桩承台计算\_序号110

# 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=4353.8kN =-46.7kN.m =50.3kN.m =34.8kN =16.5kN

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 | 1487.20 | 1537.59 | 满足 |
| 2 | -750.0 | -433.0 | 1399.76 | 1450.14 | 满足 |
| 3 | 750.0 | -433.0 | 1466.85 | 1517.23 | 满足 |

桩总反力= 4505.0 kN; 桩均反力= 1501.7 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=4344.1kN =-30.9kN.m =66.5kN.m =39.7kN =11.7kN

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 | 1471.82 | 1522.20 | 满足 |
| 2 | -750.0 | -433.0 | 1391.80 | 1442.18 | 满足 |
| 3 | 750.0 | -433.0 | 1480.47 | 1530.85 | 满足 |

桩总反力= 4495.2 kN; 桩均反力= 1498.4 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=5979.3kN =15.3kN.m =60.8kN.m =42.3kN =-1.9kN

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 | 1981.33 | 2031.71 | 满足 |
| 2 | -750.0 | -433.0 | 1958.48 | 2008.87 | 满足 |
| 3 | 750.0 | -433.0 | 2039.49 | 2089.87 | 满足 |

桩总反力= 6130.5 kN; 桩均反力= 2043.5 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=5985.1kN =5.8kN.m =51.0kN.m =39.3kN =1.0kN

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 | 866.0 | 1990.56 | 2040.95 | 满足 |
| 2 | -750.0 | -433.0 | 1963.26 | 2013.64 | 满足 |
| 3 | 750.0 | -433.0 | 2031.31 | 2081.70 | 满足 |

桩总反力= 6136.3 kN; 桩均反力= 2045.4 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=4607.8kN =-0.6kN.m =185.2kN.m =78.1kN =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 | 1536.38 | 1586.77 | 满足 |
| 2 | -750.0 | -433.0 | 1412.26 | 1462.64 | 满足 |
| 3 | 750.0 | -433.0 | 1659.17 | 1709.55 | 满足 |

桩总反力= 4759.0 kN; 桩均反力= 1586.3 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=5832.4kN =-15.4kN.m =-75.0kN.m =-1.6kN =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 | 1955.99 | 2006.37 | 满足 |
| 2 | -750.0 | -433.0 | 1988.19 | 2038.57 | 满足 |
| 3 | 750.0 | -433.0 | 1888.24 | 1938.63 | 满足 |

桩总反力= 5983.6 kN; 桩均反力= 1994.5 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=4481.0kN =-135.6kN.m =62.9kN.m =41.7kN =44.0kN

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 | 866.0 | 1598.02 | 1648.40 | 满足 |
| 2 | -750.0 | -433.0 | 1399.58 | 1449.96 | 满足 |
| 3 | 750.0 | -433.0 | 1483.38 | 1533.76 | 满足 |

桩总反力= 4632.1 kN; 桩均反力= 1544.0 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=5959.3kN =119.6kN.m =47.4kN.m =34.8kN =-34.0kN

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 | 866.0 | 1894.36 | 1944.74 | 满足 |
| 2 | -750.0 | -433.0 | 2000.87 | 2051.25 | 满足 |
| 3 | 750.0 | -433.0 | 2064.03 | 2114.41 | 满足 |

桩总反力= 6110.4 kN; 桩均反力= 2036.8 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=4479.0kN =-132.4kN.m =66.1kN.m =42.7kN =43.0kN

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 | 866.0 | 1594.94 | 1645.32 | 满足 |
| 2 | -750.0 | -433.0 | 1397.99 | 1448.37 | 满足 |
| 3 | 750.0 | -433.0 | 1486.10 | 1536.49 | 满足 |

桩总反力= 4630.2 kN; 桩均反力= 1543.4 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=5961.2kN =116.4kN.m =44.1kN.m =33.8kN =-33.0kN

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 | 866.0 | 1897.44 | 1947.82 | 满足 |
| 2 | -750.0 | -433.0 | 2002.46 | 2052.84 | 满足 |
| 3 | 750.0 | -433.0 | 2061.30 | 2111.69 | 满足 |

桩总反力= 6112.3 kN; 桩均反力= 2037.4 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=7221.8kN =-9.3kN.m =77.2kN.m =53.6kN =6.0kN

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 | 2414.44 | 2474.90 |
| 2 | -750.0 | -433.0 | 2352.20 | 2412.66 |
| 3 | 750.0 | -433.0 | 2455.12 | 2515.58 |

桩总反力= 7403.1 kN; 桩均反力= 2467.7 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

> = 2455.12×1.00 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

> = 2455.12×1.00 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

> = 2455.12 (\* 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

> = 2455.12 (\* 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

=2455.12 = 1500. c = 700.

M = (-0.433\*c)/3 = 979.51 kN.m

= 2879.22

= 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=7446.7kN =23.0kN.m =75.4kN.m =52.5kN =-3.7kN

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 | 2464.50 | 2524.96 |
| 2 | -750.0 | -433.0 | 2440.83 | 2501.29 |
| 3 | 750.0 | -433.0 | 2541.38 | 2601.84 |

桩总反力= 7628.1 kN; 桩均反力= 2542.7 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

> = 2541.38×1.00 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

> = 2541.38×1.00 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

> = 2541.38 (\* 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

> = 2541.38 (\* 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

=2541.38 = 1500. c = 700.

M = (-0.433\*c)/3 = 1013.92 kN.m

= 2980.38

= 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 | 2040.95 (35) | 1522.20 (12) | 2006.37 (43) | 1586.77 (42) |
| 2 | 2013.64 (35) | 1442.18 (12) | 2052.84 (53) | 1448.37 (52) |
| 3 | 2089.87 (19) | 1517.23 (4) | 2114.41 (45) | 1533.76 (44) |

桩平均反力最大值2045.43 (非震)(Load 35)

桩平均反力最小值1498.41 (非震)(Load 12)

桩平均反力最大值2037.45 (震)(Load 53)

桩平均反力最小值1543.39 (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3370.56 kN 冲切力2541.38 kN ：1050 mm (Load:73)

桩 2: 抗力3312.91 kN 冲切力2541.38 kN ：1050 mm (Load:73)

抗剪计算：

1左边： 抗力5308.79kN 剪力2541.38kN ：1050mm (Load:73)

2上边： 抗力4056.35kN 剪力2541.38kN ：1050mm (Load:73)

承台高度：

承台高1100

底板配筋计算：

弯矩1013.92 kN.m 计算钢筋面积2980 Load： 73

配筋宽度833 mm

每边受弯筋 AS= 2980. 钢筋级别: HRB400