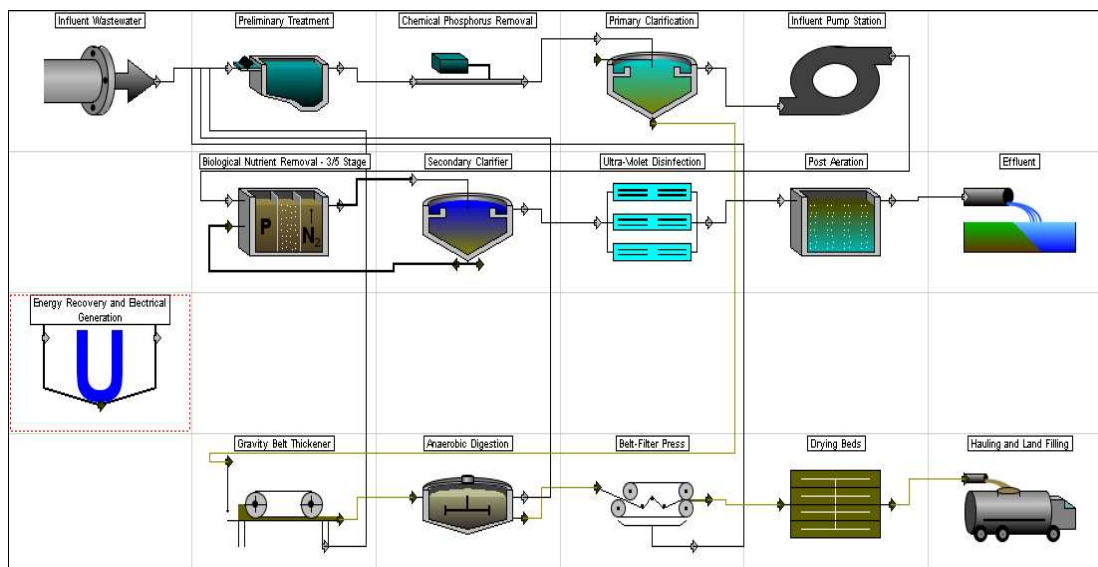


Layout - Central Valley



Summary

Equipment Database

Hydromantis 2014, (USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost:	\$313,000,000	\$
Other direct construction costs	\$39,200,000	\$
Other indirect construction costs	\$260,000,000	\$
Total construction costs	\$612,000,000	\$

ANNUAL COSTS

LABOR COSTS

Administration labor cost	\$528,000	\$/yr
Laboratory labor cost	\$370,000	\$/yr
Unit process operation labor cost	\$5,340,000	\$/yr
Unit process maintenance labor cost	\$3,580,000	\$/yr
Total labor costs	\$9,810,000	\$/yr

MATERIAL COSTS

Total material cost	\$2,560,000	\$/yr
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CHEMICAL COSTS

Total chemical cost	\$7,600,000	\$/yr
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ENERGY COSTS

Total energy cost	\$7,900,000	\$/yr
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Total operation and maintenance	\$27,900,000	\$/yr
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CONSTRUCTION COST AMC

Amortization cost for total construction	\$48,800,000	\$/yr
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Total annual project cost	\$76,700,000	\$/yr
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PROJECT SUMMARY

Present worth	\$916,000,000	\$
Total project cost	\$612,000,000	\$
Total operation labor cost	\$6,240,000	\$/yr
Total maintenance labor cost	\$3,580,000	\$/yr
Total material cost	\$2,560,000	\$/yr
Total chemical cost	\$7,600,000	\$/yr
Total energy cost	\$7,900,000	\$/yr
Total amortization cost	\$48,800,000	\$/yr

Process Summary

Process	Construction (\$)	Operation (\$/yr)	Maintenance (\$/yr)	Material (\$/yr)	Chemical (\$/yr)	Energy (\$/yr)	Amortization (\$/yr)
Energy Recovery and Electrical Generation	55000000	0	0	0	0	0	0
Preliminary Treatment	3780000	576000	225000	94400	0	11800	317000
Biological Nutrient Removal - 3/5 Stage	82700000	788000	549000	901000	0	4880000	7660000
Gravity Belt Thickener	2810000	174000	43600	0	200000	62300	263000

