桩承台计算\_序号78

# 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

| 【2】SATWE标准组合:1.00\*恒+1.00\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5534.2kN =11.6kN.m =59.3kN.m =31.1kN =-8.6kN

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 | 1835.84 | 1886.22 | 满足 |
| 2 | -750.0 | -433.0 | 1809.67 | 1860.06 | 满足 |
| 3 | 750.0 | -433.0 | 1888.70 | 1939.08 | 满足 |

桩总反力= 5685.4 kN; 桩均反力= 1895.1 kN

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=5494.4kN =-28.2kN.m =32.0kN.m =22.2kN =3.7kN

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 | 1853.15 | 1903.54 | 满足 |
| 2 | -750.0 | -433.0 | 1799.29 | 1849.67 | 满足 |
| 3 | 750.0 | -433.0 | 1842.00 | 1892.39 | 满足 |

桩总反力= 5645.6 kN; 桩均反力= 1881.9 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=5491.7kN =-12.3kN.m =49.4kN.m =27.9kN =-1.2kN

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 | 1840.07 | 1890.45 | 满足 |
| 2 | -750.0 | -433.0 | 1792.90 | 1843.28 | 满足 |
| 3 | 750.0 | -433.0 | 1858.76 | 1909.14 | 满足 |

桩总反力= 5642.9 kN; 桩均反力= 1881.0 kN

当前荷载组合

| 【15】SATWE标准组合:1.00\*恒+1.00\*活-0.60\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7016.0kN =12.7kN.m =25.4kN.m =23.8kN =-9.3kN

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 | 2328.87 | 2379.25 | 满足 |
| 2 | -750.0 | -433.0 | 2326.66 | 2377.05 | 满足 |
| 3 | 750.0 | -433.0 | 2360.48 | 2410.86 | 满足 |

桩总反力= 7167.2 kN; 桩均反力= 2389.1 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=7039.9kN =36.6kN.m =41.7kN.m =29.1kN =-16.6kN

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 | 2318.48 | 2368.86 | 满足 |
| 2 | -750.0 | -433.0 | 2332.89 | 2383.28 | 满足 |
| 3 | 750.0 | -433.0 | 2388.50 | 2438.88 | 满足 |

桩总反力= 7191.0 kN; 桩均反力= 2397.0 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=7041.5kN =27.1kN.m =31.3kN.m =25.7kN =-13.7kN

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 | 2326.33 | 2376.72 | 满足 |
| 2 | -750.0 | -433.0 | 2336.73 | 2387.11 | 满足 |
| 3 | 750.0 | -433.0 | 2378.44 | 2428.83 | 满足 |

桩总反力= 7192.7 kN; 桩均反力= 2397.6 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=5956.1kN =4.5kN.m =177.4kN.m =72.5kN =-6.4kN

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 | 1981.90 | 2032.28 | 满足 |
| 2 | -750.0 | -433.0 | 1868.84 | 1919.23 | 满足 |
| 3 | 750.0 | -433.0 | 2105.40 | 2155.78 | 满足 |

桩总反力= 6107.3 kN; 桩均反力= 2035.8 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=6624.0kN =19.8kN.m =-103.9kN.m =-21.3kN =-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 | 2192.74 | 2243.12 | 满足 |
| 2 | -750.0 | -433.0 | 2284.90 | 2335.28 | 满足 |
| 3 | 750.0 | -433.0 | 2146.36 | 2196.75 | 满足 |

桩总反力= 6775.1 kN; 桩均反力= 2258.4 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=5946.3kN =-118.9kN.m =43.8kN.m =28.0kN =32.4kN

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 | 2073.59 | 2123.97 | 满足 |
| 2 | -750.0 | -433.0 | 1907.14 | 1957.52 | 满足 |
| 3 | 750.0 | -433.0 | 1965.55 | 2015.93 | 满足 |

桩总反力= 6097.4 kN; 桩均反力= 2032.5 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=6633.9kN =143.2kN.m =29.7kN.m =23.2kN =-50.2kN

