桩承台计算\_序号20

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台上段高：600mm

承台下段高：700mm

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 | -1500 | -1500 |
| 2 | -1500 | 1500 |
| 3 | 0 | -3000 |
| 4 | 0 | 0 |
| 5 | 0 | 3000 |
| 6 | 1500 | -1500 |
| 7 | 1500 | 1500 |

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 | 1575 | 0 |
| 柱2 | 2 | 300 | -1925 | -0 | 90 |
| 外接柱 | 700 | 3851 | 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

= 28.0× 24.0

= 672.0 kN

∑ = 9000000.0 ∑ = 27000000.0

当前荷载组合

| 【3】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=10891.5kN =-3836.9kN.m =-59.2kN.m =-130.5kN =87.5kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1352.65 | 1448.65 | 满足 |
| 2 | -1500.0 | 1500.0 | 1778.97 | 1874.97 | 满足 |
| 3 | 0.0 | -3000.0 | 1129.62 | 1225.62 | 满足 |
| 4 | 0.0 | 0.0 | 1555.93 | 1651.93 | 满足 |
| 5 | 0.0 | 3000.0 | 1982.25 | 2078.25 | 满足 |
| 6 | 1500.0 | -1500.0 | 1332.90 | 1428.90 | 满足 |
| 7 | 1500.0 | 1500.0 | 1759.22 | 1855.22 | 满足 |

桩总反力= 11563.5 kN; 桩均反力= 1651.9 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=11449.2kN =-5865.6kN.m =-41.4kN.m =-115.6kN =113.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1316.64 | 1412.64 | 满足 |
| 2 | -1500.0 | 1500.0 | 1968.37 | 2064.37 | 满足 |
| 3 | 0.0 | -3000.0 | 983.87 | 1079.87 | 满足 |
| 4 | 0.0 | 0.0 | 1635.60 | 1731.60 | 满足 |
| 5 | 0.0 | 3000.0 | 2287.33 | 2383.33 | 满足 |
| 6 | 1500.0 | -1500.0 | 1302.83 | 1398.83 | 满足 |
| 7 | 1500.0 | 1500.0 | 1954.56 | 2050.56 | 满足 |

桩总反力= 12121.2 kN; 桩均反力= 1731.6 kN

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=11105.8kN =-2130.3kN.m =-42.3kN.m =-117.7kN =69.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1475.24 | 1571.24 | 满足 |
| 2 | -1500.0 | 1500.0 | 1711.94 | 1807.94 | 满足 |
| 3 | 0.0 | -3000.0 | 1349.83 | 1445.83 | 满足 |
| 4 | 0.0 | 0.0 | 1586.54 | 1682.54 | 满足 |
| 5 | 0.0 | 3000.0 | 1823.24 | 1919.24 | 满足 |
| 6 | 1500.0 | -1500.0 | 1461.13 | 1557.13 | 满足 |
| 7 | 1500.0 | 1500.0 | 1697.84 | 1793.84 | 满足 |

桩总反力= 11777.8 kN; 桩均反力= 1682.5 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=11128.5kN =-5015.1kN.m =-52.6kN.m =-124.8kN =102.2kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1319.93 | 1415.93 | 满足 |
| 2 | -1500.0 | 1500.0 | 1877.17 | 1973.17 | 满足 |
| 3 | 0.0 | -3000.0 | 1032.55 | 1128.55 | 满足 |
| 4 | 0.0 | 0.0 | 1589.78 | 1685.78 | 满足 |
| 5 | 0.0 | 3000.0 | 2147.02 | 2243.02 | 满足 |
| 6 | 1500.0 | -1500.0 | 1302.40 | 1398.40 | 满足 |
| 7 | 1500.0 | 1500.0 | 1859.63 | 1955.63 | 满足 |

桩总反力= 11800.5 kN; 桩均反力= 1685.8 kN

当前荷载组合

| 【14】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=14369.3kN =-5057.3kN.m =-36.8kN.m =-122.9kN =121.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1777.93 | 1873.93 | 满足 |
| 2 | -1500.0 | 1500.0 | 2339.85 | 2435.85 | 满足 |
| 3 | 0.0 | -3000.0 | 1490.83 | 1586.83 | 满足 |
| 4 | 0.0 | 0.0 | 2052.75 | 2148.75 | 满足 |
| 5 | 0.0 | 3000.0 | 2614.67 | 2710.67 | 满足 |
| 6 | 1500.0 | -1500.0 | 1765.65 | 1861.65 | 满足 |
| 7 | 1500.0 | 1500.0 | 2327.57 | 2423.57 | 满足 |

