桩承台计算\_序号18

# 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=4713.3kN =-38.1kN.m =-53.5kN.m =-152.8kN =46.8kN

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 | 1593.09 | 1637.88 | 满足 |
| 2 | -1000.0 | -577.4 | 1586.82 | 1631.61 | 满足 |
| 3 | 1000.0 | -577.3 | 1533.36 | 1578.14 | 满足 |

桩总反力= 4847.6 kN; 桩均反力= 1615.9 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=4723.8kN =-26.5kN.m =-65.2kN.m =-160.4kN =38.0kN

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 | 1154.7 | 1589.90 | 1634.69 | 满足 |
| 2 | -1000.0 | -577.4 | 1599.55 | 1644.34 | 满足 |
| 3 | 1000.0 | -577.3 | 1534.39 | 1579.18 | 满足 |

桩总反力= 4858.2 kN; 桩均反力= 1619.4 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=6427.6kN =5.1kN.m =-56.9kN.m =-161.4kN =16.8kN

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 | 2139.62 | 2184.41 | 满足 |
| 2 | -1000.0 | -577.4 | 2172.47 | 2217.25 | 满足 |
| 3 | 1000.0 | -577.3 | 2115.56 | 2160.34 | 满足 |

桩总反力= 6562.0 kN; 桩均反力= 2187.3 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=6421.3kN =-1.9kN.m =-49.9kN.m =-156.8kN =22.1kN

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 | 2141.54 | 2186.32 | 满足 |
| 2 | -1000.0 | -577.4 | 2164.83 | 2209.62 | 满足 |
| 3 | 1000.0 | -577.3 | 2114.94 | 2159.72 | 满足 |

桩总反力= 6555.7 kN; 桩均反力= 2185.2 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=4700.6kN =-107.2kN.m =-65.3kN.m =-181.6kN =102.8kN

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 | 1628.76 | 1673.55 | 满足 |
| 2 | -1000.0 | -577.4 | 1568.60 | 1613.38 | 满足 |
| 3 | 1000.0 | -577.3 | 1503.25 | 1548.04 | 满足 |

桩总反力= 4835.0 kN; 桩均反力= 1611.7 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=6577.0kN =85.5kN.m =-44.1kN.m =-129.9kN =-47.8kN

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 | 2142.99 | 2187.78 | 满足 |
| 2 | -1000.0 | -577.4 | 2239.10 | 2283.88 | 满足 |
| 3 | 1000.0 | -577.3 | 2194.96 | 2239.74 | 满足 |

桩总反力= 6711.4 kN; 桩均反力= 2237.1 kN

当前荷载组合

| 【50】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y左+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4702.7kN =-104.9kN.m =-67.7kN.m =-183.1kN =101.0kN

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 | 1154.7 | 1628.13 | 1672.91 | 满足 |
| 2 | -1000.0 | -577.4 | 1571.15 | 1615.93 | 满足 |
| 3 | 1000.0 | -577.3 | 1503.46 | 1548.24 | 满足 |

桩总反力= 4837.1 kN; 桩均反力= 1612.4 kN

当前荷载组合

| 【51】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y左-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6574.9kN =83.2kN.m =-41.8kN.m =-128.4kN =-46.1kN

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 | 2143.63 | 2188.42 | 满足 |
| 2 | -1000.0 | -577.4 | 2236.55 | 2281.34 | 满足 |
| 3 | 1000.0 | -577.3 | 2194.75 | 2239.53 | 满足 |

桩总反力= 6709.3 kN; 桩均反力= 2236.4 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=7700.5kN =-14.7kN.m =-71.3kN.m =-202.5kN =36.5kN

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 | 2575.34 | 2629.09 |
| 2 | -1000.0 | -577.4 | 2598.23 | 2651.98 |
| 3 | 1000.0 | -577.3 | 2526.95 | 2580.69 |

桩总反力= 7861.7 kN; 桩均反力= 2620.6 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

> = 2598.23×1.00 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

> = 2598.23×1.00 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

> = 2598.23 (\* 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

> = 2598.23 (\* 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

> = 2598.23 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2598.23 = 2000. c = 700.

M = (-0.433\*c)/3 = 1469.65 kN.m

= 2668.21

= 727.

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=7987.7kN =9.1kN.m =-69.4kN.m =-196.8kN =18.4kN

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 | 2657.33 | 2711.07 |
| 2 | -1000.0 | -577.4 | 2699.89 | 2753.63 |
| 3 | 1000.0 | -577.3 | 2630.46 | 2684.20 |

桩总反力= 8148.9 kN; 桩均反力= 2716.3 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

> = 2699.89×1.00 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

> = 2699.89×1.00 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

> = 2699.89 (\* 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

> = 2699.89 (\* 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

> = 2699.89 (\* 1.00) kN

承台阶梯高度：

1阶高： 1750mm

c、承台板配筋计算

=2699.89 = 2000. c = 700.

M = (-0.433\*c)/3 = 1527.15 kN.m

= 2772.60

= 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 | 2186.32 (31) | 1634.69 (10) | 2188.42 (51) | 1672.91 (50) |
| 2 | 2217.25 (19) | 1631.61 (4) | 2283.88 (45) | 1613.38 (44) |
| 3 | 2160.34 (19) | 1578.14 (4) | 2239.74 (45) | 1548.04 (44) |

桩平均反力最大值2187.33 (非震)(Load 19)

桩平均反力最小值1615.88 (非震)(Load 4)

桩平均反力最大值2237.13 (震)(Load 45)

桩平均反力最小值1611.66 (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2699.89 kN ：1700 mm (Load:73)

桩 2: 抗力3714.23 kN 冲切力2699.89 kN ：1700 mm (Load:73)

抗剪计算：

1左边： 抗力6242.41kN 剪力2699.89kN ：1700mm (Load:73)

2上边： 抗力4517.73kN 剪力2699.89kN ：1700mm (Load:73)

承台高度：

承台高1750

底板配筋计算：

弯矩1527.15 kN.m 计算钢筋面积2773 Load： 73

配筋宽度727 mm

每边受弯筋 AS= 2773. 钢筋级别: HRB400