桩承台计算\_序号107

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台上段高：200mm

承台下段高：800mm

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 | -750 |
| 2 | 0 | 750 |

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

= 4.5× 24.0

= 108.0 kN

∑ = 0.0 ∑ = 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=2253.6kN =-65.4kN.m =13.6kN.m =9.2kN =29.7kN

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 | -750.0 | 1083.23 | 1137.23 | 满足 |
| 2 | 0.0 | 750.0 | 1170.37 | 1224.37 | 满足 |

桩总反力= 2361.6 kN; 桩均反力= 1180.8 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=3699.6kN =1.7kN.m =9.2kN.m =6.5kN =7.8kN

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 | -750.0 | 1850.92 | 1904.92 | 满足 |
| 2 | 0.0 | 750.0 | 1848.66 | 1902.66 | 满足 |

桩总反力= 3807.6 kN; 桩均反力= 1903.8 kN

当前荷载组合

| 【21】SATWE标准组合:1.00\*恒-1.00\*风y+0.70\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=3705.8kN =21.1kN.m =5.1kN.m =3.7kN =0.3kN

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 | -750.0 | 1866.98 | 1920.98 | 满足 |
| 2 | 0.0 | 750.0 | 1838.85 | 1892.85 | 满足 |

桩总反力= 3813.8 kN; 桩均反力= 1906.9 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=1799.3kN =-163.5kN.m =26.1kN.m =17.2kN =64.0kN

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 | -750.0 | 790.65 | 844.65 | 满足 |
| 2 | 0.0 | 750.0 | 1008.66 | 1062.66 | 满足 |

桩总反力= 1907.3 kN; 桩均反力= 953.7 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=4353.9kN =117.8kN.m =-5.8kN.m =-3.2kN =-32.9kN

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 | -750.0 | 2255.48 | 2309.48 | 满足 |
| 2 | 0.0 | 750.0 | 2098.41 | 2152.41 | 满足 |

桩总反力= 4461.9 kN; 桩均反力= 2230.9 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=4208.6kN =-31.3kN.m =16.5kN.m =11.5kN =21.5kN

承台及覆土重:

= 108.0×1.20= 129.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | -750.0 | 2083.47 | 2148.27 |
| 2 | 0.0 | 750.0 | 2125.16 | 2189.96 |

桩总反力= 4338.2 kN; 桩均反力= 2169.1 kN

3、承台板抗弯计算

X方向配筋计算：

Y方向配筋计算：

= 833.39\*1.00= 833.39 Y = -350. H = 950.

= /(0.9\*\*)/XS = 833.39/(0.9\* 950.0\*360.0)/1.5= 1805.0 /m

= 850.06\*1.00= 850.06 Y = 350. H = 950.

= /(0.9\*\*)/XS = 850.06/(0.9\* 950.0\*360.0)/1.5= 1841.2 /m

= 850.06\*1.00= 850.06 Y = 350. H = 950.

= /(0.9\*\*)/XS = 850.06/(0.9\* 950.0\*360.0)/1.5= 1841.2 /m

计算的钢筋面积：

= 0./m = 1841./m

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=4628.7kN =6.5kN.m =11.4kN.m =8.1kN =8.1kN

承台及覆土重:

= 108.0×1.20= 129.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | -750.0 | 2318.64 | 2383.44 |
| 2 | 0.0 | 750.0 | 2310.03 | 2374.83 |

桩总反力= 4758.3 kN; 桩均反力= 2379.1 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

2、右侧抗剪计算

3、下侧抗剪计算

= 950. = 150. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2318.64 (\* 1.00) kN

4、上侧抗剪计算

= 950. = 150. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2310.03 (\* 1.00) kN

c、承台抗剪计算

1、左侧抗剪计算

2、右侧抗剪计算

3、下侧抗剪计算

= 950. = 200. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2318.64 (\* 1.00) kN

4、上侧抗剪计算

= 950. = 200. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2310.03 (\* 1.00) kN

承台阶梯高度：

1阶高： 800mm

2阶高： 200mm

当前荷载组合

| 【75】SATWE基本组合:1.20\*恒-1.40\*风y+0.98\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4637.4kN =33.6kN.m =5.7kN.m =4.2kN =-2.3kN

承台及覆土重:

= 108.0×1.20= 129.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | -750.0 | 2341.13 | 2405.93 |
| 2 | 0.0 | 750.0 | 2296.30 | 2361.10 |

桩总反力= 4767.0 kN; 桩均反力= 2383.5 kN

3、承台板抗弯计算

X方向配筋计算：

Y方向配筋计算：

= 936.45\*1.00= 936.45 Y = -350. H = 950.

= /(0.9\*\*)/XS = 936.45/(0.9\* 950.0\*360.0)/1.5= 2028.3 /m

= 918.52\*1.00= 918.52 Y = 350. H = 950.

= /(0.9\*\*)/XS = 918.52/(0.9\* 950.0\*360.0)/1.5= 1989.4 /m

= 936.45\*1.00= 936.45 Y = -350. H = 950.

= /(0.9\*\*)/XS = 936.45/(0.9\* 950.0\*360.0)/1.5= 2028.3 /m

计算的钢筋面积：

= 0./m = 2028./m

当前荷载组合

| 【99】SATWE基本组合:1.20\*恒+0.60\*活-0.20\*风y-1.30\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5322.4kN =152.7kN.m =-8.2kN.m =-4.6kN =-43.4kN

承台及覆土重:

= 108.0×1.20= 129.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | -750.0 | 2763.02 | 2827.82 |
| 2 | 0.0 | 750.0 | 2559.37 | 2624.17 |

桩总反力= 5452.0 kN; 桩均反力= 2726.0 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

2、右侧抗剪计算

3、下侧抗剪计算

= 950. = 150. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2763.02 (\* 0.85) kN

4、上侧抗剪计算

= 950. = 150. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2559.37 (\* 0.85) kN

c、承台抗剪计算

1、左侧抗剪计算

2、右侧抗剪计算

3、下侧抗剪计算

= 950. = 200. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2763.02 (\* 0.85) kN

4、上侧抗剪计算

= 950. = 200. =0.250

= 2386.0 kN

= [1.75/(+1.0)]

=0.958\*[1.75/(0.250+1.0)]\*1426.\* 950.\*1.4329\*1.e-3

= 2603.9 kN

= min( , )

> = 2559.37 (\* 0.85) kN

承台阶梯高度：

1阶高： 800mm

2阶高： 200mm

# 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 | 1920.98 (21) | 1137.23 (4) | 2309.48 (45) | 844.65 (44) |
| 2 | 1902.66 (19) | 1224.37 (4) | 2152.41 (45) | 1062.66 (44) |

桩平均反力最大值1906.91 (非震)(Load 21)

桩平均反力最小值1180.80 (非震)(Load 4)

桩平均反力最大值2230.94 (震)(Load 45)

桩平均反力最小值953.65 (震)(Load 44)

基本组合下承台冲切、剪切、配筋计算:

角桩冲切计算：

抗剪计算：

承台高度：

一阶高800 二阶高200

底板配筋计算：

X方向：弯矩0.00 kN.m 计算钢筋面积1390 /m Load： 54

Y方向：弯矩936.45 kN.m 计算钢筋面积2028 /m Load： 75