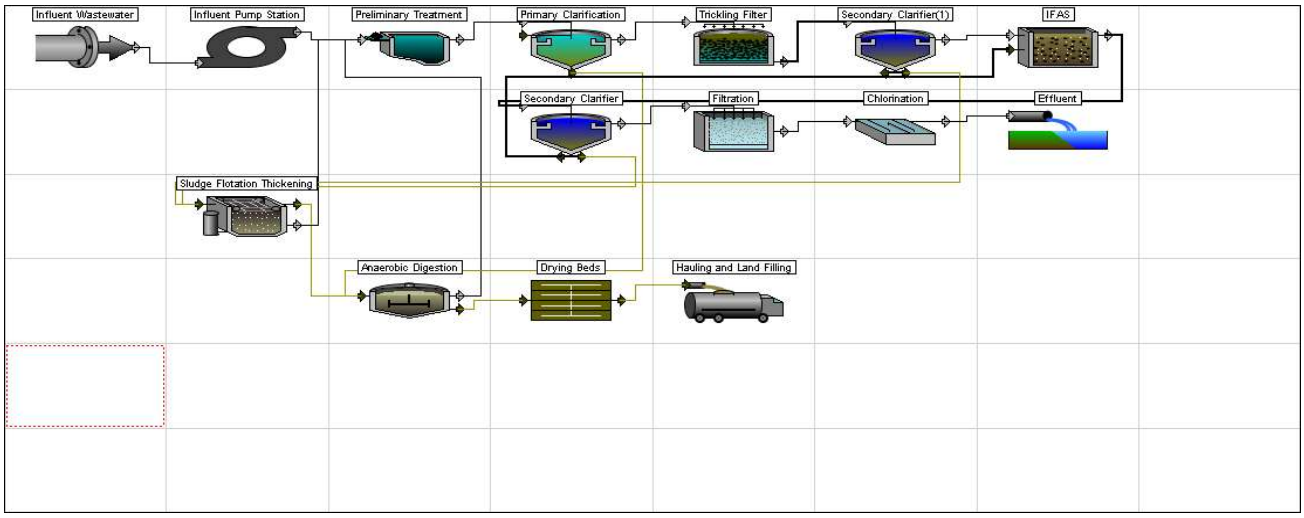
Layout 1 Payson City



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost	$16,500,000	$
Other direct construction costs	$5,760,000	$
Other indirect construction cos	$16,700,000	$
Total construction costs	$38,900,000	$
ANNUAL COSTS		
LABOR COSTS		
Administration labor cost	$58,300	$/yr
Laboratory labor cost	$158,000	$/yr
Unit process operation labor c	$838,000	$/yr
Unit process maintenance labc	$370,000	$/yr
Total labor costs	$1,420,000	$/yr
MATERIAL COSTS		
Total material cost	$282,000	$/yr
CHEMICAL COSTS		
Total chemical cost	$89,900	$/yr
ENERGY COSTS		
Total energy cost	$263,000	$/yr
Total operation and maintanen	$2,060,000	$/yr
CONSTRUCTION COST AMC		
Amortization cost for total cons	$3,430,000	$/yr
Total annual project cost	$5,490,000	$/yr
PROJECT SUMMARY		
Present worth	$65,700,000	$
Total project cost	$38,900,000	$
Total operation labor cost	$1,050,000	$/yr
Total maintenance labor cost	$370,000	$/yr
Total material cost	$282,000	$/yr
Total chemical cost	$89,900	$/yr
Total energy cost	$263,000	$/yr
Total amortization cost	$3,430,000	$/yr

Process Summary

Process	Construction ($)	Operation ($/yr)	Maintenance ($/yr)	Material ($/yr)	Chemical ($/yr)	Energy ($/yr)	Amortization ($/yr)
Influent Pump Station	2230000	37600	26600	15600	0	30600	192000
Sludge Flotation Thickening	504000	90600	9650	5300	1120	14200	46500
Preliminary Treatment	753000	56700	25200	18800	0	3230	63200
Anaerobic Digestion	2820000	75700	41100	23100	0	12200	267000

