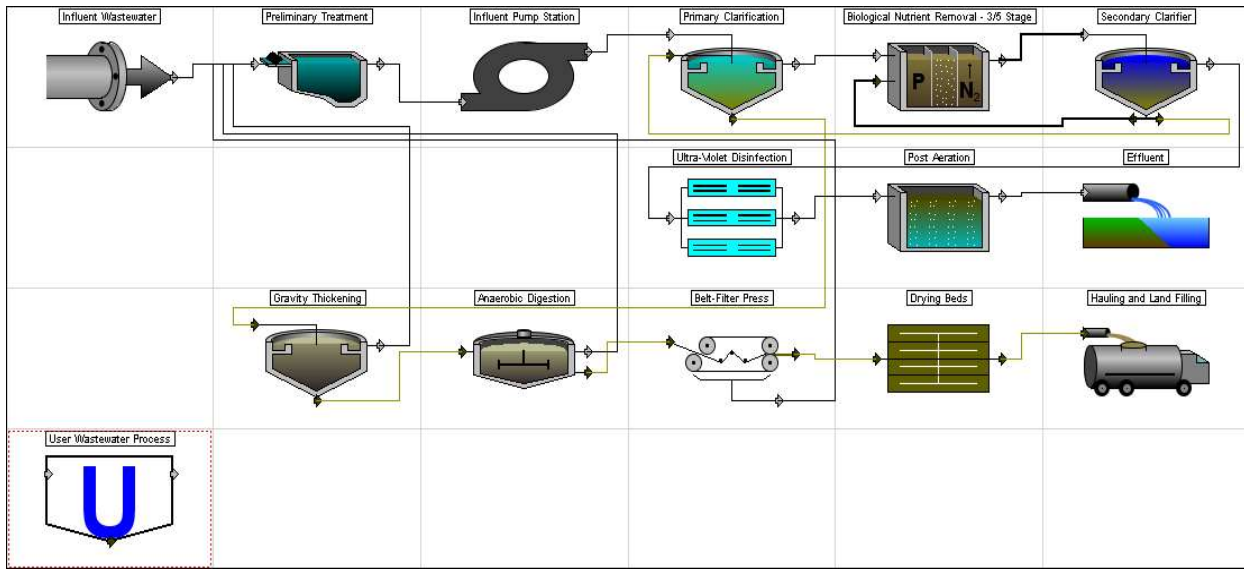


**Layout - Salt Lake City**



**Summary**

**Equipment Database**

Hydromantis 2014,(USA Avg)

**Layout Summary**

Description	Value	Units
<b>CONSTRUCTION COSTS</b>		
Unit process construction cost:	\$286,000,000	\$
Other direct construction costs	\$32,100,000	\$
Other indirect construction costs	\$235,000,000	\$
<b>Total construction costs</b>	<b>\$553,000,000</b>	<b>\$</b>

**ANNUAL COSTS**

**LABOR COSTS**

Administration labor cost	\$420,000	\$/yr
Laboratory labor cost	\$325,000	\$/yr
Unit process operation labor cost	\$5,060,000	\$/yr
Unit process maintenance labor cost	\$3,400,000	\$/yr
<b>Total labor costs</b>	<b>\$9,200,000</b>	<b>\$/yr</b>

**MATERIAL COSTS**

Total material cost	\$2,700,000	\$/yr
---------------------	-------------	-------

**CHEMICAL COSTS**

Total chemical cost	\$735,000	\$/yr
---------------------	-----------	-------

**ENERGY COSTS**

Total energy cost	\$6,980,000	\$/yr
-------------------	-------------	-------

<b>Total operation and maintenance</b>	<b>\$19,600,000</b>	<b>\$/yr</b>
--	---------------------	--------------

**CONSTRUCTION COST AMC**

Amortization cost for total construction	\$46,400,000	\$/yr
--	--------------	-------

<b>Total annual project cost</b>	<b>\$66,000,000</b>	<b>\$/yr</b>
----------------------------------	---------------------	--------------

