APPENDIX I

WWTF Cost Tables

Table No. 1
Centralized Wastewater Treatment Facility
Preliminary Opinion of Project Cost

Item No.	Description	Unit	Est. Qty.	Cost/Unit	Total Cost
1	**General**				
	Mobilization/Demobilization (5%)	L.S.	1	$ 656,700.00	$657,000
	Bonds and Insurance (8%)	L.S.	1	$ 1,050,720.00	$1,051,000
	General Conditions (10%)	L.S.	1	$ 1,313,400.00	$1,313,000
				General	**$3,021,000**
2	**Primary Treatment**				
	Influent Belt Screen and Screw Compactor	Ea.	1	$ 150,000.00	$150,000
	Bypass Screen Assembly	Ea.	1	$ 1,000.00	$1,000
	Grit Chamber, Pump and Classifier	Ea.	1	$ 120,000.00	$120,000
	Grit Process Piping, valves and appurtenances	L.F.	150	$ 150.00	$22,500
	Installation for Headworks Equipment	L.S.	1	$ 67,500.00	$67,500
	Disposal Bin for Grit and Screenings	Ea.	1	$ 500.00	$500
	Concrete for Headworks Building	C.Y.	163	$ 550.00	$89,800
	Headworks Building	S.F.	2,940	$ 250.00	$735,000
	Plumbing and HVAC	S.F.	2,940	$ 31.00	$91,100
	Pavement for Grit Loading Area	S.Y.	220	$ 25.00	$5,500
				Primary Treatment	**$1,283,000**
3	**Septage Receiving**				
	Septage Rotary Screen	Ea.	1	$ 120,000.00	$120,000
	Septage Storage Tanks	L.S.	1	$ 400,000.00	$400,000
	Al. Cover System for Septage Storage Tanks	S.F.	1,323	$ 50.00	$66,200
	Septage Pumps	Ea.	3	$ 15,000.00	$45,000
	Installation for Headworks Equipment	L.S.	1	$ 41,250.00	$41,250
	Septage Process Piping and Valves	L.F.	100	$ 150.00	$15,000
	Pavement for Septic Unloading Area	S.Y.	220	$ 25.00	$5,500
				Septage Receiving	**$693,000**
4	**Biological Treatment**				
	SBR and Aerobic Sludge Storage Tanks	L.S.	1	$ 1,600,000.00	$1,600,000
	Furnish SBR Equipment Package	L.S.	1	$ 850,000.00	$850,000
	SBR Equipment Installation	L.S.	1	$ 212,500.00	$212,500
	In-Tank Ductile Iron Flanged Piping and Valves	L.F.	250	$ 150.00	$37,500
	Al. Cover System for Aerated Sludge Storage Tanks	S.F.	1,536	$ 50.00	$76,800
				Biological Treatment	**$2,777,000**
5	**Chemical Addition**				
	Magnesium Hydroxide Chem. Feed System	Ea.	1	$ 40,000.00	$40,000
	Methanol Chem. Feed System	Ea.	1	$ 20,000.00	$20,000
	Chem. Feed Piping, Valves and Appurtenances	L.S.	1	$5,000.00	$5,000
				Chemical Addition	**$65,000**
6	**Solids Handling**				
	Submersible Sludge Pumps	Ea.	2	$ 15,000.00	$30,000
	Dewatering Centrifuge	Ea.	1	$ 250,000.00	$250,000