Primary Clarification	439000	46300	23600	4280	0	946	40900
Secondary Clarifier	633000	62400	31000	6230	0	1040	58500
Drying Beds	751000	161000	67200	6760	0	0	65300
Trickling Filter	1360000	51500	36700	7660	0	41000	120000
Filtration	2210000	9770	5610	62300	0	3530	213000
Hauling and Land Filling	310000	5590	0	53600	0	0	63500
Secondary Clarifier(1)	649000	64900	32700	6370	0	1140	60000
Chlorination	606000	48600	7210	22900	88800	11800	61500
IFAS	2600000	128000	63200	49400	0	144000	271000
Effluent	0	0	0	0	0	0	0
Blower System	627000	0	0	0	0	0	52500
Other Costs	22400000	217000	0	0	0	0	1860000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land	15	acre
Administration labor hours	1130	hr/yr
Laboratory labor hours	3080	hr/yr
Costs		
DIRECT COSTS		
Mobilization	519000	$
Site preparation	758000	$
Site electrical	1450000	$
Yard piping	969000	$
Instrumentation and control	729000	$
Lab and administration building	1340000	$
Total direct construction costs	5760000	$
INDIRECT COSTS		
Cost of land	300000	$
Miscellaneous cost	1280000	$
Legal cost	512000	$
Engineering design fee	3840000	$
Inspection cost	512000	$
Contingency	2560000	$
Technical	512000	$
Interest during construction	3810000	$
Profit	3340000	$
Total indirect construction cost	16700000	$
Total of other construction cos	22400000	$
LABOR COSTS		
Administration labor cost	58300	$/yr
Laboratory labor cost	158000	$/yr

Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity	5390	scfm
Safety factor	1.5	
Requested air flow capacity	8080	scfm
Total capacity of blowers	8080	scfm
Number of blowers in use	2	
Total number of blowers	3	
Capacity of individual blowers	4040	scfm
Estimated cost of an installed l	141000	$
Blower building area	1280	sqft
Costs		
Construction and equipment cc	627000	$
Installed Blower Cost	424000	$
Building Cost	141000	$
Misc Costs	62100	$
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	52500	$/yr
Notes		
Energy costs are shown at the individual unit processes that require air		

Influent Wastewater
Influent Pump Station
Design Output Data

Description	Value	Units
Pump Station		
Design Information		
Volume of wet well	29500	cuft

Width of wet well	227	ft
Depth of the pumping station	28.6	ft
Length of the pumping station	21.2	ft
Width of the pumping station	258	ft
Minimum depth of water in wet	7.6	ft
Area of pump building	682	sqft
Peak capacity of pumps	15.1	MGD(US)
Firm pumping capacity	15.1	MGD(US)
Total dynamic head - average	44.4	ft
Quantities		
Operation labor required	731	pers-hrs/yr
Maintenance labor required	616	pers-hrs/yr
Electrical energy required	306000	kWh/yr
Volume of earthwork required	689000	cuft
Volume of slab concrete requir	52000	cuft
Volume of wall concrete requir	21700	cuft
Capacity per pump	10500	gpm(US)
Number of constant speed pur	2	
Number of variable speed pur	0	
Diameter of discharge header	23.1	in
Total dynamic head	59.1	ft
Size of selected pump	20	in
Specific speed of pump	4320	
Pump rotating speed	833	rpm
Motor size required	177	HP
Size of selected motor	200	HP
Width of pump system	4.6	ft
Length of pump system	21.6	ft
Length of the dry well	21.2	ft
Width of the dry well	30.6	ft
Costs		
Construction and equipment co	2230000	$
Earthwork Cost	204000	$
Wall Concrete Cost	522000	$
Slab Concrete Cost	675000	$
Building Cost	75000	$
Installed Pump Equipment C	410000	$
Misc Costs	340000	$
Operational labor cost	37600	$/yr
Maintenance labor cost	26600	$/yr
Material and supply cost	15600	$/yr
Chemical cost	0	$/yr
Energy cost	30600	$/yr
Amortization cost	192000	$/yr

