桩承台计算\_序号99

# 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

| 【10】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=4421.2kN =-35.0kN.m =-65.8kN.m =-161.3kN =61.0kN

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 | 1493.93 | 1538.71 | 满足 |
| 2 | -1000.0 | -577.4 | 1496.54 | 1541.32 | 满足 |
| 3 | 1000.0 | -577.3 | 1430.76 | 1475.55 | 满足 |

桩总反力= 4555.6 kN; 桩均反力= 1518.5 kN

当前荷载组合

| 【31】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=5974.6kN =-11.1kN.m =-50.9kN.m =-160.2kN =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 | 1154.7 | 1997.93 | 2042.71 | 满足 |
| 2 | -1000.0 | -577.4 | 2013.79 | 2058.57 | 满足 |
| 3 | 1000.0 | -577.3 | 1962.91 | 2007.69 | 满足 |

桩总反力= 6109.0 kN; 桩均反力= 2036.3 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=6225.8kN =-27.3kN.m =53.1kN.m =-65.9kN =60.2kN

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 | 2091.01 | 2135.79 | 满足 |
| 2 | -1000.0 | -577.4 | 2040.83 | 2085.62 | 满足 |
| 3 | 1000.0 | -577.3 | 2093.93 | 2138.72 | 满足 |

桩总反力= 6360.1 kN; 桩均反力= 2120.0 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=4278.3kN =-12.1kN.m =-164.5kN.m =-251.1kN =46.8kN

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 | 1154.7 | 1433.09 | 1477.87 | 满足 |
| 2 | -1000.0 | -577.4 | 1504.87 | 1549.66 | 满足 |
| 3 | 1000.0 | -577.3 | 1340.37 | 1385.15 | 满足 |

桩总反力= 4412.7 kN; 桩均反力= 1470.9 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=6225.7kN =-25.4kN.m =51.5kN.m =-67.2kN =58.9kN

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 | 2089.89 | 2134.67 | 满足 |
| 2 | -1000.0 | -577.4 | 2042.18 | 2086.97 | 满足 |
| 3 | 1000.0 | -577.3 | 2093.65 | 2138.43 | 满足 |

桩总反力= 6360.1 kN; 桩均反力= 2120.0 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=4278.4kN =-14.0kN.m =-162.9kN.m =-249.8kN =48.1kN

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 | 1434.21 | 1478.99 | 满足 |
| 2 | -1000.0 | -577.4 | 1503.52 | 1548.30 | 满足 |
| 3 | 1000.0 | -577.3 | 1340.65 | 1385.43 | 满足 |

桩总反力= 4412.7 kN; 桩均反力= 1470.9 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=7198.8kN =-25.8kN.m =-71.7kN.m =-203.7kN =69.1kN

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 | 2414.48 | 2468.22 |
| 2 | -1000.0 | -577.4 | 2428.02 | 2481.76 |
| 3 | 1000.0 | -577.3 | 2356.29 | 2410.03 |

桩总反力= 7360.0 kN; 桩均反力= 2453.3 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

> = 2428.02×1.00 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

> = 2428.02×1.00 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

> = 2428.02 (\* 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

> = 2428.02 (\* 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

> = 2428.02 (\* 1.00) kN

承台阶梯高度：

1阶高： 1400mm

c、承台板配筋计算

=2428.02 = 2000. c = 700.

M = (-0.433\*c)/3 = 1373.37 kN.m

= 3139.84

= 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=7432.0kN =-27.4kN.m =-77.1kN.m =-219.1kN =74.1kN

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 | 2493.15 | 2553.61 |
| 2 | -1000.0 | -577.4 | 2507.95 | 2568.41 |
| 3 | 1000.0 | -577.3 | 2430.89 | 2491.35 |

桩总反力= 7613.4 kN; 桩均反力= 2537.8 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

> = 2507.95×1.00 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

> = 2507.95×1.00 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

> = 2507.95 (\* 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

> = 2507.95 (\* 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

> = 2507.95 (\* 1.00) kN

承台阶梯高度：

1阶高： 1400mm

c、承台板配筋计算

=2507.95 = 2000. c = 700.

M = (-0.433\*c)/3 = 1418.58 kN.m

= 3243.21

= 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 | 2042.71 (31) | 1538.71 (10) | 2135.79 (42) | 1477.87 (43) |
| 2 | 2058.57 (31) | 1541.32 (10) | 2086.97 (48) | 1548.30 (49) |
| 3 | 2007.69 (31) | 1475.55 (10) | 2138.72 (42) | 1385.15 (43) |

桩平均反力最大值2036.33 (非震)(Load 31)

桩平均反力最小值1518.53 (非震)(Load 10)

桩平均反力最大值2120.04 (震)(Load 42)

桩平均反力最小值1470.89 (震)(Load 43)

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2507.95 kN ：1350 mm (Load:55)

桩 2: 抗力2629.58 kN 冲切力2507.95 kN ：1350 mm (Load:55)

抗剪计算：

1左边： 抗力4980.98kN 剪力2507.95kN ：1350mm (Load:55)

2上边： 抗力3558.38kN 剪力2507.95kN ：1350mm (Load:55)

承台高度：

承台高1400

底板配筋计算：

弯矩1418.58 kN.m 计算钢筋面积3243 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3243. 钢筋级别: HRB400