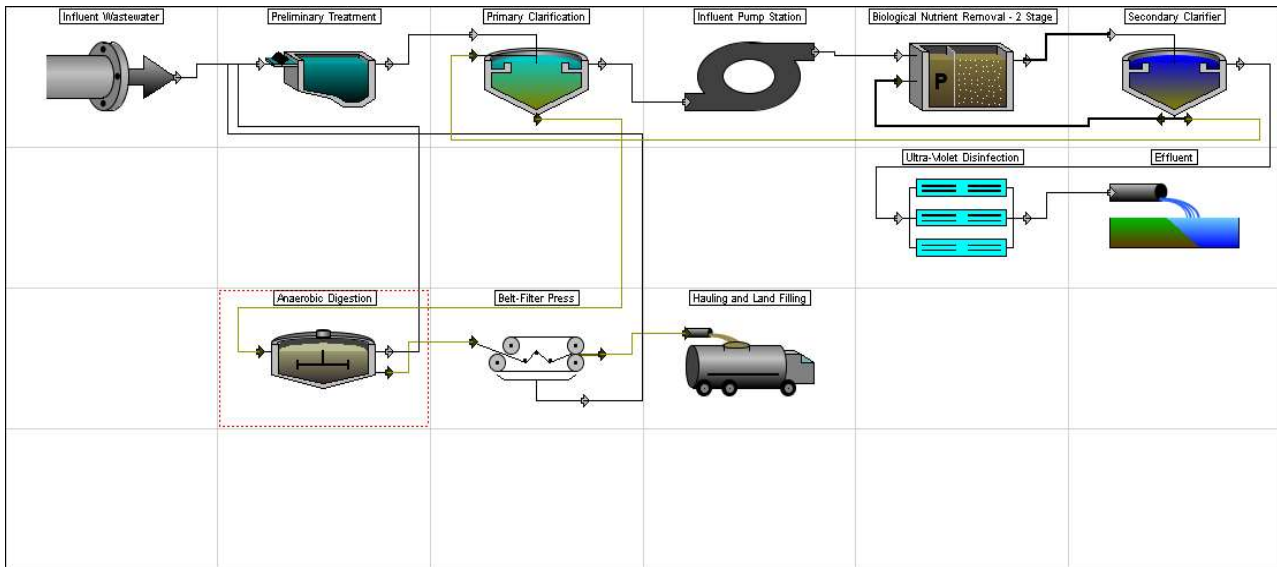


**Layout Orem City**



**Summary**

**Equipment Database**

Hydromantis 2014,(USA Avg)

**Layout Summary**

| Description                       | Value                | Units     |
|-----------------------------------|----------------------|-----------|
| <b>CONSTRUCTION COSTS</b>         |                      |           |
| Unit process construction cost:   | \$62,900,000         | \$        |
| Other direct construction costs   | \$12,100,000         | \$        |
| Other indirect construction costs | \$55,600,000         | \$        |
| <b>Total construction costs</b>   | <b>\$131,000,000</b> | <b>\$</b> |

**ANNUAL COSTS**

**LABOR COSTS**

|                                     |                    |              |
|-------------------------------------|--------------------|--------------|
| Administration labor cost           | \$138,000          | \$/yr        |
| Laboratory labor cost               | \$187,000          | \$/yr        |
| Unit process operation labor cost   | \$922,000          | \$/yr        |
| Unit process maintenance labor cost | \$617,000          | \$/yr        |
| <b>Total labor costs</b>            | <b>\$1,860,000</b> | <b>\$/yr</b> |

**MATERIAL COSTS**

|                     |           |       |
|---------------------|-----------|-------|
| Total material cost | \$868,000 | \$/yr |
|---------------------|-----------|-------|

**CHEMICAL COSTS**

|                     |           |       |
|---------------------|-----------|-------|
| Total chemical cost | \$163,000 | \$/yr |
|---------------------|-----------|-------|

**ENERGY COSTS**

|                   |             |       |
|-------------------|-------------|-------|
| Total energy cost | \$1,370,000 | \$/yr |
|-------------------|-------------|-------|

|                                 |             |       |
|---------------------------------|-------------|-------|
| Total operation and maintenance | \$4,260,000 | \$/yr |
|---------------------------------|-------------|-------|

