桩承台计算\_序号104

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1400mm

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

| 【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=4441.4kN =-34.0kN.m =58.9kN.m =153.5kN =58.4kN

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 | 1154.7 | 1500.12 | 1544.90 | 满足 |
| 2 | -1000.0 | -577.4 | 1441.20 | 1485.98 | 满足 |
| 3 | 1000.0 | -577.3 | 1500.13 | 1544.92 | 满足 |

桩总反力= 4575.8 kN; 桩均反力= 1525.3 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=6005.4kN =-9.7kN.m =42.6kN.m =150.9kN =46.5kN

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 | 2007.42 | 2052.20 | 满足 |
| 2 | -1000.0 | -577.4 | 1977.70 | 2022.49 | 满足 |
| 3 | 1000.0 | -577.3 | 2020.32 | 2065.11 | 满足 |

桩总反力= 6139.8 kN; 桩均反力= 2046.6 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=4294.6kN =-10.1kN.m =156.9kN.m =242.6kN =43.9kN

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 | 1437.35 | 1482.13 | 满足 |
| 2 | -1000.0 | -577.4 | 1350.14 | 1394.92 | 满足 |
| 3 | 1000.0 | -577.3 | 1507.08 | 1551.86 | 满足 |

桩总反力= 4428.9 kN; 桩均反力= 1476.3 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=6261.8kN =-26.9kN.m =-60.7kN.m =57.3kN =56.7kN

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 | 2102.82 | 2147.61 | 满足 |
| 2 | -1000.0 | -577.4 | 2109.83 | 2154.62 | 满足 |
| 3 | 1000.0 | -577.3 | 2049.17 | 2093.96 | 满足 |

桩总反力= 6396.2 kN; 桩均反力= 2132.1 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=4294.5kN =-12.0kN.m =155.3kN.m =241.3kN =45.2kN

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 | 1154.7 | 1438.43 | 1483.21 | 满足 |
| 2 | -1000.0 | -577.4 | 1350.39 | 1395.17 | 满足 |
| 3 | 1000.0 | -577.3 | 1505.70 | 1550.49 | 满足 |

桩总反力= 4428.9 kN; 桩均反力= 1476.3 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=6261.9kN =-25.0kN.m =-59.0kN.m =58.6kN =55.3kN

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 | 2101.75 | 2146.53 | 满足 |
| 2 | -1000.0 | -577.4 | 2109.58 | 2154.37 | 满足 |
| 3 | 1000.0 | -577.3 | 2050.55 | 2095.33 | 满足 |

桩总反力= 6396.2 kN; 桩均反力= 2132.1 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=7234.6kN =-24.2kN.m =61.6kN.m =192.3kN =64.7kN

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 | 2425.50 | 2479.25 |
| 2 | -1000.0 | -577.4 | 2373.77 | 2427.52 |
| 3 | 1000.0 | -577.3 | 2435.36 | 2489.10 |

桩总反力= 7395.9 kN; 桩均反力= 2465.3 kN

a、角桩冲切

= 1350. = 450. =0.33 = 1066. =1.05

= 1350. = 524. =0.39 = 1039. =0.95

下部：

= (2+)tan(/2)

= 1.05×(2× 1066.+ 450.)×tan(1.05/2)×0.9500\* 1.433× 1350.×1e-3

= 2876.30 kN

> = 2435.36×1.00 kN

上部：

= (2+)×tan(/2)

= 0.95×(2× 1066.+ 524.)×tan(1.05/2)×0.9500\* 1.433× 1350.×1e-3

= 2629.58 kN

> = 2435.36×1.00 kN

b、抗剪切计算

承台高度 HCD= 1400.

