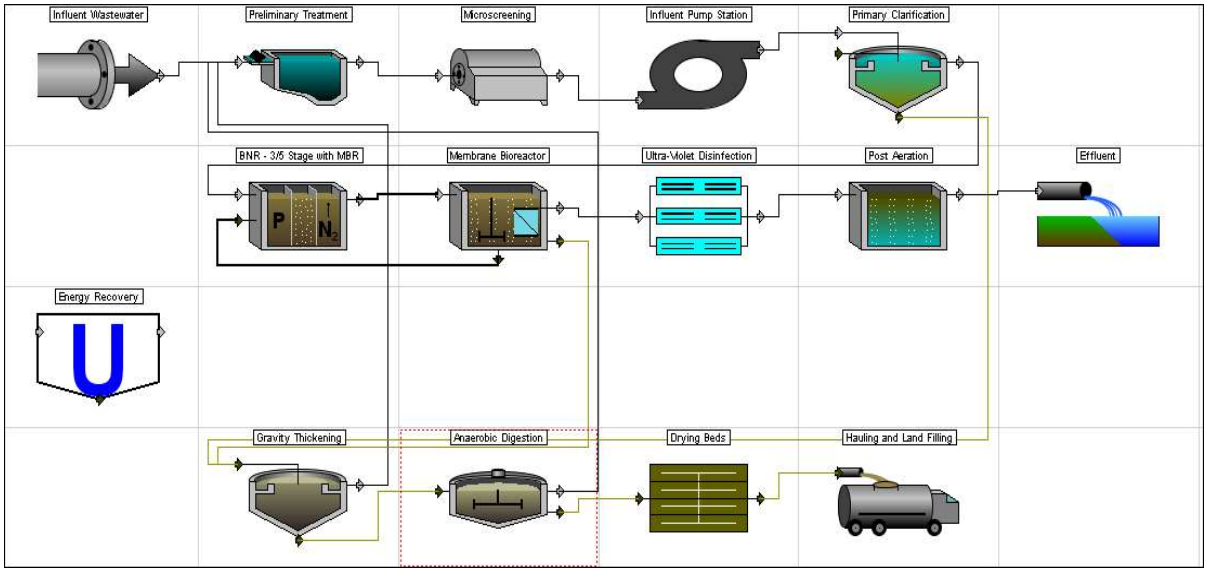
Layout - Growth Increment Model



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost	$29,100,000	$
Other direct construction costs	$6,190,000	$
Other indirect construction cos	$26,300,000	$
Total construction costs	$61,600,000	$
ANNUAL COSTS		
LABOR COSTS		
Administration labor cost	$63,300	$/yr
Laboratory labor cost	$161,000	$/yr
Unit process operation labor c	$930,000	$/yr
Unit process maintenance labc	$499,000	$/yr
Total labor costs	$1,650,000	$/yr
MATERIAL COSTS		
Total material cost	$408,000	$/yr
CHEMICAL COSTS		
Total chemical cost	$66,000	$/yr
ENERGY COSTS		
Total energy cost	$564,000	$/yr
Total operation and maintanen	$2,690,000	$/yr
CONSTRUCTION COST AMC		
Amortization cost for total cons	$5,260,000	$/yr
Total annual project cost	$7,950,000	$/yr
PROJECT SUMMARY		
Present worth	$95,100,000	$
Total project cost	$61,600,000	$
Total operation labor cost	$1,150,000	$/yr
Total maintenance labor cost	$499,000	$/yr
Total material cost	$408,000	$/yr
Total chemical cost	$66,000	$/yr
Total energy cost	$564,000	$/yr
Total amortization cost	$5,260,000	$/yr