**CONSTRUCTION COST AMC**

|  |              |       |
|--|--------------|-------|
| Amortization cost for total construction | \$11,500,000 | \$/yr |
|--|--------------|-------|

|                                  |                     |              |
|----------------------------------|---------------------|--------------|
| <b>Total annual project cost</b> | <b>\$15,700,000</b> | <b>\$/yr</b> |
|----------------------------------|---------------------|--------------|

**PROJECT SUMMARY**

|                              |               |       |
|------------------------------|---------------|-------|
| Present worth                | \$188,000,000 | \$    |
| Total project cost           | \$131,000,000 | \$    |
| Total operation labor cost   | \$1,250,000   | \$/yr |
| Total maintenance labor cost | \$617,000     | \$/yr |
| Total material cost          | \$868,000     | \$/yr |
| Total chemical cost          | \$163,000     | \$/yr |
| Total energy cost            | \$1,370,000   | \$/yr |
| Total amortization cost      | \$11,500,000  | \$/yr |

**Process Summary**

| Process               | Construction (\$) | Operation (\$/yr) | Maintenance (\$/yr) | Material (\$/yr) | Chemical (\$/yr) | Energy (\$/yr) | Amortization (\$/yr) |
|-----------------------|-------------------|-------------------|---------------------|------------------|------------------|----------------|----------------------|
| Preliminary Treatment | 1330000           | 129000            | 54000               | 33300            | 0                | 5350           | 112000               |
| Anaerobic Digestion   | 7190000           | 129000            | 73300               | 68800            | 0                | 32600          | 682000               |
| Primary Clarification | 1220000           | 89400             | 46300               | 12100            | 0                | 1380           | 113000               |
| Belt-Filter Press     | 918000            | 27900             | 6080                | 0                | 92500            | 15300          | 83700                |

|                                 |          |        |        |        |       |        |         |
|---------------------------------|----------|--------|--------|--------|-------|--------|---------|
| Influent Pump Station           | 9200000  | 52600  | 42700  | 64400  | 0     | 61300  | 784000  |
| Hauling and Land Filling        | 465000   | 40800  | 0      | 90400  | 0     | 0      | 76500   |
| Biological Nutrient Removal - 2 | 24300000 | 324000 | 175000 | 440000 | 0     | 741000 | 2220000 |
| Ultra-Violet Disinfection       | 14100000 | 0      | 153000 | 141000 | 70600 | 506000 | 1390000 |
| Secondary Clarifier             | 1860000  | 129000 | 66500  | 18400  | 0     | 2380   | 170000  |
| Effluent                        | 0        | 0      | 0      | 0      | 0     | 0      | 0       |
| Blower System                   | 2300000  | 0      | 0      | 0      | 0     | 0      | 192000  |
| Other Costs                     | 67700000 | 325000 | 0      | 0      | 0     | 0      | 5640000 |

#### Summary of Other Costs for Layout

| Description                       | Value    | Units |
|-----------------------------------|----------|-------|
| Other Costs                       |          |       |
| Quantities                        |          |       |
| Required land                     | 23       | acre  |
| Administration labor hours        | 2680     | hr/yr |
| Laboratory labor hours            | 3630     | hr/yr |
| Costs                             |          |       |
| DIRECT COSTS                      |          |       |
| Mobilization                      | 1110000  | \$    |
| Site preparation                  | 1420000  | \$    |
| Site electrical                   | 3230000  | \$    |
| Yard piping                       | 2110000  | \$    |
| Instrumentation and control       | 1720000  | \$    |
| Lab and administration building   | 2530000  | \$    |
| Total direct construction costs   | 12100000 | \$    |
| INDIRECT COSTS                    |          |       |
| Cost of land                      | 460000   | \$    |
| Miscellaneous cost                | 4310000  | \$    |
| Legal cost                        | 1730000  | \$    |
| Engineering design fee            | 12900000 | \$    |
| Inspection cost                   | 1730000  | \$    |
| Contingency                       | 8630000  | \$    |
| Technical                         | 1730000  | \$    |
| Interest during construction      | 12800000 | \$    |
| Profit                            | 11300000 | \$    |
| Total indirect construction cost  | 55600000 | \$    |
| Total of other construction costs | 67700000 | \$    |
| LABOR COSTS                       |          |       |
| Administration labor cost         | 138000   | \$/yr |
| Laboratory labor cost             | 187000   | \$/yr |

