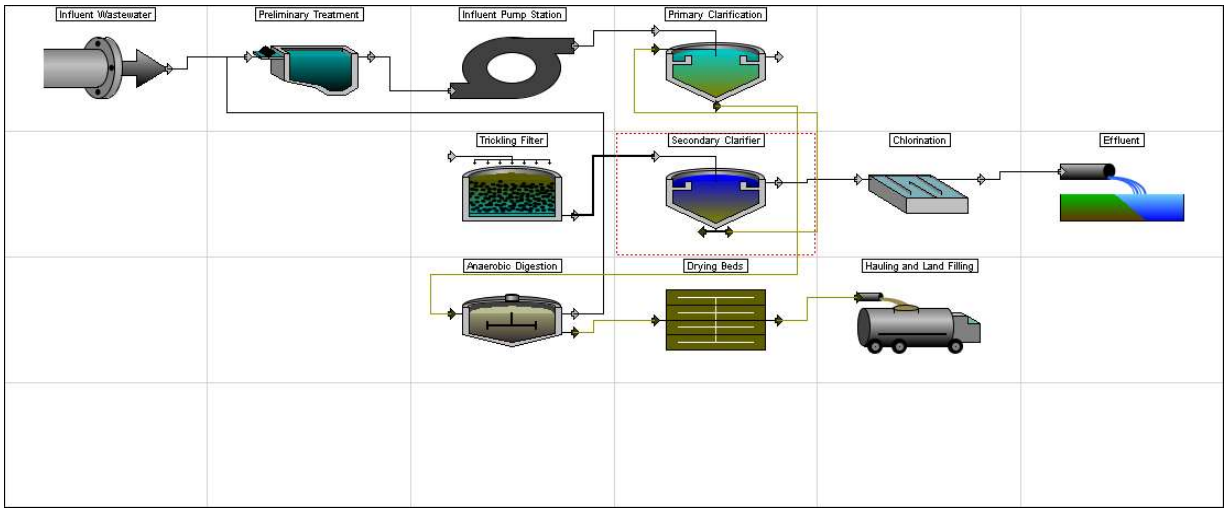
Layout 1 Moab City



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost	$3,750,000	$
Other direct construction costs	$3,880,000	$
Other indirect construction cos	$5,890,000	$
Total construction costs	$13,500,000	$
ANNUAL COSTS		
LABOR COSTS		
Administration labor cost	$36,800	$/yr
Laboratory labor cost	$145,000	$/yr
Unit process operation labor c	$206,000	$/yr
Unit process maintenance labc	$93,800	$/yr
Total labor costs	$481,000	$/yr
MATERIAL COSTS		
Total material cost	$89,300	$/yr
CHEMICAL COSTS		
Total chemical cost	$0	$/yr
ENERGY COSTS		
Total energy cost	$28,600	$/yr
Total operation and maintanen	$599,000	$/yr
CONSTRUCTION COST AMC		
Amortization cost for total cons	$1,170,000	$/yr
Total annual project cost	$1,770,000	$/yr
PROJECT SUMMARY		
Present worth	$21,300,000	$
Total project cost	$13,500,000	$
Total operation labor cost	$387,000	$/yr
Total maintenance labor cost	$93,800	$/yr
Total material cost	$89,300	$/yr
Total chemical cost	$0	$/yr
Total energy cost	$28,600	$/yr
Total amortization cost	$1,170,000	$/yr

Process Summary

Process	Construction ($)	Operation ($/yr)	Maintenance ($/yr)	Material ($/yr)	Chemical ($/yr)	Energy ($/yr)	Amortization ($/yr)
Preliminary Treatment	488000	42100	17300	12200	0	2450	40900
Influent Pump Station	1440000	31500	20100	10100	0	19500	124000
Trickling Filter	0	0	0	0	0	0	0
Anaerobic Digestion	929000	43900	20800	7800	0	5870	87900
Primary Clarification	363000	38500	17600	3530	0	861	34000
Secondary Clarifier	0	0	0	0	0	0	0
Drying Beds	235000	47900	18000	2120	0	0	20400
Chlorination	0	0	0	0	0	0	0
Hauling and Land Filling	292000	1670	0	53600	0	0	62000
Effluent	0	0	0	0	0	0	0
Other Costs	9770000	182000	0	0	0	0	798000