Process Summary

Process	Construction ($)	Operation ($/yr)	Maintenance ($/yr)	Material ($/yr)	Chemical ($/yr)	Energy ($/yr)	Amortization ($/yr)
Energy Recovery	6000000	0	0	0	0	0	0
Preliminary Treatment	752000	59900	27100	18800	0	3380	63000
BNR - 3/5 Stage with MBR	3360000	205000	112000	57700	0	232000	313000
Gravity Thickening	113000	14200	10100	1130	0	581	10900

Microscreening	1340000	41400	22900	129000	0	46200	146000
Membrane Bioreactor	9160000	354000	186000	90100	61800	207000	1250000
Anaerobic Digestion	2150000	51500	28000	18600	0	7270	204000
Influent Pump Station	2500000	38900	28100	17500	0	33100	216000
Ultra-Violet Disinfection	1190000	0	13300	11900	4150	29800	101000
Drying Beds	331000	68800	29500	2970	0	0	28700
Primary Clarification	612000	59300	30000	6030	0	1000	56600
Post Aeration	60000	34200	11500	1410	0	4160	5440
Hauling and Land Filling	295000	2400	0	53600	0	0	62300
Effluent	0	0	0	0	0	0	0
Blower System	1280000	0	0	0	0	0	108000
Other Costs	32500000	224000	0	0	0	0	2700000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land	16	acre
Administration labor hours	1230	hr/yr
Laboratory labor hours	3130	hr/yr
Costs		
DIRECT COSTS		
Mobilization	558000	$
Site preparation	805000	$
Site electrical	1570000	$
Yard piping	1040000	$
Instrumentation and control	791000	$
Lab and administration building	1420000	$
Total direct construction costs	6190000	$
INDIRECT COSTS		
Cost of land	320000	$
Miscellaneous cost	2030000	$
Legal cost	813000	$
Engineering design fee	6090000	$
Inspection cost	813000	$
Contingency	4060000	$
Technical	813000	$
Interest during construction	6030000	$
Profit	5300000	$
Total indirect construction cost	26300000	$
Total of other construction cos	32500000	$
LABOR COSTS		
Administration labor cost	63300	$/yr
Laboratory labor cost	161000	$/yr

Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity	17900	scfm
Safety factor	1.5	
Requested air flow capacity	26800	scfm
Total capacity of blowers	26800	scfm
Number of blowers in use	4	
Total number of blowers	5	
Capacity of individual blowers	6700	scfm
Estimated cost of an installed I	193000	$
Blower building area	1740	sqft
Costs		
Construction and equipment cc	1280000	$
Installed Blower Cost	964000	$
Building Cost	191000	$
Misc Costs	127000	$
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	108000	$/yr
Notes		
Energy costs are shown at the individual unit processes that require air		

Influent Wastewater
Energy Recovery
Design Output Data

Description	Value	Units
Costs		
Construction and equipment cc	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	3.09	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	18.5	cuft/s
Average flow	7.74	cuft/s
Minimum flow	4.66	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	9.26	cuft/s
Width of channel	1.54	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.00112	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	20.1	cuft/d
Costs		
Construction and equipment cc	752000	$
Operational labor cost	59900	$/yr
Maintenance labor cost	27100	$/yr
Material and supply cost	18800	$/yr
Chemical cost	0	$/yr
Energy cost	3380	$/yr
Amortization cost	63000	$/yr

BNR - 3/5 Stage with MBR

Design Output Data

Description	Value	Units
BNR System for BIO-P and N Removal		
Design Information		
Influent BOD/TP ratio too smal		
3-Stage Biological Phosphorus		
Design aerobic SRT for nitrifica	12.5	d
Total reactor SRT	25	d
Design SS	9000	mg/L
Calculated VSS	6710	mg/L
Calculated VSS:TSS ratio	0.746	mg VSS/mg SS
Total volume of anaerobic reac	0	m3
Total volume of anoxic reactor	1520	m3
Total volume of aerobic reacto	1520	m3
Total volume of all reactors	3040	m3
Width of parallel train	10	m
Sidewater depth	5	m
Number of batteries	1	
Number of parallel trains per b	4	
Number of anoxic cells within c	1	
Number of aerobic cells within	1	
Anaerobic hydraulic retention ti	0	hr
Anoxic hydraulic retention time	1.92	hr
Aerobic hydraulic retention tim	1.92	hr
Amount of sludge generated	1090	kg/d
Sludge recycle ratio	300	%
Sludge recycle rate	57000	m3/d
Nitrogen required for biomass	7.95	mg/L
Phosphorus required for bioma	1.59	mg/L
Oxygen required to meet avera	2890	kg/d
Air flow required to meet avera	4810	N m3/hr

