桩承台计算\_序号59

# 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=1942.3kN =-17.5kN.m =37.3kN.m =82.8kN =41.6kN

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 | 0.0 | 952.52 | 988.52 | 满足 |
| 2 | 1000.0 | 0.0 | 989.83 | 1025.83 | 满足 |

桩总反力= 2014.3 kN; 桩均反力= 1007.2 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=1940.9kN =-15.5kN.m =21.4kN.m =68.1kN =38.6kN

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 | 0.0 | 959.75 | 995.75 | 满足 |
| 2 | 1000.0 | 0.0 | 981.11 | 1017.11 | 满足 |

桩总反力= 2012.9 kN; 桩均反力= 1006.4 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=2617.7kN =-23.9kN.m =39.0kN.m =92.5kN =57.4kN

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 | 1289.33 | 1325.33 | 满足 |
| 2 | 1000.0 | 0.0 | 1328.36 | 1364.36 | 满足 |

桩总反力= 2689.7 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=2616.8kN =-22.7kN.m =29.5kN.m =83.7kN =55.6kN

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 | 0.0 | 1293.67 | 1329.67 | 满足 |
| 2 | 1000.0 | 0.0 | 1323.13 | 1359.13 | 满足 |

桩总反力= 2688.8 kN; 桩均反力= 1344.4 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=2282.9kN =-27.0kN.m =75.6kN.m =123.1kN =57.2kN

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 | 1103.62 | 1139.62 | 满足 |
| 2 | 1000.0 | 0.0 | 1179.26 | 1215.26 | 满足 |

桩总反力= 2354.9 kN; 桩均反力= 1177.4 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=2276.0kN =-12.8kN.m =-12.1kN.m =40.4kN =39.4kN

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 | 1144.02 | 1180.02 | 满足 |
| 2 | 1000.0 | 0.0 | 1131.95 | 1167.95 | 满足 |

桩总反力= 2348.0 kN; 桩均反力= 1174.0 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=2287.1kN =-65.4kN.m =34.0kN.m =83.9kN =95.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | 0.0 | 1126.55 | 1162.55 | 满足 |
| 2 | 1000.0 | 0.0 | 1160.53 | 1196.53 | 满足 |

桩总反力= 2359.1 kN; 桩均反力= 1179.5 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=2271.8kN =25.6kN.m =29.6kN.m =79.7kN =1.7kN

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 | 1121.09 | 1157.09 | 满足 |
| 2 | 1000.0 | 0.0 | 1150.68 | 1186.68 | 满足 |

桩总反力= 2343.8 kN; 桩均反力= 1171.9 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=3275.8kN =-29.3kN.m =42.1kN.m =108.3kN =71.1kN

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 | 1616.88 | 1660.08 |
| 2 | 1000.0 | 0.0 | 1658.95 | 1702.15 |

桩总反力= 3362.2 kN; 桩均反力= 1681.1 kN

3、承台板抗弯计算

X方向配筋计算：

= 1172.23\*1.00= 1172.23 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1172.23/(0.9\*1500.0\*360.0)/1.0= 2412.0 /m

= 1202.74\*1.00= 1202.74 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1202.74/(0.9\*1500.0\*360.0)/1.0= 2474.8 /m

= 1202.74\*1.00= 1202.74 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1202.74/(0.9\*1500.0\*360.0)/1.0= 2474.8 /m

Y方向配筋计算：

计算的钢筋面积：

= 2475./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=3283.3kN =-28.9kN.m =44.4kN.m =114.3kN =70.2kN

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 | 1619.44 | 1668.04 |
| 2 | 1000.0 | 0.0 | 1663.85 | 1712.45 |

桩总反力= 3380.5 kN; 桩均反力= 1690.2 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( , )

> = 1619.44 (\* 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( , )

> = 1663.85 (\* 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( , )

> = 1619.44 (\* 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( , )

> = 1663.85 (\* 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：

= 1174.10\*1.00= 1174.10 X = -275. H = 1500.

= /(0.9\*\*)/YS = 1174.10/(0.9\*1500.0\*360.0)/1.0= 2415.8 /m

= 1206.29\*1.00= 1206.29 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1206.29/(0.9\*1500.0\*360.0)/1.0= 2482.1 /m

= 1206.29\*1.00= 1206.29 X = 275. H = 1500.

= /(0.9\*\*)/YS = 1206.29/(0.9\*1500.0\*360.0)/1.0= 2482.1 /m

Y方向配筋计算：

计算的钢筋面积：

= 2482./m = 0./m

当前荷载组合

| 【69】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=3275.2kN =-28.4kN.m =35.4kN.m =102.1kN =69.9kN

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 | 1619.91 | 1663.11 |
| 2 | 1000.0 | 0.0 | 1655.29 | 1698.49 |

桩总反力= 3361.6 kN; 桩均反力= 1680.8 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( , )

> = 1619.91 (\* 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( , )

> = 1655.29 (\* 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( , )

> = 1619.91 (\* 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( , )

> = 1655.29 (\* 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 | 1329.67 (15) | 988.52 (2) | 1180.02 (43) | 1139.62 (42) |
| 2 | 1364.36 (14) | 1017.11 (3) | 1215.26 (42) | 1167.95 (43) |

桩平均反力最大值1345.42 (非震)(Load 18)

桩平均反力最小值1005.48 (非震)(Load 5)

桩平均反力最大值1179.54 (震)(Load 44)

桩平均反力最小值1171.88 (震)(Load 45)

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1619.91kN ：1500mm (Load:69)

2边： 抗力2012.67kN 剪力1663.85kN ：1500mm (Load:55)

承台高度：

一阶高1350 二阶高200

底板配筋计算：

X方向：弯矩1206.29 kN.m 计算钢筋面积2482 /m Load： 55

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