桩承台计算\_序号76

# 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=5633.5kN =41.1kN.m =-11.9kN.m =-7.9kN =-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 | 1846.19 | 1896.57 | 满足 |
| 2 | -750.0 | -433.0 | 1901.56 | 1951.94 | 满足 |
| 3 | 750.0 | -433.0 | 1885.72 | 1936.10 | 满足 |

桩总反力= 5784.6 kN; 桩均反力= 1928.2 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=5612.7kN =-23.4kN.m =-27.2kN.m =-12.4kN =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 | 1888.93 | 1939.31 | 满足 |
| 2 | -750.0 | -433.0 | 1879.98 | 1930.36 | 满足 |
| 3 | 750.0 | -433.0 | 1843.77 | 1894.15 | 满足 |

桩总反力= 5763.8 kN; 桩均反力= 1921.3 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=5636.2kN =-23.5kN.m =6.9kN.m =-1.5kN =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 | 1896.84 | 1947.22 | 满足 |
| 2 | -750.0 | -433.0 | 1865.09 | 1915.47 | 满足 |
| 3 | 750.0 | -433.0 | 1874.32 | 1924.70 | 满足 |

桩总反力= 5787.4 kN; 桩均反力= 1929.1 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=7247.1kN =-20.9kN.m =-12.9kN.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 | 2431.77 | 2482.15 | 满足 |
| 2 | -750.0 | -433.0 | 2416.24 | 2466.63 | 满足 |
| 3 | 750.0 | -433.0 | 2399.05 | 2449.44 | 满足 |

桩总反力= 7398.2 kN; 桩均反力= 2466.1 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=7259.5kN =17.8kN.m =-3.7kN.m =-6.1kN =-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 | 2406.13 | 2456.51 | 满足 |
| 2 | -750.0 | -433.0 | 2429.19 | 2479.58 | 满足 |
| 3 | 750.0 | -433.0 | 2424.23 | 2474.61 | 满足 |

桩总反力= 7410.7 kN; 桩均反力= 2470.2 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=7245.4kN =17.9kN.m =-24.2kN.m =-12.7kN =-7.5kN

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 | 2401.38 | 2451.76 | 满足 |
| 2 | -750.0 | -433.0 | 2438.13 | 2488.51 | 满足 |
| 3 | 750.0 | -433.0 | 2405.89 | 2456.27 | 满足 |

桩总反力= 7396.5 kN; 桩均反力= 2465.5 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=6537.4kN =-9.2kN.m =124.3kN.m =35.8kN =2.3kN

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 | 2186.22 | 2236.60 | 满足 |
| 2 | -750.0 | -433.0 | 2092.71 | 2143.09 | 满足 |
| 3 | 750.0 | -433.0 | 2258.44 | 2308.82 | 满足 |

桩总反力= 6688.5 kN; 桩均反力= 2229.5 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=6340.9kN =13.3kN.m =-148.6kN.m =-52.3kN =-6.2kN

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 | 2103.41 | 2153.79 | 满足 |
| 2 | -750.0 | -433.0 | 2217.84 | 2268.22 | 满足 |
| 3 | 750.0 | -433.0 | 2019.67 | 2070.05 | 满足 |

桩总反力= 6492.1 kN; 桩均反力= 2164.0 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=6406.8kN =-131.6kN.m =-5.0kN.m =-5.6kN =41.0kN

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 | 2236.89 | 2287.28 | 满足 |
| 2 | -750.0 | -433.0 | 2088.26 | 2138.65 | 满足 |
| 3 | 750.0 | -433.0 | 2081.60 | 2131.98 | 满足 |

桩总反力= 6557.9 kN; 桩均反力= 2186.0 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=6471.5kN =135.7kN.m =-19.3kN.m =-10.9kN =-45.0kN

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 | 2052.74 | 2103.12 | 满足 |
| 2 | -750.0 | -433.0 | 2222.29 | 2272.67 | 满足 |
| 3 | 750.0 | -433.0 | 2196.51 | 2246.89 | 满足 |

桩总反力= 6622.7 kN; 桩均反力= 2207.6 kN

当前荷载组合

| 【52】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y右+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6409.6kN =-128.4kN.m =-1.7kN.m =-4.6kN =40.0kN

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 | 2235.35 | 2285.73 | 满足 |
| 2 | -750.0 | -433.0 | 2088.23 | 2138.61 | 满足 |
| 3 | 750.0 | -433.0 | 2085.99 | 2136.37 | 满足 |

桩总反力= 6560.7 kN; 桩均反力= 2186.9 kN

当前荷载组合

| 【53】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y右-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6468.7kN =132.5kN.m =-22.7kN.m =-11.9kN =-44.0kN

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 | 2054.28 | 2104.66 | 满足 |
| 2 | -750.0 | -433.0 | 2222.32 | 2272.71 | 满足 |
| 3 | 750.0 | -433.0 | 2192.12 | 2242.50 | 满足 |

桩总反力= 6619.9 kN; 桩均反力= 2206.6 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=9025.1kN =4.5kN.m =-16.8kN.m =-11.4kN =-3.7kN

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 | 3004.89 | 3065.35 |
| 2 | -750.0 | -433.0 | 3021.30 | 3081.76 |
| 3 | 750.0 | -433.0 | 2998.87 | 3059.33 |

桩总反力= 9206.4 kN; 桩均反力= 3068.8 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

> = 3021.30×1.00 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

> = 3021.30×1.00 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

> = 3021.30 (\* 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

> = 3021.30 (\* 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

=3021.30 = 1500. c = 700.

M = (-0.433\*c)/3 = 1205.40 kN.m

= 3720.36

= 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=9187.7kN =3.5kN.m =-17.3kN.m =-11.7kN =-3.2kN

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 | 3059.86 | 3127.88 |
| 2 | -750.0 | -433.0 | 3075.45 | 3143.47 |
| 3 | 750.0 | -433.0 | 3052.42 | 3120.44 |

桩总反力= 9391.8 kN; 桩均反力= 3130.6 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

> = 3075.45×1.00 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

> = 3075.45×1.00 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

> = 3075.45 (\* 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

> = 3075.45 (\* 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

=3075.45 = 1500. c = 700.

M = (-0.433\*c)/3 = 1227.00 kN.m

= 3787.05

= 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 | 2482.15 (18) | 1896.57 (5) | 2287.28 (44) | 2103.12 (45) |
| 2 | 2488.51 (35) | 1915.47 (12) | 2272.71 (53) | 2138.61 (52) |
| 3 | 2474.61 (31) | 1894.15 (10) | 2308.82 (42) | 2070.05 (43) |

桩平均反力最大值2470.86 (非震)(Load 14)

桩平均反力最小值1920.23 (非震)(Load 3)

桩平均反力最大值2229.50 (震)(Load 42)

桩平均反力最小值2164.02 (震)(Load 43)

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3075.45 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力3075.45 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力3075.45kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力3075.45kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩1227.00 kN.m 计算钢筋面积3787 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3787. 钢筋级别: HRB400