桩承台计算\_序号82

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1050mm

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=4289.5kN =-29.7kN.m =-6.6kN.m =-4.6kN =4.8kN

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 | 1452.69 | 1503.07 | 满足 |
| 2 | -750.0 | -433.0 | 1422.84 | 1473.23 | 满足 |
| 3 | 750.0 | -433.0 | 1414.02 | 1464.40 | 满足 |

桩总反力= 4440.7 kN; 桩均反力= 1480.2 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=4323.1kN =-12.2kN.m =-24.9kN.m =-10.8kN =-1.1kN

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 | 1450.44 | 1500.82 | 满足 |
| 2 | -750.0 | -433.0 | 1452.93 | 1503.32 | 满足 |
| 3 | 750.0 | -433.0 | 1419.69 | 1470.08 | 满足 |

桩总反力= 4474.2 kN; 桩均反力= 1491.4 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=5615.6kN =39.4kN.m =-9.7kN.m =-6.5kN =-18.5kN

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 | 1841.51 | 1891.89 | 满足 |
| 2 | -750.0 | -433.0 | 1893.54 | 1943.93 | 满足 |
| 3 | 750.0 | -433.0 | 1880.55 | 1930.93 | 满足 |

桩总反力= 5766.8 kN; 桩均反力= 1922.3 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=5595.5kN =29.0kN.m =1.2kN.m =-2.7kN =-15.0kN

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 | 1842.86 | 1893.24 | 满足 |
| 2 | -750.0 | -433.0 | 1875.49 | 1925.87 | 满足 |
| 3 | 750.0 | -433.0 | 1877.14 | 1927.53 | 满足 |

桩总反力= 5746.6 kN; 桩均反力= 1915.5 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=4537.5kN =-123.9kN.m =-1.1kN.m =-3.0kN =36.0kN

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 | 1607.88 | 1658.27 | 满足 |
| 2 | -750.0 | -433.0 | 1465.53 | 1515.91 | 满足 |
| 3 | 750.0 | -433.0 | 1464.11 | 1514.50 | 满足 |

桩总反力= 4688.7 kN; 桩均反力= 1562.9 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=5425.3kN =150.4kN.m =-15.6kN.m =-8.1kN =-55.3kN

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 | 1692.62 | 1743.00 | 满足 |
| 2 | -750.0 | -433.0 | 1876.71 | 1927.09 | 满足 |
| 3 | 750.0 | -433.0 | 1855.93 | 1906.31 | 满足 |

桩总反力= 5576.4 kN; 桩均反力= 1858.8 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=5167.3kN =7.3kN.m =134.1kN.m =43.3kN =-6.6kN

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 | 1716.83 | 1767.21 | 满足 |
| 2 | -750.0 | -433.0 | 1635.86 | 1686.25 | 满足 |
| 3 | 750.0 | -433.0 | 1814.60 | 1864.98 | 满足 |

桩总反力= 5318.4 kN; 桩均反力= 1772.8 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=4795.5kN =19.3kN.m =-150.7kN.m =-54.5kN =-12.6kN

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 | 1583.68 | 1634.06 | 满足 |
| 2 | -750.0 | -433.0 | 1706.37 | 1756.75 | 满足 |
| 3 | 750.0 | -433.0 | 1505.44 | 1555.83 | 满足 |

桩总反力= 4946.6 kN; 桩均反力= 1648.9 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=6854.1kN =17.6kN.m =-11.6kN.m =-7.8kN =-12.5kN

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 | 2271.18 | 2331.63 |
| 2 | -750.0 | -433.0 | 2299.19 | 2359.65 |
| 3 | 750.0 | -433.0 | 2283.72 | 2344.18 |

桩总反力= 7035.5 kN; 桩均反力= 2345.2 kN

a、角桩冲切

= 1000. = 200. =0.25 = 1499. =1.24

= 1000. = 274. =0.27 = 1472. =1.18

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3223.78 kN

> = 2299.19×1.00 kN

上部：

= (2+)×tan(/2)

= 1.18×(2× 1499.+ 274.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3081.45 kN

> = 2299.19×1.00 kN

b、抗剪切计算

承台高度 HCD= 1050.

左侧：

= 1000. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.25+1.0)\* 2698.\* 1000.\*1.4329\*1.e-3

= 5118.03

> = 2299.19 (\* 1.00) kN

承台高度 HCD= 1050.00

上侧：

= 1000. = 316. =0.32

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.32+1.0)\* 2145.\* 1000.\*1.4329\*1.e-3

= 3865.88

> = 2299.19 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1050mm

c、承台板配筋计算

=2299.19 = 1500. c = 700.

M = (-0.433\*c)/3 = 917.30 kN.m

= 2831.18

= 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=7059.0kN =18.5kN.m =-11.8kN.m =-8.0kN =-13.4kN

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 | 2338.74 | 2406.75 |
| 2 | -750.0 | -433.0 | 2368.04 | 2436.06 |
| 3 | 750.0 | -433.0 | 2352.24 | 2420.26 |

桩总反力= 7263.1 kN; 桩均反力= 2421.0 kN

a、角桩冲切

= 1000. = 200. =0.25 = 1499. =1.24

= 1000. = 274. =0.27 = 1472. =1.18

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3223.78 kN

> = 2368.04×1.00 kN

上部：

= (2+)×tan(/2)

= 1.18×(2× 1499.+ 274.)×tan(1.05/2)×0.9792\* 1.433× 1000.×1e-3

= 3081.45 kN

> = 2368.04×1.00 kN

b、抗剪切计算

承台高度 HCD= 1050.

左侧：

= 1000. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.25+1.0)\* 2698.\* 1000.\*1.4329\*1.e-3

= 5118.03

> = 2368.04 (\* 1.00) kN

承台高度 HCD= 1050.00

上侧：

= 1000. = 316. =0.32

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.95\*1.75/(0.32+1.0)\* 2145.\* 1000.\*1.4329\*1.e-3

= 3865.88

> = 2368.04 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1050mm

c、承台板配筋计算

=2368.04 = 1500. c = 700.

M = (-0.433\*c)/3 = 944.77 kN.m

= 2915.95

= 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 | 1893.24 (31) | 1500.82 (10) | 1767.21 (48) | 1634.06 (49) |
| 2 | 1943.93 (19) | 1473.23 (4) | 1927.09 (45) | 1515.91 (44) |
| 3 | 1930.93 (19) | 1464.40 (4) | 1906.31 (45) | 1514.50 (44) |

桩平均反力最大值1922.25 (非震)(Load 19)

桩平均反力最小值1480.23 (非震)(Load 4)

桩平均反力最大值1858.80 (震)(Load 45)

桩平均反力最小值1562.89 (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3223.78 kN 冲切力2368.04 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力2368.04 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力2368.04kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力2368.04kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩944.77 kN.m 计算钢筋面积2916 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 2916. 钢筋级别: HRB400