Chemical Phosphorus Removal	0	0	0	0	6640000	0	0
Secondary Clarifier	10900000	388000	225000	109000	0	8470	984000
Anaerobic Digestion	18900000	407000	252000	156000	0	73700	1790000
Primary Clarification	8990000	328000	189000	89700	0	5520	815000
Ultra-Violet Disinfection	73100000	0	907000	731000	365000	2620000	7180000
Belt-Filter Press	2810000	121000	30200	0	400000	59100	263000
Influent Pump Station	39600000	228000	164000	277000	0	113000	3350000
Post Aeration	421000	53400	30100	4900	0	61600	39800
Drying Beds	8390000	1930000	963000	75600	0	0	731000
Effluent	0	0	0	0	0	0	0
Hauling and Land Filling	655000	67100	0	90100	0	0	103000
Blower System	3220000	0	0	0	0	0	270000
Alum Feed System	1420000	282000	0	28500	0	0	119000
Other Costs	299000000	897000	0	0	0	0	25000000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land	81.6	acre
Administration labor hours	10200	hr/yr
Laboratory labor hours	7180	hr/yr
Costs		
DIRECT COSTS		
Mobilization	3610000	\$
Site preparation	3770000	\$
Site electrical	11300000	\$
Yard piping	7140000	\$
Instrumentation and control	6540000	\$
Lab and administration building	6840000	\$
Total direct construction costs	39200000	\$
INDIRECT COSTS		
Cost of land	1630000	\$
Miscellaneous cost	20200000	\$
Legal cost	8090000	\$
Engineering design fee	60700000	\$
Inspection cost	8090000	\$
Contingency	40500000	\$
Technical	8090000	\$
Interest during construction	59900000	\$
Profit	52800000	\$
Total indirect construction cost	260000000	\$
Total of other construction costs	299000000	\$
LABOR COSTS		
Administration labor cost	528000	\$/yr
Laboratory labor cost	370000	\$/yr

Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity	64900	scfm
Safety factor	1.5	
Requested air flow capacity	97400	scfm
Total capacity of blowers	97400	scfm
Number of blowers in use	1	
Total number of blowers	2	
Capacity of individual blowers	97400	scfm
Estimated cost of an installed blower	1320000	\$
Blower building area	2420	sqft
Costs		
Construction and equipment cost	3220000	\$
Installed Blower Cost	2630000	\$
Building Cost	266000	\$
Misc Costs	319000	\$
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	270000	\$/yr

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

Summary of Chemical Feed System for Alum

Description	Value	Units
Alum Solution Feed System		
Design Information		
Alum dosage rate as Al ₂ (SO ₄)	67400	lb/d

Alum dosage rate as equivalent	6120 lb/d
Liquid chemical solution fed	12600 gpd(US)
Operation labor required	5470 pers-hrs/yr
Costs	
Construction and equipment cost	1420000 \$
Operational labor cost	282000 \$/yr
Maintenance labor cost	0 \$/yr
Material and supply cost	28500 \$/yr
Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	119000 \$/yr

Influent Wastewater

Energy Recovery and Electrical Generation

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	0.5	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	46.4	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	247	cuft/s
Average flow	116	cuft/s
Minimum flow	100	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	123	cuft/s
Width of channel	20.6	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.000191	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	301	cuft/d
Costs		
Construction and equipment cost	3780000	\$
Operational labor cost	576000	\$/yr
Maintenance labor cost	225000	\$/yr
Material and supply cost	94400	\$/yr
Chemical cost	0	\$/yr
Energy cost	11800	\$/yr
Amortization cost	317000	\$/yr