**PROJECT SUMMARY**

Present worth	\$788,000,000	\$
Total project cost	\$553,000,000	\$
Total operation labor cost	\$5,800,000	\$/yr
Total maintenance labor cost	\$3,400,000	\$/yr
Total material cost	\$2,700,000	\$/yr
Total chemical cost	\$735,000	\$/yr
Total energy cost	\$6,980,000	\$/yr
Total amortization cost	\$46,400,000	\$/yr

**Process Summary**

Process	Construction (\$)	Operation (\$/yr)	Maintenance (\$/yr)	Material (\$/yr)	Chemical (\$/yr)	Energy (\$/yr)	Amortization (\$/yr)
User Wastewater Process	25000000	0	0	0	0	0	0
Preliminary Treatment	3430000	447000	180000	85800	0	10400	288000
Gravity Thickening	959000	131000	73600	9590	0	1830	89200
Influent Pump Station	37700000	175000	130000	264000	0	153000	3200000

Anaerobic Digestion	27700000	489000	299000	230000	0	87700	2620000
Primary Clarification	52100000	226000	131000	51900	0	4520	476000
Ultra-Violet Disinfection	55300000	0	684000	553000	277000	1980000	5430000
Belt-Filter Press	34400000	138000	34400	0	459000	67100	323000
Biological Nutrient Removal - 3	104000000	779000	546000	1230000	0	4610000	9610000
Post Aeration	318000	50900	27600	3980	0	46600	30000
Drying Beds	9620000	2210000	1100000	86500	0	0	837000
Secondary Clarifier	8370000	334000	194000	83400	0	8890	755000
Effluent	0	0	0	0	0	0	0
Hauling and Land Filling	697000	76900	0	108000	0	0	106000
Blower System	3860000	0	0	0	0	0	323000
Other Costs	267000000	745000	0	0	0	0	22300000

#### Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land	91.5	acre
Administration labor hours	8150	hr/yr
Laboratory labor hours	6310	hr/yr
Costs		
<b>DIRECT COSTS</b>		
Mobilization	2950000	\$
Site preparation	3190000	\$
Site electrical	9140000	\$
Yard piping	5810000	\$
Instrumentation and control	5210000	\$
Lab and administration building	5770000	\$
Total direct construction costs	32100000	\$
<b>INDIRECT COSTS</b>		
Cost of land	1830000	\$
Miscellaneous cost	18300000	\$
Legal cost	7310000	\$
Engineering design fee	54800000	\$
Inspection cost	7310000	\$
Contingency	36600000	\$
Technical	7310000	\$
Interest during construction	54200000	\$
Profit	47700000	\$
Total indirect construction cost	235000000	\$
Total of other construction costs	267000000	\$
<b>LABOR COSTS</b>		
Administration labor cost	420000	\$/yr
Laboratory labor cost	325000	\$/yr

#### Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity	79000	scfm
Safety factor	1.5	
Requested air flow capacity	119000	scfm
Total capacity of blowers	119000	scfm
Number of blowers in use	2	
Total number of blowers	3	
Capacity of individual blowers	59300	scfm
Estimated cost of an installed blower	1060000	\$
Blower building area	2550	sqft
Costs		
Construction and equipment cost	3860000	\$
Installed Blower Cost	3190000	\$
Building Cost	280000	\$
Misc Costs	382000	\$
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	323000	\$/yr
Notes		

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

#### Influent Wastewater

#### User Wastewater Process

#### Design Output Data

Description	Value	Units
Costs		
Construction and equipment cost	Overridden	
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

### Preliminary Treatment

#### Design Output Data

Description	Value	Units
Preliminary Treatment		
Design Information		
Mechanically Cleaned Bar Screen		
Bar size	0.25	in
Bar spacing	0.375	in
Slope of bars from horizontal	30	degrees
Head loss through screen	0.444	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	34.7	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	212	cuft/s
Average flow	86.8	cuft/s
Minimum flow	62.2	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	106	cuft/s
Width of channel	17.6	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.00023	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	226	cuft/d
Costs		
Construction and equipment co	3430000	\$
Operational labor cost	447000	\$/yr
Maintenance labor cost	180000	\$/yr
Material and supply cost	85800	\$/yr
Chemical cost	0	\$/yr
Energy cost	10400	\$/yr
Amortization cost	288000	\$/yr

