桩承台计算\_序号102

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1100mm

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 | 866 |
| 2 | -750 | -433 |
| 3 | 750 | -433 |

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

= 6.3× 24.0

= 151.1 kN

∑ = 1125000.0 ∑ = 1125000.0

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=4113.1kN =144.1kN.m =96.1kN.m =66.6kN =-85.0kN

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 | 866.0 | 1260.11 | 1310.49 | 满足 |
| 2 | -750.0 | -433.0 | 1362.43 | 1412.81 | 满足 |
| 3 | 750.0 | -433.0 | 1490.55 | 1540.93 | 满足 |

桩总反力= 4264.2 kN; 桩均反力= 1421.4 kN

当前荷载组合

| 【11】SATWE标准组合:1.00\*恒-1.00\*风y左 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4077.6kN =127.4kN.m =117.7kN.m =75.4kN =-79.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1261.10 | 1311.49 | 满足 |
| 2 | -750.0 | -433.0 | 1329.80 | 1380.18 | 满足 |
| 3 | 750.0 | -433.0 | 1486.74 | 1537.12 | 满足 |

桩总反力= 4228.8 kN; 桩均反力= 1409.6 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=5479.8kN =88.6kN.m =113.8kN.m =78.6kN =-70.6kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1758.38 | 1808.76 | 满足 |
| 2 | -750.0 | -433.0 | 1784.87 | 1835.25 | 满足 |
| 3 | 750.0 | -433.0 | 1936.60 | 1986.98 | 满足 |

桩总反力= 5631.0 kN; 桩均反力= 1877.0 kN

当前荷载组合

| 【30】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y左 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5501.1kN =98.6kN.m =100.8kN.m =73.4kN =-73.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1757.78 | 1808.17 | 满足 |
| 2 | -750.0 | -433.0 | 1804.45 | 1854.83 | 满足 |
| 3 | 750.0 | -433.0 | 1938.88 | 1989.26 | 满足 |

桩总反力= 5652.3 kN; 桩均反力= 1884.1 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=3755.2kN =95.6kN.m =281.8kN.m =145.3kN =-70.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1178.11 | 1228.49 | 满足 |
| 2 | -750.0 | -433.0 | 1100.68 | 1151.06 | 满足 |
| 3 | 750.0 | -433.0 | 1476.41 | 1526.79 | 满足 |

桩总反力= 3906.3 kN; 桩均反力= 1302.1 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=5941.3kN =121.2kN.m =-72.0kN.m =-0.2kN =-80.2kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1887.12 | 1937.50 | 满足 |
| 2 | -750.0 | -433.0 | 2075.11 | 2125.49 | 满足 |
| 3 | 750.0 | -433.0 | 1979.10 | 2029.48 | 满足 |

桩总反力= 6092.5 kN; 桩均反力= 2030.8 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=5655.0kN =-20.8kN.m =95.9kN.m =68.6kN =-35.0kN

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 | 866.0 | 1900.96 | 1951.34 | 满足 |
| 2 | -750.0 | -433.0 | 1813.10 | 1863.48 | 满足 |
| 3 | 750.0 | -433.0 | 1940.90 | 1991.28 | 满足 |

桩总反力= 5806.1 kN; 桩均反力= 1935.4 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=4041.6kN =237.6kN.m =113.9kN.m =76.5kN =-115.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1164.27 | 1214.65 | 满足 |
| 2 | -750.0 | -433.0 | 1362.69 | 1413.07 | 满足 |
| 3 | 750.0 | -433.0 | 1514.61 | 1564.99 | 满足 |

桩总反力= 4192.7 kN; 桩均反力= 1397.6 kN

当前荷载组合

| 【48】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风x右+1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=3753.2kN =98.6kN.m =279.1kN.m =144.2kN =-71.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1175.16 | 1225.54 | 满足 |
| 2 | -750.0 | -433.0 | 1102.95 | 1153.33 | 满足 |
| 3 | 750.0 | -433.0 | 1475.06 | 1525.44 | 满足 |

桩总反力= 3904.3 kN; 桩均反力= 1301.4 kN

当前荷载组合

| 【49】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风x右-1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5943.4kN =118.3kN.m =-69.3kN.m =0.9kN =-79.3kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1890.07 | 1940.45 | 满足 |
| 2 | -750.0 | -433.0 | 2072.84 | 2123.22 | 满足 |
| 3 | 750.0 | -433.0 | 1980.45 | 2030.84 | 满足 |

桩总反力= 6094.5 kN; 桩均反力= 2031.5 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=6579.8kN =136.5kN.m =140.3kN.m =97.1kN =-94.7kN

承台及覆土重:

= 151.1×1.20= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2088.19 | 2148.65 |
| 2 | -750.0 | -433.0 | 2152.26 | 2212.72 |
| 3 | 750.0 | -433.0 | 2339.37 | 2399.83 |

桩总反力= 6761.2 kN; 桩均反力= 2253.7 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2339.37×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2339.37×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2339.37 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2339.37 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2339.37 = 1500. c = 700.

M = (-0.433\*c)/3 = 933.33 kN.m

= 2743.47

= 833.

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=6835.6kN =148.8kN.m =147.1kN.m =101.7kN =-103.3kN

承台及覆土重:

= 151.1×1.35= 204.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2163.98 | 2232.00 |
| 2 | -750.0 | -433.0 | 2237.74 | 2305.76 |
| 3 | 750.0 | -433.0 | 2433.90 | 2501.92 |

桩总反力= 7039.7 kN; 桩均反力= 2346.6 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2433.90×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2433.90×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2433.90 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2433.90 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2433.90 = 1500. c = 700.

M = (-0.433\*c)/3 = 971.05 kN.m

= 2854.34

= 833.

# 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 | 1808.76 (18) | 1310.49 (5) | 1951.34 (44) | 1214.65 (45) |
| 2 | 1854.83 (30) | 1380.18 (11) | 2125.49 (43) | 1151.06 (42) |
| 3 | 1989.26 (30) | 1537.12 (11) | 2030.84 (49) | 1525.44 (48) |

桩平均反力最大值1884.09 (非震)(Load 30)

桩平均反力最小值1409.59 (非震)(Load 11)

桩平均反力最大值2031.50 (震)(Load 49)

桩平均反力最小值1301.44 (震)(Load 48)

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3370.56 kN 冲切力2433.90 kN ：1050 mm (Load:55)

桩 2: 抗力3312.91 kN 冲切力2433.90 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力5308.79kN 剪力2433.90kN ：1050mm (Load:55)

2上边： 抗力4056.35kN 剪力2433.90kN ：1050mm (Load:55)

承台高度：

承台高1100

底板配筋计算：

弯矩971.05 kN.m 计算钢筋面积2854 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 2854. 钢筋级别: HRB400