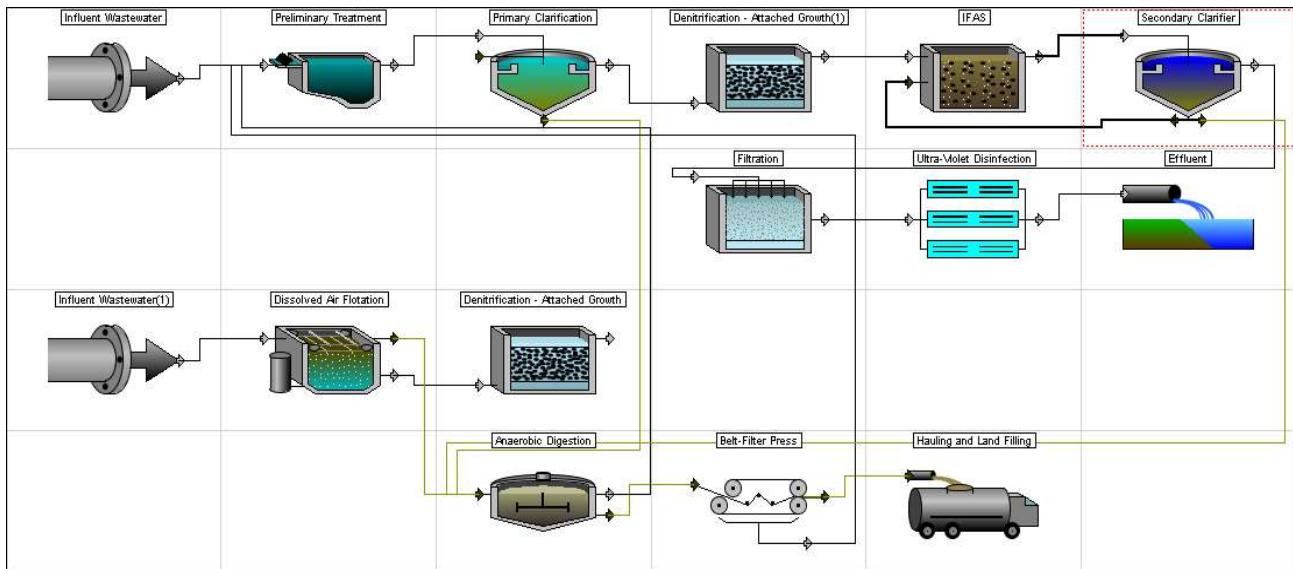


Layout - Springville City



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost:	\$23,200,000	\$
Other direct construction costs	\$8,710,000	\$
Other indirect construction costs	\$23,800,000	\$
Total construction costs	\$55,700,000	\$

ANNUAL COSTS

LABOR COSTS		
Administration labor cost	\$94,100	\$/yr
Laboratory labor cost	\$174,000	\$/yr
Unit process operation labor cost	\$1,350,000	\$/yr
Unit process maintenance labor cost	\$651,000	\$/yr
Total labor costs	\$2,270,000	\$/yr

MATERIAL COSTS		
Total material cost	\$352,000	\$/yr

CHEMICAL COSTS		
Total chemical cost	\$65,900	\$/yr

ENERGY COSTS		
Total energy cost	\$608,000	\$/yr

Total operation and maintenance	\$3,300,000	\$/yr
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CONSTRUCTION COST AMC		
Amortization cost for total construction	\$4,950,000	\$/yr

Total annual project cost	\$8,250,000	\$/yr
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PROJECT SUMMARY		
Present worth	\$98,700,000	\$
Total project cost	\$55,700,000	\$
Total operation labor cost	\$1,620,000	\$/yr
Total maintenance labor cost	\$651,000	\$/yr
Total material cost	\$352,000	\$/yr
Total chemical cost	\$65,900	\$/yr
Total energy cost	\$608,000	\$/yr
Total amortization cost	\$4,950,000	\$/yr