Sludge Flotation Thickening

Design Output Data

Description	Value	Units
Sludge Flotation Thickening		
Design Information		
Air to solids ratio	0.02	
Air pressure	60	psig
Solids loading rate	10	lb/(sqft·d)
Recycle flow	0.249	MGD(US)
Surface area required	473	sqft
Volume of pressure tank	46.2	cuft
Volume of flotation tank	5100	cuft
Pressure tank detention time	2	min
Flotation tank detention time	3	hr
Polymer required	2.37	lb/d
Quantities		
Number units	1	
Surface area per flotation unit	570	sqft
Diameter per flotation unit	26.9	ft
Amount of sludge generated	2.37	ton(long)/d
Area of flotation building	924	sqft
Volume of earthwork required	7650	cuft
Slab thickness	9.9	in
Volume of slab concrete requir	652	cuft
Wall thickness	11	in
Volume of wall concrete requir	798	cuft
Sidewater depth	8	ft
Operation labor required	769	pers-hrs/yr
Maintenance labor required	224	pers-hrs/yr
Electrical energy required	142000	kWhr/yr
Costs		
Construction and equipment co	479000	$
Earthwork Cost	2270	$
Wall Concrete Cost	19200	$
Slab Concrete Cost	8450	$
Building Cost	76300	$
Installed Equipment Cost	300000	$

Misc Costs	73000	$
Operational labor cost	39600	$/yr
Maintenance labor cost	9650	$/yr
Material and supply cost	4790	$/yr
Chemical cost	0	$/yr
Energy cost	14200	$/yr
Amortization cost	46500	$/yr
Polymer Feed System		
Quantities		
Polymer dosage	2.37	lb/d
Liquid chemical solution fed	114	gpd(US)
O&M labor required	637	pers-hrs/yr
Dry material handling and mixi	353	pers-hrs/yr
Total operation labor required	990	pers-hrs/yr
Costs		
Construction and equipment c	25600	$
Operational labor cost	51000	$/yr
Maintenance labor cost	0	$/yr
Material and supply cost	513	$/yr
Chemical cost	1120	$/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	2.81	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	18.6	cuft/s
Average flow	7.02	cuft/s
Minimum flow	4.71	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	9.29	cuft/s
Width of channel	1.55	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.00115	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	18.2	cuft/d
Costs		
Construction and equipment c	753000	$
Operational labor cost	56700	$/yr
Maintenance labor cost	25200	$/yr
Material and supply cost	18800	$/yr
Chemical cost	0	$/yr
Energy cost	3230	$/yr
Amortization cost	63200	$/yr

Anaerobic Digestion

Design Output Data

Description	Value	Units
Anaerobic Digestion		
Design Information		
Percent VSS destroyed	50	%
Solids concentration in digeste	5	%
Detention time	15	d
Digester depth	25.3	ft
Digester diameter	55	ft
Effective digester volume	131000	cuft
Number of digesters per batte	2	
Number of primary digesters p	1	
Number of secondary digester	1	
Number of batteries	1	

Gas produced	40	cuft/min
Heat required	630000	BTU/hr
Digester gas required	24.3	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	1470	pers-hrs/yr
Maintenance labor required	954	pers-hrs/yr
Electrical energy required	122000	kWh/yr
Volume of earthwork required	131000	cuft
Slab thickness	10.4	in
Volume of slab concrete requir	4570	cuft
Wall thickness	20.2	in
Volume of wall concrete requir	18200	cuft
Sidewater depth	25.3	ft
Surface area/floor of 2-story cc	889	sqft
Piping size	8	in
Length of total piping system	555	ft
Number of 90 degree elbows	26	
Number of tees	51	
Number of plug valves	37	
Total dry solids treated	4.99	ton(short)/d
Costs		
Construction and equipment cc	2820000	$
Earthwork Cost	38700	$
Wall Concrete Cost	437000	$
Slab Concrete Cost	59300	$
Building Cost	97800	$
Piping System Cost	373000	$
Floating Cover Cost	914000	$
Gas Recirculation Units Cost	247000	$
Heating Units Cost	182000	$
Gas Safety Equipment Cost	120000	$
Installed Pumps Cost	74800	$
Operational labor cost	75700	$/yr
Maintenance labor cost	41100	$/yr
Material and supply cost	23100	$/yr
Chemical cost	0	$/yr
Energy cost	12200	$/yr
Amortization cost	267000	$/yr

