 |
| 2 | -1000.0 | 1000.0 | 1538.91 | 1592.91 | 满足 |
| 3 | 1000.0 | -1000.0 | 1482.64 | 1536.64 | 满足 |
| 4 | 1000.0 | 1000.0 | 1534.19 | 1588.19 | 满足 |

桩总反力= 6259.1 kN; 桩均反力= 1564.8 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=5266.0kN =79.2kN.m =-19.1kN.m =-32.0kN =-28.8kN

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 | 1341.08 | 1395.08 | 满足 |
| 2 | -1000.0 | 1000.0 | 1301.50 | 1355.50 | 满足 |
| 3 | 1000.0 | -1000.0 | 1331.52 | 1385.52 | 满足 |
| 4 | 1000.0 | 1000.0 | 1291.94 | 1345.94 | 满足 |

桩总反力= 5482.0 kN; 桩均反力= 1370.5 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=5870.6kN =-9.4kN.m =82.7kN.m =37.1kN =26.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1444.61 | 1498.61 | 满足 |
| 2 | -1000.0 | 1000.0 | 1449.31 | 1503.31 | 满足 |
| 3 | 1000.0 | -1000.0 | 1485.98 | 1539.98 | 满足 |
| 4 | 1000.0 | 1000.0 | 1490.68 | 1544.68 | 满足 |

桩总反力= 6086.6 kN; 桩均反力= 1521.6 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=5438.6kN =-14.5kN.m =-111.3kN.m =-108.4kN =34.8kN

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 | 1383.84 | 1437.84 | 满足 |
| 2 | -1000.0 | 1000.0 | 1391.10 | 1445.10 | 满足 |
| 3 | 1000.0 | -1000.0 | 1328.18 | 1382.18 | 满足 |
| 4 | 1000.0 | 1000.0 | 1335.45 | 1389.45 | 满足 |

桩总反力= 5654.6 kN; 桩均反力= 1413.6 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=7904.9kN =-15.6kN.m =-18.6kN.m =-46.0kN =39.1kN

承台及覆土重:

= 216.0×1.20= 259.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1976.96 | 2041.76 |
| 2 | -1000.0 | 1000.0 | 1984.76 | 2049.56 |
| 3 | 1000.0 | -1000.0 | 1967.68 | 2032.48 |
| 4 | 1000.0 | 1000.0 | 1975.48 | 2040.28 |

桩总反力= 8164.1 kN; 桩均反力= 2041.0 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

=1050. = 802. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3961.72 (\* 1.00) kN

2、右侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3943.16 (\* 1.00) kN

3、下侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3944.64 (\* 1.00) kN

4、上侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3960.24 (\* 1.00) kN

承台阶梯高度：

1阶高： 500mm

3、承台板抗弯计算

X方向配筋计算：

= 2575.12\*1.00= 2575.12 X = -350. H = 1050.

= /(0.9\*\*)/YS = 2575.12/(0.9\*1050.0\*360.0)/3.0= 2523.1 /m

= 2563.06\*1.00= 2563.06 X = 350. H = 1050.

= /(0.9\*\*)/YS = 2563.06/(0.9\*1050.0\*360.0)/3.0= 2511.3 /m

= 2575.12\*1.00= 2575.12 X = -350. H = 1050.

= /(0.9\*\*)/YS = 2575.12/(0.9\*1050.0\*360.0)/3.0= 2523.1 /m

Y方向配筋计算：

= 2564.02\*1.00= 2564.02 Y = -350. H = 1050.

= /(0.9\*\*)/XS = 2564.02/(0.9\*1050.0\*360.0)/3.0= 2512.3 /m

= 2574.16\*1.00= 2574.16 Y = 350. H = 1050.

= /(0.9\*\*)/XS = 2574.16/(0.9\*1050.0\*360.0)/3.0= 2522.2 /m

= 2574.16\*1.00= 2574.16 Y = 350. H = 1050.

