桩承台计算\_序号93

# 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=5602.9kN =23.3kN.m =56.0kN.m =38.9kN =-1.6kN

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 | 1849.67 | 1900.05 | 满足 |
| 2 | -750.0 | -433.0 | 1839.33 | 1889.71 | 满足 |
| 3 | 750.0 | -433.0 | 1913.94 | 1964.32 | 满足 |

桩总反力= 5754.1 kN; 桩均反力= 1918.0 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=5621.1kN =7.0kN.m =71.5kN.m =43.4kN =3.6kN

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 | 1868.29 | 1918.67 | 满足 |
| 2 | -750.0 | -433.0 | 1828.71 | 1879.09 | 满足 |
| 3 | 750.0 | -433.0 | 1924.10 | 1974.48 | 满足 |

桩总反力= 5772.3 kN; 桩均反力= 1924.1 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=7251.3kN =-43.7kN.m =62.7kN.m =43.3kN =20.7kN

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 | 2450.71 | 2501.09 | 满足 |
| 2 | -750.0 | -433.0 | 2358.51 | 2408.89 | 满足 |
| 3 | 750.0 | -433.0 | 2442.07 | 2492.46 | 满足 |

桩总反力= 7402.4 kN; 桩均反力= 2467.5 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=7240.4kN =-33.9kN.m =53.3kN.m =40.6kN =17.5kN

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 | 2439.53 | 2489.92 | 满足 |
| 2 | -750.0 | -433.0 | 2364.88 | 2415.26 | 满足 |
| 3 | 750.0 | -433.0 | 2435.98 | 2486.36 | 满足 |

桩总反力= 7391.5 kN; 桩均反力= 2463.8 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=6187.7kN =-26.0kN.m =186.1kN.m =79.1kN =14.8kN

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 | 2082.60 | 2132.98 | 满足 |
| 2 | -750.0 | -433.0 | 1928.51 | 1978.89 | 满足 |
| 3 | 750.0 | -433.0 | 2176.60 | 2226.98 | 满足 |

桩总反力= 6338.9 kN; 桩均反力= 2113.0 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=6721.0kN =-10.8kN.m =-67.4kN.m =3.1kN =9.6kN

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 | 2248.64 | 2299.02 | 满足 |
| 2 | -750.0 | -433.0 | 2281.14 | 2331.52 | 满足 |
| 3 | 750.0 | -433.0 | 2191.27 | 2241.65 | 满足 |

桩总反力= 6872.2 kN; 桩均反力= 2290.7 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=6892.6kN =-154.3kN.m =65.6kN.m =39.1kN =56.9kN

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 | 2416.32 | 2466.70 | 满足 |
| 2 | -750.0 | -433.0 | 2194.42 | 2244.80 | 满足 |
| 3 | 750.0 | -433.0 | 2281.88 | 2332.26 | 满足 |

桩总反力= 7043.8 kN; 桩均反力= 2347.9 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=6016.1kN =117.5kN.m =53.1kN.m =43.0kN =-32.5kN

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 | 1914.92 | 1965.30 | 满足 |
| 2 | -750.0 | -433.0 | 2015.23 | 2065.62 | 满足 |
| 3 | 750.0 | -433.0 | 2085.99 | 2136.37 | 满足 |

桩总反力= 6167.3 kN; 桩均反力= 2055.8 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=8889.4kN =-23.0kN.m =76.5kN.m =53.0kN =15.4kN

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 | 2980.81 | 3041.27 |
| 2 | -750.0 | -433.0 | 2903.31 | 2963.77 |
| 3 | 750.0 | -433.0 | 3005.29 | 3065.75 |

桩总反力= 9070.8 kN; 桩均反力= 3023.6 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

> = 3005.29×1.00 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

> = 3005.29×1.00 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

> = 3005.29 (\* 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

> = 3005.29 (\* 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

=3005.29 = 1500. c = 700.

M = (-0.433\*c)/3 = 1199.01 kN.m

= 3700.66

= 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=9149.6kN =-25.2kN.m =82.1kN.m =56.8kN =16.8kN

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 | 3069.25 | 3137.27 |
| 2 | -750.0 | -433.0 | 2985.45 | 3053.46 |
| 3 | 750.0 | -433.0 | 3094.93 | 3162.95 |

桩总反力= 9353.7 kN; 桩均反力= 3117.9 kN

a、角桩冲切

桩冲切不足，自动增加承台高度...

= 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

> = 3094.93×1.00 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

> = 3094.93×1.00 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

> = 3094.93 (\* 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

> = 3094.93 (\* 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

=3094.93 = 1500. c = 700.

M = (-0.433\*c)/3 = 1234.77 kN.m

= 3629.55

= 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 | 2501.09 (18) | 1900.05 (5) | 2466.70 (44) | 1965.30 (45) |
| 2 | 2415.26 (30) | 1879.09 (11) | 2331.52 (43) | 1978.89 (42) |
| 3 | 2492.46 (18) | 1964.32 (5) | 2332.26 (44) | 2136.37 (45) |

桩平均反力最大值2467.48 (非震)(Load 18)

桩平均反力最小值1918.03 (非震)(Load 5)

桩平均反力最大值2347.92 (震)(Load 44)

桩平均反力最小值2055.76 (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3005.29 kN ：1000 mm (Load:54)

桩 2: 抗力3370.56 kN 冲切力3094.93 kN ：1050 mm (Load:55) H+

抗剪计算：

1左边： 抗力5118.03kN 剪力3005.29kN ：1000mm (Load:54)

2上边： 抗力3865.88kN 剪力3005.29kN ：1000mm (Load:54)

承台高度：

承台高1100

底板配筋计算：

弯矩1199.01 kN.m 计算钢筋面积3701 Load： 54

配筋宽度833 mm

每边受弯筋 AS= 3701. 钢筋级别: HRB400