桩承台计算\_序号56

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台上段高：200mm

承台下段高：1350mm

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 | 0 |
| 2 | 1000 | 0 |

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 | 550 | 550 | 0 | 0 | 0 |
| 外接柱 | 550 | 550 | 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

= 3.0× 24.0

= 72.0 kN

∑ = 2000000.0 ∑ = 0.0

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=1967.5kN =-21.1kN.m =-23.1kN.m =-68.5kN =51.1kN

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 | 0.0 | 995.29 | 1031.29 | 满足 |
| 2 | 1000.0 | 0.0 | 972.19 | 1008.19 | 满足 |

桩总反力= 2039.5 kN; 桩均反力= 1019.7 kN

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=1961.8kN =-20.5kN.m =-39.1kN.m =-83.4kN =50.4kN

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 | 0.0 | 1000.46 | 1036.46 | 满足 |
| 2 | 1000.0 | 0.0 | 961.36 | 997.36 | 满足 |

桩总反力= 2033.8 kN; 桩均反力= 1016.9 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=2647.4kN =-28.5kN.m =-28.6kN.m =-76.8kN =69.4kN

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 | 0.0 | 1337.98 | 1373.98 | 满足 |
| 2 | 1000.0 | 0.0 | 1309.41 | 1345.41 | 满足 |

桩总反力= 2719.4 kN; 桩均反力= 1359.7 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=2644.0kN =-28.2kN.m =-38.2kN.m =-85.7kN =68.9kN

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 | 0.0 | 1341.08 | 1377.08 | 满足 |
| 2 | 1000.0 | 0.0 | 1302.91 | 1338.91 | 满足 |

桩总反力= 2716.0 kN; 桩均反力= 1358.0 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=2319.8kN =-27.6kN.m =11.8kN.m =-36.9kN =63.2kN

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 | 0.0 | 1154.02 | 1190.02 | 满足 |
| 2 | 1000.0 | 0.0 | 1165.81 | 1201.81 | 满足 |

桩总反力= 2391.8 kN; 桩均反力= 1195.9 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=2290.5kN =-21.4kN.m =-76.3kN.m =-120.4kN =56.7kN

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 | 0.0 | 1183.38 | 1219.38 | 满足 |
| 2 | 1000.0 | 0.0 | 1107.12 | 1143.12 | 满足 |

桩总反力= 2362.5 kN; 桩均反力= 1181.3 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=3311.0kN =-35.5kN.m =-40.5kN.m =-98.5kN =86.7kN

承台及覆土重:

= 72.0×1.20= 86.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | 0.0 | 1675.77 | 1718.97 |
| 2 | 1000.0 | 0.0 | 1635.27 | 1678.47 |

桩总反力= 3397.4 kN; 桩均反力= 1698.7 kN

3、承台板抗弯计算

X方向配筋计算：

= 1214.93\*1.00= 1214.93 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1214.93/(0.9\*1500.0\*360.0)/1.0= 2499.9 /m

= 1185.57\*1.00= 1185.57 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1185.57/(0.9\*1500.0\*360.0)/1.0= 2439.5 /m

= 1214.93\*1.00= 1214.93 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1214.93/(0.9\*1500.0\*360.0)/1.0= 2499.9 /m

Y方向配筋计算：

计算的钢筋面积：

= 2500./m = 0./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=3319.7kN =-35.4kN.m =-44.2kN.m =-107.7kN =86.5kN

承台及覆土重:

= 72.0×1.35= 97.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | 0.0 | 1681.95 | 1730.55 |
| 2 | 1000.0 | 0.0 | 1637.75 | 1686.35 |

桩总反力= 3416.9 kN; 桩均反力= 1708.4 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

=1500. = 802. =0.317

= 2142.5 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.317+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2384.3 kN

= min( , )

> = 1681.95 (\* 1.00) kN

2、右侧抗剪计算

=1500. = 475. =0.317

= 2142.5 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.317+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2384.3 kN

= min( , )

> = 1637.75 (\* 1.00) kN

3、下侧抗剪计算

4、上侧抗剪计算

c、承台抗剪计算

1、左侧抗剪计算

=1500. = 803. =0.350

= 2012.7 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.350+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2325.4 kN

= min( , )

> = 1681.95 (\* 1.00) kN

2、右侧抗剪计算

=1500. = 525. =0.350

= 2012.7 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.350+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2325.4 kN

= min( , )

> = 1637.75 (\* 1.00) kN

3、下侧抗剪计算

4、上侧抗剪计算

承台阶梯高度：

1阶高： 1350mm

2阶高： 200mm

3、承台板抗弯计算

X方向配筋计算：

= 1219.42\*1.00= 1219.42 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1219.42/(0.9\*1500.0\*360.0)/1.0= 2509.1 /m

= 1187.37\*1.00= 1187.37 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1187.37/(0.9\*1500.0\*360.0)/1.0= 2443.1 /m

= 1219.42\*1.00= 1219.42 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1219.42/(0.9\*1500.0\*360.0)/1.0= 2509.1 /m

Y方向配筋计算：

计算的钢筋面积：

= 2509./m = 0./m

当前荷载组合

| 【68】SATWE基本组合:1.20\*恒+1.40\*活+0.84\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=3313.4kN =-35.8kN.m =-33.8kN.m =-92.3kN =87.0kN

承台及覆土重:

= 72.0×1.20= 86.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | 0.0 | 1673.59 | 1716.79 |
| 2 | 1000.0 | 0.0 | 1639.82 | 1683.02 |

桩总反力= 3399.8 kN; 桩均反力= 1699.9 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

=1500. = 802. =0.317

= 2142.5 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.317+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2384.3 kN

= min( , )

> = 1673.59 (\* 1.00) kN

2、右侧抗剪计算

=1500. = 475. =0.317

= 2142.5 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.317+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2384.3 kN

= min( , )

> = 1639.82 (\* 1.00) kN

3、下侧抗剪计算

4、上侧抗剪计算

c、承台抗剪计算

1、左侧抗剪计算

=1500. = 803. =0.350

= 2012.7 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.350+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2325.4 kN

= min( , )

> = 1673.59 (\* 1.00) kN

2、右侧抗剪计算

=1500. = 525. =0.350

= 2012.7 kN

= [1.75/(+1.0)]

=0.855\*[1.75/(0.350+1.0)]\* 977.\*1500.\*1.4329\*1.e-3

= 2325.4 kN

= min( , )

> = 1639.82 (\* 1.00) kN

3、下侧抗剪计算

4、上侧抗剪计算

承台阶梯高度：

1阶高： 1350mm

2阶高： 200mm

# 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 | 1377.08 (15) | 1031.29 (2) | 1219.38 (43) | 1190.02 (42) |
| 2 | 1345.41 (14) | 997.36 (3) | 1201.81 (42) | 1143.12 (43) |

桩平均反力最大值1359.70 (非震)(Load 14)

桩平均反力最小值1016.91 (非震)(Load 3)

桩平均反力最大值1195.92 (震)(Load 42)

桩平均反力最小值1181.25 (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：

1边： 抗力2012.67kN 剪力1681.95kN ：1500mm (Load:55)

2边： 抗力2012.67kN 剪力1639.82kN ：1500mm (Load:68)

承台高度：

一阶高1350 二阶高200

底板配筋计算：

X方向：弯矩1219.42 kN.m 计算钢筋面积2509 /m Load： 55

Y方向：弯矩0.00 kN.m 计算钢筋面积2208 /m Load： 54