左侧：

= 1350. = 450. =0.33

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.88\*1.75/(0.33+1.0)\* 2236.\* 1350.\*1.4329\*1.e-3

= 4980.98

> = 2435.36 (\* 1.00) kN

承台高度 HCD= 1400.00

上侧：

= 1350. = 605. =0.45

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.88\*1.75/(0.45+1.0)\* 1735.\* 1350.\*1.4329\*1.e-3

= 3558.38

> = 2435.36 (\* 1.00) kN

承台高度 HCD= 1400.00

下侧：

= 1350. = 27. =0.25

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

= 0.95\*1.75/(0.25+1.0)\* 2908.\* 1350.\*1.4329\*1.e-3

= 6909.65

> = 2435.36 (\* 1.00) kN

承台阶梯高度：

1阶高： 1400mm

c、承台板配筋计算

=2435.36 = 2000. c = 700.

M = (-0.433\*c)/3 = 1377.52 kN.m

= 3149.33

= 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=7469.0kN =-25.7kN.m =66.4kN.m =207.1kN =69.5kN

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 | 2504.53 | 2564.99 |
| 2 | -1000.0 | -577.4 | 2449.01 | 2509.47 |
| 3 | 1000.0 | -577.3 | 2515.46 | 2575.91 |

桩总反力= 7650.4 kN; 桩均反力= 2550.1 kN

a、角桩冲切

= 1350. = 450. =0.33 = 1066. =1.05

= 1350. = 524. =0.39 = 1039. =0.95

下部：

= (2+)tan(/2)

= 1.05×(2× 1066.+ 450.)×tan(1.05/2)×0.9500\* 1.433× 1350.×1e-3

= 2876.30 kN

> = 2515.46×1.00 kN

上部：

= (2+)×tan(/2)

= 0.95×(2× 1066.+ 524.)×tan(1.05/2)×0.9500\* 1.433× 1350.×1e-3

= 2629.58 kN

> = 2515.46×1.00 kN

b、抗剪切计算

承台高度 HCD= 1400.

左侧：

= 1350. = 450. =0.33

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.88\*1.75/(0.33+1.0)\* 2236.\* 1350.\*1.4329\*1.e-3

= 4980.98

> = 2515.46 (\* 1.00) kN

承台高度 HCD= 1400.00

上侧：

= 1350. = 605. =0.45

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.88\*1.75/(0.45+1.0)\* 1735.\* 1350.\*1.4329\*1.e-3

= 3558.38

> = 2515.46 (\* 1.00) kN

承台高度 HCD= 1400.00

下侧：

= 1350. = 27. =0.25

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

= 0.95\*1.75/(0.25+1.0)\* 2908.\* 1350.\*1.4329\*1.e-3

= 6909.65

> = 2515.46 (\* 1.00) kN

承台阶梯高度：

1阶高： 1400mm

c、承台板配筋计算

=2515.46 = 2000. c = 700.

M = (-0.433\*c)/3 = 1422.83 kN.m

= 3252.92

= 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 | 2052.20 (35) | 1544.90 (12) | 2147.61 (43) | 1482.13 (42) |
| 2 | 2022.49 (35) | 1485.98 (12) | 2154.62 (43) | 1394.92 (42) |
| 3 | 2065.11 (35) | 1544.92 (12) | 2095.33 (47) | 1550.49 (46) |

桩平均反力最大值2046.60 (非震)(Load 35)

桩平均反力最小值1525.27 (非震)(Load 12)

桩平均反力最大值2132.08 (震)(Load 47)

桩平均反力最小值1476.29 (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2876.30 kN 冲切力2515.46 kN ：1350 mm (Load:55)

桩 2: 抗力2629.58 kN 冲切力2515.46 kN ：1350 mm (Load:55)

抗剪计算：

1左边： 抗力4980.98kN 剪力2515.46kN ：1350mm (Load:55)

2上边： 抗力3558.38kN 剪力2515.46kN ：1350mm (Load:55)

承台高度：

承台高1400

底板配筋计算：

弯矩1422.83 kN.m 计算钢筋面积3253 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3253. 钢筋级别: HRB400