#### Summary of Air Supply System

| Description                           | Value   | Units |
|---------------------------------------|---------|-------|
| Blower System for Entire Plant        |         |       |
| Design Information                    |         |       |
| Minimum air flow capacity             | 25700   | scfm  |
| Safety factor                         | 1.5     |       |
| Requested air flow capacity           | 38500   | scfm  |
| Total capacity of blowers             | 38500   | scfm  |
| Number of blowers in use              | 3       |       |
| Total number of blowers               | 4       |       |
| Capacity of individual blowers        | 12800   | scfm  |
| Estimated cost of an installed blower | 464000  | \$    |
| Blower building area                  | 1910    | sqft  |
| Costs                                 |         |       |
| Construction and equipment cost       | 2300000 | \$    |
| Installed Blower Cost                 | 1860000 | \$    |
| Building Cost                         | 210000  | \$    |
| Misc Costs                            | 227000  | \$    |
| Operational labor cost                | 0       | \$/yr |
| Maintenance labor cost                | 0       | \$/yr |
| Material and supply cost              | 0       | \$/yr |
| Chemical cost                         | 0       | \$/yr |
| Energy cost                           | 0       | \$/yr |
| Amortization cost                     | 192000  | \$/yr |
| Notes                                 |         |       |

Energy costs are shown at the individual unit processes that require air

#### Influent Wastewater

##### Preliminary Treatment

##### Design Output Data

| Description                     | Value | Units   |
|---------------------------------|-------|---------|
| Preliminary Treatment           |       |         |
| Design Information              |       |         |
| Mechanically Cleaned Bar Screen |       |         |
| Bar size                        | 0.2   | in      |
| Bar spacing                     | 0.375 | in      |
| Slope of bars from horizontal   | 30    | degrees |
| Head loss through screen        | 0.21  | ft      |

|                                 |              |
|---------------------------------|--------------|
| Approach velocity               | 2.5 ft/s     |
| Average flow through velocity ( | 2.5 ft/s     |
| Maximum flow through velocity   | 3 ft/s       |
| Screen channel width            | 8.36 ft      |
| Average channel depth           | 1 ft         |
| Horizontal Flow Grit Chamber    |              |
| Maximum flow                    | 46.3 cuft/s  |
| Average flow                    | 20.9 cuft/s  |
| Minimum flow                    | 14 cuft/s    |
| Temperature                     | 10 deg C     |
| Maximum flow through velocity   | 1.5 ft/s     |
| Average flow through velocity ( | 1 ft/s       |
| Size of smallest particle 100%  | 0.2 mm       |
| Specific gravity of particle    | 2.65         |
| Number of units                 | 2            |
| Maximum flow/unit               | 23.2 cuft/s  |
| Width of channel                | 3.86 ft      |
| Depth of channel                | 4 ft         |
| Length of channel               | 144 ft       |
| Settling velocity of particle   | 0.0707 ft/s  |
| Slope of channel bottom         | 0.000471     |
| Allowance for currents          | 1.7          |
| Manning coefficient             | 0.035        |
| Hydraulic retention time        | 1.6 min      |
| Volume of grit                  | 54.3 cuft/d  |
| Costs                           |              |
| Construction and equipment co   | 1330000 \$   |
| Operational labor cost          | 129000 \$/yr |
| Maintenance labor cost          | 54000 \$/yr  |
| Material and supply cost        | 33300 \$/yr  |
| Chemical cost                   | 0 \$/yr      |
| Energy cost                     | 5350 \$/yr   |
| Amortization cost               | 112000 \$/yr |

