桩承台计算\_序号87

# 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

| 【5】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=4800.6kN =94.3kN.m =23.3kN.m =16.4kN =-50.8kN

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 | 1527.58 | 1577.96 | 满足 |
| 2 | -750.0 | -433.0 | 1620.96 | 1671.34 | 满足 |
| 3 | 750.0 | -433.0 | 1652.07 | 1702.45 | 满足 |

桩总反力= 4951.8 kN; 桩均反力= 1650.6 kN

当前荷载组合

| 【11】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=4806.8kN =79.2kN.m =40.5kN.m =21.9kN =-46.3kN

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 | 1541.28 | 1591.66 | 满足 |
| 2 | -750.0 | -433.0 | 1605.75 | 1656.13 | 满足 |
| 3 | 750.0 | -433.0 | 1659.79 | 1710.17 | 满足 |

桩总反力= 4958.0 kN; 桩均反力= 1652.7 kN

当前荷载组合

| 【18】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=6375.1kN =46.3kN.m =31.7kN.m =22.0kN =-41.7kN

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 | 2089.38 | 2139.77 | 满足 |
| 2 | -750.0 | -433.0 | 2121.76 | 2172.14 | 满足 |
| 3 | 750.0 | -433.0 | 2163.96 | 2214.35 | 满足 |

桩总反力= 6526.3 kN; 桩均反力= 2175.4 kN

当前荷载组合

| 【30】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=6371.4kN =55.4kN.m =21.3kN.m =18.6kN =-44.4kN

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 | 2081.17 | 2131.55 | 满足 |
| 2 | -750.0 | -433.0 | 2130.88 | 2181.27 | 满足 |
| 3 | 750.0 | -433.0 | 2159.33 | 2209.72 | 满足 |

桩总反力= 6522.5 kN; 桩均反力= 2174.2 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=5169.4kN =48.5kN.m =160.7kN.m =61.2kN =-49.0kN

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 | 1685.77 | 1736.15 | 满足 |
| 2 | -750.0 | -433.0 | 1634.65 | 1685.03 | 满足 |
| 3 | 750.0 | -433.0 | 1848.95 | 1899.33 | 满足 |

桩总反力= 5320.5 kN; 桩均反力= 1773.5 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=6073.9kN =76.2kN.m =-104.9kN.m =-22.3kN =-38.6kN

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 | 1965.99 | 2016.38 | 满足 |
| 2 | -750.0 | -433.0 | 2123.91 | 2174.30 | 满足 |
| 3 | 750.0 | -433.0 | 1984.00 | 2034.39 | 满足 |

桩总反力= 6225.1 kN; 桩均反力= 2075.0 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=6138.1kN =-68.7kN.m =36.3kN.m =23.5kN =-2.8kN

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 | 2098.91 | 2149.30 | 满足 |
| 2 | -750.0 | -433.0 | 1995.42 | 2045.80 | 满足 |
| 3 | 750.0 | -433.0 | 2043.81 | 2094.19 | 满足 |

桩总反力= 6289.3 kN; 桩均反力= 2096.4 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=5105.1kN =193.4kN.m =19.5kN.m =15.4kN =-84.8kN

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 | 1552.85 | 1603.23 | 满足 |
| 2 | -750.0 | -433.0 | 1763.14 | 1813.52 | 满足 |
| 3 | 750.0 | -433.0 | 1789.15 | 1839.53 | 满足 |

桩总反力= 5256.3 kN; 桩均反力= 1752.1 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=7789.4kN =87.4kN.m =37.5kN.m =26.2kN =-61.1kN

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 | 2529.14 | 2589.60 |
| 2 | -750.0 | -433.0 | 2605.08 | 2665.54 |
| 3 | 750.0 | -433.0 | 2655.15 | 2715.60 |

桩总反力= 7970.7 kN; 桩均反力= 2656.9 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

> = 2655.15×1.00 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

> = 2655.15×1.00 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

> = 2655.15 (\* 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

> = 2655.15 (\* 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

=2655.15 = 1500. c = 700.

M = (-0.433\*c)/3 = 1059.31 kN.m

= 3269.49

= 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=7987.0kN =89.0kN.m =39.2kN.m =27.3kN =-62.4kN

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 | 2593.83 | 2661.85 |
| 2 | -750.0 | -433.0 | 2670.45 | 2738.46 |
| 3 | 750.0 | -433.0 | 2722.73 | 2790.75 |

桩总反力= 8191.1 kN; 桩均反力= 2730.4 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

> = 2722.73×1.00 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

> = 2722.73×1.00 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

> = 2722.73 (\* 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

> = 2722.73 (\* 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

=2722.73 = 1500. c = 700.

M = (-0.433\*c)/3 = 1086.28 kN.m

= 3352.71

= 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 | 2139.77 (18) | 1577.96 (5) | 2149.30 (44) | 1603.23 (45) |
| 2 | 2181.27 (30) | 1656.13 (11) | 2174.30 (43) | 1685.03 (42) |
| 3 | 2214.35 (18) | 1702.45 (5) | 2094.19 (44) | 1839.53 (45) |

桩平均反力最大值2175.42 (非震)(Load 18)

桩平均反力最小值1650.58 (非震)(Load 5)

桩平均反力最大值2096.43 (震)(Load 44)

桩平均反力最小值1752.10 (震)(Load 45)

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2722.73 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力2722.73 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力2722.73kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力2722.73kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1086.28 kN.m 计算钢筋面积3353 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3353. 钢筋级别: HRB400