Summary of Other Costs for Layout

Description	Value	Units

Other Costs		
Quantities		
Required land	13	acre
Administration labor hours	714	hr/yr
Laboratory labor hours	2810	hr/yr
Costs		
DIRECT COSTS		
Mobilization	346000	$
Site preparation	542000	$
Site electrical	944000	$
Yard piping	639000	$
Instrumentation and control	461000	$
Lab and administration building	951000	$
Total direct construction costs	3880000	$
INDIRECT COSTS		
Cost of land	260000	$
Miscellaneous cost	439000	$
Legal cost	176000	$
Engineering design fee	1320000	$
Inspection cost	176000	$
Contingency	878000	$
Technical	176000	$
Interest during construction	1330000	$
Profit	1140000	$
Total indirect construction cost	5890000	$
Total of other construction cos	9770000	$
LABOR COSTS		
Administration labor cost	36800	$/yr
Laboratory labor cost	145000	$/yr

Influent Wastewater

Preliminary Treatment

Design Output Data

Description	**Value**	**Units**
Preliminary Treatment		
Design Information		
Mechanically Cleaned Bar Screen		
Bar size	0.25	in
Bar spacing	1.5	in
Slope of bars from horizontal	30	degrees
Head loss through screen	0.0206	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	1.54	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	9.25	cuft/s
Average flow	3.86	cuft/s
Minimum flow	1.39	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	4.62	cuft/s
Width of channel	0.771	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.00238	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	10	cuft/d
Costs		
Construction and equipment co	488000	$
Operational labor cost	42100	$/yr
Maintenance labor cost	17300	$/yr
Material and supply cost	12200	$/yr
Chemical cost	0	$/yr
Energy cost	2450	$/yr
Amortization cost	40900	$/yr

Influent Pump Station

Design Output Data

Description	**Value**	**Units**
Pump Station		
Design Information		
Volume of wet well	17700	cuft
Width of wet well	148	ft
Depth of the pumping station	27.3	ft
Length of the pumping station	19.6	ft
Width of the pumping station	177	ft
Minimum depth of water in wet	6.3	ft
Area of pump building	594	sqft
Peak capacity of pumps	8.85	MGD(US)
Firm pumping capacity	8.85	MGD(US)

Total dynamic head - average	44.7	ft
Quantities		
Operation labor required	611	pers-hrs/yr
Maintenance labor required	518	pers-hrs/yr
Electrical energy required	195000	kWh/yr
Volume of earthwork required	445000	cuft
Volume of slab concrete requir	30600	cuft
Volume of wall concrete requir	14700	cuft
Capacity per pump	6150	gpm(US)
Number of constant speed pur	2	
Number of variable speed pur	0	
Diameter of discharge header	17.7	in
Total dynamic head	63.9	ft
Size of selected pump	16	in
Specific speed of pump	4160	
Pump rotating speed	1150	rpm
Motor size required	127	HP
Size of selected motor	150	HP
Width of pump system	3.8	ft
Length of pump system	19.9	ft
Length of the dry well	19.6	ft
Width of the dry well	28.9	ft
Costs		
Construction and equipment co	1440000	$
Earthwork Cost	132000	$
Wall Concrete Cost	353000	$
Slab Concrete Cost	396000	$
Building Cost	65300	$
Installed Pump Equipment C	275000	$
Misc Costs	220000	$
Operational labor cost	31500	$/yr
Maintenance labor cost	20100	$/yr
Material and supply cost	10100	$/yr
Chemical cost	0	$/yr
Energy cost	19500	$/yr
Amortization cost	124000	$/yr

Trickling Filter

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

Anaerobic Digestion

Design Output Data

Description	Value	Units
Anaerobic Digestion		
Design Information		
Percent VSS destroyed	50	%
Solids concentration in digeste	5	%
Detention time	40	d
Digester depth	22.7	ft
Digester diameter	40	ft
Effective digester volume	30600	cuft
Number of digesters per batter	1	
Number of primary digesters p	0	
Number of secondary digesters	0	
Number of batteries	1	
Gas produced	11.5	cuft/min
Heat required	236000	BTU/hr
Digester gas required	9.09	cuft/min
Total natural gas required	0	cuft/yr
Quantities		
Operation labor required	853	pers-hrs/yr
Maintenance labor required	536	pers-hrs/yr
Electrical energy required	58700	kWh/yr
Volume of earthwork required	30400	cuft
Slab thickness	9.72	in
Volume of slab concrete requir	1180	cuft
Wall thickness	18.8	in
Volume of wall concrete requir	5630	cuft
Sidewater depth	22.7	ft
Surface area/floor of 2-story co	315	sqft
Piping size	6	in
Length of total piping system	225	ft
Number of 90 degree elbows	13	
Number of tees	26	
Number of plug valves	19	
Total dry solids treated	1.47	ton(short)/d
Costs		
Construction and equipment co	929000	$
Earthwork Cost	9020	$
Wall Concrete Cost	135000	$
Slab Concrete Cost	15200	$
Building Cost	34700	$
Piping System Cost	123000	$