### Gravity Thickening

#### Design Output Data

Description	Value	Units
Gravity Thickening		
Design Information		
Initial concentration	4	%
Thickened concentration	5	%
Mass loading	10	lb/(sqft·d)
Hydraulic loading	30	gal(US)/(sqft·d)
Hydraulic retention time	53.9	hr
Number of tanks	2	
Tank volume	132000	cuft
Depth	9	ft
Surface area per tank	7350	sqft
Tank diameter	97	ft
Quantities		
Amount of sludge generated	73.5	ton(short)/d
Volume of thickened sludge	302000	gpd(US)
Operation labor required	2550	pers-hrs/yr
Maintenance labor required	1430	pers-hrs/yr
Electrical energy required	18300	kWh/yr
Volume of earthwork required	197000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	14200	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	6350	cuft
Costs		
Construction and equipment co	959000	\$
Earthwork Cost	58400	\$
Wall Concrete Cost	153000	\$
Slab Concrete Cost	185000	\$
Installed Equipment Cost	417000	\$

Misc Costs	146000	\$
Operational labor cost	131000	\$/yr
Maintenance labor cost	73600	\$/yr
Material and supply cost	9590	\$/yr
Chemical cost	0	\$/yr
Energy cost	1830	\$/yr
Amortization cost	89200	\$/yr

### Influent Pump Station

#### Design Output Data

Description	Value	Units
Pump Station		
Design Information		
Volume of wet well	524000	cuft
Width of wet well	1700	ft
Depth of the pumping station	50.6	ft
Length of the pumping station	42	ft
Width of the pumping station	1760	ft
Minimum depth of water in wet	19.6	ft
Area of pump building	2670	sqft
Peak capacity of pumps	151	MGD(US)
Firm pumping capacity	151	MGD(US)
Total dynamic head - average	63.6	ft
Quantities		
Operation labor required	3400	pers-hrs/yr
Maintenance labor required	2530	pers-hrs/yr
Electrical energy required	1530000	kWh/yr
Volume of earthwork required	13600000	cuft
Volume of slab concrete requir	1390000	cuft
Volume of wall concrete requir	282000	cuft
Capacity per pump	105000	gpm(US)
Number of constant speed pur	2	
Number of variable speed purr	0	
Diameter of discharge header	73.1	in
Total dynamic head	69.4	ft
Size of selected pump	72	in
Specific speed of pump	8060	
Pump rotating speed	298	rpm
Motor size required	580	HP
Size of selected motor	600	HP
Width of pump system	15	ft
Length of pump system	51.4	ft
Length of the dry well	42	ft
Width of the dry well	60.4	ft
Costs		
Construction and equipment cc	37700000	\$
Earthwork Cost	4030000	\$
Wall Concrete Cost	6800000	\$
Slab Concrete Cost	18000000	\$
Building Cost	293000	\$
Installed Pump Equipment C	2840000	\$
Misc Costs	5760000	\$
Operational labor cost	175000	\$/yr
Maintenance labor cost	130000	\$/yr
Material and supply cost	264000	\$/yr
Chemical cost	0	\$/yr
Energy cost	153000	\$/yr
Amortization cost	3200000	\$/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	1690000	cuft
Number of digesters per batter	12	
Number of primary digesters p	8	
Number of secondary digester:	4	
Number of batteries	1	
Gas produced	497	cuft/min
Heat required	8070000	BTU/hr
Digester gas required	311	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	9490	pers-hrs/yr
Maintenance labor required	5810	pers-hrs/yr
Electrical energy required	877000	kWh/yr