Biological Nutrient Removal - 3/5 Stage

Design Output Data

Description	Value	Units
BNR System for BIO-P and N Removal		
Design Information		
5-Stage Biological Phosphorus		
Design aerobic SRT for nitrifica:	12.5	d
Total reactor SRT	25	d
Design SS	3000	mg/L
Calculated VSS	1790	mg/L
Calculated VSS:TSS ratio	0.596	mg VSS/mg SS
Total volume of anaerobic reac	-4790	m3
Total volume of anoxic reactor:	158000	m3

Total volume of aerobic reactor	154000 m3
Total volume of all reactors	307000 m3
Width of parallel train	10 m
Sidewater depth	5 m
Number of batteries	1
Number of parallel trains per battery	24
Number of anoxic cells within cell	3
Number of aerobic cells within cell	3
Anaerobic hydraulic retention time	-0.405 hr
Anoxic hydraulic retention time	13.4 hr
Aerobic hydraulic retention time	13 hr
Amount of sludge generated	36800 kg/d
Sludge recycle ratio	42.9 %
Sludge recycle rate	122000 m3/d
Nitrogen required for biomass	12.7 mg/L
Phosphorus required for biomass	2.55 mg/L
Oxygen required to meet average	66400 kg/d
Air flow required to meet average	110000 N m3/hr
Design air flow	12 N m3/min/1000 m3
Quantities	
Operation labor required	12200 pers-hrs/yr
Maintenance labor required	8100 pers-hrs/yr
Electrical energy required	26400000 kWh/yr
Volume of earthwork required	4640000 cuft
Volume of slab concrete required	1240000 cuft
Volume of wall concrete required	745000 cuft
Handrail length	24600 ft
Number of diffusers per train	1350
Fine bubble diffuser floor coverage	4.34 %
Number of swing arm headers	34
Required mixing power	2010 kW
Total number of mixers	288
Required mixing power per mixer	6.99 kW
Design mixing power per mixer	3.73 kW
Mixing power for each un-aerated	21 kW
Costs	
Construction and equipment cost	70100000 \$
Earthwork Cost	1370000 \$
Wall Concrete Cost	17900000 \$
Slab Concrete Cost	16100000 \$
Handrail Cost	1840000 \$
Installed Aerator Equipment	18400000 \$
Air Piping Cost	2640000 \$
Installed Mixer Equipment Cost	4940000 \$
Misc Costs	6950000 \$
Operational labor cost	630000 \$/yr
Maintenance labor cost	418000 \$/yr
Material and supply cost	814000 \$/yr
Chemical cost	0 \$/yr
Energy cost	2640000 \$/yr
Amortization cost	6470000 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	12.5 MGD(US)
Total pumping capacity	12.5 MGD(US)
Design capacity per pump	4340 gpm(US)
Number of pumps	72
Number of batteries	1
Firm pumping capacity	12.5 MGD(US)
Quantities	
Operation labor required	686 pers-hrs/yr
Maintenance labor required	579 pers-hrs/yr
Electrical energy required	9980000 kWh/yr
Volume of earthwork required	3570 cuft
Area of pump building	446 sqft
Costs	
Construction and equipment cost	5640000 \$
Earthwork Cost	25400 \$
Pump Building Cost	1180000 \$
Installed Pump Cost	3580000 \$
Misc Costs	860000 \$
Operational labor cost	35300 \$/yr
Maintenance labor cost	29900 \$/yr
Material and supply cost	39500 \$/yr
Chemical cost	0 \$/yr
Energy cost	998000 \$/yr
Amortization cost	533000 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	12.5 MGD(US)
Total pumping capacity	12.5 MGD(US)
Design capacity per pump	4340 gpm(US)