Design air flow	52.8	N m3/min/1000 m3
Quantities		
Operation labor required	2380	pers-hrs/yr
Maintenance labor required	1190	pers-hrs/yr
Electrical energy required	983000	kWh/yr
Volume of earthwork required	73300	cuft
Volume of slab concrete requir	41300	cuft
Volume of wall concrete requir	17700	cuft
Handrail length	614	ft
Number of diffusers per train	373	
Fine bubble diffuser floor cove	19.1	%
Number of swing arm headers	3	
Required mixing power	20.8	kW
Total number of mixers	16	
Design mixing power per mixe	1.49	kW
Mixing power for each unaerat	2.6	kW
Costs		
Construction and equipment c	2020000	$
Earthwork Cost	21700	$
Wall Concrete Cost	425000	$
Slab Concrete Cost	535000	$
Handrail Cost	46100	$
Installed Aerator Equipment	337000	$
Air Piping Cost	219000	$
Installed Mixer Equipment C	232000	$
Misc Costs	200000	$
Operational labor cost	123000	$/yr
Maintenance labor cost	52500	$/yr
Material and supply cost	48200	$/yr
Chemical cost	0	$/yr
Energy cost	98300	$/yr
Amortization cost	186000	$/yr
Internal Recycle Pumping		
Design Information		
Average daily pumping rate	3.76	MGD(US)
Total pumping capacity	3.76	MGD(US)
Design capacity per pump	1310	gpm(US)
Number of pumps	12	
Number of batteries	1	
Firm pumping capacity	3.76	MGD(US)
Quantities		
Operation labor required	522	pers-hrs/yr
Maintenance labor required	438	pers-hrs/yr
Electrical energy required	503000	kWh/yr
Volume of earthwork required	2190	cuft
Area of pump building	274	sqft
Costs		
Construction and equipment c	560000	$
Earthwork Cost	2600	$
Pump Building Cost	121000	$
Installed Pump Cost	351000	$
Misc Costs	85400	$
Operational labor cost	26900	$/yr
Maintenance labor cost	19300	$/yr
Material and supply cost	3920	$/yr
Chemical cost	0	$/yr
Energy cost	50300	$/yr
Amortization cost	53000	$/yr
Internal Recycle Pumping		
Design Information		
Average daily pumping rate	5.02	MGD(US)
Total pumping capacity	5.02	MGD(US)
Design capacity per pump	1740	gpm(US)
Number of pumps	12	
Number of batteries	1	
Firm pumping capacity	5.02	MGD(US)
Quantities		
Operation labor required	541	pers-hrs/yr
Maintenance labor required	457	pers-hrs/yr
Electrical energy required	670000	kWh/yr
Volume of earthwork required	2390	cuft
Area of pump building	299	sqft
Costs		
Construction and equipment c	629000	$
Earthwork Cost	2830	$
Pump Building Cost	132000	$
Installed Pump Cost	399000	$
Misc Costs	96000	$
Operational labor cost	27900	$/yr
Maintenance labor cost	20200	$/yr
Material and supply cost	4400	$/yr
Chemical cost	0	$/yr