桩总反力= 15041.3 kN; 桩均反力= 2148.8 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=14240.7kN =-6081.2kN.m =-47.0kN.m =-130.6kN =132.1kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1704.38 | 1800.38 | 满足 |
| 2 | -1500.0 | 1500.0 | 2380.07 | 2476.07 | 满足 |
| 3 | 0.0 | -3000.0 | 1358.70 | 1454.70 | 满足 |
| 4 | 0.0 | 0.0 | 2034.39 | 2130.39 | 满足 |
| 5 | 0.0 | 3000.0 | 2710.08 | 2806.08 | 满足 |
| 6 | 1500.0 | -1500.0 | 1688.72 | 1784.72 | 满足 |
| 7 | 1500.0 | 1500.0 | 2364.40 | 2460.40 | 满足 |

桩总反力= 14912.7 kN; 桩均反力= 2130.4 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=14034.7kN =-3840.1kN.m =-47.5kN.m =-131.9kN =105.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1799.54 | 1895.54 | 满足 |
| 2 | -1500.0 | 1500.0 | 2226.21 | 2322.21 | 满足 |
| 3 | 0.0 | -3000.0 | 1578.28 | 1674.28 | 满足 |
| 4 | 0.0 | 0.0 | 2004.95 | 2100.95 | 满足 |
| 5 | 0.0 | 3000.0 | 2431.63 | 2527.63 | 满足 |
| 6 | 1500.0 | -1500.0 | 1783.70 | 1879.70 | 满足 |
| 7 | 1500.0 | 1500.0 | 2210.37 | 2306.37 | 满足 |

桩总反力= 14706.7 kN; 桩均反力= 2101.0 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=14227.1kN =-4350.3kN.m =-40.8kN.m =-126.3kN =112.6kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1797.56 | 1893.56 | 满足 |
| 2 | -1500.0 | 1500.0 | 2280.93 | 2376.93 | 满足 |
| 3 | 0.0 | -3000.0 | 1549.07 | 1645.07 | 满足 |
| 4 | 0.0 | 0.0 | 2032.44 | 2128.44 | 满足 |
| 5 | 0.0 | 3000.0 | 2515.81 | 2611.81 | 满足 |
| 6 | 1500.0 | -1500.0 | 1783.96 | 1879.96 | 满足 |
| 7 | 1500.0 | 1500.0 | 2267.32 | 2363.32 | 满足 |

桩总反力= 14899.1 kN; 桩均反力= 2128.4 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=14132.6kN =-5193.4kN.m =49.7kN.m =-44.8kN =120.5kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1722.14 | 1818.14 | 满足 |
| 2 | -1500.0 | 1500.0 | 2299.18 | 2395.18 | 满足 |
| 3 | 0.0 | -3000.0 | 1441.90 | 1537.90 | 满足 |
| 4 | 0.0 | 0.0 | 2018.94 | 2114.94 | 满足 |
| 5 | 0.0 | 3000.0 | 2595.98 | 2691.98 | 满足 |
| 6 | 1500.0 | -1500.0 | 1738.70 | 1834.70 | 满足 |
| 7 | 1500.0 | 1500.0 | 2315.74 | 2411.74 | 满足 |

桩总反力= 14804.6 kN; 桩均反力= 2114.9 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=11282.6kN =-3765.2kN.m =-138.8kN.m =-203.1kN =90.2kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1425.76 | 1521.76 | 满足 |
| 2 | -1500.0 | 1500.0 | 1844.11 | 1940.11 | 满足 |
| 3 | 0.0 | -3000.0 | 1193.45 | 1289.45 | 满足 |
| 4 | 0.0 | 0.0 | 1611.80 | 1707.80 | 满足 |
| 5 | 0.0 | 3000.0 | 2030.16 | 2126.16 | 满足 |
| 6 | 1500.0 | -1500.0 | 1379.49 | 1475.49 | 满足 |
| 7 | 1500.0 | 1500.0 | 1797.84 | 1893.84 | 满足 |