### Anaerobic Digestion

#### Design Output Data

| Description                      | Value   | Units        |
|----------------------------------|---------|--------------|
| Anaerobic Digestion              |         |              |
| Design Information               |         |              |
| Percent VSS destroyed            | 50      | %            |
| Solids concentration in digeste  | 5       | %            |
| Detention time                   | 25      | d            |
| Digester depth                   | 28.8    | ft           |
| Digester diameter                | 75      | ft           |
| Effective digester volume        | 424000  | cuft         |
| Number of digesters per batter   | 3       |              |
| Number of primary digesters p    | 2       |              |
| Number of secondary digester:    | 1       |              |
| Number of batteries              | 1       |              |
| Gas produced                     | 106     | cuft/min     |
| Heat required                    | 2860000 | BTU/hr       |
| Digester gas required            | 110     | cuft/min     |
| Total natural gas required       | 461000  | cuft/yr      |
| Quantities                       |         |              |
| Operation labor required         | 2510    | pers-hrs/yr  |
| Maintenance labor required       | 1630    | pers-hrs/yr  |
| Electrical energy required       | 248000  | kWh/yr       |
| Volume of earthwork required     | 422000  | cuft         |
| Slab thickness                   | 11.2    | in           |
| Volume of slab concrete requir   | 13500   | cuft         |
| Wall thickness                   | 21.9    | in           |
| Volume of wall concrete requir   | 45200   | cuft         |
| Sidewater depth                  | 28.8    | ft           |
| Surface area/floor of 2-story co | 2200    | sqft         |
| Piping size                      | 10      | in           |
| Length of total piping system    | 1040    | ft           |
| Number of 90 degree elbows       | 39      |              |
| Number of tees                   | 77      |              |
| Number of plug valves            | 56      |              |
| Total dry solids treated         | 13.6    | ton(short)/d |
| Costs                            |         |              |
| Construction and equipment co    | 7190000 | \$           |
| Earthwork Cost                   | 125000  | \$           |
| Wall Concrete Cost               | 1090000 | \$           |
| Slab Concrete Cost               | 175000  | \$           |
| Building Cost                    | 242000  | \$           |
| Piping System Cost               | 787000  | \$           |
| Floating Cover Cost              | 2470000 | \$           |
| Gas Recirculation Units Cost     | 587000  | \$           |
| Heating Units Cost               | 519000  | \$           |
| Gas Safety Equipment Cost        | 240000  | \$           |
| Installed Pumps Cost             | 250000  | \$           |

|                          |              |
|--------------------------|--------------|
| Operational labor cost   | 129000 \$/yr |
| Maintenance labor cost   | 73300 \$/yr  |
| Material and supply cost | 68800 \$/yr  |
| Chemical cost            | 0 \$/yr      |
| Energy cost              | 32600 \$/yr  |
| Amortization cost        | 682000 \$/yr |

### Primary Clarification

#### Design Output Data

| Description                       | Value   | Units       |
|-----------------------------------|---------|-------------|
| Primary Clarification             |         |             |
| Design Information                |         |             |
| Surface area                      | 17200   | sqft        |
| Surface area per circular clarifi | 4310    | sqft        |
| Diameter of each circular clarif  | 75      | ft          |
| Number of clarifiers per batter   | 4       |             |
| Number of batteries               | 1       |             |
| Solids loading rate               | 2.58    | lb/(sqft-d) |
| Hydraulic retention time          | 2.02    | hr          |
| Weir length                       | 3030    | ft          |
| Volume of sludge generated        | 77700   | gpd(US)     |
| Quantities                        |         |             |
| Operation labor required          | 1420    | pers-hrs/yr |
| Maintenance labor required        | 785     | pers-hrs/yr |
| Electrical energy required        | 11200   | kWh/yr      |
| Volume of earthwork required      | 222000  | cuft        |
| Slab thickness                    | 10.2    | in          |
| Volume of slab concrete requir    | 17400   | cuft        |
| Wall thickness                    | 11.5    | in          |
| Volume of wall concrete requir    | 9960    | cuft        |
| Costs                             |         |             |
| Construction and equipment co     | 1180000 | \$          |
| Earthwork Cost                    | 65900   | \$          |
| Wall Concrete Cost                | 240000  | \$          |
| Slab Concrete Cost                | 226000  | \$          |
| Installed Equipment Cost          | 468000  | \$          |
| Misc Costs                        | 180000  | \$          |
| Operational labor cost            | 73100   | \$/yr       |
| Maintenance labor cost            | 35300   | \$/yr       |
| Material and supply cost          | 11800   | \$/yr       |
| Chemical cost                     | 0       | \$/yr       |
| Energy cost                       | 1120    | \$/yr       |
| Amortization cost                 | 109000  | \$/yr       |
| Waste Sludge Pumping              |         |             |
| Design Information                |         |             |
| Average daily pumping rate        | 0.0777  | MGD(US)     |
| Total pumping capacity            | 0.0777  | MGD(US)     |
| Design capacity per pump          | 27      | gpm(US)     |
| Number of pumps                   | 3       |             |
| Number of batteries               | 1       |             |
| Firm pumping capacity             | 0.0777  | MGD(US)     |
| Quantities                        |         |             |
| Operation labor required          | 317     | pers-hrs/yr |
| Maintenance labor required        | 247     | pers-hrs/yr |
| Electrical energy required        | 2620    | kWh/yr      |
| Volume of earthwork required      | 1610    | cuft        |
| Area of pump building             | 202     | sqft        |
| Costs                             |         |             |
| Construction and equipment co     | 45500   | \$          |
| Earthwork Cost                    | 478     | \$          |
| Pump Building Cost                | 22200   | \$          |
| Installed Pump Cost               | 15900   | \$          |
| Misc Costs                        | 6940    | \$          |
| Operational labor cost            | 16300   | \$/yr       |
| Maintenance labor cost            | 11100   | \$/yr       |
| Material and supply cost          | 318     | \$/yr       |
| Chemical cost                     | 0       | \$/yr       |
| Energy cost                       | 262     | \$/yr       |
| Amortization cost                 | 4300    | \$/yr       |