Primary Clarification

Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		
Surface area	4560	sqft
Surface area per circular clarifi	2280	sqft
Diameter of each circular clarif	54	ft
Number of clarifiers per battery	2	
Number of batteries	1	
Solids loading rate	2.22	lb/(sqft·d)
Hydraulic retention time	1.62	hr
Weir length	804	ft
Volume of sludge generated	17700	gpd(US)
Quantities		
Operation labor required	638	pers-hrs/yr
Maintenance labor required	349	pers-hrs/yr
Electrical energy required	8860	kWh/yr
Volume of earthwork required	55800	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	4690	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	3630	cuft
Costs		
Construction and equipment cc	402000	$
Earthwork Cost	16500	$
Wall Concrete Cost	87400	$
Slab Concrete Cost	60900	$
Installed Equipment Cost	176000	$
Misc Costs	61400	$
Operational labor cost	32900	$/yr
Maintenance labor cost	15100	$/yr
Material and supply cost	4020	$/yr
Chemical cost	0	$/yr
Energy cost	886	$/yr
Amortization cost	37500	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.0177	MGD(US)
Total pumping capacity	0.0177	MGD(US)
Design capacity per pump	6.14	gpm(US)
Number of pumps	3	

Number of batteries	1	
Firm pumping capacity	0.0177	MGD(US)
Quantities		
Operation labor required	262	pers-hrs/yr
Maintenance labor required	198	pers-hrs/yr
Electrical energy required	598	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment co	36300	$
Earthwork Cost	475	$
Pump Building Cost	22000	$
Installed Pump Cost	8290	$
Misc Costs	5540	$
Operational labor cost	13500	$/yr
Maintenance labor cost	8550	$/yr
Material and supply cost	254	$/yr
Chemical cost	0	$/yr
Energy cost	60	$/yr
Amortization cost	3440	$/yr

Secondary Clarifier

Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	9000	sqft
Surface area per circular clarifi	4500	sqft
Diameter of each circular clarif	76	ft
Number of clarifiers per battery	2	
Number of batteries	1	
Solids loading rate	13.9	lb/(sqft·d)
Hydraulic retention time	3.23	hr
Designed surface overflow rate	500	gal(US)/(sqft·d)
Weir length	800	ft
Volume of wasted sludge	12800	gpd(US)
Quantities		
Operation labor required	960	pers-hrs/yr
Maintenance labor required	528	pers-hrs/yr
Electrical energy required	9920	kWh/yr
Volume of earthwork required	114000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	8930	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	5020	cuft
Costs		
Construction and equipment co	598000	$
Earthwork Cost	33900	$
Wall Concrete Cost	121000	$
Slab Concrete Cost	116000	$
Installed Equipment Cost	236000	$
Misc Costs	91300	$
Operational labor cost	49500	$/yr
Maintenance labor cost	22800	$/yr
Material and supply cost	5980	$/yr
Chemical cost	0	$/yr
Energy cost	992	$/yr
Amortization cost	55200	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.0128	MGD(US)
Total pumping capacity	0.0128	MGD(US)
Design capacity per pump	4.43	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.0128	MGD(US)
Quantities		
Operation labor required	251	pers-hrs/yr
Maintenance labor required	189	pers-hrs/yr
Electrical energy required	432	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment co	35000	$
Earthwork Cost	475	$
Pump Building Cost	22000	$
Installed Pump Cost	7180	$
Misc Costs	5340	$
Operational labor cost	12900	$/yr
Maintenance labor cost	8150	$/yr
Material and supply cost	245	$/yr
Chemical cost	0	$/yr