桩总反力= 11954.6 kN; 桩均反力= 1707.8 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=13034.8kN =-10490.5kN.m =-39.6kN.m =-118.1kN =179.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1285.91 | 1381.91 | 满足 |
| 2 | -1500.0 | 1500.0 | 2451.53 | 2547.53 | 满足 |
| 3 | 0.0 | -3000.0 | 696.51 | 792.51 | 满足 |
| 4 | 0.0 | 0.0 | 1862.12 | 1958.12 | 满足 |
| 5 | 0.0 | 3000.0 | 3027.74 | 3123.74 | 满足 |
| 6 | 1500.0 | -1500.0 | 1272.72 | 1368.72 | 满足 |
| 7 | 1500.0 | 1500.0 | 2438.33 | 2534.33 | 满足 |

桩总反力= 13706.8 kN; 桩均反力= 1958.1 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=12380.3kN =1532.0kN.m =-49.5kN.m =-129.8kN =31.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1861.98 | 1957.98 | 满足 |
| 2 | -1500.0 | 1500.0 | 1691.77 | 1787.77 | 满足 |
| 3 | 0.0 | -3000.0 | 1938.84 | 2034.84 | 满足 |
| 4 | 0.0 | 0.0 | 1768.62 | 1864.62 | 满足 |
| 5 | 0.0 | 3000.0 | 1598.40 | 1694.40 | 满足 |
| 6 | 1500.0 | -1500.0 | 1845.47 | 1941.47 | 满足 |
| 7 | 1500.0 | 1500.0 | 1675.25 | 1771.25 | 满足 |

桩总反力= 13052.3 kN; 桩均反力= 1864.6 kN

当前荷载组合

| 【50】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y左+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=12970.7kN =-10320.4kN.m =-41.8kN.m =-119.9kN =176.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1286.57 | 1382.57 | 满足 |
| 2 | -1500.0 | 1500.0 | 2433.29 | 2529.29 | 满足 |
| 3 | 0.0 | -3000.0 | 706.24 | 802.24 | 满足 |
| 4 | 0.0 | 0.0 | 1852.96 | 1948.96 | 满足 |
| 5 | 0.0 | 3000.0 | 2999.67 | 3095.67 | 满足 |
| 6 | 1500.0 | -1500.0 | 1272.63 | 1368.63 | 满足 |
| 7 | 1500.0 | 1500.0 | 2419.34 | 2515.34 | 满足 |

桩总反力= 13642.7 kN; 桩均反力= 1949.0 kN

当前荷载组合

| 【51】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y左-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=12444.5kN =1361.9kN.m =-47.3kN.m =-127.9kN =34.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 1861.33 | 1957.33 | 满足 |
| 2 | -1500.0 | 1500.0 | 1710.01 | 1806.01 | 满足 |
| 3 | 0.0 | -3000.0 | 1929.10 | 2025.10 | 满足 |
| 4 | 0.0 | 0.0 | 1777.78 | 1873.78 | 满足 |
| 5 | 0.0 | 3000.0 | 1626.46 | 1722.46 | 满足 |
| 6 | 1500.0 | -1500.0 | 1845.56 | 1941.56 | 满足 |
| 7 | 1500.0 | 1500.0 | 1694.24 | 1790.24 | 满足 |

桩总反力= 13116.5 kN; 桩均反力= 1873.8 kN

2、承台内力配筋计算

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=18027.6kN =-6340.7kN.m =-61.8kN.m =-171.7kN =150.5kN

承台及覆土重:

= 672.0×1.35= 907.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 2233.42 | 2363.02 |
| 2 | -1500.0 | 1500.0 | 2937.93 | 3067.53 |
| 3 | 0.0 | -3000.0 | 1870.86 | 2000.46 |
| 4 | 0.0 | 0.0 | 2575.37 | 2704.97 |
| 5 | 0.0 | 3000.0 | 3279.89 | 3409.49 |
| 6 | 1500.0 | -1500.0 | 2212.82 | 2342.42 |
| 7 | 1500.0 | 1500.0 | 2917.33 | 3046.93 |

桩总反力= 18934.8 kN; 桩均反力= 2705.0 kN

b、柱冲切计算：

采用“桩基规范”5.9.7条,公式如下：

≤2[

=, =

截面净高=1250.mm

X正方向:= 900. =0.720

X负方向:= 900. =0.720

Y正方向:= 825. =0.660

Y负方向:= 825. =0.660

= 800. =3950. = 0.91 = 0.98 = 1.43 =0.958

=2[( + ) + ( + )]

