桩承台计算\_序号106

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1750mm

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 | 1155 |
| 2 | -1000 | -577 |
| 3 | 1000 | -577 |

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

= 5.6× 24.0

= 134.4 kN

∑ = 2000000.1 ∑ = 2000000.0

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=5445.9kN =-67.2kN.m =60.5kN.m =185.7kN =133.5kN

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 | 1154.7 | 1854.09 | 1898.88 | 满足 |
| 2 | -1000.0 | -577.4 | 1765.63 | 1810.41 | 满足 |
| 3 | 1000.0 | -577.3 | 1826.15 | 1870.93 | 满足 |

桩总反力= 5580.2 kN; 桩均反力= 1860.1 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=5452.3kN =-55.2kN.m =49.4kN.m =179.2kN =124.8kN

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 | 1154.7 | 1849.29 | 1894.07 | 满足 |
| 2 | -1000.0 | -577.4 | 1776.78 | 1821.57 | 满足 |
| 3 | 1000.0 | -577.3 | 1826.20 | 1870.98 | 满足 |

桩总反力= 5586.6 kN; 桩均反力= 1862.2 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=7116.0kN =-27.8kN.m =75.3kN.m =231.1kN =114.6kN

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 | 1154.7 | 2388.07 | 2432.86 | 满足 |
| 2 | -1000.0 | -577.4 | 2326.34 | 2371.12 | 满足 |
| 3 | 1000.0 | -577.3 | 2401.60 | 2446.38 | 满足 |

桩总反力= 7250.4 kN; 桩均反力= 2416.8 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=7112.2kN =-35.0kN.m =81.9kN.m =235.1kN =119.8kN

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 | 1154.7 | 2390.96 | 2435.74 | 满足 |
| 2 | -1000.0 | -577.4 | 2319.65 | 2364.43 | 满足 |
| 3 | 1000.0 | -577.3 | 2401.57 | 2446.35 | 满足 |

桩总反力= 7246.5 kN; 桩均反力= 2415.5 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=5783.9kN =-135.2kN.m =61.6kN.m =195.8kN =187.3kN

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 | 1154.7 | 2006.00 | 2050.79 | 满足 |
| 2 | -1000.0 | -577.4 | 1858.17 | 1902.96 | 满足 |
| 3 | 1000.0 | -577.3 | 1919.72 | 1964.51 | 满足 |

桩总反力= 5918.2 kN; 桩均反力= 1972.7 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=6849.8kN =51.2kN.m =74.8kN.m =222.8kN =52.7kN

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 | 1154.7 | 2253.68 | 2298.47 | 满足 |
| 2 | -1000.0 | -577.4 | 2260.67 | 2305.46 | 满足 |
| 3 | 1000.0 | -577.3 | 2335.44 | 2380.23 | 满足 |

桩总反力= 6984.1 kN; 桩均反力= 2328.0 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=6843.5kN =-52.8kN.m =164.2kN.m =276.7kN =128.4kN

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 | 1154.7 | 2311.66 | 2356.44 | 满足 |
| 2 | -1000.0 | -577.4 | 2183.84 | 2228.62 | 满足 |
| 3 | 1000.0 | -577.3 | 2348.04 | 2392.82 | 满足 |

桩总反力= 6977.9 kN; 桩均反力= 2326.0 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=5790.2kN =-31.1kN.m =-27.9kN.m =141.8kN =111.6kN

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 | 1154.7 | 1948.02 | 1992.81 | 满足 |
| 2 | -1000.0 | -577.4 | 1935.00 | 1979.79 | 满足 |
| 3 | 1000.0 | -577.3 | 1907.13 | 1951.91 | 满足 |

桩总反力= 5924.5 kN; 桩均反力= 1974.8 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=8686.5kN =-54.4kN.m =91.9kN.m =282.0kN =154.6kN

承台及覆土重:

= 134.4×1.20= 161.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 2926.94 | 2980.68 |
| 2 | -1000.0 | -577.4 | 2833.87 | 2887.61 |
| 3 | 1000.0 | -577.3 | 2925.72 | 2979.47 |

桩总反力= 8847.8 kN; 桩均反力= 2949.3 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 2926.94×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 2926.94×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 2926.94 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 2926.94 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 2926.94 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2926.94 = 2000. c = 700.

M = (-0.433\*c)/3 = 1655.57 kN.m

= 3005.76

= 727.

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=8949.5kN =-58.2kN.m =95.9kN.m =294.3kN =166.0kN

承台及覆土重:

= 134.4×1.35= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1154.7 | 3016.78 | 3077.24 |
| 2 | -1000.0 | -577.4 | 2918.45 | 2978.91 |
| 3 | 1000.0 | -577.3 | 3014.30 | 3074.76 |

桩总反力= 9130.9 kN; 桩均反力= 3043.6 kN

a、角桩冲切

= 1700. = 450. =0.26 = 1066. =1.21

= 1700. = 524. =0.31 = 1039. =1.10

下部：

= (2+)tan(/2)

= 1.21×(2× 1066.+ 450.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 4029.30 kN

> = 3016.78×1.00 kN

上部：

= (2+)×tan(/2)

= 1.10×(2× 1066.+ 524.)×tan(1.05/2)×0.9208\* 1.433× 1700.×1e-3

= 3714.23 kN

> = 3016.78×1.00 kN

b、抗剪切计算

承台高度 HCD= 1750.

左侧：

= 1700. = 450. =0.26

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.26+1.0)\* 2236.\* 1700.\*1.4329\*1.e-3

= 6242.41

> = 3016.78 (\* 1.00) kN

承台高度 HCD= 1750.00

上侧：

= 1700. = 605. =0.36

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.83\*1.75/(0.36+1.0)\* 1735.\* 1700.\*1.4329\*1.e-3

= 4517.73

> = 3016.78 (\* 1.00) kN

承台高度 HCD= 1750.00

下侧：

= 1700. = 27. =0.25

= \*1.75/(+1.0)\*\*\*\*1.E-3

= 0.92\*1.75/(0.25+1.0)\* 2908.\* 1700.\*1.4329\*1.e-3

= 8213.76

> = 3016.78 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=3016.78 = 2000. c = 700.

M = (-0.433\*c)/3 = 1706.39 kN.m

= 3098.02

= 727.

# 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 | 2435.74 (31) | 1894.07 (10) | 2356.44 (48) | 1992.81 (49) |
| 2 | 2371.12 (19) | 1810.41 (4) | 2305.46 (45) | 1902.96 (44) |
| 3 | 2446.38 (19) | 1870.93 (4) | 2392.82 (48) | 1951.91 (49) |

桩平均反力最大值2416.79 (非震)(Load 19)

桩平均反力最小值1860.07 (非震)(Load 4)

桩平均反力最大值2328.05 (震)(Load 45)

桩平均反力最小值1972.75 (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4029.30 kN 冲切力3016.78 kN ：1700 mm (Load:55)

桩 2: 抗力3714.23 kN 冲切力3016.78 kN ：1700 mm (Load:55)

抗剪计算：

1左边： 抗力6242.41kN 剪力3016.78kN ：1700mm (Load:55)

2上边： 抗力4517.73kN 剪力3016.78kN ：1700mm (Load:55)

承台高度：

承台高1750

底板配筋计算：

弯矩1706.39 kN.m 计算钢筋面积3098 Load： 55

配筋宽度727 mm

每边受弯筋 AS= 3098. 钢筋级别: HRB400