Energy cost	67000	$/yr
Amortization cost	59500	$/yr
Sludge Recycle Pumping		
Design Information		
Average daily pumping rate	5.02	MGD(US)
Total pumping capacity	5.02	MGD(US)
Design capacity per pump	1740	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	5.02	MGD(US)
Quantities		
Operation labor required	541	pers-hrs/yr
Maintenance labor required	457	pers-hrs/yr
Electrical energy required	167000	kWh/yr
Volume of earthwork required	2390	cuft
Area of pump building	299	sqft
Costs		
Construction and equipment cc	157000	$
Earthwork Cost	709	$
Pump Building Cost	32900	$
Installed Pump Cost	99700	$
Misc Costs	24000	$
Operational labor cost	27900	$/yr
Maintenance labor cost	20200	$/yr
Material and supply cost	1100	$/yr
Chemical cost	0	$/yr
Energy cost	16700	$/yr
Amortization cost	14900	$/yr

Gravity Thickening

Design Output Data

Description	Value	Units
Gravity Thickening		
Design Information		
Initial concentration	1.84	%
Thickened concentration	5	%
Mass loading	10	lb/(sqft·d)
Hydraulic loading	65	gal(US)/(sqft·d)
Hydraulic retention time	24.8	hr
Number of tanks	1	
Tank volume	4200	cuft
Depth	9	ft
Surface area per tank	467	sqft
Tank diameter	25	ft
Quantities		
Amount of sludge generated	2.33	ton(short)/d
Volume of thickened sludge	9600	gpd(US)
Operation labor required	277	pers-hrs/yr
Maintenance labor required	228	pers-hrs/yr
Electrical energy required	5810	kWh/yr
Volume of earthwork required	6750	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	587	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	890	cuft
Costs		
Construction and equipment cc	113000	$
Earthwork Cost	2000	$
Wall Concrete Cost	21400	$
Slab Concrete Cost	7610	$
Installed Equipment Cost	64900	$
Misc Costs	17300	$
Operational labor cost	14200	$/yr
Maintenance labor cost	10100	$/yr
Material and supply cost	1130	$/yr
Chemical cost	0	$/yr
Energy cost	581	$/yr
Amortization cost	10900	$/yr

Microscreening

Design Output Data

Description	Value	Units
Microscreening		
Design Information		
Microscreen loading rate	7	gal(US)/(sqft·min)
Quantity of wash water require	4	%
Area of microscreens required	1190	sqft
Quantities		
Number of batteries	1	
Number of units/battery	4	
Drum diameter	10	ft
Drum width	10	ft

Area of selected unit	315	sqft
Area of building	777	sqft
Operation labor required	804	pers-hrs/yr
Maintenance labor required	518	pers-hrs/yr
Electrical energy required	462000	kWh/yr
Volume of wall concrete requir	8960	cuft
Volume of earthwork required	30900	cuft
Costs		
Construction and equipment cc	1340000	$
Earthwork Cost	9170	$
Slab Concrete Cost	216000	$
Building Cost	85400	$
Installed Equipment Cost	857000	$
Misc Costs	175000	$
Operational labor cost	41400	$/yr
Maintenance labor cost	22900	$/yr
Material and supply cost	129000	$/yr
Chemical cost	0	$/yr
Energy cost	46200	$/yr
Amortization cost	146000	$/yr