Energy cost	43	$/yr
Amortization cost	3310	$/yr

Drying Beds

Design Output Data

Description	Value	Units
Sludge Drying Beds		
Design Information		
Total surface area required	53400	sqft
Initial depth of sludge	12	in
Final solids	50	%
Bed holding time	28.5	d
Quantities		
Total drying bed surface area	53400	sqft
Number beds	18	
Surface area of each individua	2960	sqft
Length of each bed	148	ft
Volume of earthwork required	263000	cuft
Volume concrete for dividing w	17900	cuft
Volume of R.C. in-place for tru	4000	cuft
Volume of sand	40000	cuft
Volume of gravel	53400	cuft
Clay pipe diameter	6	in
Total length clay pipe	5340	in
Sludge solids produced	2.92	ton(short)/d
Operational labor required	3120	pers-hrs/yr
Maintenance labor required	1560	pers-hrs/yr
Costs		
Construction and equipment cc	751000	$
Earthwork Cost	77800	$
Wall Concrete Cost	301000	$
Slab Concrete Cost	31100	$
Drying Bed Media Cost	149000	$
Drain Pipe System Cost	117000	$
Misc Costs	74400	$
Operational labor cost	161000	$/yr
Maintenance labor cost	67200	$/yr
Material and supply cost	6760	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	65300	$/yr

Trickling Filter

Design Output Data

Description	Value	Units
Trickling Filtration		
Design Information		
Reaction rate constant	0.00156	
Hydraulic loading rate	0.75	gal(US)/(sqft·min)
Total hydraulic loading rate	0.761	gal(US)/(sqft·min)
Recirculation ratio	0.0141	
Number of towers per stage	2	
Number of stages	1	
Depth of filter tower	19.2	ft
Diameter of filter tower	51.7	ft
Surface area per filter tower	2100	sqft
Total surface area	4210	sqft
Volume per filter tower	40300	cuft
Total volume	80600	cuft
Quantities		
Operation labor required	322	pers-hr/yr
Maintenance labor required	279	pers-hr/yr
Volume of earthwork required	51200	cuft
Volume of slab concrete requir	2800	cuft
Volume of wall concrete requir	6540	cuft
Number of posts per tower	154	
Total length of precast beams	2240	ft
Costs		
Construction and equipment cc	1130000	$
Earthwork Cost	15200	$
Wall Concrete Cost	157000	$
Slab Concrete Cost	36400	$
Concrete Beam Cost	89800	$
Media Cost	459000	$
Installed Distributor Arm Cos	145000	$
Misc Costs	226000	$
Operational labor cost	16600	$/yr
Maintenance labor cost	12000	$/yr
Material and supply cost	6050	$/yr
Chemical cost	0	$/yr
Energy cost	874	$/yr
Amortization cost	98000	$/yr

Internal Recycle Pumping		
Design Information		
Average daily pumping rate	12	MGD(US)
Total pumping capacity	12	MGD(US)
Design capacity per pump	4180	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	12	MGD(US)
Quantities		
Operation labor required	678	pers-hrs/yr
Maintenance labor required	573	pers-hrs/yr
Electrical energy required	401000	kWh/yr
Volume of earthwork required	3500	cuft
Area of pump building	438	sqft
Costs		
Construction and equipment cc	231000	$
Earthwork Cost	1040	$
Pump Building Cost	48100	$
Installed Pump Cost	147000	$
Misc Costs	35200	$
Operational labor cost	34900	$/yr
Maintenance labor cost	24700	$/yr
Material and supply cost	1620	$/yr
Chemical cost	0	$/yr
Energy cost	40100	$/yr
Amortization cost	21800	$/yr

