桩承台计算\_序号86

# 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=5633.1kN =41.3kN.m =10.7kN.m =7.7kN =-13.9kN

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 | 1845.89 | 1896.28 | 满足 |
| 2 | -750.0 | -433.0 | 1886.48 | 1936.86 | 满足 |
| 3 | 750.0 | -433.0 | 1900.74 | 1951.12 | 满足 |

桩总反力= 5784.3 kN; 桩均反力= 1928.1 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=5634.1kN =-22.9kN.m =-6.9kN.m =1.6kN =6.6kN

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 | 1895.71 | 1946.09 | 满足 |
| 2 | -750.0 | -433.0 | 1873.84 | 1924.22 | 满足 |
| 3 | 750.0 | -433.0 | 1864.60 | 1914.98 | 满足 |

桩总反力= 5785.3 kN; 桩均反力= 1928.4 kN

当前荷载组合

| 【12】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=5610.8kN =-23.4kN.m =27.1kN.m =12.5kN =6.5kN

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 | 1888.31 | 1938.69 | 满足 |
| 2 | -750.0 | -433.0 | 1843.14 | 1893.52 | 满足 |
| 3 | 750.0 | -433.0 | 1879.33 | 1929.72 | 满足 |

桩总反力= 5761.9 kN; 桩均反力= 1920.6 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=7242.3kN =-20.6kN.m =12.6kN.m =8.8kN =4.9kN

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 | 2429.94 | 2480.32 | 满足 |
| 2 | -750.0 | -433.0 | 2397.80 | 2448.19 | 满足 |
| 3 | 750.0 | -433.0 | 2414.61 | 2464.99 | 满足 |

桩总反力= 7393.5 kN; 桩均反力= 2464.5 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=7241.7kN =18.0kN.m =23.2kN.m =12.5kN =-7.4kN

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 | 2400.05 | 2450.43 | 满足 |
| 2 | -750.0 | -433.0 | 2405.39 | 2455.77 | 满足 |
| 3 | 750.0 | -433.0 | 2436.29 | 2486.67 | 满足 |

桩总反力= 7392.9 kN; 桩均反力= 2464.3 kN

当前荷载组合

| 【35】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=7255.7kN =18.3kN.m =2.7kN.m =5.9kN =-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 | 2404.49 | 2454.87 | 满足 |
| 2 | -750.0 | -433.0 | 2423.80 | 2474.19 | 满足 |
| 3 | 750.0 | -433.0 | 2427.45 | 2477.83 | 满足 |

桩总反力= 7406.9 kN; 桩均反力= 2469.0 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=6338.8kN =14.1kN.m =148.0kN.m =52.2kN =-6.3kN

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 | 2102.07 | 2152.45 | 满足 |
| 2 | -750.0 | -433.0 | 2019.68 | 2070.06 | 满足 |
| 3 | 750.0 | -433.0 | 2217.02 | 2267.40 | 满足 |

桩总反力= 6489.9 kN; 桩均反力= 2163.3 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=6534.0kN =-9.5kN.m =-124.8kN.m =-35.8kN =2.4kN

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 | 2185.29 | 2235.67 | 满足 |
| 2 | -750.0 | -433.0 | 2257.60 | 2307.99 | 满足 |
| 3 | 750.0 | -433.0 | 2091.14 | 2141.52 | 满足 |

桩总反力= 6685.2 kN; 桩均反力= 2228.4 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=6402.4kN =-130.0kN.m =4.5kN.m =5.6kN =40.7kN

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 | 2234.21 | 2284.59 | 满足 |
| 2 | -750.0 | -433.0 | 2081.09 | 2131.48 | 满足 |
| 3 | 750.0 | -433.0 | 2087.12 | 2137.50 | 满足 |

桩总反力= 6553.6 kN; 桩均反力= 2184.5 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=6470.4kN =134.6kN.m =18.6kN.m =10.8kN =-44.5kN

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 | 2053.15 | 2103.53 | 满足 |
| 2 | -750.0 | -433.0 | 2196.19 | 2246.57 | 满足 |
| 3 | 750.0 | -433.0 | 2221.04 | 2271.42 | 满足 |

桩总反力= 6621.5 kN; 桩均反力= 2207.2 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=6405.3kN =-126.7kN.m =1.1kN.m =4.5kN =39.7kN

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 | 2232.64 | 2283.03 | 满足 |
| 2 | -750.0 | -433.0 | 2085.56 | 2135.95 | 满足 |
| 3 | 750.0 | -433.0 | 2087.08 | 2137.47 | 满足 |

桩总反力= 6556.4 kN; 桩均反力= 2185.5 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=6467.5kN =131.4kN.m =22.0kN.m =11.9kN =-43.5kN

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 | 2054.71 | 2105.10 | 满足 |
| 2 | -750.0 | -433.0 | 2191.72 | 2242.10 | 满足 |
| 3 | 750.0 | -433.0 | 2221.07 | 2271.45 | 满足 |

桩总反力= 6618.7 kN; 桩均反力= 2206.2 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=9019.6kN =4.9kN.m =15.9kN.m =11.2kN =-3.6kN

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 | 3002.76 | 3063.22 |
| 2 | -750.0 | -433.0 | 2997.82 | 3058.28 |
| 3 | 750.0 | -433.0 | 3019.00 | 3079.46 |

桩总反力= 9201.0 kN; 桩均反力= 3067.0 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

> = 3019.00×1.00 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

> = 3019.00×1.00 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

> = 3019.00 (\* 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

> = 3019.00 (\* 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

=3019.00 = 1500. c = 700.

M = (-0.433\*c)/3 = 1204.48 kN.m

= 3717.54

= 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=9183.2kN =3.9kN.m =16.4kN.m =11.6kN =-3.1kN

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 | 3058.03 | 3126.05 |
| 2 | -750.0 | -433.0 | 3051.66 | 3119.67 |
| 3 | 750.0 | -433.0 | 3073.51 | 3141.53 |

桩总反力= 9387.2 kN; 桩均反力= 3129.1 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

> = 3073.51×1.00 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

> = 3073.51×1.00 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

> = 3073.51 (\* 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

> = 3073.51 (\* 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

=3073.51 = 1500. c = 700.

M = (-0.433\*c)/3 = 1226.23 kN.m

= 3784.65

= 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 | 2480.32 (18) | 1896.28 (5) | 2284.59 (44) | 2103.53 (45) |
| 2 | 2474.19 (35) | 1893.52 (12) | 2307.99 (43) | 2070.06 (42) |
| 3 | 2486.67 (31) | 1914.98 (10) | 2271.45 (51) | 2137.47 (50) |

桩平均反力最大值2469.46 (非震)(Load 15)

桩平均反力最小值1919.82 (非震)(Load 2)

桩平均反力最大值2228.39 (震)(Load 43)

桩平均反力最小值2163.30 (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3223.78 kN 冲切力3073.51 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力3073.51 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力3073.51kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力3073.51kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1226.23 kN.m 计算钢筋面积3785 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3785. 钢筋级别: HRB400