桩承台计算\_序号97

# 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

| 【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=4440.5kN =16.4kN.m =-27.0kN.m =-18.5kN =3.3kN

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 | 1467.58 | 1517.96 | 满足 |
| 2 | -750.0 | -433.0 | 1504.48 | 1554.87 | 满足 |
| 3 | 750.0 | -433.0 | 1468.48 | 1518.87 | 满足 |

桩总反力= 4591.7 kN; 桩均反力= 1530.6 kN

当前荷载组合

| 【13】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=4461.7kN =0.2kN.m =-42.6kN.m =-23.2kN =8.5kN

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 | 1487.06 | 1537.44 | 满足 |
| 2 | -750.0 | -433.0 | 1515.71 | 1566.09 | 满足 |
| 3 | 750.0 | -433.0 | 1458.96 | 1509.34 | 满足 |

桩总反力= 4612.9 kN; 桩均反力= 1537.6 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=5990.2kN =-47.3kN.m =-30.4kN.m =-21.1kN =23.3kN

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 | 2033.18 | 2083.56 | 满足 |
| 2 | -750.0 | -433.0 | 1998.79 | 2049.17 | 满足 |
| 3 | 750.0 | -433.0 | 1958.23 | 2008.61 | 满足 |

桩总反力= 6141.3 kN; 桩均反力= 2047.1 kN

当前荷载组合

| 【34】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=5977.5kN =-37.7kN.m =-21.1kN.m =-18.3kN =20.2kN

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 | 2021.48 | 2071.87 | 满足 |
| 2 | -750.0 | -433.0 | 1992.06 | 2042.44 | 满足 |
| 3 | 750.0 | -433.0 | 1963.94 | 2014.33 | 满足 |

桩总反力= 6128.6 kN; 桩均反力= 2042.9 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=5451.8kN =-16.8kN.m =99.9kN.m =19.5kN =13.0kN

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 | 1830.20 | 1880.58 | 满足 |
| 2 | -750.0 | -433.0 | 1744.18 | 1794.56 | 满足 |
| 3 | 750.0 | -433.0 | 1877.41 | 1927.79 | 满足 |

桩总反力= 5602.9 kN; 桩均反力= 1867.6 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=5026.7kN =-30.0kN.m =-157.2kN.m =-59.1kN =18.5kN

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 | 1698.67 | 1749.06 | 满足 |
| 2 | -750.0 | -433.0 | 1768.82 | 1819.21 | 满足 |
| 3 | 750.0 | -433.0 | 1559.24 | 1609.62 | 满足 |

桩总反力= 5177.9 kN; 桩均反力= 1726.0 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=5621.7kN =-152.9kN.m =-22.2kN.m =-17.8kN =56.1kN

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 | 1991.58 | 2041.97 | 满足 |
| 2 | -750.0 | -433.0 | 1829.86 | 1880.24 | 满足 |
| 3 | 750.0 | -433.0 | 1800.23 | 1850.61 | 满足 |

桩总反力= 5772.8 kN; 桩均反力= 1924.3 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=4856.9kN =106.1kN.m =-35.0kN.m =-21.8kN =-24.6kN

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 | 1537.29 | 1587.68 | 满足 |
| 2 | -750.0 | -433.0 | 1683.14 | 1733.53 | 满足 |
| 3 | 750.0 | -433.0 | 1636.41 | 1686.80 | 满足 |

桩总反力= 5008.0 kN; 桩均反力= 1669.3 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=7373.9kN =-28.4kN.m =-37.6kN.m =-26.0kN =19.2kN

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 | 2479.81 | 2540.27 |
| 2 | -750.0 | -433.0 | 2472.13 | 2532.59 |
| 3 | 750.0 | -433.0 | 2422.00 | 2482.46 |

桩总反力= 7555.3 kN; 桩均反力= 2518.4 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

> = 2479.81×1.00 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

> = 2479.81×1.00 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

> = 2479.81 (\* 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

> = 2479.81 (\* 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

=2479.81 = 1500. c = 700.

M = (-0.433\*c)/3 = 989.36 kN.m

= 2908.17

= 833.

当前荷载组合

| 【72】SATWE基本组合:1.20\*恒+1.40\*活+0.84\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7474.3kN =-61.6kN.m =-37.3kN.m =-25.9kN =29.5kN

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 | 2538.87 | 2599.33 |
| 2 | -750.0 | -433.0 | 2492.55 | 2553.01 |
| 3 | 750.0 | -433.0 | 2442.86 | 2503.32 |

桩总反力= 7655.7 kN; 桩均反力= 2551.9 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

> = 2538.87×1.00 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

> = 2538.87×1.00 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

> = 2538.87 (\* 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

> = 2538.87 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2538.87 = 1500. c = 700.

M = (-0.433\*c)/3 = 1012.92 kN.m

= 2977.44

= 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 | 2083.56 (18) | 1517.96 (5) | 2041.97 (44) | 1587.68 (45) |
| 2 | 2049.17 (18) | 1554.87 (5) | 1880.24 (44) | 1733.53 (45) |
| 3 | 2014.33 (34) | 1509.34 (13) | 1927.79 (42) | 1609.62 (43) |

桩平均反力最大值2047.12 (非震)(Load 18)

桩平均反力最小值1530.56 (非震)(Load 5)

桩平均反力最大值1924.27 (震)(Load 44)

桩平均反力最小值1669.33 (震)(Load 45)

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2538.87 kN ：1050 mm (Load:72)

桩 2: 抗力3312.91 kN 冲切力2538.87 kN ：1050 mm (Load:72)

抗剪计算：

1左边： 抗力5308.79kN 剪力2538.87kN ：1050mm (Load:72)

2上边： 抗力4056.35kN 剪力2538.87kN ：1050mm (Load:72)

承台高度：

承台高1100

底板配筋计算：

弯矩1012.92 kN.m 计算钢筋面积2977 Load： 72

配筋宽度833 mm

每边受弯筋 AS= 2977. 钢筋级别: HRB400