Number of pumps	72
Number of batteries	1
Firm pumping capacity	12.5 MGD(US)
Quantities	
Operation labor required	686 pers-hrs/yr
Maintenance labor required	579 pers-hrs/yr
Electrical energy required	9980000 kWh/yr
Volume of earthwork required	3570 cuft
Area of pump building	446 sqft
Costs	
Construction and equipment cost	5640000 \$
Earthwork Cost	25400 \$
Pump Building Cost	1180000 \$
Installed Pump Cost	3580000 \$
Misc Costs	860000 \$
Operational labor cost	35300 \$/yr
Maintenance labor cost	29900 \$/yr
Material and supply cost	39500 \$/yr
Chemical cost	0 \$/yr
Energy cost	998000 \$/yr
Amortization cost	533000 \$/yr
Sludge Recycle Pumping	
Design Information	
Average daily pumping rate	75 MGD(US)
Total pumping capacity	75 MGD(US)
Design capacity per pump	17400 gpm(US)
Number of pumps	4
Number of batteries	1
Firm pumping capacity	75 MGD(US)
Quantities	
Operation labor required	1700 pers-hrs/yr
Maintenance labor required	1390 pers-hrs/yr
Electrical energy required	2490000 kWh/yr
Volume of earthwork required	13400 cuft
Area of pump building	1680 sqft
Costs	
Construction and equipment cost	1280000 \$
Earthwork Cost	3980 \$
Pump Building Cost	185000 \$
Installed Pump Cost	898000 \$
Misc Costs	196000 \$
Operational labor cost	87700 \$/yr
Maintenance labor cost	71700 \$/yr
Material and supply cost	8970 \$/yr
Chemical cost	0 \$/yr
Energy cost	249000 \$/yr
Amortization cost	121000 \$/yr

Gravity Belt Thickener

Design Output Data

Description	Value	Units
Gravity Belt Thickener		
Design Information		
Belt filter width	2	m
Number of units	4	
Hydraulic loading per unit per r	125	gpm(US)
Hydraulic loading required per	887	gpm(US)
Final solids content	7	%
Solids capture fraction	0.998	
Quantities		
Operation labor required	3380	pers-hrs/yr
Maintenance labor required	845	pers-hrs/yr
Power	623000	kWh/yr
Polymer required	154000	lb/yr
Dry solids produced	106000	lb/d
Costs		
Construction and equipment cost	2810000	\$
Building Cost	429000	\$
Polymer System Cost	445000	\$
Feed Pump Cost	132000	\$
Conveyor System Cost	301000	\$
Installed Belt Filter System C	1510000	\$
Operational labor cost	174000	\$/yr
Maintenance labor cost	43600	\$/yr
Material and supply cost	0	\$/yr
Chemical cost	200000	\$/yr
Energy cost	62300	\$/yr
Amortization cost	263000	\$/yr

Chemical Phosphorus Removal

Design Output Data

Description	Value	Units
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Chemical Phosphorus Removal

Design Information

Chemical used	Equivalent Aluminum
Chemical dosage	9.75 g/m3
Mass of chemical per year	1010000 kg/yr
Chemical sludge production	52.4 g/m3
Organic sludge production	5.34 g/m3

Costs

Construction and equipment cost	0 \$
Operational labor cost	0 \$/yr
Maintenance labor cost	0 \$/yr
Material and supply cost	0 \$/yr
Chemical cost	6640000 \$/yr
Energy cost	0 \$/yr
Amortization cost	0 \$/yr