=20667.31 kN > =15452.25 × 1.00 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

=1250. =1302. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 5171.35 (\* 1.00) kN

2、右侧抗剪计算

=1250. = 900. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 5130.15 (\* 1.00) kN

3、下侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 1870.86 (\* 1.00) kN

4、上侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 3279.89 (\* 1.00) kN

b、柱冲切计算：

截面净高=1250.mm

X正方向:= 950. =0.760

X负方向:= 950. =0.760

Y正方向:= 875. =0.700

Y负方向:= 874. =0.699

= 700. =3851. = 0.88 = 0.93 = 1.43 =0.958

=2[( + ) + ( + )]

=19483.80 kN > =15452.25 × 1.00 kN

c、承台抗剪计算

1、左侧抗剪计算

=1250. =1303. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 5171.35 (\* 1.00) kN

2、右侧抗剪计算

=1250. = 950. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 5130.15 (\* 1.00) kN

3、下侧抗剪计算

=1250. = 875. =0.700

= [1.75/(+1.0)]

=0.894\*[1.75/(0.700+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5330.0 kN

> = 1870.86 (\* 1.00) kN

4、上侧抗剪计算

=1250. = 874. =0.699

= [1.75/(+1.0)]

=0.894\*[1.75/(0.699+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5332.5 kN

> = 3279.89 (\* 1.00) kN

承台阶梯高度：

1阶高： 700mm

2阶高： 600mm

3、承台板抗弯计算

X方向配筋计算：

= 5947.05\*1.00= 5947.05 X = -350. H = 1250.

= /(0.9\*\*)/YS = 5947.05/(0.9\*1250.0\*360.0)/7.0= 2097.7 /m

= 5899.67\*1.00= 5899.67 X = 350. H = 1250.

= /(0.9\*\*)/YS = 5899.67/(0.9\*1250.0\*360.0)/7.0= 2081.0 /m

= 5947.05\*1.00= 5947.05 X = -350. H = 1250.

= /(0.9\*\*)/YS = 5947.05/(0.9\*1250.0\*360.0)/7.0= 2097.7 /m

Y方向配筋计算：

= 2011.17\*1.00= 2011.17 Y =-1925. H = 1250.

= /(0.9\*\*)/XS = 2011.17/(0.9\*1250.0\*360.0)/4.0= 1241.5 /m

= 3522.60\*1.00= 3522.60 Y = 1926. H = 1250.

= /(0.9\*\*)/XS = 3522.60/(0.9\*1250.0\*360.0)/4.0= 2174.4 /m

= 3525.88\*1.00= 3525.88 Y = 1925. H = 1250.

= /(0.9\*\*)/XS = 3525.88/(0.9\*1250.0\*360.0)/4.0= 2176.5 /m

计算的钢筋面积：

= 2098./m = 2176./m

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=17681.5kN =-7714.1kN.m =-57.4kN.m =-159.5kN =166.6kN

承台及覆土重:

= 672.0×1.20= 806.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 2106.94 | 2222.14 |
| 2 | -1500.0 | 1500.0 | 2964.06 | 3079.26 |
| 3 | 0.0 | -3000.0 | 1668.81 | 1784.01 |
| 4 | 0.0 | 0.0 | 2525.93 | 2641.13 |
| 5 | 0.0 | 3000.0 | 3383.05 | 3498.25 |
| 6 | 1500.0 | -1500.0 | 2087.81 | 2203.01 |
| 7 | 1500.0 | 1500.0 | 2944.93 | 3060.13 |

桩总反力= 18487.9 kN; 桩均反力= 2641.1 kN

台阶1 H = 700.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 2106.94(×1.00) kN

角桩No.=2

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 1668.81(×1.00) kN

角桩No.=3

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 3383.05(×1.00) kN

角桩No.=4

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 2964.06(×1.00) kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

=1250. =1302. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 5071.00 (\* 1.00) kN

2、右侧抗剪计算

=1250. = 900. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 5032.73 (\* 1.00) kN

3、下侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 1668.81 (\* 1.00) kN

4、上侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 3383.05 (\* 1.00) kN

台阶2 H = 1300.00 mm

c、承台抗剪计算

1、左侧抗剪计算

=1250. =1303. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 5071.00 (\* 1.00) kN