Process Summary

Process	Construction (\$)	Operation (\$/yr)	Maintenance (\$/yr)	Material (\$/yr)	Chemical (\$/yr)	Energy (\$/yr)	Amortization (\$/yr)
Preliminary Treatment	865000	71300	32600	21600	0	3900	72500
Dissolved Air Flotation	587000	54200	14500	5870	0	25300	56900
Primary Clarification	617000	62200	32600	6060	0	1070	57100
Denitrification - Attached Growth	867000	262000	137000	5010	0	29300	78600

Anaerobic Digestion	4610000	95800	55200	37900	0	16700	436000
Denitrification - Attached Grow	2800000	479000	199000	15300	489	122000	253000
Filtration	2600000	12400	7490	73100	0	5310	251000
Belt-Filter Press	918000	17400	3820	0	57900	9890	83700
IFAS	5180000	186000	101000	88400	0	339000	561000
Ultra-Violet Disinfection	1770000	0	24400	17700	7470	53600	162000
Hauling and Land Filling	398000	25500	0	72000	0	0	70900
Secondary Clarifier	935000	85600	43700	9240	0	1160	85400
Effluent	0	0	0	0	0	0	0
Blower System	1030000	0	0	0	0	0	86500
Other Costs	32500000	268000	0	0	0	0	2700000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land		19 acre
Administration labor hours		1830 hr/yr
Laboratory labor hours		3380 hr/yr
Costs		
DIRECT COSTS		
Mobilization	791000 \$	
Site preparation	1070000 \$	
Site electrical	2270000 \$	
Yard piping	1500000 \$	
Instrumentation and control	1170000 \$	
Lab and administration building	1910000 \$	
Total direct construction costs	8710000 \$	
INDIRECT COSTS		
Cost of land	380000 \$	
Miscellaneous cost	1830000 \$	
Legal cost	734000 \$	
Engineering design fee	5500000 \$	
Inspection cost	734000 \$	
Contingency	3670000 \$	
Technical	734000 \$	
Interest during construction	5460000 \$	
Profit	4780000 \$	
Total indirect construction cost	23800000 \$	
Total of other construction costs	32500000 \$	
LABOR COSTS		
Administration labor cost	94100 \$/yr	
Laboratory labor cost	174000 \$/yr	

Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity		12900 scfm
Safety factor		1.5
Requested air flow capacity		19300 scfm
Total capacity of blowers		19300 scfm
Number of blowers in use		3
Total number of blowers		4
Capacity of individual blowers		6440 scfm
Estimated cost of an installed blower	188000 \$	
Blower building area		1600 sqft
Costs		
Construction and equipment cost	1030000 \$	
Installed Blower Cost	753000 \$	
Building Cost	176000 \$	
Misc Costs	102000 \$	
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	86500 \$/yr	

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

Influent Wastewater

Influent Wastewater(1)

Preliminary Treatment

Design Output Data

Description	Value	Units
Preliminary Treatment		
Design Information		
Mechanically Cleaned Bar Screen		

Bar size	0.25 in
Bar spacing	0.5 in
Slope of bars from horizontal	30 degrees
Head loss through screen	0.176 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	4.22 ft
Average channel depth	1 ft
Horizontal Flow Grit Chamber	
Maximum flow	23.2 cuft/s
Average flow	10.6 cuft/s
Minimum flow	6.25 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	11.6 cuft/s
Width of channel	1.93 ft
Depth of channel	4 ft
Length of channel	144 ft
Settling velocity of particle	0.0707 ft/s
Slope of channel bottom	0.000865
Allowance for currents	1.7
Manning coefficient	0.035
Hydraulic retention time	1.6 min
Volume of grit	27.4 cuft/d
Costs	
Construction and equipment cc	865000 \$
Operational labor cost	71300 \$/yr
Maintenance labor cost	32600 \$/yr
Material and supply cost	21600 \$/yr
Chemical cost	0 \$/yr
Energy cost	3900 \$/yr
Amortization cost	72500 \$/yr