Membrane Bioreactor

Design Output Data

Description	Value	Units
Membrane Bioreactor		
Design Information		
Total volume of reactors	66100	cuft
Length of parallel train	44.9	ft
Width of parallel train	22.4	ft
Sidewater depth	16.4	ft
Number of batteries	1	
Number of parallel trains per b	4	
Total Membrane Area	84200	m2
Total Scour Air Requirement	19000	N m3/hr
Quantities		
Operation labor required	5900	pers-hrs/yr
Maintenance labor required	3410	pers-hrs/yr
Electrical energy required	1920000	kWh/yr
Volume of earthwork required	48100	cuft
Volume of slab concrete requir	29600	cuft
Volume of wall concrete requir	14100	cuft
Handrail length	800	ft
Number of diffusers per train	310	
Number of swing arm headers	2	
Costs		
Construction and equipment cc	8670000	$
Earthwork Cost	14200	$
Wall Concrete Cost	341000	$
Slab Concrete Cost	384000	$
Handrail Cost	60000	$
Membrane Cost	7270000	$
Installed Aerator Equipment	209000	$
Air Piping Cost	253000	$
Misc Cost	162000	$
Operational labor cost	304000	$/yr
Maintenance labor cost	151000	$/yr
Material and supply cost	86700	$/yr
Chemical cost	61800	$/yr
Energy cost	192000	$/yr
Amortization cost	1210000	$/yr
Permeate Pumping		
Design Information		
Average daily pumping rate	1.67	MGD(US)
Total pumping capacity	4.01	MGD(US)
Design capacity per pump	1550	gpm(US)
Number of pumps	9	
Number of batteries	1	
Firm pumping capacity	13.4	MGD(US)
Quantities		
Operation labor required	701	pers-hrs/yr
Maintenance labor required	592	pers-hrs/yr
Electrical energy required	151000	kWh/yr
Volume of earthwork required	2300	cuft
Area of pump building	288	sqft
Costs		
Construction and equipment cc	449000	$
Earthwork Cost	2050	$
Pump Building Cost	95000	$
Installed Pump Cost	284000	$
Misc Costs	68500	$
Operational labor cost	36100	$/yr
Maintenance labor cost	26200	$/yr

Material and supply cost	3150	$/yr
Chemical cost	0	$/yr
Energy cost	15100	$/yr
Amortization cost	42500	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.0234	MGD(US)
Total pumping capacity	0.0234	MGD(US)
Design capacity per pump	8.12	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.0234	MGD(US)
Quantities		
Operation labor required	272	pers-hrs/yr
Maintenance labor required	207	pers-hrs/yr
Electrical energy required	790	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment cc	37600	$
Earthwork Cost	475	$
Pump Building Cost	22100	$
Installed Pump Cost	9370	$
Misc Costs	5740	$
Operational labor cost	14000	$/yr
Maintenance labor cost	9130	$/yr
Material and supply cost	263	$/yr
Chemical cost	0	$/yr
Energy cost	79	$/yr
Amortization cost	3560	$/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	23.5	ft
Digester diameter	45	ft
Effective digester volume	80800	cuft
Number of digesters per batter	2	
Number of primary digesters p	1	
Number of secondary digester	1	
Number of batteries	1	
Gas produced	16.4	cuft/min
Heat required	290000	BTU/hr
Digester gas required	11.2	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	1000	pers-hrs/yr
Maintenance labor required	635	pers-hrs/yr
Electrical energy required	72700	kWh/yr
Volume of earthwork required	80500	cuft
Slab thickness	9.93	in
Volume of slab concrete requir	3000	cuft
Wall thickness	19.3	in
Volume of wall concrete requir	13400	cuft
Sidewater depth	23.5	ft
Surface area/floor of 2-story cc	595	sqft
Piping size	6	in
Length of total piping system	486	ft
Number of 90 degree elbows	26	
Number of tees	51	
Number of plug valves	37	
Total dry solids treated	2.1	ton(short)/d
Costs		
Construction and equipment cc	2150000	$
Earthwork Cost	23900	$
Wall Concrete Cost	322000	$
Slab Concrete Cost	38900	$
Building Cost	65500	$
Piping System Cost	244000	$
Floating Cover Cost	680000	$
Gas Recirculation Units Cost	233000	$
Heating Units Cost	145000	$
Gas Safety Equipment Cost	105000	$
Installed Pumps Cost	74800	$
Operational labor cost	51500	$/yr
Maintenance labor cost	28000	$/yr
Material and supply cost	18600	$/yr