Secondary Clarifier

Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	250000	sqft
Surface area per circular clarifier	15600	sqft
Diameter of each circular clarifier	141	ft
Number of clarifiers per battery	16	
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	20000	ft
Volume of wasted sludge	945000	gpd(US)
Quantities		
Operation labor required	7100	pers-hrs/yr
Maintenance labor required	4010	pers-hrs/yr
Electrical energy required	53100	kWh/yr
Volume of earthwork required	3800000	cuft
Slab thickness	10.2	in
Volume of slab concrete required	235000	cuft
Wall thickness	11.5	in
Volume of wall concrete required	73600	cuft
Costs		
Construction and equipment cost	10800000	\$
Earthwork Cost	1120000	\$
Wall Concrete Cost	1770000	\$
Slab Concrete Cost	3040000	\$
Installed Equipment Cost	3230000	\$
Misc Costs	1650000	\$
Operational labor cost	366000	\$/yr
Maintenance labor cost	207000	\$/yr
Material and supply cost	108000	\$/yr
Chemical cost	0	\$/yr
Energy cost	5310	\$/yr
Amortization cost	976000	\$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.945	MGD(US)
Total pumping capacity	0.945	MGD(US)
Design capacity per pump	328	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.945	MGD(US)
Quantities		
Operation labor required	437	pers-hrs/yr
Maintenance labor required	357	pers-hrs/yr
Electrical energy required	31700	kWh/yr
Volume of earthwork required	1750	cuft
Area of pump building	219	sqft
Costs		
Construction and equipment cost	85400	\$
Earthwork Cost	518	\$
Pump Building Cost	24100	\$
Installed Pump Cost	47800	\$
Misc Costs	13000	\$
Operational labor cost	22500	\$/yr
Maintenance labor cost	18400	\$/yr
Material and supply cost	598	\$/yr
Chemical cost	0	\$/yr
Energy cost	3170	\$/yr
Amortization cost	8080	\$/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	26.2	ft
Digester diameter	60	ft
Effective digester volume	973000	cuft
Number of digesters per batter	12	
Number of primary digesters p	8	
Number of secondary digester:	4	
Number of batteries	1	
Gas produced	339	cuft/min
Heat required	4770000	BTU/hr
Digester gas required	184	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	7900	pers-hrs/yr
Maintenance labor required	4880	pers-hrs/yr
Electrical energy required	737000	kWh/yr
Volume of earthwork required	970000	cuft
Slab thickness	10.6	in
Volume of slab concrete requir	33100	cuft
Wall thickness	20.6	in
Volume of wall concrete requir	125000	cuft
Sidewater depth	26.2	ft
Surface area/floor of 2-story cc	5330	sqft
Piping size	8	in
Length of total piping system	3540	ft
Number of 90 degree elbows	156	
Number of tees	306	
Number of plug valves	222	
Total dry solids treated	53.2	ton(short)/d
Costs		
Construction and equipment cc	18900000	\$
Earthwork Cost	287000	\$
Wall Concrete Cost	3010000	\$
Slab Concrete Cost	429000	\$
Building Cost	586000	\$
Piping System Cost	2260000	\$
Floating Cover Cost	6340000	\$
Gas Recirculation Units Cost	2030000	\$
Heating Units Cost	872000	\$
Gas Safety Equipment Cost	721000	\$
Installed Pumps Cost	449000	\$
Operational labor cost	407000	\$/yr
Maintenance labor cost	252000	\$/yr
Material and supply cost	156000	\$/yr
Chemical cost	0	\$/yr
Energy cost	73700	\$/yr
Amortization cost	1790000	\$/yr

Primary Clarification

Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		
Surface area	188000	sqft
Surface area per circular clarifi	11800	sqft
Diameter of each circular clarif	123	ft
Number of clarifiers per batter	16	
Number of batteries	1	
Solids loading rate	0.926	lb/(sqft-d)
Hydraulic retention time	4.04	hr
Weir length	20000	ft
Volume of sludge generated	304000	gpd(US)
Quantities		
Operation labor required	5990	pers-hrs/yr
Maintenance labor required	3370	pers-hrs/yr
Electrical energy required	45000	kWh/yr
Volume of earthwork required	2740000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	180000	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	64500	cuft
Costs		
Construction and equipment cc	8930000	\$
Earthwork Cost	811000	\$
Wall Concrete Cost	1550000	\$
Slab Concrete Cost	2330000	\$
Installed Equipment Cost	2870000	\$