Volume of earthwork required	1690000	cuft
Slab thickness	11.2	in
Volume of slab concrete requir	53900	cuft
Wall thickness	21.9	in
Volume of wall concrete requir	181000	cuft
Sidewater depth	28.8	ft
Surface area/floor of 2-story c	8330	sqft
Piping size	10	in
Length of total piping system	4160	ft
Number of 90 degree elbows	156	
Number of tees	306	
Number of plug valves	222	
Total dry solids treated	66.1	ton(short)/d
Costs		
Construction and equipment cc	27700000	\$
Earthwork Cost	500000	\$
Wall Concrete Cost	4350000	\$
Slab Concrete Cost	698000	\$
Building Cost	916000	\$
Piping System Cost	3130000	\$
Floating Cover Cost	9870000	\$
Gas Recirculation Units Cost	2350000	\$
Heating Units Cost	1490000	\$
Gas Safety Equipment Cost	721000	\$
Installed Pumps Cost	899000	\$
Operational labor cost	489000	\$/yr
Maintenance labor cost	299000	\$/yr
Material and supply cost	230000	\$/yr
Chemical cost	0	\$/yr
Energy cost	87700	\$/yr
Amortization cost	2620000	\$/yr

#### Primary Clarification

##### Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		
Surface area	96100	sqft
Surface area per circular clarifi	8010	sqft
Diameter of each circular clarif	101	ft
Number of clarifiers per batter	12	
Number of batteries	1	
Solids loading rate	2.62	lb/(sqft-d)
Hydraulic retention time	2.69	hr
Weir length	13900	ft
Volume of sludge generated	440000	gpd(US)
Quantities		
Operation labor required	4000	pers-hrs/yr
Maintenance labor required	2240	pers-hrs/yr
Electrical energy required	30400	kWh/yr
Volume of earthwork required	1300000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	92300	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	40000	cuft
Costs		
Construction and equipment cc	5140000	\$
Earthwork Cost	384000	\$
Wall Concrete Cost	962000	\$
Slab Concrete Cost	1200000	\$
Installed Equipment Cost	1810000	\$
Misc Costs	784000	\$
Operational labor cost	206000	\$/yr
Maintenance labor cost	115000	\$/yr
Material and supply cost	51400	\$/yr
Chemical cost	0	\$/yr
Energy cost	3040	\$/yr
Amortization cost	470000	\$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.44	MGD(US)
Total pumping capacity	0.44	MGD(US)
Design capacity per pump	153	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.44	MGD(US)
Quantities		
Operation labor required	396	pers-hrs/yr
Maintenance labor required	319	pers-hrs/yr
Electrical energy required	14800	kWh/yr
Volume of earthwork required	1670	cuft
Area of pump building	209	sqft

Costs	
Construction and equipment cost	68000 \$
Earthwork Cost	495 \$
Pump Building Cost	23000 \$
Installed Pump Cost	34200 \$
Misc Costs	10400 \$
Operational labor cost	20400 \$/yr
Maintenance labor cost	16400 \$/yr
Material and supply cost	476 \$/yr
Chemical cost	0 \$/yr
Energy cost	1480 \$/yr
Amortization cost	6430 \$/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)
Total number of lamps needed	24700	
Number of spare channels	1	
Total number of lamps used in	26700	
Number of excess lamps	1920	
Number of lamps/modules	16	
Number of modules/bank	17	
Number of banks/channel	7	
Number of channels	14	
Calculated headloss	3.07	in

Costs	
Construction and equipment cost	55300000 \$
Cost of installation	33200000 \$
Total cost of UV lamps	22100000 \$
Operational labor cost	0 \$/yr
Maintenance labor cost	684000 \$/yr
Material and supply cost	553000 \$/yr
Chemical cost	277000 \$/yr
Energy cost	1980000 \$/yr
Amortization cost	5430000 \$/yr

### Belt-Filter Press

#### Design Output Data

Description	Value	Units
Belt-Filter Press		
Design Information		
Belt filter width	2	m
Number of units	5	
Hydraulic loading per unit per r	70	gpm(US)
Hydraulic loading required per	563	gpm(US)
Final solids content	19	%
Solids capture fraction	0.998	
Quantities		
Operation labor required	2680	pers-hrs/yr
Maintenance labor required	671	pers-hrs/yr
Power	671000	kWh/yr
Polymer required	353000	lb/yr
Dry solids produced	96600	lb/d
Belt filter(s)	1510000	\$
Building	465000	\$
Installation	376000	\$
Polymer system	557000	\$
Feed pumps	166000	\$
Conveyor system	376000	\$

