桩承台计算\_序号106

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1100mm

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 | 866 |
| 2 | -750 | -433 |
| 3 | 750 | -433 |

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

= 6.3× 24.0

= 151.1 kN

∑ = 1125000.0 ∑ = 1125000.0

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=4782.3kN =-97.0kN.m =-21.3kN.m =-14.9kN =51.6kN

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 | 866.0 | 1668.77 | 1719.15 | 满足 |
| 2 | -750.0 | -433.0 | 1570.98 | 1621.37 | 满足 |
| 3 | 750.0 | -433.0 | 1542.57 | 1592.95 | 满足 |

桩总反力= 4933.5 kN; 桩均反力= 1644.5 kN

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=4786.9kN =-80.0kN.m =-38.2kN.m =-20.3kN =46.2kN

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 | 866.0 | 1657.21 | 1707.59 | 满足 |
| 2 | -750.0 | -433.0 | 1590.32 | 1640.70 | 满足 |
| 3 | 750.0 | -433.0 | 1539.40 | 1589.78 | 满足 |

桩总反力= 4938.1 kN; 桩均反力= 1646.0 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=6349.0kN =-47.0kN.m =-29.2kN.m =-20.0kN =41.4kN

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 | 866.0 | 2152.53 | 2202.91 | 满足 |
| 2 | -750.0 | -433.0 | 2117.68 | 2168.06 | 满足 |
| 3 | 750.0 | -433.0 | 2078.81 | 2129.20 | 满足 |

桩总反力= 6500.2 kN; 桩均反力= 2166.7 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=6346.3kN =-57.2kN.m =-19.0kN.m =-16.8kN =44.7kN

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 | 866.0 | 2159.46 | 2209.84 | 满足 |
| 2 | -750.0 | -433.0 | 2106.08 | 2156.46 | 满足 |
| 3 | 750.0 | -433.0 | 2080.72 | 2131.10 | 满足 |

桩总反力= 6497.4 kN; 桩均反力= 2165.8 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=6117.3kN =-48.9kN.m =105.1kN.m =23.0kN =49.5kN

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 | 866.0 | 2076.77 | 2127.16 | 满足 |
| 2 | -750.0 | -433.0 | 1950.16 | 2000.54 | 满足 |
| 3 | 750.0 | -433.0 | 2090.35 | 2140.73 | 满足 |

桩总反力= 6268.4 kN; 桩均反力= 2089.5 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=5083.4kN =-79.0kN.m =-156.4kN.m =-58.3kN =38.5kN

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 | 866.0 | 1755.24 | 1805.63 | 满足 |
| 2 | -750.0 | -433.0 | 1768.34 | 1818.72 | 满足 |
| 3 | 750.0 | -433.0 | 1559.78 | 1610.16 | 满足 |

桩总反力= 5234.5 kN; 桩均反力= 1744.8 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=5079.5kN =-194.0kN.m =-17.2kN.m =-13.6kN =85.1kN

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 | 866.0 | 1842.53 | 1892.91 | 满足 |
| 2 | -750.0 | -433.0 | 1629.97 | 1680.36 | 满足 |
| 3 | 750.0 | -433.0 | 1607.03 | 1657.41 | 满足 |

桩总反力= 5230.7 kN; 桩均反力= 1743.6 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=6121.1kN =66.1kN.m =-34.1kN.m =-21.7kN =2.9kN

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 | 866.0 | 1989.48 | 2039.87 | 满足 |
| 2 | -750.0 | -433.0 | 2088.53 | 2138.91 | 满足 |
| 3 | 750.0 | -433.0 | 2043.09 | 2093.48 | 满足 |

桩总反力= 6272.3 kN; 桩均反力= 2090.8 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=6122.3kN =-45.9kN.m =103.0kN.m =22.3kN =48.6kN

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 | 866.0 | 2076.12 | 2126.50 | 满足 |
| 2 | -750.0 | -433.0 | 1954.44 | 2004.83 | 满足 |
| 3 | 750.0 | -433.0 | 2091.72 | 2142.10 | 满足 |

桩总反力= 6273.4 kN; 桩均反力= 2091.1 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=5078.4kN =-82.0kN.m =-154.2kN.m =-57.6kN =39.4kN

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 | 866.0 | 1755.90 | 1806.28 | 满足 |
| 2 | -750.0 | -433.0 | 1764.06 | 1814.44 | 满足 |
| 3 | 750.0 | -433.0 | 1558.40 | 1608.78 | 满足 |

桩总反力= 5229.5 kN; 桩均反力= 1743.2 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=7752.0kN =-88.2kN.m =-34.4kN.m =-23.7kN =60.9kN

承台及覆土重:

= 151.1×1.20= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2651.91 | 2712.37 |
| 2 | -750.0 | -433.0 | 2572.99 | 2633.45 |
| 3 | 750.0 | -433.0 | 2527.10 | 2587.56 |

桩总反力= 7933.4 kN; 桩均反力= 2644.5 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2651.91×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2651.91×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2651.91 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2651.91 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2651.91 = 1500. c = 700.

M = (-0.433\*c)/3 = 1058.02 kN.m

= 3110.00

= 833.

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=7953.7kN =-90.7kN.m =-36.0kN.m =-24.8kN =62.5kN

承台及覆土重:

= 151.1×1.35= 204.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2721.08 | 2789.09 |
| 2 | -750.0 | -433.0 | 2640.33 | 2708.35 |
| 3 | 750.0 | -433.0 | 2592.33 | 2660.34 |

桩总反力= 8157.8 kN; 桩均反力= 2719.3 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2721.08×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2721.08×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2721.08 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2721.08 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2721.08 = 1500. c = 700.

M = (-0.433\*c)/3 = 1085.62 kN.m

= 3191.12

= 833.

# 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 | 2209.84 (31) | 1707.59 (10) | 2127.16 (42) | 1805.63 (43) |
| 2 | 2168.06 (19) | 1621.37 (4) | 2138.91 (45) | 1680.36 (44) |
| 3 | 2131.10 (31) | 1589.78 (10) | 2142.10 (48) | 1608.78 (49) |

桩平均反力最大值2166.72 (非震)(Load 19)

桩平均反力最小值1644.49 (非震)(Load 4)

桩平均反力最大值2091.14 (震)(Load 48)

桩平均反力最小值1743.17 (震)(Load 49)

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3370.56 kN 冲切力2721.08 kN ：1050 mm (Load:55)

桩 2: 抗力3312.91 kN 冲切力2721.08 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力5308.79kN 剪力2721.08kN ：1050mm (Load:55)

2上边： 抗力4056.35kN 剪力2721.08kN ：1050mm (Load:55)

承台高度：

承台高1100

底板配筋计算：

弯矩1085.62 kN.m 计算钢筋面积3191 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3191. 钢筋级别: HRB400