桩承台计算\_序号89

# 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：750mm

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=2231.0kN =-66.3kN.m =-11.0kN.m =-7.8kN =30.0kN

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 | 1071.28 | 1125.28 | 满足 |
| 2 | 0.0 | 750.0 | 1159.73 | 1213.73 | 满足 |

桩总反力= 2339.0 kN; 桩均反力= 1169.5 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=3684.1kN =1.0kN.m =-5.7kN.m =-3.8kN =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 | 1842.77 | 1896.77 | 满足 |
| 2 | 0.0 | 750.0 | 1841.37 | 1895.37 | 满足 |

桩总反力= 3792.1 kN; 桩均反力= 1896.1 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=3694.5kN =20.5kN.m =-2.8kN.m =-1.7kN =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 | 1860.93 | 1914.93 | 满足 |
| 2 | 0.0 | 750.0 | 1833.55 | 1887.55 | 满足 |

桩总反力= 3802.5 kN; 桩均反力= 1901.2 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=1748.4kN =-166.9kN.m =-22.4kN.m =-14.9kN =65.2kN

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 | -750.0 | 762.96 | 816.96 | 满足 |
| 2 | 0.0 | 750.0 | 985.45 | 1039.45 | 满足 |

桩总反力= 1856.4 kN; 桩均反力= 928.2 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=4369.6kN =119.6kN.m =7.7kN.m =4.7kN =-33.8kN

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 | 2264.54 | 2318.54 | 满足 |
| 2 | 0.0 | 750.0 | 2105.05 | 2159.05 | 满足 |

桩总反力= 4477.6 kN; 桩均反力= 2238.8 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=4184.2kN =-32.2kN.m =-11.1kN.m =-7.7kN =21.6kN

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 | 2070.62 | 2135.42 |
| 2 | 0.0 | 750.0 | 2113.54 | 2178.34 |

桩总反力= 4313.8 kN; 桩均反力= 2156.9 kN

3、承台板抗弯计算

X方向配筋计算：

Y方向配筋计算：

= 828.25\*1.00= 828.25 Y = -350. H = 900.

= /(0.9\*\*)/XS = 828.25/(0.9\* 900.0\*360.0)/1.5= 1893.6 /m

= 845.42\*1.00= 845.42 Y = 350. H = 900.

= /(0.9\*\*)/XS = 845.42/(0.9\* 900.0\*360.0)/1.5= 1932.8 /m

= 845.42\*1.00= 845.42 Y = 350. H = 900.

= /(0.9\*\*)/XS = 845.42/(0.9\* 900.0\*360.0)/1.5= 1932.8 /m

计算的钢筋面积：

= 0./m = 1933./m

当前荷载组合

| 【69】SATWE基本组合:1.20\*恒+1.40\*活-0.84\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4327.7kN =-32.1kN.m =-30.2kN.m =-12.7kN =21.3kN

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 | 2142.41 | 2207.21 |
| 2 | 0.0 | 750.0 | 2185.28 | 2250.08 |

桩总反力= 4457.3 kN; 桩均反力= 2228.6 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

= 900. = 150. =0.250

= 2263.4 kN

= [1.75/(+1.0)]

=0.971\*[1.75/(0.250+1.0)]\*1422.\* 900.\*1.4329\*1.e-3

= 2493.2 kN

= min( , )

> = 2142.41 (\* 1.00) kN

4、上侧抗剪计算

= 900. = 150. =0.250

= 2263.4 kN

= [1.75/(+1.0)]

=0.971\*[1.75/(0.250+1.0)]\*1422.\* 900.\*1.4329\*1.e-3

= 2493.2 kN

= min( , )

> = 2185.28 (\* 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

= 900. = 200. =0.250

= 2263.4 kN

= [1.75/(+1.0)]

=0.971\*[1.75/(0.250+1.0)]\*1422.\* 900.\*1.4329\*1.e-3

= 2493.2 kN

= min( , )

> = 2142.41 (\* 1.00) kN

4、上侧抗剪计算

= 900. = 200. =0.250

= 2263.4 kN

= [1.75/(+1.0)]

=0.971\*[1.75/(0.250+1.0)]\*1422.\* 900.\*1.4329\*1.e-3

= 2493.2 kN

= min( , )

> = 2185.28 (\* 1.00) kN

承台阶梯高度：

1阶高： 750mm

2阶高： 200mm

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=4610.2kN =5.7kN.m =-6.8kN.m =-4.5kN =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 | 2308.89 | 2373.69 |
| 2 | 0.0 | 750.0 | 2301.27 | 2366.07 |

桩总反力= 4739.8 kN; 桩均反力= 2369.9 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

桩冲剪不足,增加承台高度

新台阶高: 800.00 mm

= 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( , )

> = 2308.89 (\* 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( , )

> = 2301.27 (\* 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( , )

> = 2308.89 (\* 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( , )

> = 2301.27 (\* 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=4624.6kN =33.0kN.m =-2.7kN.m =-1.6kN =-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 | 2334.32 | 2399.12 |
| 2 | 0.0 | 750.0 | 2290.33 | 2355.13 |

桩总反力= 4754.2 kN; 桩均反力= 2377.1 kN

3、承台板抗弯计算

X方向配筋计算：

Y方向配筋计算：

= 933.73\*1.00= 933.73 Y = -350. H = 950.

= /(0.9\*\*)/XS = 933.73/(0.9\* 950.0\*360.0)/1.5= 2022.4 /m

= 916.13\*1.00= 916.13 Y = 350. H = 950.

= /(0.9\*\*)/XS = 916.13/(0.9\* 950.0\*360.0)/1.5= 1984.3 /m

= 933.73\*1.00= 933.73 Y = -350. H = 950.

= /(0.9\*\*)/XS = 933.73/(0.9\* 950.0\*360.0)/1.5= 2022.4 /m

计算的钢筋面积：

= 0./m = 2022./m

# 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 | 1914.93 (21) | 1125.28 (4) | 2318.54 (45) | 816.96 (44) |
| 2 | 1895.37 (19) | 1213.73 (4) | 2159.05 (45) | 1039.45 (44) |

桩平均反力最大值1901.24 (非震)(Load 21)

桩平均反力最小值1169.51 (非震)(Load 4)

桩平均反力最大值2238.80 (震)(Load 45)

桩平均反力最小值928.20 (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933.73 kN.m 计算钢筋面积2022 /m Load： 75