桩承台计算\_序号88

# 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=4777.0kN =-98.1kN.m =22.6kN.m =15.5kN =52.0kN

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 | 1667.84 | 1718.22 | 满足 |
| 2 | -750.0 | -433.0 | 1539.54 | 1589.92 | 满足 |
| 3 | 750.0 | -433.0 | 1569.64 | 1620.02 | 满足 |

桩总反力= 4928.2 kN; 桩均反力= 1642.7 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=4781.1kN =-81.3kN.m =39.1kN.m =20.8kN =46.6kN

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 | 1656.27 | 1706.66 | 满足 |
| 2 | -750.0 | -433.0 | 1536.31 | 1586.70 | 满足 |
| 3 | 750.0 | -433.0 | 1588.47 | 1638.85 | 满足 |

桩总反力= 4932.2 kN; 桩均反力= 1644.1 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=6342.8kN =-48.1kN.m =29.1kN.m =20.3kN =41.8kN

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 | 2151.29 | 2201.68 | 满足 |
| 2 | -750.0 | -433.0 | 2076.35 | 2126.73 | 满足 |
| 3 | 750.0 | -433.0 | 2115.15 | 2165.54 | 满足 |

桩总反力= 6493.9 kN; 桩均反力= 2164.6 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=6340.4kN =-58.2kN.m =19.2kN.m =17.1kN =45.0kN

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 | 2158.23 | 2208.62 | 满足 |
| 2 | -750.0 | -433.0 | 2078.29 | 2128.67 | 满足 |
| 3 | 750.0 | -433.0 | 2103.86 | 2154.24 | 满足 |

桩总反力= 6491.5 kN; 桩均反力= 2163.8 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=5066.4kN =-79.0kN.m =156.7kN.m =58.7kN =39.2kN

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 | 1749.62 | 1800.01 | 满足 |
| 2 | -750.0 | -433.0 | 1553.94 | 1604.32 | 满足 |
| 3 | 750.0 | -433.0 | 1762.87 | 1813.25 | 满足 |

桩总反力= 5217.6 kN; 桩均反力= 1739.2 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=6123.2kN =-51.1kN.m =-104.5kN.m =-22.4kN =49.4kN

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 | 2080.39 | 2130.78 | 满足 |
| 2 | -750.0 | -433.0 | 2091.10 | 2141.48 | 满足 |
| 3 | 750.0 | -433.0 | 1951.75 | 2002.13 | 满足 |

桩总反力= 6274.4 kN; 桩均反力= 2091.5 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=5065.1kN =-197.2kN.m =18.1kN.m =14.2kN =86.1kN

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 | 1840.18 | 1890.56 | 满足 |
| 2 | -750.0 | -433.0 | 1600.41 | 1650.79 | 满足 |
| 3 | 750.0 | -433.0 | 1624.48 | 1674.86 | 满足 |

桩总反力= 5216.2 kN; 桩均反力= 1738.7 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=6124.6kN =67.2kN.m =34.1kN.m =22.1kN =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 | 1989.84 | 2040.23 | 满足 |
| 2 | -750.0 | -433.0 | 2044.63 | 2095.01 | 满足 |
| 3 | 750.0 | -433.0 | 2090.14 | 2140.52 | 满足 |

桩总反力= 6275.8 kN; 桩均反力= 2091.9 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=5061.5kN =-82.0kN.m =154.6kN.m =58.0kN =40.2kN

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 | 1750.27 | 1800.65 | 满足 |
| 2 | -750.0 | -433.0 | 1552.55 | 1602.93 | 满足 |
| 3 | 750.0 | -433.0 | 1758.65 | 1809.03 | 满足 |

桩总反力= 5212.6 kN; 桩均反力= 1737.5 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=6128.2kN =-48.1kN.m =-102.4kN.m =-21.7kN =48.5kN

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 | 2079.75 | 2130.13 | 满足 |
| 2 | -750.0 | -433.0 | 2092.49 | 2142.87 | 满足 |
| 3 | 750.0 | -433.0 | 1955.97 | 2006.35 | 满足 |

桩总反力= 6279.4 kN; 桩均反力= 2093.1 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=7742.9kN =-89.6kN.m =34.9kN.m =24.2kN =61.3kN

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 | 2649.94 | 2710.40 |
| 2 | -750.0 | -433.0 | 2523.21 | 2583.67 |
| 3 | 750.0 | -433.0 | 2569.75 | 2630.21 |

桩总反力= 7924.3 kN; 桩均反力= 2641.4 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

> = 2649.94×1.00 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

> = 2649.94×1.00 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

> = 2649.94 (\* 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

> = 2649.94 (\* 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

=2649.94 = 1500. c = 700.

M = (-0.433\*c)/3 = 1057.24 kN.m

= 3263.08

= 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=7945.4kN =-92.2kN.m =36.6kN.m =25.4kN =63.0kN

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 | 2719.44 | 2787.45 |
| 2 | -750.0 | -433.0 | 2588.57 | 2656.59 |
| 3 | 750.0 | -433.0 | 2637.37 | 2705.38 |

桩总反力= 8149.4 kN; 桩均反力= 2716.5 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

> = 2719.44×1.00 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

> = 2719.44×1.00 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

> = 2719.44 (\* 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

> = 2719.44 (\* 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

=2719.44 = 1500. c = 700.

M = (-0.433\*c)/3 = 1084.96 kN.m

= 3348.66

= 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 | 2208.62 (35) | 1706.66 (12) | 2130.78 (43) | 1800.01 (42) |
| 2 | 2128.67 (35) | 1586.70 (12) | 2142.87 (47) | 1602.93 (46) |
| 3 | 2165.54 (19) | 1620.02 (4) | 2140.52 (45) | 1674.86 (44) |

桩平均反力最大值2164.65 (非震)(Load 19)

桩平均反力最小值1642.72 (非震)(Load 4)

桩平均反力最大值2093.12 (震)(Load 47)

桩平均反力最小值1737.54 (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2719.44 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力2719.44 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力2719.44kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力2719.44kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1084.96 kN.m 计算钢筋面积3349 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3349. 钢筋级别: HRB400