2、右侧抗剪计算

=1250. = 950. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 5032.73 (\* 1.00) kN

3、下侧抗剪计算

=1250. = 875. =0.700

= [1.75/(+1.0)]

=0.894\*[1.75/(0.700+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5330.0 kN

> = 1668.81 (\* 1.00) kN

4、上侧抗剪计算

=1250. = 874. =0.699

= [1.75/(+1.0)]

=0.894\*[1.75/(0.699+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5332.5 kN

> = 3383.05 (\* 1.00) kN

承台阶梯高度：

1阶高： 700mm

2阶高： 600mm

3、承台板抗弯计算

X方向配筋计算：

= 5831.65\*1.00= 5831.65 X = -350. H = 1250.

= /(0.9\*\*)/YS = 5831.65/(0.9\*1250.0\*360.0)/7.0= 2057.0 /m

= 5787.64\*1.00= 5787.64 X = 350. H = 1250.

= /(0.9\*\*)/YS = 5787.64/(0.9\*1250.0\*360.0)/7.0= 2041.5 /m

= 5831.65\*1.00= 5831.65 X = -350. H = 1250.

= /(0.9\*\*)/YS = 5831.65/(0.9\*1250.0\*360.0)/7.0= 2057.0 /m

Y方向配筋计算：

= 1793.97\*1.00= 1793.97 Y =-1925. H = 1250.

= /(0.9\*\*)/XS = 1793.97/(0.9\*1250.0\*360.0)/4.0= 1107.4 /m

= 3633.40\*1.00= 3633.40 Y = 1926. H = 1250.

= /(0.9\*\*)/XS = 3633.40/(0.9\*1250.0\*360.0)/4.0= 2242.8 /m

= 3636.78\*1.00= 3636.78 Y = 1925. H = 1250.

= /(0.9\*\*)/XS = 3636.78/(0.9\*1250.0\*360.0)/4.0= 2244.9 /m

计算的钢筋面积：

= 2057./m = 2245./m

当前荷载组合

| 【73】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=17393.0kN =-4576.5kN.m =-58.1kN.m =-161.3kN =129.7kN

承台及覆土重:

= 672.0×1.20= 806.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 2240.16 | 2355.36 |
| 2 | -1500.0 | 1500.0 | 2748.66 | 2863.86 |
| 3 | 0.0 | -3000.0 | 1976.22 | 2091.42 |
| 4 | 0.0 | 0.0 | 2484.72 | 2599.92 |
| 5 | 0.0 | 3000.0 | 2993.22 | 3108.42 |
| 6 | 1500.0 | -1500.0 | 2220.78 | 2335.98 |
| 7 | 1500.0 | 1500.0 | 2729.28 | 2844.48 |

桩总反力= 18199.4 kN; 桩均反力= 2599.9 kN

台阶1 H = 700.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 2240.16(×1.00) kN

角桩No.=2

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 1976.22(×1.00) kN

角桩No.=3

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 2993.22(×1.00) kN

角桩No.=4

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 2748.66(×1.00) kN

台阶2 H = 1300.00 mm

当前荷载组合

| 【99】SATWE基本组合:1.20\*恒+0.60\*活-0.20\*风y-1.30\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=14834.0kN =2327.4kN.m =-59.9kN.m =-156.3kN =32.0kN

承台及覆土重:

= 672.0×1.20= 806.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1500.0 | -1500.0 | 2258.43 | 2373.63 |
| 2 | -1500.0 | 1500.0 | 1999.83 | 2115.03 |
| 3 | 0.0 | -3000.0 | 2377.74 | 2492.94 |
| 4 | 0.0 | 0.0 | 2119.14 | 2234.34 |
| 5 | 0.0 | 3000.0 | 1860.54 | 1975.74 |
| 6 | 1500.0 | -1500.0 | 2238.46 | 2353.66 |
| 7 | 1500.0 | 1500.0 | 1979.85 | 2095.05 |

桩总反力= 15640.4 kN; 桩均反力= 2234.3 kN

台阶1 H = 700.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 2258.43(×0.85) kN

角桩No.=2

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 2377.74(×0.85) kN

角桩No.=3

= 1250. =1.00 = 2200.

= 825. =0.66 = 700.