	Sludge Conveyer	Ea.	1	$	50,000.00	$50,000
	Polymer Injection System, Valves and Piping	Ea.	1	$	12,000.00	$12,000
	Installation of Solids Handling Equipment	L.S.	1	$	81,750.00	$81,800
					Solids Handling	**$424,000**
7	**Disinfection**					
	UV Disinfection System	Ea.	2	$	100,000.00	$200,000
	Installation of UV Disinfection System	L.S.	1	$	50,000.00	$50,000
	Process Piping and Valves	L.S.	1	$	10,000.00	$10,000
					Disinfection	**$260,000**
8	**Pumping**					
	Screened Influent Pumping	Ea.	3	$	15,000.00	$45,000
	Effluent Pumping	Ea.	3	$	18,000.00	$54,000
	Scum Pumping	Ea.	2	$	10,000.00	$20,000
	Plant Water System Pumps	Ea.	2	$	21,000.00	$42,000
	Onsite Wastewater Pumps	Ea.	2	$	12,000.00	$24,000
	Installation of Pumping Systems	L.S.	1	$	50,000.00	$50,000
					Pumping	**$235,000**
9	**Odor Control**					
	Packaged Inorganic Media Filter	Ea.	1	$	250,000.00	$250,000
	Installation of Odor Control Systems	L.S.	1	$	62,500.00	$62,500
	FRP Odorous Air Duct	L.S.	1	$	20,000.00	$20,000
	Odor Piping Balancing Gates	L.S.	1	$	7,500.00	$7,500
					Odor Control	**$340,000**
10	**Wastewater Effluent Disposal**					
	Rapid Infiltration Basin Berms	Cu. Yd.	2,000	$	20.00	$40,000
	Basin Excavation	Cu. Yd.	22,222	$	15.00	$333,300
	Rip-rap on Berm Face with Geotextile Stabilization	Cu. Yd.	1,800	$	25.00	$45,000
	Sand Filter Bedding	Cu. Yd.	14,815	$	10.00	$148,100
	Yard Piping for Effluent and Valves	L.F.	2,000	$	100.00	$200,000
					Wastewater Effluent Disposal	**$767,000**
11	**Sitework**					
	Earthwork and Grading	C.Y.	150,000	$	15.00	$2,250,000
	Rock Excavation	C.Y.	1,000	$	150.00	$150,000
	Erosion Control	L.S.	1	$	20,000.00	$20,000
	Dewatering	L.S.	1	$	20,000.00	$20,000
	Process Yard Piping	L.F.	1,000	$	85.00	$85,000
	Plant Wastewater Collection System (pipe and structur	L.F.	500	$	125.00	$62,500
					Sitework	**$2,588,000**
12	**Miscellaneous Work**					
	Equipment Spare Parts, Tools and Maintenance Mat.	L.S.	1		$75,000.00	$75,000
	Fire Extinguishers	Ea.	5	$	50.00	$300
	Emergency Eye Wash Station	Ea.	6	$	500.00	$3,000
	MSDS Notebook Cabinet	Ea.	1	$	500.00	$500
	Smoke Detectors	Ea.	10	$	60.00	$600
	Telephone Service to the WWTF	L.S.	1	$	6,000.00	$6,000
	Alarm Autodialer	Ea.	1	$	5,000.00	$5,000
	Back-Up Power Generator	L.S.	1	$	150,000.00	$150,000

Power Distribution and Lighting	L.S.	1	$ 1,000,000.00	$1,000,000
Control Systems	L.S.	1	$ 800,000.00	$800,000
Control Building	S.F.	6,250	$ 180.00	$1,125,000
Plumbing and HVAC (Control Building)	S.F.	6,250	$ 31.00	$193,800
Laboratory Facilities (equipment, sinks, cabinets, glass	L.S.	1	$ 50,000.00	$50,000
Existing WWTF Building/Structure Demo. and Dispos	S.F.	15,000	$ 10.00	$150,000
Existing Facility Plumbing and Electrical Demolition	L.S.	1	$ 100,000.00	$100,000
Reroute Existing Buried Water Main	L.F.	500	$ 85.00	$42,500
			Miscellaneous Work	**$3,702,000**
			Construction Subtotal	**$16,155,000**
			Engineering, Permitting, Project Development (25%)	$4,039,000
			Construction Contingencies (25%)	$4,039,000
			TOTAL OPINION OF PROJECT COST	**$24,240,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Subtotal amounts have been rounded to the next $1,000.
3- Overall anticipated project cost has been rounded to the next $10,000.
4- Anticipated costs have been developed based on similar recent projects, and equipment manufacturer's cost data.
5- Contractor's OH&P are included in the unit prices.
6- Start-up and Operator Training is included in the listed equipment costs.

