桩承台计算\_序号80

# 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

| 【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=4443.6kN =14.6kN.m =35.8kN.m =14.9kN =-10.7kN

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 | 1469.95 | 1520.34 | 满足 |
| 2 | -750.0 | -433.0 | 1462.97 | 1513.36 | 满足 |
| 3 | 750.0 | -433.0 | 1510.70 | 1561.08 | 满足 |

桩总反力= 4594.8 kN; 桩均反力= 1531.6 kN

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=4374.1kN =-25.6kN.m =7.7kN.m =5.3kN =2.0kN

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 | 1477.77 | 1528.15 | 满足 |
| 2 | -750.0 | -433.0 | 1443.01 | 1493.39 | 满足 |
| 3 | 750.0 | -433.0 | 1453.32 | 1503.71 | 满足 |

桩总反力= 4525.3 kN; 桩均反力= 1508.4 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=5628.3kN =16.4kN.m =-7.8kN.m =0.8kN =-11.7kN

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 | 1863.49 | 1913.87 | 满足 |
| 2 | -750.0 | -433.0 | 1887.62 | 1938.00 | 满足 |
| 3 | 750.0 | -433.0 | 1877.20 | 1927.58 | 满足 |

桩总反力= 5779.5 kN; 桩均反力= 1926.5 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=5670.0kN =40.5kN.m =9.0kN.m =6.5kN =-19.3kN

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 | 1858.80 | 1909.18 | 满足 |
| 2 | -750.0 | -433.0 | 1899.60 | 1949.98 | 满足 |
| 3 | 750.0 | -433.0 | 1911.62 | 1962.00 | 满足 |

桩总反力= 5821.2 kN; 桩均反力= 1940.4 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=4850.5kN =21.9kN.m =153.0kN.m =55.6kN =-13.7kN

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 | 1599.95 | 1650.33 | 满足 |
| 2 | -750.0 | -433.0 | 1523.26 | 1573.64 | 满足 |
| 3 | 750.0 | -433.0 | 1727.28 | 1777.67 | 满足 |

桩总反力= 5001.6 kN; 桩均反力= 1667.2 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=5237.6kN =8.9kN.m =-136.5kN.m =-43.8kN =-8.6kN

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 | 1739.02 | 1789.41 | 满足 |
| 2 | -750.0 | -433.0 | 1840.24 | 1890.63 | 满足 |
| 3 | 750.0 | -433.0 | 1658.30 | 1708.68 | 满足 |

桩总反力= 5388.7 kN; 桩均反力= 1796.2 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=4717.0kN =-114.6kN.m =15.5kN.m =8.4kN =29.5kN

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 | 1660.56 | 1710.94 | 满足 |
| 2 | -750.0 | -433.0 | 1517.90 | 1568.28 | 满足 |
| 3 | 750.0 | -433.0 | 1538.58 | 1588.96 | 满足 |

桩总反力= 4868.2 kN; 桩均反力= 1622.7 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=5371.0kN =145.4kN.m =1.1kN.m =3.4kN =-51.8kN

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 | 1678.42 | 1728.80 | 满足 |
| 2 | -750.0 | -433.0 | 1845.61 | 1895.99 | 满足 |
| 3 | 750.0 | -433.0 | 1847.01 | 1897.39 | 满足 |

桩总反力= 5522.2 kN; 桩均反力= 1840.7 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=6949.0kN =20.5kN.m =11.6kN.m =8.3kN =-14.6kN

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 | 2300.52 | 2360.98 |
| 2 | -750.0 | -433.0 | 2316.50 | 2376.96 |
| 3 | 750.0 | -433.0 | 2331.93 | 2392.39 |

桩总反力= 7130.3 kN; 桩均反力= 2376.8 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

> = 2331.93×1.00 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

> = 2331.93×1.00 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

> = 2331.93 (\* 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

> = 2331.93 (\* 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

=2331.93 = 1500. c = 700.

M = (-0.433\*c)/3 = 930.36 kN.m

= 2871.49

= 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=7151.1kN =21.6kN.m =11.8kN.m =8.4kN =-15.5kN

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 | 2367.09 | 2435.11 |
| 2 | -750.0 | -433.0 | 2384.13 | 2452.15 |
| 3 | 750.0 | -433.0 | 2399.87 | 2467.88 |

桩总反力= 7355.1 kN; 桩均反力= 2451.7 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

> = 2399.87×1.00 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

> = 2399.87×1.00 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

> = 2399.87 (\* 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

> = 2399.87 (\* 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

=2399.87 = 1500. c = 700.

M = (-0.433\*c)/3 = 957.47 kN.m

= 2955.14

= 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 | 1913.87 (15) | 1520.34 (2) | 1789.41 (43) | 1650.33 (42) |
| 2 | 1949.98 (19) | 1493.39 (4) | 1895.99 (45) | 1568.28 (44) |
| 3 | 1962.00 (19) | 1503.71 (4) | 1897.39 (45) | 1588.96 (44) |

桩平均反力最大值1940.39 (非震)(Load 19)

桩平均反力最小值1508.42 (非震)(Load 4)

桩平均反力最大值1840.73 (震)(Load 45)

桩平均反力最小值1622.73 (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2399.87 kN ：1000 mm (Load:55)

桩 2: 抗力3081.45 kN 冲切力2399.87 kN ：1000 mm (Load:55)

抗剪计算：

1左边： 抗力5118.03kN 剪力2399.87kN ：1000mm (Load:55)

2上边： 抗力3865.88kN 剪力2399.87kN ：1000mm (Load:55)

承台高度：

承台高1050

底板配筋计算：

弯矩957.47 kN.m 计算钢筋面积2955 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 2955. 钢筋级别: HRB400