Chemical cost	0	$/yr
Energy cost	7270	$/yr
Amortization cost	204000	$/yr

Influent Pump Station

Design Output Data

Description	Value	Units
Pump Station		
Design Information		
Volume of wet well	32500	cuft
Width of wet well	230	ft
Depth of the pumping station	28.9	ft
Length of the pumping station	22.8	ft
Width of the pumping station	263	ft
Minimum depth of water in wet	7.89	ft
Area of pump building	777	sqft
Peak capacity of pumps	16.7	MGD(US)
Firm pumping capacity	16.7	MGD(US)
Total dynamic head - average	44.3	ft
Quantities		
Operation labor required	756	pers-hrs/yr
Maintenance labor required	636	pers-hrs/yr
Electrical energy required	331000	kWh/yr
Volume of earthwork required	737000	cuft
Volume of slab concrete requir	58500	cuft
Volume of wall concrete requir	22500	cuft
Capacity per pump	11600	gpm(US)
Number of constant speed pur	2	
Number of variable speed purr	0	
Diameter of discharge header	24.3	in
Total dynamic head	58.4	ft
Size of selected pump	24	in
Specific speed of pump	4590	
Pump rotating speed	785	rpm
Motor size required	188	HP
Size of selected motor	200	HP
Width of pump system	5.4	ft
Length of pump system	23.5	ft
Length of the dry well	22.8	ft
Width of the dry well	32.5	ft
Costs		
Construction and equipment cc	2500000	$
Earthwork Cost	218000	$
Wall Concrete Cost	542000	$
Slab Concrete Cost	759000	$
Building Cost	85500	$
Installed Pump Equipment C	512000	$
Misc Costs	381000	$
Operational labor cost	38900	$/yr
Maintenance labor cost	28100	$/yr
Material and supply cost	17500	$/yr
Chemical cost	0	$/yr
Energy cost	33100	$/yr
Amortization cost	216000	$/yr

Ultra-Violet Disinfection

Design Output Data

Description	Value	Units
Ultra-Violet Disinfection		
Design Information		
Design based on a model calc	2.12	gal(US)/(min·W)
Total number of lamps needed	299	
Number of spare channels	1	
Total number of lamps used in	400	
Number of excess lamps	101	
Number of lamps/modules	4	
Number of modules/bank	5	
Number of banks/channel	5	
Number of channels	4	
Calculated headloss	58.3	in
Costs		
Construction and equipment cc	1190000	$
Cost of installation	716000	$
Total cost of UV lamps	477000	$
Operational labor cost	0	$/yr
Maintenance labor cost	13300	$/yr
Material and supply cost	11900	$/yr
Chemical cost	4150	$/yr
Energy cost	29800	$/yr
Amortization cost	101000	$/yr

Drying Beds

Design Output Data

Description	Value	Units
Sludge Drying Beds		
Design Information		
Total surface area required	22900	sqft
Initial depth of sludge	12	in
Final solids	50	%
Bed holding time	28.5	d
Quantities		
Total drying bed surface area	22900	sqft
Number beds	8	
Surface area of each individua	2860	sqft
Length of each bed	143	ft
Volume of earthwork required	113000	cuft
Volume concrete for dividing w	8130	cuft
Volume of R.C. in-place for tru	1710	cuft
Volume of sand	17100	cuft
Volume of gravel	22900	cuft
Clay pipe diameter	6	in
Total length clay pipe	2290	in
Sludge solids produced	1.25	ton(short)/d
Operational labor required	1340	pers-hrs/yr
Maintenance labor required	667	pers-hrs/yr
Costs		
Construction and equipment cc	331000	$
Earthwork Cost	33400	$
Wall Concrete Cost	137000	$
Slab Concrete Cost	13300	$
Drying Bed Media Cost	63800	$
Drain Pipe System Cost	50300	$
Misc Costs	32800	$
Operational labor cost	68800	$/yr
Maintenance labor cost	29500	$/yr
Material and supply cost	2970	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	28700	$/yr