= 650. =0.4667 = 0.651 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3470.92 kN > = 1860.54(×0.85) kN

角桩No.=4

= 900. =0.72 = 700.

= 1250. =1.00 = 2200.

= 650. =0.6087 = 0.467 =1.00 = 1.433

=[( +/2)+ (+/2)]

= 3321.17 kN > = 1999.83(×0.85) kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

=1250. =1302. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 4258.25 (\* 0.85) kN

2、右侧抗剪计算

=1250. = 900. =0.720

= [1.75/(+1.0)]

=0.894\*[1.75/(0.720+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 10216.6 kN

> = 4218.31 (\* 0.85) kN

3、下侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 2377.74 (\* 0.85) kN

4、上侧抗剪计算

=1250. = 825. =0.660

= [1.75/(+1.0)]

=0.894\*[1.75/(0.660+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5458.5 kN

> = 1860.54 (\* 0.85) kN

台阶2 H = 1300.00 mm

c、承台抗剪计算

1、左侧抗剪计算

=1250. =1303. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 4258.25 (\* 0.85) kN

2、右侧抗剪计算

=1250. = 950. =0.760

= [1.75/(+1.0)]

=0.894\*[1.75/(0.760+1.0)]\*6268.\*1250.\*1.4329\*1.e-3

= 9984.4 kN

> = 4218.31 (\* 0.85) kN

3、下侧抗剪计算

=1250. = 875. =0.700

= [1.75/(+1.0)]

=0.894\*[1.75/(0.700+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5330.0 kN

> = 2377.74 (\* 0.85) kN

4、上侧抗剪计算

=1250. = 874. =0.699

= [1.75/(+1.0)]

=0.894\*[1.75/(0.699+1.0)]\*3232.\*1250.\*1.4329\*1.e-3

= 5332.5 kN

> = 1860.54 (\* 0.85) kN

承台阶梯高度：

1阶高： 700mm

2阶高： 600mm

# 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 | 1895.54 (19) | 1412.64 (4) | 1957.98 (45) | 1381.91 (44) |
| 2 | 2476.07 (18) | 1807.94 (5) | 2547.53 (44) | 1787.77 (45) |
| 3 | 1674.28 (19) | 1079.87 (4) | 2034.84 (45) | 792.51 (44) |
| 4 | 2148.75 (14) | 1651.93 (3) | 2114.94 (42) | 1707.80 (43) |
| 5 | 2806.08 (18) | 1919.24 (5) | 3123.74 (44) | 1694.40 (45) |
| 6 | 1879.96 (31) | 1398.40 (10) | 1941.56 (51) | 1368.63 (50) |
| 7 | 2460.40 (18) | 1793.84 (5) | 2534.33 (44) | 1771.25 (45) |

桩平均反力最大值2148.75 (非震)(Load 14)

桩平均反力最小值1651.93 (非震)(Load 3)

桩平均反力最大值2114.94 (震)(Load 42)

桩平均反力最小值1707.80 (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3321.17 kN 冲切力2240.16 kN ：650 mm (Load:73)

桩 2: 抗力3470.92 kN 冲切力2021.08 kN ：650 mm (Load:99)

桩 3: 抗力3470.92 kN 冲切力3383.05 kN ：650 mm (Load:72)

桩 4: 抗力3321.17 kN 冲切力2964.06 kN ：650 mm (Load:72)

柱冲切计算：

抗力19483.80 kN 冲切力15452.25 kN ：1250 mm Load：55

抗剪计算：

1左边： 抗力9984.41kN 剪力5171.35kN ：1250mm (Load:55)

2右边： 抗力9984.41kN 剪力5130.15kN ：1250mm (Load:55)

3上边： 抗力5330.02kN 剪力2021.08kN ：1250mm (Load:99)

4下边： 抗力5332.53kN 剪力3383.05kN ：1250mm (Load:72)

承台高度：

一阶高700 二阶高600

底板配筋计算：

X方向：弯矩5947.05 kN.m 计算钢筋面积2098 /m Load： 55

Y方向：弯矩3636.78 kN.m 计算钢筋面积2245 /m Load： 72

根据最小配筋率计算承台最小配筋：

= 1754. /m

= 1590. /m

原钢筋x方向配筋量不满足

原钢筋y方向配筋量不满足

计算的配筋方案为：

Agx: HRB400 18@100

Agy: HRB400 18@100