Dissolved Air Flotation

Design Output Data

Description	Value	Units
Dissolved Air Flotation		
Design Information		
Recycle flow	0.823	MGD(US)
Surface area	584	sqft
Volume of pressure tank	229	cuft
Volume of flotation tank	6470	cuft
Quantities		
Amount of sludge generated	4.38	ton(short)/d
Operation labor required	1050	pers-hour/yr
Maintenance labor required	320	pers-hour/yr
Electrical energy required	253000	kWh/yr
Slab thickness	9.95	in
Volume of slab concrete requir	833	cuft
Wall thickness	11.1	in
Volume of wall concrete requir	925	cuft
Sidewater depth	8.19	ft
Surface area per flotation unit	750	sqft
Diameter per flotation unit	30.9	ft
Number of units	1	
Area of flotation building	1180	sqft
Volume of earthwork required	9690	cuft
Costs		
Construction and equipment cc	587000	\$
Earthwork Cost	2870	\$
Wall Concrete Cost	22300	\$
Slab Concrete Cost	10800	\$
Building Cost	97500	\$
Installed Equipment Cost	364000	\$
Misc Costs	89500	\$
Operational labor cost	54200	\$/yr
Maintenance labor cost	14500	\$/yr
Material and supply cost	5870	\$/yr
Chemical cost	0	\$/yr
Energy cost	25300	\$/yr
Amortization cost	56900	\$/yr

Primary Clarification

Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		

Surface area	8570 sqft
Surface area per circular clarifi	4290 sqft
Diameter of each circular clarif	74 ft
Number of clarifiers per batter	2
Number of batteries	1
Solids loading rate	1.7 lb/(sqft·d)
Hydraulic retention time	2.02 hr
Weir length	1510 ft
Volume of sludge generated	25400 gpd(US)
Quantities	
Operation labor required	933 pers-hrs/yr
Maintenance labor required	513 pers-hrs/yr
Electrical energy required	9840 kWh/yr
Volume of earthwork required	108000 cuft
Slab thickness	10.2 in
Volume of slab concrete requir	8490 cuft
Wall thickness	11.5 in
Volume of wall concrete requir	4900 cuft
Costs	
Construction and equipment co	579000 \$
Earthwork Cost	32000 \$
Wall Concrete Cost	118000 \$
Slab Concrete Cost	110000 \$
Installed Equipment Cost	231000 \$
Misc Costs	88400 \$
Operational labor cost	48000 \$/yr
Maintenance labor cost	23100 \$/yr
Material and supply cost	5790 \$/yr
Chemical cost	0 \$/yr
Energy cost	984 \$/yr
Amortization cost	53500 \$/yr
Waste Sludge Pumping	
Design Information	
Average daily pumping rate	0.0254 MGD(US)
Total pumping capacity	0.0254 MGD(US)
Design capacity per pump	8.83 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	0.0254 MGD(US)
Quantities	
Operation labor required	274 pers-hrs/yr
Maintenance labor required	209 pers-hrs/yr
Electrical energy required	859 kWh/yr
Volume of earthwork required	1600 cuft
Area of pump building	201 sqft
Costs	
Construction and equipment co	38100 \$
Earthwork Cost	475 \$
Pump Building Cost	22100 \$
Installed Pump Cost	9730 \$
Misc Costs	5810 \$
Operational labor cost	14100 \$/yr
Maintenance labor cost	9440 \$/yr
Material and supply cost	266 \$/yr
Chemical cost	0 \$/yr
Energy cost	86 \$/yr
Amortization cost	3600 \$/yr

Denitrification - Attached Growth

Design Output Data

Description	Value	Units
Attached Growth Denitrification		
Design Information		
Surface removal rate	3.28 lb/(1000 sqft·d)	
Total media surface area	-22700 sqft	
Total volume of media needed	-554 cuft	
Total column area	1360 sqft	
Actual media volume	16400 cuft	
Hydraulic retention time	120 min	
Daily methanol required	0 lb/d	
Total backwash required	13600 gpm(US)	
Costs		
Construction and equipment co	529000 \$	
Earthwork Cost	6290 \$	
Wall Concrete Cost	101000 \$	
Slab Concrete Cost	67700 \$	
Installed Media Cost	91500 \$	
Methanol Feed System Cost	0 \$	
Distribution System Cost	181000 \$	
Operational labor cost	205000 \$/yr	
Maintenance labor cost	95200 \$/yr	
Material and supply cost	2640 \$/yr	