Primary Clarification

Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		
Surface area	8370	sqft
Surface area per circular clarifi	4190	sqft
Diameter of each circular clarif	74	ft
Number of clarifiers per battery	2	
Number of batteries	1	
Solids loading rate	0.479	lb/(sqft·d)
Hydraulic retention time	2.69	hr
Weir length	1200	ft
Volume of sludge generated	6980	gpd(US)
Quantities		
Operation labor required	920	pers-hrs/yr
Maintenance labor required	506	pers-hrs/yr
Electrical energy required	9810	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 cc	579000	$
Earthwork Cost	32000	$
Wall Concrete Cost	118000	$
Slab Concrete Cost	110000	$
Installed Equipment Cost	231000	$
Misc Costs	88400	$
Operational labor cost	47400	$/yr
Maintenance labor cost	22300	$/yr
Material and supply cost	5790	$/yr
Chemical cost	0	$/yr
Energy cost	981	$/yr
Amortization cost	53500	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.00698	MGD(US)
Total pumping capacity	0.00698	MGD(US)
Design capacity per pump	2.42	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.00698	MGD(US)

Quantities		
Operation labor required	232	pers-hrs/yr
Maintenance labor required	173	pers-hrs/yr
Electrical energy required	237	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment cc	33000	$
Earthwork Cost	474	$
Pump Building Cost	22000	$
Installed Pump Cost	5500	$
Misc Costs	5040	$
Operational labor cost	12000	$/yr
Maintenance labor cost	7630	$/yr
Material and supply cost	231	$/yr
Chemical cost	0	$/yr
Energy cost	24	$/yr
Amortization cost	3120	$/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 ef	5	mg/L
Correction factor for pressure	1	
Minimum dissolved oxygen in t	2	mg/L
Oxygen saturation at summer t	8.5	mg/L
Oxygen required	125	lb/d
Operating transfer efficiency	2.95	lbO2/(HP·h)
Total volume of aerobic reacto	34700	gal(US)
Air flow rate required to meet a	167	scfm
Quantities		
Basin depth	15	ft
Length of basin	10.3	ft
Width of basin	30	ft
Number of diffusers	14	
Number of swing arm diffuser l	1	
Volume of wall concrete requir	907	cuft
Volume of slab concrete requir	232	cuft
Electrical energy required	41600	kWh/yr
Operation labor required	664	pers-hrs/yr
Maintenance labor required	260	pers-hrs/yr
Costs		
Construction and equipment cc	60000	$
Wall Concrete Cost	21800	$
Slab Concrete Cost	11800	$
Installed Equipment Cost	20400	$
Misc Costs	5940	$
Operational labor cost	34200	$/yr
Maintenance labor cost	11500	$/yr
Material and supply cost	1410	$/yr
Chemical cost	0	$/yr
Energy cost	4160	$/yr
Amortization cost	5440	$/yr

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	2.97	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	2.97	cuyd/d
Maximum anticipated landfill dc	30	d
Anticipated sludge storage heig	8	ft
Sludge storage shed area	301	sqft
Width of sludge storage shed s	12.3	ft
Length of sludge storage shed	24.5	ft
Volume of earthwork required	1000	cuft
Volume of slab concrete requir	470	cuft
Surface area of canopy roof	301	sqft
Round trip haul distance	20	miles
Round trips per day per truck	1	
Distance traveled per year per	5000	miles

Sludge hauled	2.63	ton(short)/d
Operation labor required	46.5	pers-hrs/yr
LandFilling cost	35200	$/yr
Costs		
Construction and equipment cc	295000	$
Earthwork Cost	297	$
Slab Concrete Cost	6090	$
Canopy Roof Cost	6020	$
Vehicle Cost	283000	$
Operational labor cost	2400	$/yr
Maintenance labor cost	0	$/yr
Material and supply cost	53600	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	62300	$/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