桩承台计算\_序号85

# 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=3947.2kN =-32.2kN.m =50.6kN.m =35.0kN =6.7kN

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 | 1340.55 | 1390.93 | 满足 |
| 2 | -750.0 | -433.0 | 1269.59 | 1319.97 | 满足 |
| 3 | 750.0 | -433.0 | 1337.04 | 1387.42 | 满足 |

桩总反力= 4098.3 kN; 桩均反力= 1366.1 kN

当前荷载组合

| 【12】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=3906.2kN =-17.1kN.m =70.3kN.m =42.3kN =2.1kN

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 | 1315.21 | 1365.60 | 满足 |
| 2 | -750.0 | -433.0 | 1248.66 | 1299.04 | 满足 |
| 3 | 750.0 | -433.0 | 1342.33 | 1392.71 | 满足 |

桩总反力= 4057.3 kN; 桩均反力= 1352.4 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=5365.0kN =34.3kN.m =64.0kN.m =44.6kN =-14.9kN

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 | 1761.91 | 1812.29 | 满足 |
| 2 | -750.0 | -433.0 | 1758.91 | 1809.29 | 满足 |
| 3 | 750.0 | -433.0 | 1844.18 | 1894.56 | 满足 |

桩总反力= 5516.1 kN; 桩均反力= 1838.7 kN

当前荷载组合

| 【35】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=5389.6kN =25.2kN.m =52.2kN.m =40.2kN =-12.1kN

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 | 1777.11 | 1827.49 | 满足 |
| 2 | -750.0 | -433.0 | 1771.47 | 1821.85 | 满足 |
| 3 | 750.0 | -433.0 | 1841.01 | 1891.39 | 满足 |

桩总反力= 5540.7 kN; 桩均反力= 1846.9 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=3743.5kN =-2.3kN.m =217.7kN.m =100.2kN =-2.5kN

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 | 1249.62 | 1300.01 | 满足 |
| 2 | -750.0 | -433.0 | 1101.79 | 1152.17 | 满足 |
| 3 | 750.0 | -433.0 | 1392.04 | 1442.42 | 满足 |

桩总反力= 3894.6 kN; 桩均反力= 1298.2 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=5659.1kN =20.4kN.m =-103.6kN.m =-20.8kN =-10.6kN

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 | 1870.61 | 1920.99 | 满足 |
| 2 | -750.0 | -433.0 | 1963.30 | 2013.68 | 满足 |
| 3 | 750.0 | -433.0 | 1825.14 | 1875.53 | 满足 |

桩总反力= 5810.2 kN; 桩均反力= 1936.7 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=4008.2kN =-121.5kN.m =65.2kN.m =42.9kN =34.7kN

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 | 1429.59 | 1479.97 | 满足 |
| 2 | -750.0 | -433.0 | 1245.85 | 1296.23 | 满足 |
| 3 | 750.0 | -433.0 | 1332.79 | 1383.17 | 满足 |

桩总反力= 4159.4 kN; 桩均反力= 1386.5 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=5394.3kN =139.6kN.m =48.9kN.m =36.4kN =-47.9kN

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 | 1690.64 | 1741.03 | 满足 |
| 2 | -750.0 | -433.0 | 1819.24 | 1869.62 | 满足 |
| 3 | 750.0 | -433.0 | 1884.40 | 1934.78 | 满足 |

桩总反力= 5545.4 kN; 桩均反力= 1848.5 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=3743.1kN =-5.1kN.m =215.2kN.m =99.3kN =-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 | 1251.65 | 1302.03 | 满足 |
| 2 | -750.0 | -433.0 | 1102.27 | 1152.65 | 满足 |
| 3 | 750.0 | -433.0 | 1389.23 | 1439.61 | 满足 |

桩总反力= 3894.3 kN; 桩均反力= 1298.1 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=5659.4kN =23.2kN.m =-101.2kN.m =-19.9kN =-11.5kN

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 | 1868.58 | 1918.97 | 满足 |
| 2 | -750.0 | -433.0 | 1962.82 | 2013.20 | 满足 |
| 3 | 750.0 | -433.0 | 1827.95 | 1878.34 | 满足 |

桩总反力= 5810.5 kN; 桩均反力= 1936.8 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=6486.7kN =12.8kN.m =80.6kN.m =56.1kN =-9.1kN

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 | 2152.35 | 2212.81 |
| 2 | -750.0 | -433.0 | 2113.41 | 2173.87 |
| 3 | 750.0 | -433.0 | 2220.94 | 2281.39 |

桩总反力= 6668.1 kN; 桩均反力= 2222.7 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

> = 2220.94×1.00 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

> = 2220.94×1.00 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

> = 2220.94 (\* 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

> = 2220.94 (\* 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

=2220.94 = 1500. c = 700.

M = (-0.433\*c)/3 = 886.08 kN.m

= 2734.81

= 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=6676.4kN =46.5kN.m =79.7kN.m =55.5kN =-19.7kN

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 | 2189.68 | 2250.14 |
| 2 | -750.0 | -433.0 | 2190.26 | 2250.72 |
| 3 | 750.0 | -433.0 | 2296.46 | 2356.92 |

桩总反力= 6857.8 kN; 桩均反力= 2285.9 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

> = 2296.46×1.00 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

> = 2296.46×1.00 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

> = 2296.46 (\* 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

> = 2296.46 (\* 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

=2296.46 = 1500. c = 700.

M = (-0.433\*c)/3 = 916.21 kN.m

= 2827.81

= 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 | 1827.49 (35) | 1365.60 (12) | 1920.99 (43) | 1300.01 (42) |
| 2 | 1821.85 (35) | 1299.04 (12) | 2013.68 (43) | 1152.17 (42) |
| 3 | 1894.56 (19) | 1387.42 (4) | 1934.78 (45) | 1383.17 (44) |

桩平均反力最大值1846.91 (非震)(Load 35)

桩平均反力最小值1352.45 (非震)(Load 12)

桩平均反力最大值1936.83 (震)(Load 47)

桩平均反力最小值1298.10 (震)(Load 46)

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2296.46 kN ：1000 mm (Load:73)

桩 2: 抗力3081.45 kN 冲切力2296.46 kN ：1000 mm (Load:73)

抗剪计算：

1左边： 抗力5118.03kN 剪力2296.46kN ：1000mm (Load:73)

2上边： 抗力3865.88kN 剪力2296.46kN ：1000mm (Load:73)

承台高度：

承台高1050

底板配筋计算：

弯矩916.21 kN.m 计算钢筋面积2828 Load： 73

配筋宽度833 mm

每边受弯筋 AS= 2828. 钢筋级别: HRB400