### Belt-Filter Press

#### Design Output Data

| Description                      | Value | Units   |
|----------------------------------|-------|---------|
| Belt-Filter Press                |       |         |
| Design Information               |       |         |
| Belt filter width                | 2     | m       |
| Number of units                  | 1     |         |
| Hydraulic loading per unit per r | 70    | gpm(US) |
| Hydraulic loading required per   | 114   | gpm(US) |
| Final solids content             | 19    | %       |
| Solids capture fraction          | 0.998 |         |
| Quantities                       |       |         |

|                                 |                 |
|---------------------------------|-----------------|
| Operation labor required        | 542 pers-hrs/yr |
| Maintenance labor required      | 135 pers-hrs/yr |
| Power                           | 153000 kWh/yr   |
| Polymer required                | 71200 lb/yr     |
| Dry solids produced             | 19500 lb/d      |
| Belt filter(s)                  | 301000 \$       |
| Building                        | 322000 \$       |
| Installation                    | 75300 \$        |
| Polymer system                  | 111000 \$       |
| Feed pumps                      | 33100 \$        |
| Conveyor system                 | 75300 \$        |
| Costs                           |                 |
| Construction and equipment cost | 918000 \$       |
| Building Cost                   | 322000 \$       |
| Polymer System Cost             | 111000 \$       |
| Feed Pumps Cost                 | 33100 \$        |
| Conveyor System Cost            | 75300 \$        |
| Installed Belt Filter           | 376000 \$       |
| Operational labor cost          | 27900 \$/yr     |
| Maintenance labor cost          | 6080 \$/yr      |
| Material and supply cost        | 0 \$/yr         |
| Chemical cost                   | 92500 \$/yr     |
| Energy cost                     | 15300 \$/yr     |
| Amortization cost               | 83700 \$/yr     |

### Influent Pump Station

#### Design Output Data

| Description                        | Value   | Units       |
|------------------------------------|---------|-------------|
| Pump Station                       |         |             |
| Design Information                 |         |             |
| Volume of wet well                 | 155000  | cuft        |
| Width of wet well                  | 878     | ft          |
| Depth of the pumping station       | 32.3    | ft          |
| Length of the pumping station      | 27.6    | ft          |
| Width of the pumping station       | 916     | ft          |
| Minimum depth of water in wet well | 11.3    | ft          |
| Area of pump building              | 1110    | sqft        |
| Peak capacity of pumps             | 41.5    | MGD(US)     |
| Firm pumping capacity              | 41.5    | MGD(US)     |
| Total dynamic head - average       | 43.9    | ft          |
| Quantities                         |         |             |
| Operation labor required           | 1020    | pers-hrs/yr |
| Maintenance labor required         | 950     | pers-hrs/yr |
| Electrical energy required         | 613000  | kWh/yr      |
| Volume of earthwork required       | 3080000 | cuft        |
| Volume of slab concrete required   | 291000  | cuft        |
| Volume of wall concrete required   | 82800   | cuft        |
| Capacity per pump                  | 28900   | gpm(US)     |
| Number of constant speed pumps     | 2       |             |
| Number of variable speed pumps     | 0       |             |
| Diameter of discharge header       | 38.4    | in          |
| Total dynamic head                 | 53.3    | ft          |
| Size of selected pump              | 36      | in          |
| Specific speed of pump             | 5170    |             |
| Pump rotating speed                | 464     | rpm         |
| Motor size required                | 292     | HP          |
| Size of selected motor             | 300     | HP          |
| Width of pump system               | 7.8     | ft          |
| Length of pump system              | 29.4    | ft          |
| Length of the dry well             | 27.6    | ft          |
| Width of the dry well              | 38.4    | ft          |
| Costs                              |         |             |
| Construction and equipment cost    | 9200000 | \$          |
| Earthwork Cost                     | 912000  | \$          |
| Wall Concrete Cost                 | 1990000 | \$          |
| Slab Concrete Cost                 | 3770000 | \$          |
| Building Cost                      | 123000  | \$          |
| Installed Pump Equipment Cost      | 998000  | \$          |
| Misc Costs                         | 1400000 | \$          |
| Operational labor cost             | 52600   | \$/yr       |
| Maintenance labor cost             | 42700   | \$/yr       |
| Material and supply cost           | 64400   | \$/yr       |
| Chemical cost                      | 0       | \$/yr       |
| Energy cost                        | 61300   | \$/yr       |
| Amortization cost                  | 784000  | \$/yr       |

