桩承台计算\_序号111

# 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=4214.8kN =-45.4kN.m =-59.0kN.m =-40.9kN =15.8kN

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 | 866.0 | 1439.86 | 1490.24 | 满足 |
| 2 | -750.0 | -433.0 | 1426.82 | 1477.20 | 满足 |
| 3 | 750.0 | -433.0 | 1348.10 | 1398.49 | 满足 |

桩总反力= 4365.9 kN; 桩均反力= 1455.3 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=4226.0kN =-30.2kN.m =-74.1kN.m =-44.9kN =11.5kN

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 | 1431.92 | 1482.31 | 满足 |
| 2 | -750.0 | -433.0 | 1446.42 | 1496.80 | 满足 |
| 3 | 750.0 | -433.0 | 1347.64 | 1398.02 | 满足 |

桩总反力= 4377.1 kN; 桩均反力= 1459.0 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=5852.3kN =13.0kN.m =-67.6kN.m =-46.5kN =-0.2kN

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 | 1940.75 | 1991.13 | 满足 |
| 2 | -750.0 | -433.0 | 2000.83 | 2051.22 | 满足 |
| 3 | 750.0 | -433.0 | 1910.71 | 1961.10 | 满足 |

桩总反力= 6003.4 kN; 桩均反力= 2001.1 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=5845.6kN =3.9kN.m =-58.6kN.m =-44.1kN =2.4kN

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 | 1945.51 | 1995.90 | 满足 |
| 2 | -750.0 | -433.0 | 1989.07 | 2039.46 | 满足 |
| 3 | 750.0 | -433.0 | 1910.99 | 1961.38 | 满足 |

桩总反力= 5996.7 kN; 桩均反力= 1998.9 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=4201.2kN =-130.3kN.m =-75.7kN.m =-51.2kN =40.7kN

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 | 1500.71 | 1551.09 | 满足 |
| 2 | -750.0 | -433.0 | 1400.70 | 1451.09 | 满足 |
| 3 | 750.0 | -433.0 | 1299.81 | 1350.19 | 满足 |

桩总反力= 4352.4 kN; 桩均反力= 1450.8 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=5996.5kN =112.7kN.m =-49.2kN.m =-35.0kN =-29.3kN

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 | 866.0 | 1912.10 | 1962.48 | 满足 |
| 2 | -750.0 | -433.0 | 2075.01 | 2125.40 | 满足 |
| 3 | 750.0 | -433.0 | 2009.36 | 2059.75 | 满足 |

桩总反力= 6147.6 kN; 桩均反力= 2049.2 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=5740.6kN =-14.3kN.m =64.1kN.m =-4.9kN =7.7kN

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 | 1924.54 | 1974.92 | 满足 |
| 2 | -750.0 | -433.0 | 1865.27 | 1915.65 | 满足 |
| 3 | 750.0 | -433.0 | 1950.75 | 2001.13 | 满足 |

桩总反力= 5891.7 kN; 桩均反力= 1963.9 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=4457.1kN =-3.3kN.m =-189.0kN.m =-81.3kN =3.7kN

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 | 1488.27 | 1538.65 | 满足 |
| 2 | -750.0 | -433.0 | 1610.45 | 1660.83 | 满足 |
| 3 | 750.0 | -433.0 | 1358.42 | 1408.81 | 满足 |

桩总反力= 4608.3 kN; 桩均反力= 1536.1 kN

当前荷载组合

| 【50】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y左+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4203.5kN =-127.3kN.m =-78.7kN.m =-52.0kN =39.9kN

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 | 1499.12 | 1549.51 | 满足 |
| 2 | -750.0 | -433.0 | 1404.62 | 1455.01 | 满足 |
| 3 | 750.0 | -433.0 | 1299.71 | 1350.10 | 满足 |

桩总反力= 4354.6 kN; 桩均反力= 1451.5 kN

当前荷载组合

| 【51】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y左-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5994.2kN =109.6kN.m =-46.2kN.m =-34.2kN =-28.5kN

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 | 1913.68 | 1964.07 | 满足 |
| 2 | -750.0 | -433.0 | 2071.09 | 2121.48 | 满足 |
| 3 | 750.0 | -433.0 | 2009.46 | 2059.84 | 满足 |

桩总反力= 6145.4 kN; 桩均反力= 2048.5 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=7010.7kN =-11.0kN.m =-87.3kN.m =-60.2kN =7.3kN

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 | 2345.37 | 2405.83 |
| 2 | -750.0 | -433.0 | 2390.83 | 2451.29 |
| 3 | 750.0 | -433.0 | 2274.47 | 2334.93 |

桩总反力= 7192.0 kN; 桩均反力= 2397.3 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

> = 2390.83×1.00 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

> = 2390.83×1.00 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

> = 2390.83 (\* 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

> = 2390.83 (\* 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

=2390.83 = 1500. c = 700.

M = (-0.433\*c)/3 = 953.86 kN.m

= 2803.83

= 833.

当前荷载组合

| 【73】SATWE基本组合:1.20\*恒+1.40\*活-0.84\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7285.0kN =19.9kN.m =-83.7kN.m =-57.6kN =-1.4kN

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 | 2412.98 | 2473.44 |
| 2 | -750.0 | -433.0 | 2491.77 | 2552.23 |
| 3 | 750.0 | -433.0 | 2380.20 | 2440.66 |

桩总反力= 7466.3 kN; 桩均反力= 2488.8 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

> = 2491.77×1.00 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

> = 2491.77×1.00 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

> = 2491.77 (\* 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

> = 2491.77 (\* 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

=2491.77 = 1500. c = 700.

M = (-0.433\*c)/3 = 994.13 kN.m

= 2922.20

= 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 | 1995.90 (31) | 1482.31 (10) | 1974.92 (48) | 1538.65 (49) |
| 2 | 2051.22 (19) | 1477.20 (4) | 2125.40 (45) | 1451.09 (44) |
| 3 | 1961.38 (31) | 1398.02 (10) | 2059.84 (51) | 1350.10 (50) |

桩平均反力最大值2001.15 (非震)(Load 19)

桩平均反力最小值1455.31 (非震)(Load 4)

桩平均反力最大值2049.21 (震)(Load 45)

桩平均反力最小值1450.79 (震)(Load 44)

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2491.77 kN ：1050 mm (Load:73)

桩 2: 抗力3312.91 kN 冲切力2491.77 kN ：1050 mm (Load:73)

抗剪计算：

1左边： 抗力5308.79kN 剪力2491.77kN ：1050mm (Load:73)

2上边： 抗力4056.35kN 剪力2491.77kN ：1050mm (Load:73)

承台高度：

承台高1100

底板配筋计算：

弯矩994.13 kN.m 计算钢筋面积2922 Load： 73

配筋宽度833 mm

每边受弯筋 AS= 2922. 钢筋级别: HRB400