桩承台计算\_序号75

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1050mm

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

| 【4】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=3930.0kN =-33.0kN.m =-50.9kN.m =-35.2kN =7.0kN

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 | 1335.39 | 1385.78 | 满足 |
| 2 | -750.0 | -433.0 | 1331.22 | 1381.60 | 满足 |
| 3 | 750.0 | -433.0 | 1263.34 | 1313.73 | 满足 |

桩总反力= 4081.1 kN; 桩均反力= 1360.4 kN

当前荷载组合

| 【10】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=3888.9kN =-17.6kN.m =-70.9kN.m =-42.6kN =2.3kN

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 | 1309.80 | 1360.19 | 满足 |
| 2 | -750.0 | -433.0 | 1336.82 | 1387.20 | 满足 |
| 3 | 750.0 | -433.0 | 1242.24 | 1292.63 | 满足 |

桩总反力= 4040.0 kN; 桩均反力= 1346.7 kN

当前荷载组合

| 【19】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=5337.5kN =33.6kN.m =-66.1kN.m =-45.4kN =-14.6kN

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 | 1753.31 | 1803.69 | 满足 |
| 2 | -750.0 | -433.0 | 1836.15 | 1886.53 | 满足 |
| 3 | 750.0 | -433.0 | 1748.05 | 1798.43 | 满足 |

桩总反力= 5488.6 kN; 桩均反力= 1829.5 kN

当前荷载组合

| 【31】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=5362.2kN =24.3kN.m =-54.1kN.m =-40.9kN =-11.8kN

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 | 1768.66 | 1819.04 | 满足 |
| 2 | -750.0 | -433.0 | 1832.79 | 1883.17 | 满足 |
| 3 | 750.0 | -433.0 | 1760.71 | 1811.09 | 满足 |

桩总反力= 5513.3 kN; 桩均反力= 1837.8 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=5624.5kN =18.7kN.m =102.2kN.m =20.3kN =-10.1kN

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 | 1860.49 | 1910.87 | 满足 |
| 2 | -750.0 | -433.0 | 1813.86 | 1864.25 | 满足 |
| 3 | 750.0 | -433.0 | 1950.19 | 2000.58 | 满足 |

桩总反力= 5775.7 kN; 桩均反力= 1925.2 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=3732.0kN =-2.0kN.m =-219.1kN.m =-100.7kN =-2.6kN

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 | 1245.55 | 1295.93 | 满足 |
| 2 | -750.0 | -433.0 | 1389.28 | 1439.67 | 满足 |
| 3 | 750.0 | -433.0 | 1097.14 | 1147.52 | 满足 |

桩总反力= 3883.1 kN; 桩均反力= 1294.4 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=3967.0kN =-123.6kN.m =-67.0kN.m =-43.8kN =35.4kN

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 | 1417.49 | 1467.87 | 满足 |
| 2 | -750.0 | -433.0 | 1319.45 | 1369.83 | 满足 |
| 3 | 750.0 | -433.0 | 1230.08 | 1280.47 | 满足 |

桩总反力= 4118.2 kN; 桩均反力= 1372.7 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=5389.5kN =140.2kN.m =-49.8kN.m =-36.6kN =-48.1kN

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 | 1688.56 | 1738.94 | 满足 |
| 2 | -750.0 | -433.0 | 1883.70 | 1934.08 | 满足 |
| 3 | 750.0 | -433.0 | 1817.25 | 1867.63 | 满足 |

桩总反力= 5540.6 kN; 桩均反力= 1846.9 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=5624.8kN =21.5kN.m =99.7kN.m =19.4kN =-10.9kN

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 | 1858.41 | 1908.79 | 满足 |
| 2 | -750.0 | -433.0 | 1816.70 | 1867.08 | 满足 |
| 3 | 750.0 | -433.0 | 1949.66 | 2000.04 | 满足 |

桩总反力= 5775.9 kN; 桩均反力= 1925.3 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=3731.8kN =-4.8kN.m =-216.6kN.m =-99.8kN =-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 | 0.0 | 866.0 | 1247.64 | 1298.02 | 满足 |
| 2 | -750.0 | -433.0 | 1386.45 | 1436.83 | 满足 |
| 3 | 750.0 | -433.0 | 1097.67 | 1148.06 | 满足 |