### Hauling and Land Filling

#### Design Output Data

| Description                     | Value | Units  |
|---------------------------------|-------|--------|
| Sludge Hauling and Land Filling |       |        |
| Design Information              |       |        |
| Volume of sludge hauled         | 50.7  | cuyd/d |

|                                       |                   |
|---------------------------------------|-------------------|
| Truck capacity                        | 19 cuyd           |
| Round trip time to disposal site      | 1 hr              |
| Truck loading time                    | 0.75 hr           |
| Operational hours per day             | 8 hr              |
| Number of trucks required             | 1                 |
| Distance to disposal site             | 10 miles          |
| Quantities                            |                   |
| Total sludge volume hauled            | 50.7 cuyd/d       |
| Maximum anticipated landfill duration | 30 d              |
| Anticipated sludge storage height     | 8 ft              |
| Sludge storage shed area              | 5130 sqft         |
| Width of sludge storage shed          | 50.7 ft           |
| Length of sludge storage shed         | 101 ft            |
| Volume of earthwork required          | 13800 cuft        |
| Volume of slab concrete required      | 5830 cuft         |
| Surface area of canopy roof           | 5130 sqft         |
| Round trip haul distance              | 20 miles          |
| Round trips per day per truck         | 3                 |
| Distance traveled per year per truck  | 15000 miles       |
| Sludge hauled                         | 44.8 ton(short)/d |
| Operation labor required              | 793 pers-hrs/yr   |
| Landfilling cost                      | 35200 \$/yr       |
| Costs                                 |                   |
| Construction and equipment cost       | 465000 \$         |
| Earthwork Cost                        | 4090 \$           |
| Slab Concrete Cost                    | 75600 \$          |
| Canopy Roof Cost                      | 103000 \$         |
| Vehicle Cost                          | 283000 \$         |
| Operational labor cost                | 40800 \$/yr       |
| Maintenance labor cost                | 0 \$/yr           |
| Material and supply cost              | 90400 \$/yr       |
| Chemical cost                         | 0 \$/yr           |
| Energy cost                           | 0 \$/yr           |
| Amortization cost                     | 76500 \$/yr       |

## Biological Nutrient Removal - 2 Stage

### Design Output Data

| Description                              | Value  | Units |
|--|--|-------|
| 2-Stage Biological Nitrogen Removal      |  |       |
| Design Information                       |  |       |
| Aerobic SRT is greater than 7            |  |       |
| 2-Stage Biological Nutrient Removal      |  |       |
| Design aerobic SRT for nitrification     | 30 d   |       |
| Total reactor SRT                        | 31 d   |       |
| Design SS                                | 2500 mg/L                                      |       |
| Calculated VSS                           | 1850 mg/L                                      |       |
| Calculated VSS:TSS ratio                 | 0.741 mg VSS/mg SS                             |       |
| Total volume of anaerobic reactor        | 3240 m <sup>3</sup>                            |       |
| Total volume of aerobic reactor          | 99100 m <sup>3</sup>                           |       |
| Total volume of all reactors             | 102000 m <sup>3</sup>                          |       |
| Width of parallel train                  | 10 m   |       |
| Sidewater depth                          | 5 m  |       |
| Number of batteries                      | 1  |       |
| Number of parallel trains per battery    | 16   |       |
| Number of anaerobic cells within battery | 1  |       |
| Number of aerobic cells within battery   | 3  |       |
| Anaerobic hydraulic retention time       | 1.5 hr   |       |
| Aerobic hydraulic retention time         | 45.9 hr  |       |
| Design F/M ratio                         | 0.0438 1/d                                     |       |
| Aerobic F:M is less than user-specified  |  |       |
| Amount of sludge generated               | 8260 kg/d                                      |       |
| Sludge recycle ratio                     | 33.3 %   |       |
| Sludge recycle rate                      | 17300 m <sup>3</sup> /d                        |       |
| Nitrogen required for biomass            | 14.9 mg/L                                      |       |
| Phosphorus required for biomass          | 2.97 mg/L                                      |       |
| Oxygen required to meet average          | 18000 kg/d                                     |       |
| Air flow required to meet average        | 43600 N m <sup>3</sup> /hr                     |       |
| Design air flow                          | 7.33 N m <sup>3</sup> /min/1000 m <sup>3</sup> |       |
| Quantities                               |  |       |
| Operation labor required                 | 5750 pers-hrs/yr                               |       |
| Maintenance labor required               | 3450 pers-hrs/yr                               |       |
| Electrical energy required               | 7250000 kWh/yr                                 |       |
| Volume of earthwork required             | 1590000 cuft                                   |       |
| Volume of slab concrete required         | 466000 cuft                                    |       |
| Volume of wall concrete required         | 271000 cuft                                    |       |
| Handrail length                          | 9110 ft  |       |
| Number of diffusers per train            | 802  |       |
| Fine bubble diffuser floor coverage      | 2.65 %   |       |
| Number of swing arm headers              | 17   |       |
| Required mixing power                    | 52 kW  |       |
| Total number of mixers                   | 32   |       |
| Design mixing power per mixer            | 2.24 kW  |       |