Table No. 2
Centralized Wastewater Treatment Facility
Anticipated Operation and Maintenance Costs

Description	Unit	Est. Qty.	Cost/Unit	Annual Cost
Sequencing Batch Reactor (SBR) WWTF				
Labor[1]	Hours	8,320	$70.00	$582,400
Administrative	L.S.	1	$50,000.00	$50,000
Laboratory Costs	L.S.	1	$15,000.00	$15,000
Power Use[2]	kW-Hr	976,257	$0.14	$136,700
LP Gas Heat	Gal.	10,700	$4.00	$42,800
Equipment Maintenance Materials[3]	L.S.	1	$52,300.00	$52,300
Chemicals:				
Methanol	Gal.	7,300	$1.50	$11,000
Magnesium Hydroxide	Gal.	17,520	$2.75	$48,200
Polymer	Lbs.	1,095	$18.00	$19,700
Snow Removal	L.S.	1	$5,000.00	$5,000
Buildings Maintenance	S.F.	9,190	$12.50	$114,900
Sludge and Grit Disposal	Dry Ton	550	$250.00	$137,500
	Total Anticipated Annual O&M Cost			**$1,216,000**

Notes:

1- Labor costs include labor burden.
2- Power consumption has been based on motor horsepower and anticipated operating hours.
3- Equipment maintenance cost is bassed on 2% of the total capitol equipment cost.
4- Subtotal amounts have been rounded to the next $100.
5- Total amount has been rounded to the next $1,000.

Table No. 3
Centralized Wastewater Treatment Facility
Equivalent Uniform Annual Cost Analysis (EUAC)

Sequencing Batch Reactor (SBR) WWTF

Anticipated Project Capital Cost (Present Worth)	$24,240,000	
Equivalent Uniform Annual Cost (20 year life, 4% interest)		$1,784,064
Annual Operation and Maintenance Cost		$1,216,000
Centralized Wastewater EUAC		**$3,000,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Capital cost does not include permitting.
3- Equipment replacement and maintenance costs are included in the O&M value. Large equipment expected to last for a full 20 years
4- End of life equipment replacement cost for large equipment is not included.
5- EUAC has been rounded to the nearest $1,000.

Table No. 4
Decentralized Wastewater Treatment Facility
Treatment Site 163 and Disposal Sites 181, 173, and 172
Preliminary Opinion of Project Cost

Item No.	Description	Unit	Est. Qty.	Cost/Unit	Total Cost
1	**General**				
	Mobilization/Demobilization (5%)	L.S.	1	$ 230,600.00	$230,600
	Bonds and Insurance (8%)	L.S.	1	$ 368,960.00	$369,000
	General Conditions (10%)	L.S.	1	$ 461,200.00	$461,200
				General	**$1,061,000**
2	**Biological Treatment**				
	SBR and Aerated Sludge Storage	L.S.	1	$ 1,210,000.00	$1,210,000
	Furnish SBR Equipment Package	L.S.	1	$ 250,000.00	$250,000
	SBR Equipment Installation	L.S.	1	$ 62,500.00	$62,500
	In-Tank Ductile Iron Flanged Piping	L.F.	100	$ 150.00	$15,000
	Al. Cover System for Sludge Storage Tanks	S.F.	200	$ 50.00	$10,000
				Biological Treatment	**$1,548,000**
3	**Chemical Addition**				
	Magnesium Hydroxide Chem. Feed System	Ea.	1	$ 20,000.00	$20,000
	Methanol Chem. Feed System	Ea.	1	$ 10,000.00	$10,000
	Chem. Feed Piping, Valves and Appurtenances	L.S.	1	$ 5,000.00	$5,000
				Chemical Addition	**$35,000**
4	**Solids Handling**				
	Submersible Sludge Pumps	Ea.	2	$ 10,000.00	$20,000
	Yard Hydrant and Piping for Sludge Off-Site Disposal	L.S.	1	$ 5,000.00	$5,000
				Solids Handling	**$25,000**
5	**Disinfection**				
	UV Disinfection System	Ea.	2	$ 50,000.00	$100,000
	Installation of UV Disinfection System	L.S.	1	$ 25,000.00	$25,000
	Process Piping and Valves	L.S.	1	$ 6,000.00	$6,000
				Disinfection	**$131,000**
6	**Pumping**				
	Influent Pumping	Ea.	3	$ 7,500.00	$22,500
	Effluent Pumping	Ea.	6	$ 30,000.00	$180,000
	Scum Pumping	Ea.	2	$ 5,000.00	$10,000
	Plant Water System Pumps	Ea.	2	$ 10,000.00	$20,000
	Onsite Wastewater Pumps	Ea.	2	$ 12,000.00	$24,000
	Installation of Pumping Systems	L.S.	1	$ 64,125.00	$64,100
				Pumping	**$321,000**
7	**Odor Control**				
	Peroxide Chemical Injection System	Ea.	1	$ 50,000.00	$50,000
				Odor Control	**$50,000**
8	**Wastewater Effluent Disposal**				

