桩承台计算\_序号97

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1750mm

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 | 1155 |
| 2 | -1000 | -577 |
| 3 | 1000 | -577 |

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

= 5.6× 24.0

= 134.4 kN

∑ = 2000000.1 ∑ = 2000000.0

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=5568.9kN =70.8kN.m =-8.5kN.m =-18.8kN =-151.7kN

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 | 1154.7 | 1815.41 | 1860.19 | 满足 |
| 2 | -1000.0 | -577.4 | 1880.98 | 1925.76 | 满足 |
| 3 | 1000.0 | -577.3 | 1872.48 | 1917.27 | 满足 |

桩总反力= 5703.2 kN; 桩均反力= 1901.1 kN

当前荷载组合

| 【11】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=5576.6kN =60.5kN.m =2.7kN.m =-12.5kN =-144.3kN

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 | 1154.7 | 1823.97 | 1868.75 | 满足 |
| 2 | -1000.0 | -577.4 | 1874.96 | 1919.75 | 满足 |
| 3 | 1000.0 | -577.3 | 1877.69 | 1922.48 | 满足 |

桩总反力= 5711.0 kN; 桩均反力= 1903.7 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=7247.5kN =28.9kN.m =-12.0kN.m =-28.2kN =-129.5kN

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 | 1154.7 | 2399.14 | 2443.92 | 满足 |
| 2 | -1000.0 | -577.4 | 2430.18 | 2474.97 | 满足 |
| 3 | 1000.0 | -577.3 | 2418.20 | 2462.99 | 满足 |

桩总反力= 7381.9 kN; 桩均反力= 2460.6 kN

当前荷载组合

| 【30】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=7242.9kN =35.1kN.m =-18.7kN.m =-32.0kN =-134.0kN

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 | 1154.7 | 2394.00 | 2438.79 | 满足 |
| 2 | -1000.0 | -577.4 | 2433.79 | 2478.58 | 满足 |
| 3 | 1000.0 | -577.3 | 2415.08 | 2459.86 | 满足 |

桩总反力= 7377.2 kN; 桩均反力= 2459.1 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=6971.3kN =-51.0kN.m =-15.0kN.m =-27.0kN =-67.1kN

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 | 1154.7 | 2353.22 | 2398.00 | 满足 |
| 2 | -1000.0 | -577.4 | 2316.56 | 2361.34 | 满足 |
| 3 | 1000.0 | -577.3 | 2301.56 | 2346.35 | 满足 |

桩总反力= 7105.7 kN; 桩均反力= 2368.6 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=5915.1kN =139.5kN.m =-5.5kN.m =-20.1kN =-205.9kN

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 | 1154.7 | 1891.13 | 1935.91 | 满足 |
| 2 | -1000.0 | -577.4 | 2014.73 | 2059.51 | 满足 |
| 3 | 1000.0 | -577.3 | 2009.20 | 2053.99 | 满足 |

桩总反力= 6049.4 kN; 桩均反力= 2016.5 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=5981.4kN =57.9kN.m =83.1kN.m =32.1kN =-147.1kN

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 | 1154.7 | 1960.38 | 2005.16 | 满足 |
| 2 | -1000.0 | -577.4 | 1968.97 | 2013.76 | 满足 |
| 3 | 1000.0 | -577.3 | 2052.05 | 2096.83 | 满足 |

桩总反力= 6115.8 kN; 桩均反力= 2038.6 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=6905.0kN =30.7kN.m =-103.6kN.m =-79.3kN =-126.0kN

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 | 1154.7 | 2283.97 | 2328.75 | 满足 |
| 2 | -1000.0 | -577.4 | 2362.31 | 2407.10 | 满足 |
| 3 | 1000.0 | -577.3 | 2258.72 | 2303.50 | 满足 |

桩总反力= 7039.3 kN; 桩均反力= 2346.4 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=8850.7kN =55.5kN.m =-15.0kN.m =-35.2kN =-172.2kN

承台及覆土重:

= 134.4×1.20= 161.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2918.23 | 2971.97 |
| 2 | -1000.0 | -577.4 | 2973.74 | 3027.48 |
| 3 | 1000.0 | -577.3 | 2958.77 | 3012.51 |

桩总反力= 9012.0 kN; 桩均反力= 3004.0 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 2973.74×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 2973.74×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 2973.74 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 2973.74 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 2973.74 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2973.74 = 2000. c = 700.

M = (-0.433\*c)/3 = 1682.05 kN.m

= 3053.82

= 727.

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=9124.9kN =60.7kN.m =-14.9kN.m =-34.5kN =-187.5kN

承台及覆土重:

= 134.4×1.35= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 3006.61 | 3067.07 |
| 2 | -1000.0 | -577.4 | 3066.57 | 3127.03 |
| 3 | 1000.0 | -577.3 | 3051.71 | 3112.17 |

桩总反力= 9306.3 kN; 桩均反力= 3102.1 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 3066.57×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 3066.57×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 3066.57 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 3066.57 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 3066.57 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=3066.57 = 2000. c = 700.

M = (-0.433\*c)/3 = 1734.56 kN.m

= 3149.16

= 727.

# 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 | 2443.92 (18) | 1860.19 (5) | 2398.00 (44) | 1935.91 (45) |
| 2 | 2478.58 (30) | 1919.75 (11) | 2407.10 (49) | 2013.76 (48) |
| 3 | 2462.99 (18) | 1917.27 (5) | 2346.35 (44) | 2053.99 (45) |

桩平均反力最大值2460.63 (非震)(Load 18)

桩平均反力最小值1901.07 (非震)(Load 5)

桩平均反力最大值2368.56 (震)(Load 44)

桩平均反力最小值2016.47 (震)(Load 45)

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4029.30 kN 冲切力3066.57 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力3066.57 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力3066.57kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力3066.57kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1734.56 kN.m 计算钢筋面积3149 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3149. 钢筋级别: HRB400