|                                  |               |
|----------------------------------|---------------|
| Mixing power for each unaerated  | 3.25 kW       |
| Costs                            |               |
| Construction and equipment costs | 24100000 \$   |
| Earthwork Cost                   | 471000 \$     |
| Wall Concrete Cost               | 6530000 \$    |
| Slab Concrete Cost               | 6040000 \$    |
| Handrail Cost                    | 683000 \$     |
| Installed Aerator Equipment      | 6260000 \$    |
| Air Piping Cost                  | 1250000 \$    |
| Installed Mixer Equipment Costs  | 492000 \$     |
| Misc Costs                       | 2390000 \$    |
| Operational labor cost           | 296000 \$/yr  |
| Maintenance labor cost           | 155000 \$/yr  |
| Material and supply cost         | 438000 \$/yr  |
| Chemical cost                    | 0 \$/yr       |
| Energy cost                      | 725000 \$/yr  |
| Amortization cost                | 2210000 \$/yr |

|                              |                 |
|------------------------------|-----------------|
| Sludge Recycle Pumping       |                 |
| Design Information           |                 |
| Average daily pumping rate   | 4.57 MGD(US)    |
| Total pumping capacity       | 9.13 MGD(US)    |
| Design capacity per pump     | 3170 gpm(US)    |
| Number of pumps              | 3               |
| Number of batteries          | 1               |
| Firm pumping capacity        | 4.57 MGD(US)    |
| Quantities                   |                 |
| Operation labor required     | 535 pers-hrs/yr |
| Maintenance labor required   | 451 pers-hrs/yr |
| Electrical energy required   | 152000 kWh/yr   |
| Volume of earthwork required | 3040 cuft       |
| Area of pump building        | 380 sqft        |

|                                  |             |
|----------------------------------|-------------|
| Costs                            |             |
| Construction and equipment costs | 204000 \$   |
| Earthwork Cost                   | 901 \$      |
| Pump Building Cost               | 41800 \$    |
| Installed Pump Cost              | 130000 \$   |
| Misc Costs                       | 31100 \$    |
| Operational labor cost           | 27500 \$/yr |
| Maintenance labor cost           | 20200 \$/yr |
| Material and supply cost         | 1430 \$/yr  |
| Chemical cost                    | 0 \$/yr     |
| Energy cost                      | 15200 \$/yr |
| Amortization cost                | 19300 \$/yr |

### Ultra-Violet Disinfection

#### Design Output Data

| Description                          | Value | Units           |
|--------------------------------------|-------|-----------------|
| Ultra-Violet Disinfection            |       |                 |
| Design Information                   |       |                 |
| Design based on a model calculation  | 0.294 | gal(US)/(min·W) |
| System is not headloss constraining  |       |                 |
| Total number of lamps needed         | 5420  |                 |
| Number of spare channels             | 1     |                 |
| Total number of lamps used in design | 6800  |                 |
| Number of excess lamps               | 1380  |                 |
| Number of lamps/modules              | 16    |                 |
| Number of modules/bank               | 17    |                 |
| Number of banks/channel              | 5     |                 |
| Number of channels                   | 5     |                 |
| Calculated headloss                  | 1.11  | in              |

|                                  |               |
|----------------------------------|---------------|
| Costs                            |               |
| Construction and equipment costs | 14100000 \$   |
| Cost of installation             | 8470000 \$    |
| Total cost of UV lamps           | 5650000 \$    |
| Operational labor cost           | 0 \$/yr       |
| Maintenance labor cost           | 153000 \$/yr  |
| Material and supply cost         | 141000 \$/yr  |
| Chemical cost                    | 70600 \$/yr   |
| Energy cost                      | 506000 \$/yr  |
| Amortization cost                | 1390000 \$/yr |