Misc Costs	1360000	\$
Operational labor cost	308000	\$/yr
Maintenance labor cost	174000	\$/yr
Material and supply cost	89300	\$/yr
Chemical cost	0	\$/yr
Energy cost	4500	\$/yr
Amortization cost	810000	\$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.304	MGD(US)
Total pumping capacity	0.304	MGD(US)
Design capacity per pump	106	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.304	MGD(US)
Quantities		
Operation labor required	378	pers-hrs/yr
Maintenance labor required	302	pers-hrs/yr
Electrical energy required	10200	kWh/yr
Volume of earthwork required	1650	cuft
Area of pump building	206	sqft
Costs		
Construction and equipment cost	61500	\$
Earthwork Cost	488	\$
Pump Building Cost	22700	\$
Installed Pump Cost	29000	\$
Misc Costs	9390	\$
Operational labor cost	19400	\$/yr
Maintenance labor cost	15600	\$/yr
Material and supply cost	431	\$/yr
Chemical cost	0	\$/yr
Energy cost	1020	\$/yr
Amortization cost	5820	\$/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	28700	
Number of spare channels	2	
Total number of lamps used in channels	35200	
Number of excess lamps	6470	
Number of lamps/modules	16	
Number of modules/bank	25	
Number of banks/channel	8	
Number of channels	11	
Calculated headloss	4.56	in
Costs		
Construction and equipment cost	73100000	\$
Cost of installation	43800000	\$
Total cost of UV lamps	29200000	\$
Operational labor cost	0	\$/yr
Maintenance labor cost	907000	\$/yr
Material and supply cost	731000	\$/yr
Chemical cost	365000	\$/yr
Energy cost	2620000	\$/yr
Amortization cost	7180000	\$/yr

Belt-Filter Press

Design Output Data

Description	Value	Units
Belt-Filter Press		
Design Information		
Belt filter width	2	m
Number of units	4	
Hydraulic loading per unit per revolution	70	gpm(US)
Hydraulic loading required per revolution	491	gpm(US)
Final solids content	19	%
Solids capture fraction	0.998	
Quantities		
Operation labor required	2340	pers-hrs/yr
Maintenance labor required	585	pers-hrs/yr
Power	591000	kWh/yr
Polymer required	308000	lb/yr
Dry solids produced	84300	lb/d
Belt filter(s)	1200000	\$
Building	429000	\$
Installation	301000	\$
Polymer system	445000	\$
Feed pumps	132000	\$

Conveyor system	301000 \$
Costs	
Construction and equipment cost	2810000 \$
Building Cost	429000 \$
Polymer System Cost	445000 \$
Feed Pumps Cost	132000 \$
Conveyor System Cost	301000 \$
Installed Belt Filter	1510000 \$
Operational labor cost	121000 \$/yr
Maintenance labor cost	30200 \$/yr
Material and supply cost	0 \$/yr
Chemical cost	400000 \$/yr
Energy cost	59100 \$/yr
Amortization cost	263000 \$/yr

Influent Pump Station

Design Output Data

Description	Value	Units
Pump Station		
Design Information		
Volume of wet well	669000	cuft
Width of wet well	2170	ft
Depth of the pumping station	43.1	ft
Length of the pumping station	42	ft
Width of the pumping station	2230	ft
Minimum depth of water in wet well	22.1	ft
Area of pump building	2670	sqft
Peak capacity of pumps	195	MGD(US)
Firm pumping capacity	195	MGD(US)
Total dynamic head - average	43.5	ft
Quantities		
Operation labor required	4420	pers-hrs/yr
Maintenance labor required	3180	pers-hrs/yr
Electrical energy required	1130000	kWh/yr
Volume of earthwork required	13700000	cuft
Volume of slab concrete required	1510000	cuft
Volume of wall concrete required	286000	cuft
Capacity per pump	135000	gpm(US)
Number of constant speed pumps	2	
Number of variable speed pumps	0	
Diameter of discharge header	83.2	in
Total dynamic head	49	ft
Size of selected pump	72	in
Specific speed of pump	11900	
Pump rotating speed	201	rpm
Motor size required	429	HP
Size of selected motor	450	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 cost	39600000	\$
Earthwork Cost	4070000	\$
Wall Concrete Cost	6880000	\$
Slab Concrete Cost	19500000	\$
Building Cost	293000	\$
Installed Pump Equipment Cost	2750000	\$
Misc Costs	6040000	\$
Operational labor cost	228000	\$/yr
Maintenance labor cost	164000	\$/yr
Material and supply cost	277000	\$/yr
Chemical cost	0	\$/yr
Energy cost	113000	\$/yr
Amortization cost	3350000	\$/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	1850	lb/d
Operating transfer efficiency	2.95	lbO2/(HP·h)
Total volume of aerobic reactor	514000	gal(US)
Air flow rate required to meet oxygen demand	2480	scfm
Quantities		
Basin depth	15	ft

