桩承台计算\_序号16

# 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

| 【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=4874.6kN =-39.7kN.m =45.4kN.m =141.0kN =51.3kN

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 | 1647.79 | 1692.58 | 满足 |
| 2 | -1000.0 | -577.4 | 1590.69 | 1635.48 | 满足 |
| 3 | 1000.0 | -577.3 | 1636.12 | 1680.91 | 满足 |

桩总反力= 5009.0 kN; 桩均反力= 1669.7 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=4862.1kN =-27.9kN.m =57.7kN.m =150.5kN =41.8kN

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 | 1636.80 | 1681.59 | 满足 |
| 2 | -1000.0 | -577.4 | 1583.78 | 1628.57 | 满足 |
| 3 | 1000.0 | -577.3 | 1641.48 | 1686.26 | 满足 |

桩总反力= 4996.4 kN; 桩均反力= 1665.5 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=6568.6kN =3.8kN.m =49.8kN.m =155.4kN =20.5kN

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 | 2187.34 | 2232.13 | 满足 |
| 2 | -1000.0 | -577.4 | 2165.76 | 2210.54 | 满足 |
| 3 | 1000.0 | -577.3 | 2215.52 | 2260.30 | 满足 |

桩总反力= 6703.0 kN; 桩均反力= 2234.3 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=6576.1kN =-3.3kN.m =42.4kN.m =149.7kN =26.1kN

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 | 2193.94 | 2238.72 | 满足 |
| 2 | -1000.0 | -577.4 | 2169.90 | 2214.69 | 满足 |
| 3 | 1000.0 | -577.3 | 2212.30 | 2257.09 | 满足 |

桩总反力= 6710.5 kN; 桩均反力= 2236.8 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=5017.2kN =-110.2kN.m =53.2kN.m =156.2kN =110.3kN

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 | 1736.01 | 1780.80 | 满足 |
| 2 | -1000.0 | -577.4 | 1613.98 | 1658.77 | 满足 |
| 3 | 1000.0 | -577.3 | 1667.16 | 1711.94 | 满足 |

桩总反力= 5151.5 kN; 桩均反力= 1717.2 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=6536.8kN =85.8kN.m =41.6kN.m =139.2kN =-47.5kN

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 | 2129.42 | 2174.20 | 满足 |
| 2 | -1000.0 | -577.4 | 2182.88 | 2227.66 | 满足 |
| 3 | 1000.0 | -577.3 | 2224.53 | 2269.31 | 满足 |

桩总反力= 6671.2 kN; 桩均反力= 2223.7 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=5108.2kN =-8.6kN.m =153.8kN.m =241.9kN =27.9kN

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 | 1707.67 | 1752.46 | 满足 |
| 2 | -1000.0 | -577.4 | 1623.37 | 1668.16 | 满足 |
| 3 | 1000.0 | -577.3 | 1777.16 | 1821.94 | 满足 |

桩总反力= 5242.6 kN; 桩均反力= 1747.5 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=6445.8kN =-15.9kN.m =-59.0kN.m =53.5kN =34.9kN

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 | 2157.76 | 2202.54 | 满足 |
| 2 | -1000.0 | -577.4 | 2173.49 | 2218.28 | 满足 |
| 3 | 1000.0 | -577.3 | 2114.53 | 2159.31 | 满足 |

桩总反力= 6580.1 kN; 桩均反力= 2193.4 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=5014.6kN =-107.8kN.m =55.6kN.m =158.1kN =108.4kN

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 | 1733.81 | 1778.60 | 满足 |
| 2 | -1000.0 | -577.4 | 1612.60 | 1657.39 | 满足 |
| 3 | 1000.0 | -577.3 | 1668.23 | 1713.01 | 满足 |

桩总反力= 5149.0 kN; 桩均反力= 1716.3 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=6539.3kN =83.4kN.m =39.2kN.m =137.3kN =-45.6kN

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 | 2131.61 | 2176.40 | 满足 |
| 2 | -1000.0 | -577.4 | 2184.26 | 2229.04 | 满足 |
| 3 | 1000.0 | -577.3 | 2223.46 | 2268.24 | 满足 |

桩总反力= 6673.7 kN; 桩均反力= 2224.6 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=7933.2kN =-16.6kN.m =61.5kN.m =192.0kN =41.8kN

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 | 2653.96 | 2707.70 |
| 2 | -1000.0 | -577.4 | 2608.85 | 2662.59 |
| 3 | 1000.0 | -577.3 | 2670.39 | 2724.13 |

桩总反力= 8094.4 kN; 桩均反力= 2698.1 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

> = 2670.39×1.00 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

> = 2670.39×1.00 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

> = 2670.39 (\* 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

> = 2670.39 (\* 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

> = 2670.39 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2670.39 = 2000. c = 700.

M = (-0.433\*c)/3 = 1510.46 kN.m

= 2742.30

= 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=8180.5kN =-17.2kN.m =65.8kN.m =205.0kN =44.0kN

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 | 2736.77 | 2797.23 |
| 2 | -1000.0 | -577.4 | 2688.97 | 2749.43 |
| 3 | 1000.0 | -577.3 | 2754.75 | 2815.21 |

桩总反力= 8361.9 kN; 桩均反力= 2787.3 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

> = 2754.75×1.00 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

> = 2754.75×1.00 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

> = 2754.75 (\* 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

> = 2754.75 (\* 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

> = 2754.75 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2754.75 = 2000. c = 700.

M = (-0.433\*c)/3 = 1558.18 kN.m

= 2828.94

= 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 | 2238.72 (35) | 1681.59 (12) | 2202.54 (47) | 1752.46 (46) |
| 2 | 2214.69 (35) | 1628.57 (12) | 2229.04 (53) | 1657.39 (52) |
| 3 | 2260.30 (19) | 1680.91 (4) | 2269.31 (45) | 1711.94 (44) |

桩平均反力最大值2236.83 (非震)(Load 35)

桩平均反力最小值1665.47 (非震)(Load 12)

桩平均反力最大值2224.56 (震)(Load 53)

桩平均反力最小值1716.33 (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4029.30 kN 冲切力2754.75 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力2754.75 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力2754.75kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力2754.75kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1558.18 kN.m 计算钢筋面积2829 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 2829. 钢筋级别: HRB400