Chemical cost	0 \$/yr
Energy cost	24300 \$/yr
Amortization cost	46600 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	1.47 MGD(US)
Total pumping capacity	2.97 MGD(US)
Design capacity per pump	1030 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	1.47 MGD(US)
Quantities	
Operation labor required	462 pers-hrs/yr
Maintenance labor required	381 pers-hrs/yr
Electrical energy required	49300 kWh/yr
Volume of earthwork required	2070 cuft
Area of pump building	259 sqft
Costs	
Construction and equipment cost	128000 \$
Earthwork Cost	613 \$
Pump Building Cost	28500 \$
Installed Pump Cost	79200 \$
Misc Costs	19500 \$
Operational labor cost	23800 \$/yr
Maintenance labor cost	17200 \$/yr
Material and supply cost	894 \$/yr
Chemical cost	0 \$/yr
Energy cost	4930 \$/yr
Amortization cost	12100 \$/yr
Wash Water Pumping	
Design Information	
Average daily pumping rate	9.82 MGD(US)
Total pumping capacity	9.82 MGD(US)
Design capacity per pump	3410 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	9.82 MGD(US)
Quantities	
Operation labor required	633 pers-hrs/yr
Maintenance labor required	536 pers-hrs/yr
Electrical energy required	448 kWh/yr
Volume of earthwork required	3150 cuft
Area of pump building	394 sqft
Costs	
Construction and equipment cost	210000 \$
Earthwork Cost	933 \$
Pump Building Cost	43300 \$
Installed Pump Cost	134000 \$
Misc Costs	32100 \$
Operational labor cost	32600 \$/yr
Maintenance labor cost	24200 \$/yr
Material and supply cost	1470 \$/yr
Chemical cost	0 \$/yr
Energy cost	45 \$/yr
Amortization cost	19900 \$/yr

Anaerobic Digestion

Design Output Data

Description	Value	Units
Anaerobic Digestion		
Design Information		
Percent VSS destroyed	50	%
Solids concentration in digester	5	%
Detention time	15	d
Digester depth	28.8	ft
Digester diameter	75	ft
Effective digester volume	282000	cuft
Number of digesters per battery	2	
Number of primary digesters per battery	1	
Number of secondary digester per battery	1	
Number of batteries	1	
Gas produced	65.9	cuft/min
Heat required	1360000	BTU/hr
Digester gas required	52.5	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	1860	pers-hrs/yr
Maintenance labor required	1220	pers-hrs/yr
Electrical energy required	167000	kWh/yr
Volume of earthwork required	281000	cuft
Slab thickness	11.2	in
Volume of slab concrete required	8980	cuft

Wall thickness	21.9 in
Volume of wall concrete require	30100 cuft
Sidewater depth	28.8 ft
Surface area/floor of 2-story co	1650 sqft
Piping size	10 in
Length of total piping system	694 ft
Number of 90 degree elbows	26
Number of tees	51
Number of plug valves	37
Total dry solids treated	8.5 ton(short)/d

Costs	
Construction and equipment co	4610000 \$
Earthwork Cost	83400 \$
Wall Concrete Cost	726000 \$
Slab Concrete Cost	116000 \$
Building Cost	182000 \$
Piping System Cost	521000 \$
Floating Cover Cost	1640000 \$
Gas Recirculation Units Cost	294000 \$
Heating Units Cost	317000 \$
Gas Safety Equipment Cost	120000 \$
Installed Pumps Cost	150000 \$
Operational labor cost	95800 \$/yr
Maintenance labor cost	55200 \$/yr
Material and supply cost	37900 \$/yr
Chemical cost	0 \$/yr
Energy cost	16700 \$/yr
Amortization cost	436000 \$/yr

Denitrification - Attached Growth(1)