Filtration

Design Output Data

Description	Value	Units
Filtration		
Design Information		
Surface area	2220	sqft
Depth	9	ft
Terminal headloss through bec	192000	ft
Maximum head for backwashir	19.6	ft
Backwash rate	20	gal(US)/(sqft·min)
Washwater gutter depth	0.798	ft
Washwater needed	222000	gal(US)
Quantities		
Operation labor required	190	pers-hrs/yr
Maintenance labor required	130	pers-hrs/yr
Electrical energy required	35300	kWh
Surface area per filter unit	2220	sqft
Number of cells per filter unit	4	
Number of filter units per batte	1	
Number of batteries	1	
Volume of earthwork for filter	25000	cuft
Volume of concrete for filter	12600	cuft
Volume of surge tank	29700	cuft
Width of surge tank	46	ft
Length of surge tank	92.1	ft
Volume of earthwork for surge	60000	cuft
Volume of concrete for surge t	7870	cuft
Costs		
Construction and equipment cc	2210000	$
Earthwork Cost for Filter	7410	$
Earthwork Cost for Surge Ta	17800	$
Concrete Cost for Filter	304000	$
Concrete Cost for Surge Tar	189000	$
Installed Equipment Cost	1250000	$
Misc Costs	441000	$
Operational labor cost	9770	$/yr
Maintenance labor cost	5610	$/yr
Material and supply cost	62300	$/yr
Chemical cost	0	$/yr
Energy cost	3530	$/yr
Amortization cost	213000	$/yr

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	6.94	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	6.94	cuyd/d
Maximum anticipated landfill d	30	d
Anticipated sludge storage hei	8	ft
Sludge storage shed area	703	sqft
Width of sludge storage shed s	18.7	ft
Length of sludge storage shed	37.5	ft
Volume of earthwork required	2130	cuft
Volume of slab concrete requir	960	cuft
Surface area of canopy roof	703	sqft
Round trip haul distance	20	miles
Round trips per day per truck	1	
Distance traveled per year per	5000	miles
Sludge hauled	6.14	ton(short)/d
Operation labor required	109	pers-hrs/yr
LandFilling cost	35200	$/yr
Costs		
Construction and equipment co	310000	$
Earthwork Cost	631	$
Slab Concrete Cost	12400	$
Canopy Roof Cost	14100	$
Vehicle Cost	283000	$
Operational labor cost	5590	$/yr
Maintenance labor cost	0	$/yr
Material and supply cost	53600	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	63500	$/yr

Secondary Clarifier(1)

Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	9090	sqft
Surface area per circular clarifi	4540	sqft
Diameter of each circular clarif	77	ft
Number of clarifiers per battery	2	
Number of batteries	1	
Solids loading rate	0.416	lb/(sqft·d)
Hydraulic retention time	3.23	hr
Designed surface overflow rate	500	gal(US)/(sqft·d)
Weir length	803	ft
Volume of wasted sludge	44000	gpd(US)
Quantities		
Operation labor required	966	pers-hrs/yr
Maintenance labor required	532	pers-hrs/yr
Electrical energy required	9940	kWh/yr
Volume of earthwork required	118000	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	9160	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	5080	cuft
Costs		
Construction and equipment co	608000	$
Earthwork Cost	34900	$
Wall Concrete Cost	122000	$
Slab Concrete Cost	119000	$
Installed Equipment Cost	239000	$
Misc Costs	92700	$
Operational labor cost	49800	$/yr
Maintenance labor cost	22900	$/yr
Material and supply cost	6080	$/yr
Chemical cost	0	$/yr
Energy cost	994	$/yr
Amortization cost	56100	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.044	MGD(US)
Total pumping capacity	0.044	MGD(US)
Design capacity per pump	15.3	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.044	MGD(US)
Quantities		
Operation labor required	295	pers-hrs/yr
Maintenance labor required	227	pers-hrs/yr
Electrical energy required	1490	kWh/yr
Volume of earthwork required	1610	cuft
Area of pump building	201	sqft
Costs		
Construction and equipment co	41200	$
Earthwork Cost	476	$

Pump Building Cost	22100	$
Installed Pump Cost	12400	$
Misc Costs	6290	$
Operational labor cost	15200	$/yr
Maintenance labor cost	9790	$/yr
Material and supply cost	289	$/yr
Chemical cost	0	$/yr
Energy cost	149	$/yr
Amortization cost	3900	$/yr