### Secondary Clarifier

#### Design Output Data

| Description                         | Value | Units       |
|-------------------------------------|-------|-------------|
| Secondary Clarification             |       |             |
| Design Information                  |       |             |
| Surface area                        | 34300 | sqft        |
| Surface area per circular clarifier | 8560  | sqft        |
| Diameter of each circular clarifier | 105   | ft          |
| Number of clarifiers per battery    | 4     |             |
| Number of batteries                 | 1     |             |
| Solids loading rate                 | 11.1  | lb/(sqft·d) |

|                                |                      |
|--------------------------------|----------------------|
| Hydraulic retention time       | 4.04 hr              |
| Designed surface overflow rate | 400 gal(US)/(sqft-d) |
| Weir length                    | 3020 ft              |
| Volume of wasted sludge        | 212000 gpd(US)       |
| Quantities                     |                      |
| Operation labor required       | 2150 pers-hrs/yr     |
| Maintenance labor required     | 1190 pers-hrs/yr     |
| Electrical energy required     | 16700 kWh/yr         |
| Volume of earthwork required   | 473000 cuft          |
| Slab thickness                 | 10.2 in              |
| Volume of slab concrete requir | 33200 cuft           |
| Wall thickness                 | 11.5 in              |
| Volume of wall concrete requir | 13700 cuft           |
| Costs                          |                      |
| Construction and equipment cc  | 1800000 \$           |
| Earthwork Cost                 | 140000 \$            |
| Wall Concrete Cost             | 331000 \$            |
| Slab Concrete Cost             | 430000 \$            |
| Installed Equipment Cost       | 625000 \$            |
| Misc Costs                     | 275000 \$            |
| Operational labor cost         | 111000 \$/yr         |
| Maintenance labor cost         | 53600 \$/yr          |
| Material and supply cost       | 18000 \$/yr          |
| Chemical cost                  | 0 \$/yr              |
| Energy cost                    | 1670 \$/yr           |
| Amortization cost              | 164000 \$/yr         |
| Waste Sludge Pumping           |                      |
| Design Information             |                      |
| Average daily pumping rate     | 0.212 MGD(US)        |
| Total pumping capacity         | 0.212 MGD(US)        |
| Design capacity per pump       | 73.6 gpm(US)         |
| Number of pumps                | 3                    |
| Number of batteries            | 1                    |
| Firm pumping capacity          | 0.212 MGD(US)        |
| Quantities                     |                      |
| Operation labor required       | 360 pers-hrs/yr      |
| Maintenance labor required     | 286 pers-hrs/yr      |
| Electrical energy required     | 7130 kWh/yr          |
| Volume of earthwork required   | 1630 cuft            |
| Area of pump building          | 204 sqft             |
| Costs                          |                      |
| Construction and equipment cc  | 56300 \$             |
| Earthwork Cost                 | 484 \$               |
| Pump Building Cost             | 22500 \$             |
| Installed Pump Cost            | 24700 \$             |
| Misc Costs                     | 8580 \$              |
| Operational labor cost         | 18600 \$/yr          |
| Maintenance labor cost         | 12900 \$/yr          |
| Material and supply cost       | 394 \$/yr            |
| Chemical cost                  | 0 \$/yr              |
| Energy cost                    | 713 \$/yr            |
| Amortization cost              | 5320 \$/yr           |

### Effluent

#### Design Output Data

| Description                   | Value | Units |
|-------------------------------|-------|-------|
| Costs                         |       |       |
| Construction and equipment cc | 0     | \$    |
| Operational labor cost        | 0     | \$/yr |
| Maintenance labor cost        | 0     | \$/yr |
| Material and supply cost      | 0     | \$/yr |
| Chemical cost                 | 0     | \$/yr |
| Energy cost                   | 0     | \$/yr |
| Amortization cost             | 0     | \$/yr |