桩承台计算\_序号95

# 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=4402.6kN =18.7kN.m =6.3kN.m =4.5kN =1.7kN

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 | 1453.17 | 1503.56 | 满足 |
| 2 | -750.0 | -433.0 | 1470.51 | 1520.90 | 满足 |
| 3 | 750.0 | -433.0 | 1478.94 | 1529.32 | 满足 |

桩总反力= 4553.8 kN; 桩均反力= 1517.9 kN

当前荷载组合

| 【11】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=4428.8kN =1.5kN.m =23.0kN.m =9.8kN =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 | 1475.10 | 1525.48 | 满足 |
| 2 | -750.0 | -433.0 | 1461.52 | 1511.90 | 满足 |
| 3 | 750.0 | -433.0 | 1492.17 | 1542.56 | 满足 |

桩总反力= 4579.9 kN; 桩均反力= 1526.6 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=5951.2kN =-48.4kN.m =9.3kN.m =6.4kN =24.0kN

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 | 2021.00 | 2071.39 | 满足 |
| 2 | -750.0 | -433.0 | 1958.87 | 2009.26 | 满足 |
| 3 | 750.0 | -433.0 | 1971.29 | 2021.67 | 满足 |

桩总反力= 6102.3 kN; 桩均反力= 2034.1 kN

当前荷载组合

| 【30】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=5935.5kN =-38.1kN.m =-0.7kN.m =3.2kN =20.6kN

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 | 2007.85 | 2058.23 | 满足 |
| 2 | -750.0 | -433.0 | 1964.27 | 2014.66 | 满足 |
| 3 | 750.0 | -433.0 | 1963.35 | 2013.73 | 满足 |

桩总反力= 6086.6 kN; 桩均反力= 2028.9 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=4973.4kN =-31.7kN.m =142.0kN.m =48.6kN =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 | 1682.22 | 1732.60 | 满足 |
| 2 | -750.0 | -433.0 | 1550.97 | 1601.35 | 满足 |
| 3 | 750.0 | -433.0 | 1740.26 | 1790.64 | 满足 |

桩总反力= 5124.6 kN; 桩均反力= 1708.2 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=5437.9kN =-14.7kN.m =-126.1kN.m =-37.5kN =11.9kN

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 | 1823.99 | 1874.38 | 满足 |
| 2 | -750.0 | -433.0 | 1891.03 | 1941.41 | 满足 |
| 3 | 750.0 | -433.0 | 1722.90 | 1773.28 | 满足 |

桩总反力= 5589.1 kN; 桩均反力= 1863.0 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=5662.1kN =-159.9kN.m =14.7kN.m =7.7kN =60.8kN

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 | 2010.46 | 2060.84 | 满足 |
| 2 | -750.0 | -433.0 | 1816.03 | 1866.42 | 满足 |
| 3 | 750.0 | -433.0 | 1835.65 | 1886.03 | 满足 |

桩总反力= 5813.3 kN; 桩均反力= 1937.8 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=4749.2kN =113.4kN.m =1.2kN.m =3.3kN =-29.7kN

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 | 1495.75 | 1546.13 | 满足 |
| 2 | -750.0 | -433.0 | 1625.97 | 1676.35 | 满足 |
| 3 | 750.0 | -433.0 | 1627.51 | 1677.90 | 满足 |

桩总反力= 4900.4 kN; 桩均反力= 1633.5 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=7301.4kN =-28.2kN.m =11.1kN.m =7.7kN =19.1kN

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 | 2455.47 | 2515.93 |
| 2 | -750.0 | -433.0 | 2415.53 | 2475.99 |
| 3 | 750.0 | -433.0 | 2430.38 | 2490.84 |

桩总反力= 7482.8 kN; 桩均反力= 2494.3 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

> = 2455.47×1.00 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

> = 2455.47×1.00 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

> = 2455.47 (\* 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

> = 2455.47 (\* 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

=2455.47 = 1500. c = 700.

M = (-0.433\*c)/3 = 979.65 kN.m

= 2879.63

= 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=7422.3kN =-63.2kN.m =11.6kN.m =8.0kN =30.6kN

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 | 2522.75 | 2583.21 |
| 2 | -750.0 | -433.0 | 2442.02 | 2502.48 |
| 3 | 750.0 | -433.0 | 2457.54 | 2518.00 |

桩总反力= 7603.7 kN; 桩均反力= 2534.6 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

> = 2522.75×1.00 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

> = 2522.75×1.00 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

> = 2522.75 (\* 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

> = 2522.75 (\* 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

=2522.75 = 1500. c = 700.

M = (-0.433\*c)/3 = 1006.49 kN.m

= 2958.53

= 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 | 2071.39 (18) | 1503.56 (5) | 2060.84 (44) | 1546.13 (45) |
| 2 | 2014.66 (30) | 1511.90 (11) | 1941.41 (43) | 1601.35 (42) |
| 3 | 2021.67 (18) | 1529.32 (5) | 1886.03 (44) | 1677.90 (45) |

桩平均反力最大值2034.10 (非震)(Load 18)

桩平均反力最小值1517.92 (非震)(Load 5)

桩平均反力最大值1937.76 (震)(Load 44)

桩平均反力最小值1633.46 (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2522.75 kN ：1050 mm (Load:72)

桩 2: 抗力3312.91 kN 冲切力2522.75 kN ：1050 mm (Load:72)

抗剪计算：

1左边： 抗力5308.79kN 剪力2522.75kN ：1050mm (Load:72)

2上边： 抗力4056.35kN 剪力2522.75kN ：1050mm (Load:72)

承台高度：

承台高1100

底板配筋计算：

弯矩1006.49 kN.m 计算钢筋面积2959 Load： 72

配筋宽度833 mm

每边受弯筋 AS= 2959. 钢筋级别: HRB400