= /(0.9\*\*)/XS = 2574.16/(0.9\*1050.0\*360.0)/3.0= 2522.2 /m

计算的钢筋面积：

= 2523./m = 2522./m

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=8060.4kN =-16.6kN.m =-19.8kN.m =-49.4kN =42.3kN

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 | 2015.91 | 2088.81 |
| 2 | -1000.0 | 1000.0 | 2024.22 | 2097.12 |
| 3 | 1000.0 | -1000.0 | 2006.00 | 2078.90 |
| 4 | 1000.0 | 1000.0 | 2014.31 | 2087.21 |

桩总反力= 8352.0 kN; 桩均反力= 2088.0 kN

台阶1 H = 1100.00 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. =0.43 = 700.

= 450. =0.43 = 700.

= 1050. =0.8909 = 0.891 =0.98 = 1.433

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

= 2417.75 kN > = 2015.91(×1.00) kN

角桩No.=2

= 450. =0.43 = 700.

= 450. =0.43 = 700.

= 1050. =0.8909 = 0.891 =0.98 = 1.433

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

= 2417.75 kN > = 2006.00(×1.00) kN

角桩No.=3

= 450. =0.43 = 700.

= 450. =0.43 = 700.

= 1050. =0.8909 = 0.891 =0.98 = 1.433

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

= 2417.75 kN > = 2014.31(×1.00) kN

角桩No.=4

= 450. =0.43 = 700.

= 450. =0.43 = 700.

= 1050. =0.8909 = 0.891 =0.98 = 1.433

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

= 2417.75 kN > = 2024.22(×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=1050.mm

X正方向:= 450. =0.429

X负方向:= 450. =0.429

Y正方向:= 450. =0.429

Y负方向:= 450. =0.429

= 700. = 700. = 1.34 = 1.34 = 1.43 =0.975

=2[( + ) + ( + )]

= 9017.57 kN > = 8060.44 × 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

抗剪计算不足,增加承台台阶高度

新台阶高: 1150.00 mm

=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

> = 4040.13 (\* 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

> = 4020.31 (\* 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

> = 4021.91 (\* 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

> = 4038.54 (\* 1.00) kN

承台阶梯高度：

1阶高： 550mm

# 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 | 1657.19 (18) | 1269.89 (5) | 1541.36 (44) | 1395.08 (45) |
| 2 | 1671.60 (18) | 1262.10 (5) | 1592.91 (44) | 1355.50 (45) |
| 3 | 1649.72 (34) | 1263.01 (13) | 1539.98 (46) | 1382.18 (47) |
| 4 | 1664.04 (18) | 1255.35 (5) | 1588.19 (44) | 1345.94 (45) |

桩平均反力最大值1660.62 (非震)(Load 18)

桩平均反力最小值1262.62 (非震)(Load 5)

桩平均反力最大值1564.78 (震)(Load 44)

桩平均反力最小值1370.51 (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2417.75 kN 冲切力2015.91 kN ：1050 mm (Load:55)

桩 2: 抗力2417.75 kN 冲切力2006.00 kN ：1050 mm (Load:55)

桩 3: 抗力2417.75 kN 冲切力2014.31 kN ：1050 mm (Load:55)

桩 4: 抗力2417.75 kN 冲切力2024.22 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力4289.21kN 剪力4040.13kN ：1100mm (Load:55) H+

2右边： 抗力4034.22kN 剪力3943.16kN ：1050mm (Load:54)

3上边： 抗力4034.22kN 剪力3944.64kN ：1050mm (Load:54)

4下边： 抗力4034.22kN 剪力3960.24kN ：1050mm (Load:54)

承台高度：

承台高550

底板配筋计算：

X方向：弯矩2575.12 kN.m 计算钢筋面积2523 /m Load： 54

Y方向：弯矩2574.16 kN.m 计算钢筋面积2522 /m Load： 54