Floating Cover Cost	292000	$
Gas Recirculation Units Cost	0	$
Heating Units Cost	72500	$
Gas Safety Equipment Cost	105000	$
Installed Pumps Cost	49900	$
Operational labor cost	43900	$/yr
Maintenance labor cost	20800	$/yr
Material and supply cost	7800	$/yr
Chemical cost	0	$/yr
Energy cost	5870	$/yr
Amortization cost	87900	$/yr

Primary Clarification

Design Output Data

Description	Value	Units
Primary Clarification		
Design Information		
Surface area	3130	sqft
Surface area per circular clarifi	1570	sqft
Diameter of each circular clarif	45	ft
Number of clarifiers per battery	2	
Number of batteries	1	
Solids loading rate	1.54	lb/(sqft·d)
Hydraulic retention time	2.02	hr
Weir length	400	ft
Volume of sludge generated	8370	gpd(US)
Quantities		
Operation labor required	509	pers-hrs/yr
Maintenance labor required	278	pers-hrs/yr
Electrical energy required	8330	kWh/yr
Volume of earthwork required	38800	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	3350	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	3060	cuft
Costs		
Construction and equipment co	329000	$
Earthwork Cost	11500	$
Wall Concrete Cost	73700	$
Slab Concrete Cost	43400	$
Installed Equipment Cost	150000	$
Misc Costs	50200	$
Operational labor cost	26200	$/yr
Maintenance labor cost	10800	$/yr
Material and supply cost	3290	$/yr
Chemical cost	0	$/yr
Energy cost	833	$/yr
Amortization cost	30800	$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.00837	MGD(US)
Total pumping capacity	0.00837	MGD(US)
Design capacity per pump	2.91	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.00837	MGD(US)
Quantities		
Operation labor required	238	pers-hrs/yr
Maintenance labor required	178	pers-hrs/yr
Electrical energy required	284	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment co	33600	$
Earthwork Cost	474	$
Pump Building Cost	22000	$
Installed Pump Cost	5960	$
Misc Costs	5120	$
Operational labor cost	12300	$/yr
Maintenance labor cost	6880	$/yr
Material and supply cost	235	$/yr
Chemical cost	0	$/yr
Energy cost	28	$/yr
Amortization cost	3180	$/yr

Secondary Clarifier

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

Drying Beds

Design Output Data

Description	Value	Units
Sludge Drying Beds		
Design Information		

Total surface area required	15900	sqft
Initial depth of sludge	12	in
Final solids	50	%
Bed holding time	28.5	d
Quantities		
Total drying bed surface area	15900	sqft
Number beds	6	
Surface area of each individua	2660	sqft
Length of each bed	133	ft
Volume of earthwork required	78700	cuft
Volume concrete for dividing w	5920	cuft
Volume of R.C. in-place for tru	1200	cuft
Volume of sand	12000	cuft
Volume of gravel	15900	cuft
Clay pipe diameter	6	in
Total length clay pipe	1590	in
Sludge solids produced	0.873	ton(short)/d
Operational labor required	931	pers-hrs/yr
Maintenance labor required	465	pers-hrs/yr
Costs		
Construction and equipment co	235000	$
Earthwork Cost	23300	$
Wall Concrete Cost	99700	$
Slab Concrete Cost	9300	$
Drying Bed Media Cost	44500	$
Drain Pipe System Cost	35100	$
Misc Costs	23300	$
Operational labor cost	47900	$/yr
Maintenance labor cost	18000	$/yr
Material and supply cost	2120	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	20400	$/yr

Chlorination

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

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	2.07	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	2.07	cuyd/d
Maximum anticipated landfill d	30	d
Anticipated sludge storage hei	8	ft
Sludge storage shed area	210	sqft
Width of sludge storage shed s	10.2	ft
Length of sludge storage shed	20.5	ft
Volume of earthwork required	737	cuft
Volume of slab concrete requir	351	cuft
Surface area of canopy roof	210	sqft
Round trip haul distance	20	miles
Round trips per day per truck	1	
Distance traveled per year per	5000	miles
Sludge hauled	1.83	ton(short)/d
Operation labor required	32.4	pers-hrs/yr
LandFilling cost	35200	$/yr
Costs		
Construction and equipment co	292000	$
Earthwork Cost	218	$
Slab Concrete Cost	4550	$
Canopy Roof Cost	4200	$
Vehicle Cost	283000	$
Operational labor cost	1670	$/yr
Maintenance labor cost	0	$/yr
Material and supply cost	53600	$/yr
Chemical cost	0	$/yr
Energy cost	0	$/yr
Amortization cost	62000	$/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