Costs	
Construction and equipment cost	3440000 \$
Building Cost	465000 \$
Polymer System Cost	557000 \$
Feed Pumps Cost	166000 \$
Conveyor System Cost	376000 \$
Installed Belt Filter	1880000 \$
Operational labor cost	138000 \$/yr
Maintenance labor cost	34400 \$/yr
Material and supply cost	0 \$/yr
Chemical cost	459000 \$/yr
Energy cost	67100 \$/yr
Amortization cost	323000 \$/yr

### Biological Nutrient Removal - 3/5 Stage

#### Design Output Data

Description	Value	Units
BNR System for BIO-P and N Removal		
Design Information		
Influent BOD/TP ratio too small		

5-Stage Biological Phosphorus	
Design aerobic SRT for nitrific:	12.5 d
Total reactor SRT	25 d
Design SS	3000 mg/L
Calculated VSS	2070 mg/L
Calculated VSS:TSS ratio	0.691 mg VSS/mg SS
Total volume of anaerobic reac	0 m3
Total volume of anoxic reactor:	211000 m3
Total volume of aerobic reacto	211000 m3
Total volume of all reactors	422000 m3
Width of parallel train	10 m
Sidewater depth	5 m
Number of batteries	1
Number of parallel trains per b	32
Number of anoxic cells within c	3
Number of aerobic cells within	3
Anaerobic hydraulic retention ti	0 hr
Anoxic hydraulic retention time	23.4 hr
Aerobic hydraulic retention tim	23.4 hr
Amount of sludge generated	50600 kg/d
Sludge recycle ratio	42.9 %
Sludge recycle rate	92900 m3/d
Nitrogen required for biomass	19.5 mg/L
Phosphorus required for biome	3.9 mg/L
Oxygen required to meet aver	80800 kg/d
Air flow required to meet aver	134000 N m3/hr
Design air flow	10.6 N m3/min/1000 m3
Quantities	
Operation labor required	12600 pers-hrs/yr
Maintenance labor required	8500 pers-hrs/yr
Electrical energy required	28900000 kWh/yr
Volume of earthwork required	6290000 cuft
Volume of slab concrete requir	1670000 cuft
Volume of wall concrete requir	999000 cuft
Handrail length	32400 ft
Number of diffusers per train	1240
Fine bubble diffuser floor cover	3.84 %
Number of swing arm headers	35
Required mixing power	2750 kW
Total number of mixers	256
Required mixing power per mi	10.7 kW
Design mixing power per mixer	3.73 kW
Mixing power for each unaerati	21.5 kW
Costs	
Construction and equipment cc	91500000 \$
Earthwork Cost	1860000 \$
Wall Concrete Cost	24100000 \$
Slab Concrete Cost	21700000 \$
Handrail Cost	2430000 \$
Installed Aerator Equipment	24900000 \$
Air Piping Cost	3100000 \$
Installed Mixer Equipment C	4390000 \$
Misc Costs	9060000 \$
Operational labor cost	651000 \$/yr
Maintenance labor cost	436000 \$/yr
Material and supply cost	1140000 \$/yr
Chemical cost	0 \$/yr
Energy cost	2890000 \$/yr
Amortization cost	8400000 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	7.16 MGD(US)
Total pumping capacity	7.16 MGD(US)
Design capacity per pump	2480 gpm(US)
Number of pumps	96
Number of batteries	1
Firm pumping capacity	7.16 MGD(US)
Quantities	
Operation labor required	569 pers-hrs/yr
Maintenance labor required	483 pers-hrs/yr
Electrical energy required	7640000 kWh/yr
Volume of earthwork required	2730 cuft
Area of pump building	341 sqft
Costs	
Construction and equipment cc	5850000 \$
Earthwork Cost	25900 \$
Pump Building Cost	1200000 \$
Installed Pump Cost	3730000 \$
Misc Costs	892000 \$
Operational labor cost	29300 \$/yr
Maintenance labor cost	24800 \$/yr
Material and supply cost	40900 \$/yr

