桩承台计算\_序号99

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1100mm

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=5161.6kN =21.9kN.m =-22.2kN.m =-15.2kN =-0.5kN

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 | 1703.71 | 1754.09 | 满足 |
| 2 | -750.0 | -433.0 | 1743.78 | 1794.16 | 满足 |
| 3 | 750.0 | -433.0 | 1714.12 | 1764.50 | 满足 |

桩总反力= 5312.8 kN; 桩均反力= 1770.9 kN

当前荷载组合

| 【13】SATWE标准组合:1.00\*恒-1.00\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5184.0kN =6.8kN.m =-37.5kN.m =-19.7kN =4.0kN

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 | 866.0 | 1722.79 | 1773.18 | 满足 |
| 2 | -750.0 | -433.0 | 1755.65 | 1806.03 | 满足 |
| 3 | 750.0 | -433.0 | 1705.61 | 1755.99 | 满足 |

桩总反力= 5335.2 kN; 桩均反力= 1778.4 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=6895.9kN =-41.2kN.m =-30.8kN.m =-21.4kN =19.1kN

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 | 866.0 | 2330.37 | 2380.75 | 满足 |
| 2 | -750.0 | -433.0 | 2303.30 | 2353.68 | 满足 |
| 3 | 750.0 | -433.0 | 2262.21 | 2312.59 | 满足 |

桩总反力= 7047.0 kN; 桩均反力= 2349.0 kN

当前荷载组合

| 【34】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6882.4kN =-32.2kN.m =-21.6kN.m =-18.7kN =16.4kN

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 | 866.0 | 2318.92 | 2369.30 | 满足 |
| 2 | -750.0 | -433.0 | 2296.18 | 2346.56 | 满足 |
| 3 | 750.0 | -433.0 | 2267.31 | 2317.69 | 满足 |

桩总反力= 7033.6 kN; 桩均反力= 2344.5 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=6357.3kN =-26.0kN.m =99.6kN.m =19.2kN =14.7kN

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 | 2139.09 | 2189.47 | 满足 |
| 2 | -750.0 | -433.0 | 2042.74 | 2093.13 | 满足 |
| 3 | 750.0 | -433.0 | 2175.49 | 2225.87 | 满足 |

桩总反力= 6508.5 kN; 桩均反力= 2169.5 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=5764.2kN =-9.1kN.m =-152.5kN.m =-55.8kN =8.8kN

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 | 1928.39 | 1978.78 | 满足 |
| 2 | -750.0 | -433.0 | 2019.56 | 2069.95 | 满足 |
| 3 | 750.0 | -433.0 | 1816.29 | 1866.67 | 满足 |

桩总反力= 5915.4 kN; 桩均反力= 1971.8 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=6559.8kN =-146.0kN.m =-20.1kN.m =-16.4kN =51.5kN

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 | 2298.96 | 2349.35 | 满足 |
| 2 | -750.0 | -433.0 | 2143.84 | 2194.22 | 满足 |
| 3 | 750.0 | -433.0 | 2117.02 | 2167.40 | 满足 |

桩总反力= 6711.0 kN; 桩均反力= 2237.0 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=5561.7kN =110.9kN.m =-32.8kN.m =-20.2kN =-28.1kN

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 | 866.0 | 1768.52 | 1818.90 | 满足 |
| 2 | -750.0 | -433.0 | 1918.47 | 1968.85 | 满足 |
| 3 | 750.0 | -433.0 | 1874.76 | 1925.14 | 满足 |

桩总反力= 5712.9 kN; 桩均反力= 1904.3 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=8455.3kN =-21.4kN.m =-39.1kN.m =-27.0kN =14.5kN

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 | 2834.92 | 2895.38 |
| 2 | -750.0 | -433.0 | 2836.27 | 2896.73 |
| 3 | 750.0 | -433.0 | 2784.09 | 2844.55 |

桩总反力= 8636.7 kN; 桩均反力= 2878.9 kN

a、角桩冲切

= 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

> = 2836.27×1.00 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

> = 2836.27×1.00 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

> = 2836.27 (\* 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

> = 2836.27 (\* 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

=2836.27 = 1500. c = 700.

M = (-0.433\*c)/3 = 1131.58 kN.m

= 3326.22

= 833.

当前荷载组合

| 【72】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=8589.9kN =-54.3kN.m =-38.8kN.m =-26.9kN =24.5kN

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 | 2905.07 | 2965.53 |
| 2 | -750.0 | -433.0 | 2868.25 | 2928.71 |
| 3 | 750.0 | -433.0 | 2816.54 | 2877.00 |

桩总反力= 8771.2 kN; 桩均反力= 2923.7 kN

a、角桩冲切

= 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

> = 2905.07×1.00 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

> = 2905.07×1.00 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

> = 2905.07 (\* 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

> = 2905.07 (\* 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

=2905.07 = 1500. c = 700.

M = (-0.433\*c)/3 = 1159.03 kN.m

= 3406.89

= 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 | 2380.75 (18) | 1754.09 (5) | 2349.35 (44) | 1818.90 (45) |
| 2 | 2353.68 (18) | 1794.16 (5) | 2194.22 (44) | 1968.85 (45) |
| 3 | 2317.69 (34) | 1755.99 (13) | 2225.87 (42) | 1866.67 (43) |

桩平均反力最大值2349.01 (非震)(Load 18)

桩平均反力最小值1770.92 (非震)(Load 5)

桩平均反力最大值2236.99 (震)(Load 44)

桩平均反力最小值1904.30 (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3370.56 kN 冲切力2905.07 kN ：1050 mm (Load:72)

桩 2: 抗力3312.91 kN 冲切力2905.07 kN ：1050 mm (Load:72)

抗剪计算：

1左边： 抗力5308.79kN 剪力2905.07kN ：1050mm (Load:72)

2上边： 抗力4056.35kN 剪力2905.07kN ：1050mm (Load:72)

承台高度：

承台高1100

底板配筋计算：

弯矩1159.03 kN.m 计算钢筋面积3407 Load： 72

配筋宽度833 mm

每边受弯筋 AS= 3407. 钢筋级别: HRB400