	4" Effluent Force Main and Appurtenances	L.F.	15,000	$	40.00	$600,000
	Effluent Absorption Trenches (100' long)	Ea.	165	$	2,500.00	$412,500
					Wastewater Effluent Disposal	**$1,013,000**
9	**Sitework**					
	Earthwork and Grading	L.S.	1	$	10,000.00	$10,000
	Erosion Control	L.S.	1	$	20,000.00	$20,000
	Dewatering	L.S.	1	$	10,000.00	$10,000
	Process Yard Piping	L.F.	1,000	$	85.00	$85,000
	Plant Wastewater Collection System (pipe and structure	L.F.	300	$	125.00	$37,500
					Sitework	**$163,000**
10	**Miscellaneous Work**					
	Equipment Spare Parts, Tools and Maintenance Mat.	L.S.	1		$50,000.00	$50,000
	Fire Extinguishers	Ea.	3	$	50.00	$200
	Emergency Eye Wash Station	Ea.	2	$	500.00	$1,000
	MSDS Notebook Cabinet	Ea.	1	$	500.00	$500
	Smoke Detectors	Ea.	4	$	60.00	$200
	Telephone Service to the WWTF	L.S.	1	$	5,000.00	$5,000
	Alarm Autodialer	Ea.	1	$	4,000.00	$4,000
	Back-Up Power Generator	L.S.	1	$	80,000.00	$80,000
	Power Distribution and Lighting	L.S.	1	$	500,000.00	$400,000
	Control Systems	L.S.	1	$	400,000.00	$400,000
	Control Building	S.F.	1,485	$	200.00	$297,000
	Plumbing and HVAC	S.F.	1,485	$	31.00	$46,000
	Laboratory Facilities (equipment, sinks, cabinets, glass)	L.S.	1	$	25,000.00	$25,000
	Pavement	S.Y.	670	$	25.00	$16,800
					Miscellaneous Work	**$1,326,000**
					Construction Subtotal	**$5,673,000**
					Engineering, Permitting, Project Development (25%)	$1,418,000
					Construction Contingencies (25%)	$1,418,000
					TOTAL OPINION OF PROJECT COST	**$8,510,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Subtotal amounts have been rounded to the next $1,000.
3- Overall anticipated project cost has been rounded to the next $10,000.
4- Anticipated costs have been developed based on similar recent projects, and equipment manufacturer's cost data.
5- Contractor's OH&P are included in the unit prices.
6- Start-up and Operator Training is included in the listed equipment costs.