Chemical cost	0 \$/yr
Energy cost	764000 \$/yr
Amortization cost	553000 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	7.16 MGD(US)
Total pumping capacity	7.16 MGD(US)
Design capacity per pump	2480 gpm(US)
Number of pumps	96
Number of batteries	1
Firm pumping capacity	7.16 MGD(US)
Quantities	
Operation labor required	569 pers-hrs/yr
Maintenance labor required	483 pers-hrs/yr
Electrical energy required	7640000 kWh/yr
Volume of earthwork required	2730 cuft
Area of pump building	341 sqft
Costs	
Construction and equipment cost	5850000 \$
Earthwork Cost	25900 \$
Pump Building Cost	1200000 \$
Installed Pump Cost	3730000 \$
Misc Costs	892000 \$
Operational labor cost	29300 \$/yr
Maintenance labor cost	24800 \$/yr
Material and supply cost	40900 \$/yr
Chemical cost	0 \$/yr
Energy cost	764000 \$/yr
Amortization cost	553000 \$/yr
Sludge Recycle Pumping	
Design Information	
Average daily pumping rate	57.2 MGD(US)
Total pumping capacity	57.2 MGD(US)
Design capacity per pump	19900 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	57.2 MGD(US)
Quantities	
Operation labor required	1350 pers-hrs/yr
Maintenance labor required	1170 pers-hrs/yr
Electrical energy required	1900000 kWh/yr
Volume of earthwork required	10600 cuft
Area of pump building	1330 sqft
Costs	
Construction and equipment cost	1110000 \$
Earthwork Cost	3150 \$
Pump Building Cost	146000 \$
Installed Pump Cost	788000 \$
Misc Costs	169000 \$
Operational labor cost	69400 \$/yr
Maintenance labor cost	60000 \$/yr
Material and supply cost	7750 \$/yr
Chemical cost	0 \$/yr
Energy cost	190000 \$/yr
Amortization cost	105000 \$/yr

### Post Aeration

#### Design Output Data

Description	Value	Units
Post Aeration by Diffused Aeration		
Design Information		
Dissolved oxygen in influent	2	mg/L
Desired dissolved oxygen in effluent	5	mg/L
Correction factor for pressure	1	
Minimum dissolved oxygen in tank	2	mg/L
Oxygen saturation at summer temperature	8.5	mg/L
Oxygen required	1400	lb/d
Operating transfer efficiency	2.95	lbO <sub>2</sub> /(HP·h)
Total volume of aerobic reactor	389000	gal(US)
Air flow rate required to meet oxygen demand	1870	scfm
Quantities		
Basin depth	15	ft
Length of basin	115	ft
Width of basin	30	ft
Number of diffusers	156	
Number of swing arm diffuser lines	8	
Volume of wall concrete required	3270	cuft
Volume of slab concrete required	2600	cuft
Electrical energy required	466000	kWh/yr
Operation labor required	989	pers-hrs/yr
Maintenance labor required	537	pers-hrs/yr
Costs		



Construction and equipment cost	318000 \$
Wall Concrete Cost	78800 \$
Slab Concrete Cost	42400 \$
Installed Equipment Cost	165000 \$
Misc Costs	31500 \$
Operational labor cost	50900 \$/yr
Maintenance labor cost	27600 \$/yr
Material and supply cost	3980 \$/yr
Chemical cost	0 \$/yr
Energy cost	46600 \$/yr
Amortization cost	30000 \$/yr