Design Output Data

Description	Value	Units
Attached Growth Denitrification		
Design Information		
Surface removal rate	3.28	lb/(1000 sqft·d)
Total media surface area	-112000	sqft
Total volume of media needed	-2730	cuft
Total column area	6330	sqft
Actual media volume	75900	cuft
Hydraulic retention time	120	min
Daily methanol required	12.2	lb/d
Total backwash required	63300	gpm(US)
Costs		
Construction and equipment co	2130000	\$
Earthwork Cost	23100	\$
Wall Concrete Cost	375000	\$
Slab Concrete Cost	129000	\$
Installed Media Cost	424000	\$
Methanol Feed System Cost	14600	\$
Distribution System Cost	841000	\$
Operational labor cost	407000	\$/yr
Maintenance labor cost	146000	\$/yr
Material and supply cost	10700	\$/yr
Chemical cost	489	\$/yr
Energy cost	99600	\$/yr
Amortization cost	190000	\$/yr
Internal Recycle Pumping		
Design Information		
Average daily pumping rate	6.83	MGD(US)
Total pumping capacity	15	MGD(US)
Design capacity per pump	5220	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	6.83	MGD(US)
Quantities		
Operation labor required	563	pers-hrs/yr
Maintenance labor required	478	pers-hrs/yr
Electrical energy required	228000	kWh/yr
Volume of earthwork required	3970	cuft
Area of pump building	496	sqft
Costs		
Construction and equipment co	263000	\$
Earthwork Cost	1180	\$
Pump Building Cost	54600	\$
Installed Pump Cost	167000	\$
Misc Costs	40100	\$
Operational labor cost	29000	\$/yr
Maintenance labor cost	21600	\$/yr
Material and supply cost	1840	\$/yr
Chemical cost	0	\$/yr
Energy cost	22800	\$/yr
Amortization cost	24900	\$/yr

Wash Water Pumping	
Design Information	
Average daily pumping rate	22.8 MGD(US)
Total pumping capacity	22.8 MGD(US)
Design capacity per pump	7910 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	22.8 MGD(US)
Quantities	
Operation labor required	839 pers-hrs/yr
Maintenance labor required	704 pers-hrs/yr
Electrical energy required	1040 kWh/yr
Volume of earthwork required	5190 cuft
Area of pump building	649 sqft
Costs	
Construction and equipment cost	405000 \$
Earthwork Cost	1540 \$
Pump Building Cost	71400 \$
Installed Pump Cost	271000 \$
Misc Costs	61900 \$
Operational labor cost	43200 \$/yr
Maintenance labor cost	31800 \$/yr
Material and supply cost	2840 \$/yr
Chemical cost	0 \$/yr
Energy cost	104 \$/yr
Amortization cost	38300 \$/yr

Filtration

Design Output Data

Description	Value	Units
Filtration		
Design Information		
Surface area	2780	sqft
Depth	9	ft
Terminal headloss through bed	192000	ft
Maximum head for backwash	19.6	ft
Backwash rate	20	gal(US)/(sqft·min)
Washwater gutter depth	0.927	ft
Washwater needed	278000	gal(US)
Quantities		
Operation labor required	241	pers-hrs/yr
Maintenance labor required	166	pers-hrs/yr
Electrical energy required	53100	kWh
Surface area per filter unit	2780	sqft
Number of cells per filter unit	4	
Number of filter units per battery	1	
Number of batteries	1	
Volume of earthwork for filter	30000	cuft
Volume of concrete for filter	15100	cuft
Volume of surge tank	37200	cuft
Width of surge tank	51.5	ft
Length of surge tank	103	ft
Volume of earthwork for surge tank	72600	cuft
Volume of concrete for surge tank	9370	cuft
Costs		
Construction and equipment cost	2600000	\$
Earthwork Cost for Filter	8880	\$
Earthwork Cost for Surge Tank	21500	\$
Concrete Cost for Filter	363000	\$
Concrete Cost for Surge Tank	226000	\$
Installed Equipment Cost	1460000	\$
Misc Costs	520000	\$
Operational labor cost	12400	\$/yr
Maintenance labor cost	7490	\$/yr
Material and supply cost	73100	\$/yr
Chemical cost	0	\$/yr
Energy cost	5310	\$/yr
Amortization cost	251000	\$/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 hour	70	gpm(US)
Hydraulic loading required per unit	71.1	gpm(US)
Final solids content	19	%
Solids capture fraction	0.998	
Quantities		
Operation labor required	339	pers-hrs/yr