Table No. 5
Decentralized Wastewater Treatment Facility
Anticipated Operation and Maintenance Costs

Decentralized Wastewater System (Site 163 WWTF)

Labor[1]	Hours	4,160	$70.00	$291,200
Administrative	L.S.	1	$25,000.00	$25,000
Laboratory Costs	L.S.	1	$7,000.00	$7,000
Power Use[2]	kW-Hr	352,169	$0.14	$49,300
LP Gas Heat	Gal.	5,000	$4.00	$20,000
Equipment Maintenance Materials[3]	L.S.	1	$13,200.00	$13,200
Chemicals:				
Methanol	Gal.	3,000	$1.50	$4,500
Magnesium Hydroxide	Gal.	5,475	$2.75	$15,100
Polymer	Lbs.	128	$18.00	$2,300
Snow Removal	L.S.	1	$2,500.00	$2,500
Buildings Maintenance	S.F.	1,485	$12.50	$18,600
Sludge Pumping	L.S.	1	$100,000	$100,000
		Total Anticipated Annual O&M Cost		**$548,700.00**

Notes:

1- Labor costs include labor burden.
2- Power consumption has been based on motor horsepower and anticipated operating hours.
3- Equipment maintenance cost is bassed on 2% of the total capitol equipment cost.
4- Subtotal amounts have been rounded to the next $100.
5- Total amount has been rounded to the next $1,000.

Table No. 6
Decentralized Wastewater Treatment Facility
Equivalent Uniform Annual Cost Analysis (EUAC)

Decentralized Wastewater System (Site 163 WWTF)

Anticipated Project Capital Cost (Present Worth)	$8,510,000	
Equivalent Uniform Annual Cost (20 year life, 4% interest)		$626,336
Annual Operation and Maintenance Cost		$548,700
	Decentralized EUAC	**$1,175,000**

Notes:
1- ENR-CCI for March 2012 is 9267.57.
2- Capital cost does not include permitting.
3- Equipment replacement and maintenance costs are included in the O&M value. Large equipment expected to last for a full 20 years.
4- End of life equipment replacement cost for large equipment is not included.
5- EUAC has been rounded to the nearest $1,000.

Table No. 7
Decentralized Wastewater Treatment Facility
Treatment Site 111 and Disposal Sites 321, 322, and 112
Preliminary Opinion of Project Cost

Item No.	Description	Unit	Est. Qty.	Cost/Unit	Total Cost
1	**General**				
	Mobilization/Demobilization (5%)	L.S.	1	$ 256,950.00	$257,000
	Bonds and Insurance (8%)	L.S.	1	$ 411,120.00	$411,100
	General Conditions (10%)	L.S.	1	$ 513,900.00	$513,900
				General	**$1,182,000**
2	**Biological Treatment**				
	SBR and Aerated Sludge Storage	L.S.	1	$ 1,250,000.00	$1,250,000
	Furnish SBR Equipment Package	L.S.	1	$ 330,000.00	$330,000
	SBR Equipment Installation	L.S.	1	$ 82,500.00	$82,500
	In-Tank Ductile Iron Flanged Piping	L.F.	100	$ 150.00	$15,000
	Al. Cover System for Sludge Storage Tanks	S.F.	200	$ 50.00	$10,000
				Biological Treatment	**$1,688,000**
3	**Chemical Addition**				
	Magnesium Hydroxide Chem. Feed System	Ea.	1	$ 20,000.00	$20,000
	Methanol Chem. Feed System	Ea.	1	$ 10,000.00	$10,000
	Chem. Feed Piping, Valves and Appurtenances	L.S.	1	$ 5,000.00	$5,000
				Chemical Addition	**$35,000**
4	**Solids Handling**				
	Submersible Sludge Pumps	Ea.	2	$ 10,000.00	$20,000
	Yard Hydrant and Piping for Sludge Off-Site Disposal	L.S.	1	$ 5,000.00	$5,000
				Solids Handling	**$25,000**
5	**Disinfection**				
	UV Disinfection System	Ea.	2	$ 50,000.00	$100,000
	Installation of UV Disinfection System	L.S.	1	$ 25,000.00	$25,000
	Process Piping and Valves	L.S.	1	$ 6,000.00	$6,000
				Disinfection	**$131,000**
6	**Pumping**				
	Influent Pumping	Ea.	3	$ 7,500.00	$22,500
	Effluent Pumping	Ea.	6	$ 30,000.00	$180,000
	Scum Pumping	Ea.	2	$ 5,000.00	$10,000
	Plant Water System Pumps	Ea.	2	$ 10,000.00	$20,000
	Onsite Wastewater Pumps	Ea.	2	$ 12,000.00	$24,000
	Installation of Pumping Systems	L.S.	1	$ 64,125.00	$64,100
				Pumping	**$321,000**
7	**Odor Control**				
	Peroxide Chemical Injection System	Ea.	1	$ 50,000.00	$50,000
				Odor Control	**$50,000**
8	**Wastewater Effluent Disposal**				