### Drying Beds

#### Design Output Data

Description	Value	Units
Sludge Drying Beds		
Design Information		
Total surface area required	696000	sqft
Initial depth of sludge	12	in
Final solids	50	%
Bed holding time	103	d
Quantities		
Total drying bed surface area	696000	sqft
Number beds	232	
Surface area of each individual	3000	sqft
Length of each bed	150	ft
Volume of earthwork required	3420000	cuft
Volume concrete for dividing w	224000	cuft
Volume of R.C. in-place for tru	52200	cuft
Volume of sand	522000	cuft
Volume of gravel	696000	cuft
Clay pipe diameter	6	in
Total length clay pipe	69600	in
Sludge solids produced	40.2	ton(short)/d
Operational labor required	42900	pers-hrs/yr
Maintenance labor required	21400	pers-hrs/yr
Costs		
Construction and equipment cost	9620000	\$
Earthwork Cost	1010000	\$
Wall Concrete Cost	3770000	\$
Slab Concrete Cost	406000	\$
Drying Bed Media Cost	1940000	\$
Drain Pipe System Cost	1530000	\$
Misc Costs	953000	\$
Operational labor cost	2210000	\$/yr
Maintenance labor cost	1100000	\$/yr
Material and supply cost	86500	\$/yr
Chemical cost	0	\$/yr
Energy cost	0	\$/yr
Amortization cost	837000	\$/yr

### Secondary Clarifier

#### Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	191000	sqft
Surface area per circular clarifi	15900	sqft
Diameter of each circular clarif	143	ft
Number of clarifiers per batter	12	
Number of batteries	1	
Solids loading rate	10.7	lb/(sqft·d)
Hydraulic retention time	5.39	hr
Designed surface overflow rate	300	gal(US)/(sqft·d)
Weir length	13800	ft
Volume of wasted sludge	1300000	gpd(US)
Quantities		
Operation labor required	6040	pers-hrs/yr
Maintenance labor required	3400	pers-hrs/yr
Electrical energy required	45400	kWh/yr
Volume of earthwork required	2950000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	181000	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	55900	cuft
Costs		
Construction and equipment cost	8280000	\$
Earthwork Cost	873000	\$
Wall Concrete Cost	1350000	\$
Slab Concrete Cost	2350000	\$
Installed Equipment Cost	2450000	\$
Misc Costs	1260000	\$

Operational labor cost	311000 \$/yr
Maintenance labor cost	175000 \$/yr
Material and supply cost	82800 \$/yr
Chemical cost	0 \$/yr
Energy cost	4540 \$/yr
Amortization cost	746000 \$/yr
Waste Sludge Pumping	
Design Information	
Average daily pumping rate	1.3 MGD(US)
Total pumping capacity	1.3 MGD(US)
Design capacity per pump	451 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	1.3 MGD(US)
Quantities	
Operation labor required	455 pers-hrs/yr
Maintenance labor required	374 pers-hrs/yr
Electrical energy required	43500 kWh/yr
Volume of earthwork required	1810 cuft
Area of pump building	226 sqft
Costs	
Construction and equipment cost	94800 \$
Earthwork Cost	535 \$
Pump Building Cost	24800 \$
Installed Pump Cost	55000 \$
Misc Costs	14500 \$
Operational labor cost	23400 \$/yr
Maintenance labor cost	19200 \$/yr
Material and supply cost	664 \$/yr
Chemical cost	0 \$/yr
Energy cost	4350 \$/yr
Amortization cost	8970 \$/yr

#### Effluent

##### Design Output Data

Description	Value	Units
Costs		
Construction and equipment cost	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	

#### Hauling and Land Filling

##### Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	95.5 cuyd/d	
Truck capacity	30 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	95.5 cuyd/d	
Maximum anticipated landfill duration	30 d	
Anticipated sludge storage height	8 ft	
Sludge storage shed area	9660 sqft	
Width of sludge storage shed	69.5 ft	
Length of sludge storage shed	139 ft	
Volume of earthwork required	25500 cuft	
Volume of slab concrete required	10600 cuft	
Surface area of canopy roof	9660 sqft	
Round trip haul distance	20 miles	
Round trips per day per truck	4	
Distance traveled per year per truck	20000 miles	
Sludge hauled	84.4 ton(short)/d	
Operation labor required	1490 pers-hrs/yr	
LandFilling cost	35200 \$/yr	
Costs		
Construction and equipment cost	697000 \$	
Earthwork Cost	7550 \$	
Slab Concrete Cost	138000 \$	
Canopy Roof Cost	193000 \$	
Vehicle Cost	359000 \$	
Operational labor cost	76900 \$/yr	
Maintenance labor cost	0 \$/yr	
Material and supply cost	108000 \$/yr	

Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	106000 \$/yr