桩承台计算\_序号103

# 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=4360.9kN =151.2kN.m =-101.4kN.m =-70.0kN =-90.1kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1337.24 | 1387.62 | 满足 |
| 2 | -750.0 | -433.0 | 1579.41 | 1629.79 | 满足 |
| 3 | 750.0 | -433.0 | 1444.21 | 1494.59 | 满足 |

桩总反力= 4512.0 kN; 桩均反力= 1504.0 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=4328.1kN =134.8kN.m =-121.5kN.m =-77.9kN =-84.9kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1338.92 | 1389.30 | 满足 |
| 2 | -750.0 | -433.0 | 1575.59 | 1625.97 | 满足 |
| 3 | 750.0 | -433.0 | 1413.63 | 1464.01 | 满足 |

桩总反力= 4479.3 kN; 桩均反力= 1493.1 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=5693.0kN =98.2kN.m =-113.4kN.m =-78.6kN =-77.5kN

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 | 1822.07 | 1872.45 | 满足 |
| 2 | -750.0 | -433.0 | 2011.06 | 2061.44 | 满足 |
| 3 | 750.0 | -433.0 | 1859.82 | 1910.20 | 满足 |

桩总反力= 5844.1 kN; 桩均反力= 1948.0 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=5712.6kN =108.0kN.m =-101.4kN.m =-73.9kN =-80.6kN

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 | 1821.06 | 1871.45 | 满足 |
| 2 | -750.0 | -433.0 | 2013.35 | 2063.73 | 满足 |
| 3 | 750.0 | -433.0 | 1878.17 | 1928.55 | 满足 |

桩总反力= 5863.7 kN; 桩均反力= 1954.6 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=6170.5kN =106.1kN.m =61.2kN.m =-7.3kN =-85.5kN

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 | 1975.15 | 2025.53 | 满足 |
| 2 | -750.0 | -433.0 | 2056.88 | 2107.27 | 满足 |
| 3 | 750.0 | -433.0 | 2138.43 | 2188.82 | 满足 |

桩总反力= 6321.6 kN; 桩均反力= 2107.2 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=3988.7kN =127.5kN.m =-275.4kN.m =-141.0kN =-77.2kN

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 | 1231.46 | 1281.84 | 满足 |
| 2 | -750.0 | -433.0 | 1562.27 | 1612.66 | 满足 |
| 3 | 750.0 | -433.0 | 1195.02 | 1245.40 | 满足 |

桩总反力= 4139.9 kN; 桩均反力= 1380.0 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=5905.6kN =-13.3kN.m =-98.1kN.m =-70.2kN =-40.9kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1978.79 | 2029.18 | 满足 |
| 2 | -750.0 | -433.0 | 2028.77 | 2079.15 | 满足 |
| 3 | 750.0 | -433.0 | 1898.03 | 1948.41 | 满足 |

桩总反力= 6056.7 kN; 桩均反力= 2018.9 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=4253.6kN =246.9kN.m =-116.2kN.m =-78.1kN =-121.9kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1227.82 | 1278.20 | 满足 |
| 2 | -750.0 | -433.0 | 1590.39 | 1640.77 | 满足 |
| 3 | 750.0 | -433.0 | 1435.42 | 1485.81 | 满足 |

桩总反力= 4404.8 kN; 桩均反力= 1468.3 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=6172.9kN =103.2kN.m =58.7kN.m =-8.3kN =-84.6kN

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 | 1978.22 | 2028.60 | 满足 |
| 2 | -750.0 | -433.0 | 2058.26 | 2108.64 | 满足 |
| 3 | 750.0 | -433.0 | 2136.47 | 2186.86 | 满足 |

桩总反力= 6324.1 kN; 桩均反力= 2108.0 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=3986.3kN =130.4kN.m =-272.9kN.m =-140.0kN =-78.1kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1228.39 | 1278.77 | 满足 |
| 2 | -750.0 | -433.0 | 1560.90 | 1611.28 | 满足 |
| 3 | 750.0 | -433.0 | 1196.98 | 1247.36 | 满足 |

桩总反力= 4137.4 kN; 桩均反力= 1379.1 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=6823.9kN =148.3kN.m =-139.9kN.m =-96.8kN =-103.2kN

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 | 2160.47 | 2220.93 |
| 2 | -750.0 | -433.0 | 2425.01 | 2485.47 |
| 3 | 750.0 | -433.0 | 2238.42 | 2298.87 |

桩总反力= 7005.3 kN; 桩均反力= 2335.1 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

> = 2425.01×1.00 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

> = 2425.01×1.00 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

> = 2425.01 (\* 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

> = 2425.01 (\* 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

=2425.01 = 1500. c = 700.

M = (-0.433\*c)/3 = 967.50 kN.m

= 2843.91

= 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=7135.2kN =160.8kN.m =-149.0kN.m =-103.1kN =-112.0kN

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 | 2254.63 | 2322.64 |
| 2 | -750.0 | -433.0 | 2539.59 | 2607.60 |
| 3 | 750.0 | -433.0 | 2340.95 | 2408.96 |

桩总反力= 7339.2 kN; 桩均反力= 2446.4 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

> = 2539.59×1.00 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

> = 2539.59×1.00 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

> = 2539.59 (\* 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

> = 2539.59 (\* 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

=2539.59 = 1500. c = 700.

M = (-0.433\*c)/3 = 1013.21 kN.m

= 2978.28

= 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 | 1872.45 (18) | 1387.62 (5) | 2029.18 (44) | 1278.20 (45) |
| 2 | 2063.73 (34) | 1625.97 (13) | 2108.64 (46) | 1611.28 (47) |
| 3 | 1928.55 (34) | 1464.01 (13) | 2188.82 (42) | 1245.40 (43) |

桩平均反力最大值1954.58 (非震)(Load 34)

桩平均反力最小值1493.09 (非震)(Load 13)

桩平均反力最大值2108.03 (震)(Load 46)

桩平均反力最小值1379.14 (震)(Load 47)

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2539.59 kN ：1050 mm (Load:55)

桩 2: 抗力3312.91 kN 冲切力2539.59 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力5308.79kN 剪力2539.59kN ：1050mm (Load:55)

2上边： 抗力4056.35kN 剪力2539.59kN ：1050mm (Load:55)

承台高度：

承台高1100

底板配筋计算：

弯矩1013.21 kN.m 计算钢筋面积2978 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 2978. 钢筋级别: HRB400