Length of basin	153 ft
Width of basin	30 ft
Number of diffusers	207
Number of swing arm diffuser l	11
Volume of wall concrete requir	4110 cuft
Volume of slab concrete requir	3440 cuft
Electrical energy required	616000 kWh/yr
Operation labor required	1040 pers-hrs/yr
Maintenance labor required	584 pers-hrs/yr
Costs	
Construction and equipment cc	421000 \$
Wall Concrete Cost	99000 \$
Slab Concrete Cost	53300 \$
Installed Equipment Cost	227000 \$
Misc Costs	41700 \$
Operational labor cost	53400 \$/yr
Maintenance labor cost	30100 \$/yr
Material and supply cost	4900 \$/yr
Chemical cost	0 \$/yr
Energy cost	61600 \$/yr
Amortization cost	39800 \$/yr

Drying Beds

Design Output Data

Description	Value	Units
Sludge Drying Beds		
Design Information		
Total surface area required	607000	sqft
Initial depth of sludge	12	in
Final solids	50	%
Bed holding time	103	d
Quantities		
Total drying bed surface area	607000	sqft
Number beds	203	
Surface area of each individual	2990	sqft
Length of each bed	150	ft
Volume of earthwork required	2990000	cuft
Volume concrete for dividing w	195000	cuft
Volume of R.C. in-place for tru	45500	cuft
Volume of sand	455000	cuft
Volume of gravel	607000	cuft
Clay pipe diameter	6	in
Total length clay pipe	60700	in
Sludge solids produced	35.1	ton(short)/d
Operational labor required	37400	pers-hrs/yr
Maintenance labor required	18700	pers-hrs/yr
Costs		
Construction and equipment cc	8390000	\$
Earthwork Cost	885000	\$
Wall Concrete Cost	3290000	\$
Slab Concrete Cost	354000	\$
Drying Bed Media Cost	1690000	\$
Drain Pipe System Cost	1340000	\$
Misc Costs	832000	\$
Operational labor cost	1930000	\$/yr
Maintenance labor cost	963000	\$/yr
Material and supply cost	75600	\$/yr
Chemical cost	0	\$/yr
Energy cost	0	\$/yr
Amortization cost	731000	\$/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

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	83.3	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	83.3 cuyd/d
Maximum anticipated landfill d	30 d
Anticipated sludge storage hei	8 ft
Sludge storage shed area	8430 sqft
Width of sludge storage shed	64.9 ft
Length of sludge storage shed	130 ft
Volume of earthwork required	22300 cuft
Volume of slab concrete requir	9330 cuft
Surface area of canopy roof	8430 sqft
Round trip haul distance	20 miles
Round trips per day per truck	3
Distance traveled per year per	15000 miles
Sludge hauled	73.7 ton(short)/d
Operation labor required	1300 pers-hrs/yr
LandFilling cost	35200 \$/yr
Costs	
Construction and equipment co	655000 \$
Earthwork Cost	6610 \$
Slab Concrete Cost	121000 \$
Canopy Roof Cost	169000 \$
Vehicle Cost	359000 \$
Operational labor cost	67100 \$/yr
Maintenance labor cost	0 \$/yr
Material and supply cost	90100 \$/yr
Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	103000 \$/yr