Maintenance labor required	84.7 pers-hrs/yr
Power	98900 kWh/yr
Polymer required	44500 lb/yr
Dry solids produced	12200 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	17400 \$/yr
Maintenance labor cost	3820 \$/yr
Material and supply cost	0 \$/yr
Chemical cost	57900 \$/yr
Energy cost	9890 \$/yr
Amortization cost	83700 \$/yr

IFAS

Design Output Data

Description	Value	Units
IFAS		
Design Information		
Carbon & Nitrification Design		
Max. specific growth of nitrifier	0.2	1/d
Death rate of nitrifiers at winter	0.0301	1/d
Minimum SRT for design at winter	5.89	d
Design SRT for design at winter	8.83	d
Design SS	2500	mg/L
Calculated VSS	1680	mg/L
Calculated VSS:TSS ratio	0.67	mg VSS/mg SS
Total volume of reactors	10400	m ³
Length of parallel train	53	m
Width of parallel train	10	m
Sidewater depth	5	m
Number of batteries	1	
Number of parallel trains per battery	4	
Number of cells within one train	3	
Total number of dividing walls	8	
Hydraulic retention time	9.69	hr
F/M ratio	0.0904	kg BOD/kg MLSS/d
Volumetric BOD loading	0.0248	kg BOD/m ³ /d
Observed yield (VSS basis)	2.17	g VSS/g BOD
Observed yield (TSS basis)	2.15	g TSS/g BOD
Amount of alkalinity required	289	gCaCO ₃ /m ³
Amount of sludge generated	484	kg/d
Sludge recycle rate	8620	m ³ /d
Nitrogen requirement for biomass	0.652	mg/L
Phosphorus requirement for biomass	0.13	mg/L
Oxygen requirement to meet average	4640	kg/d
Air flow required to meet average	21600	N m ³ /hr
Design air flow	34.4	N m ³ /min/1000 m ³
Quantities		
Operation labor required	3120	pers-hrs/yr
Maintenance labor required	1830	pers-hrs/yr
Electrical energy required	3320000	kWh/yr
Volume of earthwork required	192000	cuft
Volume of slab concrete required	72000	cuft
Volume of wall concrete required	40900	cuft
Handrail length	1590	ft
Number of diffusers per train	269	
Number of swing arm headers	7	
Volume of Media required	5220	m ³
Sieve Area required	56.9	m ²
Costs		
Construction and equipment cost	5030000	\$
Earthwork Cost	56800	\$
Wall Concrete Cost	984000	\$
Slab Concrete Cost	933000	\$
Handrail Cost	119000	\$
Installed Aerator Equipment	600000	\$
Air Piping Cost	225000	\$
Misc Costs	321000	\$
Media Cost	1720000	\$
Screen Cost	62600	\$
Operational labor cost	161000	\$/yr

Maintenance labor cost	82600 \$/yr
Material and supply cost	87400 \$/yr
Chemical cost	0 \$/yr
Energy cost	332000 \$/yr
Amortization cost	547000 \$/yr
Sludge Recycle Pumping	
Design Information	
Average daily pumping rate	2.28 MGD(US)
Total pumping capacity	4.56 MGD(US)
Design capacity per pump	1580 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	2.28 MGD(US)
Quantities	
Operation labor required	489 pers-hrs/yr
Maintenance labor required	407 pers-hrs/yr
Electrical energy required	76100 kWh/yr
Volume of earthwork required	2320 cuft
Area of pump building	290 sqft
Costs	
Construction and equipment cost	151000 \$
Earthwork Cost	687 \$
Pump Building Cost	31900 \$
Installed Pump Cost	95600 \$
Misc Costs	23100 \$
Operational labor cost	25200 \$/yr
Maintenance labor cost	18300 \$/yr
Material and supply cost	1060 \$/yr
Chemical cost	0 \$/yr
Energy cost	7610 \$/yr
Amortization cost	14300 \$/yr