	4" Effluent Force Main and Appurtenances	L.F.	20,000	$	40.00	$800,000
	Effluent Absorption Trenches (100' long)	Ea.	240	$	2,500.00	$600,000
					Wastewater Effluent Disposal	**$1,400,000**
9	**Sitework**					
	Earthwork and Grading	L.S.	1	$	10,000.00	$10,000
	Erosion Control	L.S.	1	$	20,000.00	$20,000
	Dewatering	L.S.	1	$	10,000.00	$10,000
	Process Yard Piping	L.F.	1,000	$	85.00	$85,000
	Plant Wastewater Collection System (pipe and structures	L.F.	300	$	125.00	$37,500
					Sitework	**$163,000**
10	**Miscellaneous Work**					
	Equipment Spare Parts, Tools and Maintenance Mat.	L.S.	1		$50,000.00	$50,000
	Fire Extinguishers	Ea.	3	$	50.00	$200
	Emergency Eye Wash Station	Ea.	2	$	500.00	$1,000
	MSDS Notebook Cabinet	Ea.	1	$	500.00	$500
	Smoke Detectors	Ea.	4	$	60.00	$200
	Telephone Service to the WWTF	L.S.	1	$	5,000.00	$5,000
	Alarm Autodialer	Ea.	1	$	4,000.00	$4,000
	Back-Up Power Generator	L.S.	1	$	80,000.00	$80,000
	Power Distribution and Lighting	L.S.	1	$	500,000.00	$400,000
	Control Systems	L.S.	1	$	400,000.00	$400,000
	Control Building	S.F.	1,485	$	200.00	$297,000
	Plumbing and HVAC	S.F.	1,485	$	31.00	$46,000
	Laboratory Facilities (equipment, sinks, cabinets, glass)	L.S.	1	$	25,000.00	$25,000
	Pavement	S.Y.	670	$	25.00	$16,800
					Miscellaneous Work	**$1,326,000**
					Construction Subtotal	**$6,321,000**
					Engineering, Permitting, Project Development (25%)	$1,580,000
					Construction Contingencies (25%)	$1,580,000
					TOTAL OPINION OF PROJECT COST	**$9,490,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Subtotal amounts have been rounded to the next $1,000.
3- Overall anticipated project cost has been rounded to the next $10,000.
4- Anticipated costs have been developed based on similar recent projects, and equipment manufacturer's cost data.
5- Contractor's OH&P are included in the unit prices.
6- Start-up and Operator Training is included in the listed equipment costs.

Table No. 8
Decentralized Wastewater Treatment Facility
Anticipated Operation and Maintenance Costs

Decentralized Wastewater System (Site 111 WWTF)

Labor[1]	Hours	4,160	$70.00	$291,200
Administrative	L.S.	1	$25,000.00	$25,000
Laboratory Costs	L.S.	1	$7,000.00	$7,000
Power Use[2]	kW-Hr	352,169	$0.14	$49,300
LP Gas Heat	Gal.	5,000	$4.00	$20,000
Equipment Maintenance Materials[3]	L.S.	1	$15,800.00	$15,800
Chemicals:				
Methanol	Gal.	3,000	$1.50	$4,500
Magnesium Hydroxide	Gal.	7,391	$2.75	$20,300
Polymer	Lbs.	128	$18.00	$2,300
Snow Removal	L.S.	1	$2,500.00	$2,500
Buildings Maintenance	S.F.	1,485	$12.50	$18,600
Sludge Pumping	L.S.	1	$100,000	$100,000
			Total Anticipated Annual O&M Cost	**$556,500.00**

Notes:

1- Labor costs include labor burden.
2- Power consumption has been based on motor horsepower and anticipated operating hours.
3- Equipment maintenance cost is bassed on 2% of the total capitol equipment cost.
4- Subtotal amounts have been rounded to the next $100.
5- Total amount has been rounded to the next $1,000.

