桩承台计算\_序号84

# 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

| 【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=5429.7kN =-34.3kN.m =-32.5kN.m =-22.5kN =8.1kN

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 | 1836.29 | 1886.67 | 满足 |
| 2 | -750.0 | -433.0 | 1818.42 | 1868.81 | 满足 |
| 3 | 750.0 | -433.0 | 1775.03 | 1825.41 | 满足 |

桩总反力= 5580.9 kN; 桩均反力= 1860.3 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=5437.4kN =-18.0kN.m =-50.1kN.m =-28.3kN =3.0kN

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 | 1826.34 | 1876.72 | 满足 |
| 2 | -750.0 | -433.0 | 1838.97 | 1889.35 | 满足 |
| 3 | 750.0 | -433.0 | 1772.11 | 1822.49 | 满足 |

桩总反力= 5588.6 kN; 桩均反力= 1862.9 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=6975.5kN =30.5kN.m =-43.7kN.m =-29.9kN =-12.3kN

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 | 2301.70 | 2352.08 | 满足 |
| 2 | -750.0 | -433.0 | 2366.00 | 2416.38 | 满足 |
| 3 | 750.0 | -433.0 | 2307.77 | 2358.16 | 满足 |

桩总反力= 7126.6 kN; 桩均反力= 2375.5 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=6970.9kN =20.7kN.m =-33.1kN.m =-26.5kN =-9.2kN

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 | 2307.67 | 2358.06 | 满足 |
| 2 | -750.0 | -433.0 | 2353.67 | 2404.05 | 满足 |
| 3 | 750.0 | -433.0 | 2309.52 | 2359.91 | 满足 |

桩总反力= 7122.0 kN; 桩均反力= 2374.0 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=6555.6kN =14.2kN.m =102.6kN.m =20.7kN =-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 | 2174.22 | 2224.60 | 满足 |
| 2 | -750.0 | -433.0 | 2122.27 | 2172.65 | 满足 |
| 3 | 750.0 | -433.0 | 2259.07 | 2309.45 | 满足 |

桩总反力= 6706.7 kN; 桩均反力= 2235.6 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=5904.6kN =-1.9kN.m =-178.8kN.m =-73.1kN =-1.9kN

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 | 1969.70 | 2020.08 | 满足 |
| 2 | -750.0 | -433.0 | 2086.66 | 2137.04 | 满足 |
| 3 | 750.0 | -433.0 | 1848.24 | 1898.62 | 满足 |

桩总反力= 6055.7 kN; 桩均反力= 2018.6 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=5805.5kN =-125.4kN.m =-45.2kN.m =-28.7kN =37.3kN

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 | 2031.73 | 2082.11 | 满足 |
| 2 | -750.0 | -433.0 | 1917.02 | 1967.40 | 满足 |
| 3 | 750.0 | -433.0 | 1856.80 | 1907.18 | 满足 |

桩总反力= 5956.7 kN; 桩均反力= 1985.6 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=6654.6kN =137.7kN.m =-31.1kN.m =-23.7kN =-46.6kN

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 | 2112.18 | 2162.57 | 满足 |
| 2 | -750.0 | -433.0 | 2291.91 | 2342.29 | 满足 |
| 3 | 750.0 | -433.0 | 2250.50 | 2300.89 | 满足 |

桩总反力= 6805.7 kN; 桩均反力= 2268.6 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=6560.1kN =17.2kN.m =100.4kN.m =20.0kN =-8.3kN

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 | 2173.48 | 2223.86 | 满足 |
| 2 | -750.0 | -433.0 | 2126.37 | 2176.76 | 满足 |
| 3 | 750.0 | -433.0 | 2260.21 | 2310.59 | 满足 |

桩总反力= 6711.2 kN; 桩均反力= 2237.1 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=5900.1kN =-4.9kN.m =-176.6kN.m =-72.4kN =-1.0kN

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 | 1970.44 | 2020.82 | 满足 |
| 2 | -750.0 | -433.0 | 2082.55 | 2132.93 | 满足 |
| 3 | 750.0 | -433.0 | 1847.10 | 1897.48 | 满足 |

桩总反力= 6051.2 kN; 桩均反力= 2017.1 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=8536.9kN =7.7kN.m =-54.6kN.m =-37.5kN =-5.6kN

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 | 2839.73 | 2900.19 |
| 2 | -750.0 | -433.0 | 2884.99 | 2945.45 |
| 3 | 750.0 | -433.0 | 2812.17 | 2872.63 |

桩总反力= 8718.3 kN; 桩均反力= 2906.1 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

> = 2884.99×1.00 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

> = 2884.99×1.00 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

> = 2884.99 (\* 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

> = 2884.99 (\* 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

=2884.99 = 1500. c = 700.

M = (-0.433\*c)/3 = 1151.01 kN.m

= 3552.51

= 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=8815.0kN =8.4kN.m =-54.8kN.m =-37.7kN =-6.3kN

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 | 2931.87 | 2999.88 |
| 2 | -750.0 | -433.0 | 2978.14 | 3046.15 |
| 3 | 750.0 | -433.0 | 2905.02 | 2973.04 |

桩总反力= 9019.1 kN; 桩均反力= 3006.4 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

> = 2978.14×1.00 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

> = 2978.14×1.00 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

> = 2978.14 (\* 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

> = 2978.14 (\* 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

=2978.14 = 1500. c = 700.

M = (-0.433\*c)/3 = 1188.18 kN.m

= 3667.21

= 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 | 2358.06 (31) | 1876.72 (10) | 2224.60 (42) | 2020.08 (43) |
| 2 | 2416.38 (19) | 1868.81 (4) | 2342.29 (45) | 1967.40 (44) |
| 3 | 2359.91 (31) | 1822.49 (10) | 2310.59 (48) | 1897.48 (49) |

桩平均反力最大值2375.54 (非震)(Load 19)

桩平均反力最小值1860.30 (非震)(Load 4)

桩平均反力最大值2268.58 (震)(Load 45)

桩平均反力最小值1985.57 (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3223.78 kN 冲切力2978.14 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力2978.14 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力2978.14kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力2978.14kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1188.18 kN.m 计算钢筋面积3667 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3667. 钢筋级别: HRB400