桩承台计算\_序号101

# 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

| 【2】SATWE标准组合:1.00\*恒+1.00\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5550.4kN =-20.2kN.m =35.2kN.m =14.7kN =13.2kN

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 | 866.0 | 1865.66 | 1916.04 | 满足 |
| 2 | -750.0 | -433.0 | 1818.88 | 1869.26 | 满足 |
| 3 | 750.0 | -433.0 | 1865.86 | 1916.24 | 满足 |

桩总反力= 5701.5 kN; 桩均反力= 1900.5 kN

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=5559.5kN =22.1kN.m =8.1kN.m =5.7kN =-0.6kN

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 | 1836.13 | 1886.51 | 满足 |
| 2 | -750.0 | -433.0 | 1856.29 | 1906.67 | 满足 |
| 3 | 750.0 | -433.0 | 1867.05 | 1917.44 | 满足 |

桩总反力= 5710.6 kN; 桩均反力= 1903.5 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=5586.4kN =-40.9kN.m =-6.5kN.m =1.6kN =19.0kN

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 | 1893.63 | 1944.01 | 满足 |
| 2 | -750.0 | -433.0 | 1850.68 | 1901.07 | 满足 |
| 3 | 750.0 | -433.0 | 1842.05 | 1892.44 | 满足 |

桩总反力= 5737.5 kN; 桩均反力= 1912.5 kN

当前荷载组合

| 【15】SATWE标准组合:1.00\*恒+1.00\*活-0.60\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7147.3kN =-19.4kN.m =-3.7kN.m =3.3kN =13.4kN

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 | 2397.37 | 2447.76 | 满足 |
| 2 | -750.0 | -433.0 | 2377.41 | 2427.80 | 满足 |
| 3 | 750.0 | -433.0 | 2372.51 | 2422.89 | 满足 |

桩总反力= 7298.4 kN; 桩均反力= 2432.8 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=7141.9kN =-44.8kN.m =12.6kN.m =8.7kN =21.7kN

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 | 2415.09 | 2465.47 | 满足 |
| 2 | -750.0 | -433.0 | 2354.97 | 2405.35 | 满足 |
| 3 | 750.0 | -433.0 | 2371.79 | 2422.17 | 满足 |

桩总反力= 7293.0 kN; 桩均反力= 2431.0 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=7125.7kN =-7.0kN.m =21.3kN.m =11.2kN =9.9kN

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 | 2380.59 | 2430.97 | 满足 |
| 2 | -750.0 | -433.0 | 2358.33 | 2408.71 | 满足 |
| 3 | 750.0 | -433.0 | 2386.79 | 2437.17 | 满足 |

桩总反力= 7276.9 kN; 桩均反力= 2425.6 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=6251.3kN =-32.8kN.m =144.5kN.m =50.3kN =18.9kN

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 | 2109.00 | 2159.38 | 满足 |
| 2 | -750.0 | -433.0 | 1974.80 | 2025.18 | 满足 |
| 3 | 750.0 | -433.0 | 2167.49 | 2217.87 | 满足 |

桩总反力= 6402.4 kN; 桩均反力= 2134.1 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=6453.8kN =-6.0kN.m =-123.3kN.m =-35.6kN =7.3kN

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 | 866.0 | 2155.84 | 2206.22 | 满足 |
| 2 | -750.0 | -433.0 | 2231.19 | 2281.57 | 满足 |
| 3 | 750.0 | -433.0 | 2066.73 | 2117.12 | 满足 |

桩总反力= 6604.9 kN; 桩均反力= 2201.6 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=6396.8kN =-151.3kN.m =17.9kN.m =10.1kN =55.4kN

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 | 2248.77 | 2299.15 | 满足 |
| 2 | -750.0 | -433.0 | 2062.12 | 2112.50 | 满足 |
| 3 | 750.0 | -433.0 | 2085.93 | 2136.31 | 满足 |

桩总反力= 6548.0 kN; 桩均反力= 2182.7 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=6308.2kN =112.6kN.m =3.3kN.m =4.6kN =-29.3kN

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 | 866.0 | 2016.07 | 2066.46 | 满足 |
| 2 | -750.0 | -433.0 | 2143.87 | 2194.25 | 满足 |
| 3 | 750.0 | -433.0 | 2148.29 | 2198.67 | 满足 |

桩总反力= 6459.4 kN; 桩均反力= 2153.1 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=8877.0kN =-25.3kN.m =14.8kN.m =10.3kN =17.3kN

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 | 2978.48 | 3038.94 |
| 2 | -750.0 | -433.0 | 2939.40 | 2999.86 |
| 3 | 750.0 | -433.0 | 2959.12 | 3019.58 |

桩总反力= 9058.4 kN; 桩均反力= 3019.5 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

> = 2978.48×1.00 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

> = 2978.48×1.00 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

> = 2978.48 (\* 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

> = 2978.48 (\* 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

=2978.48 = 1500. c = 700.

M = (-0.433\*c)/3 = 1188.31 kN.m

= 3492.99

= 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=9054.0kN =-26.9kN.m =15.1kN.m =10.5kN =18.3kN

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 | 3038.73 | 3106.75 |
| 2 | -750.0 | -433.0 | 2997.57 | 3065.58 |
| 3 | 750.0 | -433.0 | 3017.69 | 3085.70 |

桩总反力= 9258.0 kN; 桩均反力= 3086.0 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

> = 3038.73×1.00 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

> = 3038.73×1.00 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

> = 3038.73 (\* 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

> = 3038.73 (\* 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

=3038.73 = 1500. c = 700.

M = (-0.433\*c)/3 = 1212.35 kN.m

= 3563.65

= 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 | 2465.47 (18) | 1886.51 (5) | 2299.15 (44) | 2066.46 (45) |
| 2 | 2427.80 (15) | 1869.26 (2) | 2281.57 (43) | 2025.18 (42) |
| 3 | 2437.17 (31) | 1892.44 (10) | 2217.87 (42) | 2117.12 (43) |

桩平均反力最大值2432.81 (非震)(Load 15)

桩平均反力最小值1900.51 (非震)(Load 2)

桩平均反力最大值2201.64 (震)(Load 43)

桩平均反力最小值2134.14 (震)(Load 42)

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3038.73 kN ：1050 mm (Load:55)

桩 2: 抗力3312.91 kN 冲切力3038.73 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力5308.79kN 剪力3038.73kN ：1050mm (Load:55)

2上边： 抗力4056.35kN 剪力3038.73kN ：1050mm (Load:55)

承台高度：

承台高1100

底板配筋计算：

弯矩1212.35 kN.m 计算钢筋面积3564 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3564. 钢筋级别: HRB400