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 | 2101.05 | 2151.44 | 满足 |
| 2 | -750.0 | -433.0 | 2246.61 | 2296.99 | 满足 |
| 3 | 750.0 | -433.0 | 2286.21 | 2336.59 | 满足 |

桩总反力= 6785.0 kN; 桩均反力= 2261.7 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=5953.5kN =1.7kN.m =175.2kN.m =71.8kN =-5.5kN

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 | 1983.21 | 2033.59 | 满足 |
| 2 | -750.0 | -433.0 | 1868.32 | 1918.70 | 满足 |
| 3 | 750.0 | -433.0 | 2101.96 | 2152.34 | 满足 |

桩总反力= 6104.6 kN; 桩均反力= 2034.9 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=6626.7kN =22.7kN.m =-101.7kN.m =-20.6kN =-12.4kN

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 | 2191.43 | 2241.82 | 满足 |
| 2 | -750.0 | -433.0 | 2285.43 | 2335.81 | 满足 |
| 3 | 750.0 | -433.0 | 2149.80 | 2200.18 | 满足 |

桩总反力= 6777.8 kN; 桩均反力= 2259.3 kN

当前荷载组合

| 【52】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y右+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5945.7kN =-115.7kN.m =47.3kN.m =29.1kN =31.4kN

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 | 2070.97 | 2121.35 | 满足 |
| 2 | -750.0 | -433.0 | 1905.86 | 1956.24 | 满足 |
| 3 | 750.0 | -433.0 | 1968.90 | 2019.28 | 满足 |

桩总反力= 6096.9 kN; 桩均反力= 2032.3 kN

当前荷载组合

| 【53】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y右-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6634.4kN =140.0kN.m =26.2kN.m =22.1kN =-49.3kN

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 | 2103.67 | 2154.05 | 满足 |
| 2 | -750.0 | -433.0 | 2247.88 | 2298.26 | 满足 |
| 3 | 750.0 | -433.0 | 2282.86 | 2333.24 | 满足 |

桩总反力= 6785.6 kN; 桩均反力= 2261.9 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=8637.8kN =15.4kN.m =52.6kN.m =36.6kN =-11.1kN

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 | 2867.44 | 2927.89 |
| 2 | -750.0 | -433.0 | 2850.14 | 2910.59 |
| 3 | 750.0 | -433.0 | 2920.23 | 2980.69 |

桩总反力= 8819.2 kN; 桩均反力= 2939.7 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

> = 2920.23×1.00 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

> = 2920.23×1.00 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

> = 2920.23 (\* 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

> = 2920.23 (\* 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

=2920.23 = 1500. c = 700.

M = (-0.433\*c)/3 = 1165.07 kN.m

= 3595.91

= 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=8907.0kN =16.7kN.m =52.8kN.m =36.8kN =-12.2kN

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 | 2956.14 | 3024.16 |
| 2 | -750.0 | -433.0 | 2940.22 | 3008.24 |
| 3 | 750.0 | -433.0 | 3010.68 | 3078.70 |

桩总反力= 9111.1 kN; 桩均反力= 3037.0 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

> = 3010.68×1.00 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

> = 3010.68×1.00 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

> = 3010.68 (\* 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

> = 3010.68 (\* 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

=3010.68 = 1500. c = 700.

M = (-0.433\*c)/3 = 1201.16 kN.m

= 3707.29

= 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 | 2379.25 (15) | 1886.22 (2) | 2243.12 (43) | 2032.28 (42) |
| 2 | 2387.11 (35) | 1843.28 (12) | 2335.81 (47) | 1918.70 (46) |
| 3 | 2438.88 (19) | 1892.39 (4) | 2336.59 (45) | 2015.93 (44) |

桩平均反力最大值2397.55 (非震)(Load 35)

桩平均反力最小值1880.96 (非震)(Load 12)

桩平均反力最大值2261.85 (震)(Load 53)

桩平均反力最小值2032.29 (震)(Load 52)

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3010.68 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力3010.68 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力3010.68kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力3010.68kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1201.16 kN.m 计算钢筋面积3707 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3707. 钢筋级别: HRB400