Ultra-Violet Disinfection

Design Output Data

Description	Value	Units
Ultra-Violet Disinfection		
Design Information		
Design based on a model calculation	1.34	gal(US)/(min-W)
Total number of lamps needed	595	
Number of spare channels	1	
Total number of lamps used in	720	
Number of excess lamps	125	
Number of lamps/modules	4	
Number of modules/bank	6	
Number of banks/channel	5	
Number of channels	6	
Calculated headloss	22.9	in
Costs		
Construction and equipment cost	1770000 \$	
Cost of installation	1060000 \$	
Total cost of UV lamps	710000 \$	
Operational labor cost	0 \$/yr	
Maintenance labor cost	24400 \$/yr	
Material and supply cost	17700 \$/yr	
Chemical cost	7470 \$/yr	
Energy cost	53600 \$/yr	
Amortization cost	162000 \$/yr	

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	31.7	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	31.7	cuyd/d
Maximum anticipated landfill depth	30	d
Anticipated sludge storage height	8	ft
Sludge storage shed area	3210	sqft
Width of sludge storage shed	40.1	ft
Length of sludge storage shed	80.1	ft
Volume of earthwork required	8800	cuft
Volume of slab concrete required	3760	cuft
Surface area of canopy roof	3210	sqft
Round trip haul distance	20	miles
Round trips per day per truck	2	

Distance traveled per year per	10000 miles
Sludge hauled	28 ton(short)/d
Operation labor required	496 pers-hrs/yr
LandFilling cost	35200 \$/yr
Costs	
Construction and equipment co	398000 \$
Earthwork Cost	2610 \$
Slab Concrete Cost	48800 \$
Canopy Roof Cost	64200 \$
Vehicle Cost	283000 \$
Operational labor cost	25500 \$/yr
Maintenance labor cost	0 \$/yr
Material and supply cost	72000 \$/yr
Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	70900 \$/yr

Secondary Clarifier

Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	17100	sqft
Surface area per circular clarifi	8540	sqft
Diameter of each circular clarif	105	ft
Number of clarifiers per batter	2	
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	1500	ft
Volume of wasted sludge	12400	gpd(US)
Quantities		
Operation labor required	1410	pers-hrs/yr
Maintenance labor required	781	pers-hrs/yr
Electrical energy required	11100	kWh/yr
Volume of earthwork required	236000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	16600	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	6850	cuft
Costs		
Construction and equipment co	900000	\$
Earthwork Cost	70000	\$
Wall Concrete Cost	165000	\$
Slab Concrete Cost	215000	\$
Installed Equipment Cost	313000	\$
Misc Costs	137000	\$
Operational labor cost	72800	\$/yr
Maintenance labor cost	35200	\$/yr
Material and supply cost	9000	\$/yr
Chemical cost	0	\$/yr
Energy cost	1110	\$/yr
Amortization cost	82100	\$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.0124	MGD(US)
Total pumping capacity	0.0124	MGD(US)
Design capacity per pump	4.31	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.0124	MGD(US)
Quantities		
Operation labor required	250	pers-hrs/yr
Maintenance labor required	188	pers-hrs/yr
Electrical energy required	420	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment co	34900	\$
Earthwork Cost	475	\$
Pump Building Cost	22000	\$
Installed Pump Cost	7090	\$
Misc Costs	5330	\$
Operational labor cost	12900	\$/yr
Maintenance labor cost	8490	\$/yr
Material and supply cost	244	\$/yr
Chemical cost	0	\$/yr
Energy cost	42	\$/yr
Amortization cost	3300	\$/yr

Effluent

Design Output Data

Description	Value	Units
Costs		
Construction and equipment c	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