桩总反力= 3882.9 kN; 桩均反力= 1294.3 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=6455.0kN =11.9kN.m =-82.6kN.m =-56.9kN =-8.8kN

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 | 2142.47 | 2202.93 |
| 2 | -750.0 | -433.0 | 2211.33 | 2271.79 |
| 3 | 750.0 | -433.0 | 2101.15 | 2161.61 |

桩总反力= 6636.3 kN; 桩均反力= 2212.1 kN

a、角桩冲切

= 1000. = 200. =0.25 = 1499. =1.24

= 1000. = 274. =0.27 = 1472. =1.18

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3223.78 kN

> = 2211.33×1.00 kN

上部：

= (2+)×tan(/2)

= 1.18×(2× 1499.+ 274.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3081.45 kN

> = 2211.33×1.00 kN

b、抗剪切计算

承台高度 HCD= 1050.

左侧：

= 1000. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.25+1.0)\* 2698.\* 1000.\*1.4329\*1.e-3

= 5118.03

> = 2211.33 (\* 1.00) kN

承台高度 HCD= 1050.00

上侧：

= 1000. = 316. =0.32

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.32+1.0)\* 2145.\* 1000.\*1.4329\*1.e-3

= 3865.88

> = 2211.33 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1050mm

c、承台板配筋计算

=2211.33 = 1500. c = 700.

M = (-0.433\*c)/3 = 882.25 kN.m

= 2722.99

= 833.

当前荷载组合

| 【73】SATWE基本组合:1.20\*恒+1.40\*活-0.84\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6642.0kN =45.6kN.m =-82.4kN.m =-56.6kN =-19.4kN

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 | 2178.88 | 2239.34 |
| 2 | -750.0 | -433.0 | 2286.47 | 2346.93 |
| 3 | 750.0 | -433.0 | 2176.63 | 2237.09 |

桩总反力= 6823.4 kN; 桩均反力= 2274.5 kN

a、角桩冲切

= 1000. = 200. =0.25 = 1499. =1.24

= 1000. = 274. =0.27 = 1472. =1.18

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3223.78 kN

> = 2286.47×1.00 kN

上部：

= (2+)×tan(/2)

= 1.18×(2× 1499.+ 274.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3081.45 kN

> = 2286.47×1.00 kN

b、抗剪切计算

承台高度 HCD= 1050.

左侧：

= 1000. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.25+1.0)\* 2698.\* 1000.\*1.4329\*1.e-3

= 5118.03

> = 2286.47 (\* 1.00) kN

承台高度 HCD= 1050.00

上侧：

= 1000. = 316. =0.32

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.32+1.0)\* 2145.\* 1000.\*1.4329\*1.e-3

= 3865.88

> = 2286.47 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1050mm

c、承台板配筋计算

=2286.47 = 1500. c = 700.

M = (-0.433\*c)/3 = 912.23 kN.m

= 2815.51

= 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 | 1819.04 (31) | 1360.19 (10) | 1910.87 (42) | 1295.93 (43) |
| 2 | 1886.53 (19) | 1381.60 (4) | 1934.08 (45) | 1369.83 (44) |
| 3 | 1811.09 (31) | 1292.63 (10) | 2000.58 (42) | 1147.52 (43) |

桩平均反力最大值1837.77 (非震)(Load 31)

桩平均反力最小值1346.67 (非震)(Load 10)

桩平均反力最大值1925.30 (震)(Load 48)

桩平均反力最小值1294.30 (震)(Load 49)

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3223.78 kN 冲切力2286.47 kN ：1000 mm (Load:73)

桩 2: 抗力3081.45 kN 冲切力2286.47 kN ：1000 mm (Load:73)

抗剪计算：

1左边： 抗力5118.03kN 剪力2286.47kN ：1000mm (Load:73)

2上边： 抗力3865.88kN 剪力2286.47kN ：1000mm (Load:73)

承台高度：

承台高1050

底板配筋计算：

弯矩912.23 kN.m 计算钢筋面积2816 Load： 73

配筋宽度833 mm

每边受弯筋 AS= 2816. 钢筋级别: HRB400