Chlorination

Design Output Data

Description	Value	Units
Chlorination		
Design Information		
Volume of tank	250000	gal(US)
Average chlorine required	374	lb/d
Peak chlorine required	1000	lb/d
Influent coliform count	10000000	/100ml
Effluent coliform count	29.2	/100ml
Quantities		
Operational labor required	944	pers-hrs/yr
Maintenance labor required	167	pers-hrs/yr
Electrical energy required	118000	kWh/yr
Volume of earthwork required	14200	cuft
Volume of slab concrete requir	3350	cuft
Volume of wall concrete requir	5620	cuft
Number of chlorinators and ev	1	
Chlorination building area	220	sqft
Number of chlorine cylinders	6	
Area of chlorine storage buildir	840	sqft
Costs		
Construction and equipment cc	606000	$
Earthwork Cost	4220	$
Wall Concrete Cost	135000	$
Slab Concrete Cost	43400	$
Installed Equipment Cost	320000	$
Building Cost	24200	$
Storage Building Cost	46200	$
Misc Costs	32900	$
Operational labor cost	48600	$/yr
Maintenance labor cost	7210	$/yr
Material and supply cost	22900	$/yr
Chemical cost	88800	$/yr
Energy cost	11800	$/yr
Amortization cost	61500	$/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 wi	5.89	d
Design SRT for design at winte	8.83	d
Design SS	2500	mg/L
Calculated VSS	1920	mg/L
Calculated VSS:TSS ratio	0.766	mg VSS/mg SS
Total volume of reactors	4270	m3
Length of parallel train	22	m
Width of parallel train	10	m
Sidewater depth	5	m
Number of batteries	1	
Number of parallel trains per b	4	
Number of cells within one trai	2	
Total number of dividing walls	4	
Hydraulic retention time	6.02	hr
F/M ratio	0.17	kg BOD/kg MLSS/d
Volumetric BOD loading	0.134	kg BOD/m3/d
Observed yield (VSS basis)	0.876	g VSS/g BOD
Observed yield (TSS basis)	0.762	g TSS/g BOD
Amount of alkalinity required	128	gCaCO3/m3
Amount of sludge generated	497	kg/d
Sludge recycle rate	5680	m3/d
Nitrogen requirement for biom	1.6	mg/L
Phosphorus requirement for bi	0.319	mg/L
Oxygen requirement to meet a	1910	kg/d
Air flow required to meet avera	8890	N m3/hr
Design air flow	34.7	N m3/min/1000 m3
Quantities		

Operation labor required	2010	pers-hrs/yr
Maintenance labor required	1080	pers-hrs/yr
Electrical energy required	1390000	kWh/yr
Volume of earthwork required	92300	cuft
Volume of slab concrete requir	46200	cuft
Volume of wall concrete requir	21400	cuft
Handrail length	771	ft
Number of diffusers per train	113	
Number of swing arm headers	3	
Volume of Media required	2140	m3
Sieve Area required	45.4	m2
Costs		
Construction and equipment co	2470000	$
Earthwork Cost	27300	$
Wall Concrete Cost	516000	$
Slab Concrete Cost	599000	$
Handrail Cost	57800	$
Installed Aerator Equipment	257000	$
Air Piping Cost	90900	$
Misc Costs	170000	$
Media Cost	705000	$
Screen Cost	50000	$
Operational labor cost	104000	$/yr
Maintenance labor cost	46700	$/yr
Material and supply cost	48500	$/yr
Chemical cost	0	$/yr
Energy cost	139000	$/yr
Amortization cost	259000	$/yr
Sludge Recycle Pumping		
Design Information		
Average daily pumping rate	1.5	MGD(US)
Total pumping capacity	3	MGD(US)
Design capacity per pump	1040	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	1.5	MGD(US)
Quantities		
Operation labor required	464	pers-hrs/yr
Maintenance labor required	382	pers-hrs/yr
Electrical energy required	50200	kWh/yr
Volume of earthwork required	2070	cuft
Area of pump building	259	sqft
Costs		
Construction and equipment co	128000	$
Earthwork Cost	614	$
Pump Building Cost	28500	$
Installed Pump Cost	79500	$
Misc Costs	19500	$
Operational labor cost	23900	$/yr
Maintenance labor cost	16500	$/yr
Material and supply cost	897	$/yr
Chemical cost	0	$/yr
Energy cost	5020	$/yr
Amortization cost	12100	$/yr

Effluent

Design Output Data

Description	Value	Units
Costs		
Construction and equipment co	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