桩承台计算\_序号107

# 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

| 【13】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=4951.4kN =40.3kN.m =-61.2kN.m =-149.9kN =-87.2kN

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 | 1627.21 | 1672.00 | 满足 |
| 2 | -1000.0 | -577.4 | 1692.66 | 1737.44 | 满足 |
| 3 | 1000.0 | -577.3 | 1631.49 | 1676.27 | 满足 |

桩总反力= 5085.7 kN; 桩均反力= 1695.2 kN

当前荷载组合

| 【34】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=6442.2kN =18.3kN.m =-48.8kN.m =-153.1kN =-82.1kN

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 | 2136.83 | 2181.61 | 满足 |
| 2 | -1000.0 | -577.4 | 2177.09 | 2221.87 | 满足 |
| 3 | 1000.0 | -577.3 | 2128.27 | 2173.06 | 满足 |

桩总反力= 6576.5 kN; 桩均反力= 2192.2 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=6879.2kN =35.0kN.m =47.6kN.m =-68.1kN =-91.7kN

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 | 2272.87 | 2317.65 | 满足 |
| 2 | -1000.0 | -577.4 | 2279.36 | 2324.14 | 满足 |
| 3 | 1000.0 | -577.3 | 2327.00 | 2371.78 | 满足 |

桩总反力= 7013.6 kN; 桩均反力= 2337.9 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=4636.5kN =17.3kN.m =-152.9kN.m =-231.0kN =-73.6kN

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 | 1154.7 | 1535.50 | 1580.28 | 满足 |
| 2 | -1000.0 | -577.4 | 1626.95 | 1671.73 | 满足 |
| 3 | 1000.0 | -577.3 | 1474.07 | 1518.86 | 满足 |

桩总反力= 4770.9 kN; 桩均反力= 1590.3 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=6881.6kN =33.0kN.m =46.2kN.m =-69.3kN =-90.3kN

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 | 2274.85 | 2319.64 | 满足 |
| 2 | -1000.0 | -577.4 | 2280.30 | 2325.09 | 满足 |
| 3 | 1000.0 | -577.3 | 2326.49 | 2371.28 | 满足 |

桩总反力= 7016.0 kN; 桩均反力= 2338.7 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=4634.1kN =19.4kN.m =-151.4kN.m =-229.9kN =-75.1kN

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 | 1533.51 | 1578.30 | 满足 |
| 2 | -1000.0 | -577.4 | 1626.00 | 1670.79 | 满足 |
| 3 | 1000.0 | -577.3 | 1474.58 | 1519.36 | 满足 |

桩总反力= 4768.4 kN; 桩均反力= 1589.5 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=7711.1kN =33.8kN.m =-68.5kN.m =-194.3kN =-107.7kN

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 | 2550.87 | 2604.62 |
| 2 | -1000.0 | -577.4 | 2614.33 | 2668.07 |
| 3 | 1000.0 | -577.3 | 2545.87 | 2599.62 |

桩总反力= 7872.3 kN; 桩均反力= 2624.1 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

> = 2614.33×1.00 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

> = 2614.33×1.00 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

> = 2614.33 (\* 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

> = 2614.33 (\* 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

> = 2614.33 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2614.33 = 2000. c = 700.

M = (-0.433\*c)/3 = 1478.75 kN.m

= 2684.74

= 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=8078.7kN =36.2kN.m =-73.1kN.m =-207.5kN =-114.9kN

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 | 2672.00 | 2732.46 |
| 2 | -1000.0 | -577.4 | 2739.90 | 2800.36 |
| 3 | 1000.0 | -577.3 | 2666.84 | 2727.30 |

桩总反力= 8260.1 kN; 桩均反力= 2753.4 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

> = 2739.90×1.00 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

> = 2739.90×1.00 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

> = 2739.90 (\* 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

> = 2739.90 (\* 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

> = 2739.90 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2739.90 = 2000. c = 700.

M = (-0.433\*c)/3 = 1549.78 kN.m

= 2813.69

= 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 | 2181.61 (34) | 1672.00 (13) | 2319.64 (46) | 1578.30 (47) |
| 2 | 2221.87 (34) | 1737.44 (13) | 2325.09 (46) | 1670.79 (47) |
| 3 | 2173.06 (34) | 1676.27 (13) | 2371.78 (42) | 1518.86 (43) |

桩平均反力最大值2192.18 (非震)(Load 34)

桩平均反力最小值1695.24 (非震)(Load 13)

桩平均反力最大值2338.67 (震)(Load 46)

桩平均反力最小值1589.48 (震)(Load 47)

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2739.90 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力2739.90 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力2739.90kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力2739.90kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1549.78 kN.m 计算钢筋面积2814 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 2814. 钢筋级别: HRB400