Table No. 9
Decentralized Wastewater Treatment Facility
Equivalent Uniform Annual Cost Analysis (EUAC)

Decentralized Wastewater System (Site 111 WWTF)

Anticipated Project Capital Cost (Present Worth)	$9,490,000	
Equivalent Uniform Annual Cost (20 year life, 4% interest)		$698,464
Annual Operation and Maintenance Cost		$556,500
	Decentralized EUAC	**$1,255,000**

Notes:
1- ENR-CCI for March 2012 is 9267.57.
2- Capital cost does not include permitting.
3- Equipment replacement and maintenance costs are included in the O&M value. Large equipment expected to last for a full 20 years.
4- End of life equipment replacement cost for large equipment is not included.
5- EUAC has been rounded to the nearest $1,000.

Table No. 10
Decentralized Wastewater Treatment Facility
Treatment Site 241
Preliminary Opinion of Project Cost

Item No.	Description	Unit	Est. Qty.	Cost/Unit	Total Cost
1	**General**				
	Mobilization/Demobilization (5%)	L.S.	1	$ 358,700.00	$358,700
	Bonds and Insurance (8%)	L.S.	1	$ 573,920.00	$573,900
	General Conditions (10%)	L.S.	1	$ 717,400.00	$717,400
				General	**$1,650,000**
2	**Biological Treatment**				
	SBR and Aerated Sludge Storage	L.S.	1	$ 1,210,000.00	$1,210,000
	Furnish SBR Equipment Package	L.S.	1	$ 250,000.00	$250,000
	SBR Equipment Installation	L.S.	1	$ 62,500.00	$62,500
	In-Tank Ductile Iron Flanged Piping	L.F.	100	$ 150.00	$15,000
	Al. Cover System for Sludge Storage Tanks	S.F.	200	$ 50.00	$10,000
				Biological Treatment	**$1,548,000**
3	**Chemical Addition**				
	Magnesium Hydroxide Chem. Feed System	Ea.	1	$ 20,000.00	$20,000
	Methanol Chem. Feed System	Ea.	1	$ 10,000.00	$10,000
	Chem. Feed Piping, Valves and Appurtenances	L.S.	1	$ 5,000.00	$5,000
				Chemical Addition	**$35,000**
4	**Solids Handling**				
	Submersible Sludge Pumps	Ea.	2	$ 10,000.00	$20,000
	Yard Hydrant and Piping for Sludge Off-Site Disposal	L.S.	1	$ 5,000.00	$5,000
				Solids Handling	**$25,000**
5	**Disinfection**				
	UV Disinfection System	Ea.	2	$ 50,000.00	$100,000
	Installation of UV Disinfection System	L.S.	1	$ 25,000.00	$25,000
	Process Piping and Valves	L.S.	1	$ 6,000.00	$6,000
				Disinfection	**$131,000**
6	**Pumping**				
	Influent Pumping	Ea.	3	$ 7,500.00	$22,500
	Effluent Pumping	Ea.	6	$ 30,000.00	$180,000
	Scum Pumping	Ea.	2	$ 5,000.00	$10,000
	Plant Water System Pumps	Ea.	2	$ 10,000.00	$20,000
	Onsite Wastewater Pumps	Ea.	2	$ 12,000.00	$24,000
	Installation of Pumping Systems	L.S.	1	$ 64,125.00	$64,100
				Pumping	**$321,000**
7	**Odor Control**				
	Peroxide Chemical Injection System	Ea.	1	$ 50,000.00	$50,000
				Odor Control	**$50,000**
8	**Wastewater Effluent Disposal**				

	Rapid Infiltration Basin Berms	Cu. Yd.	600	$	20.00	$12,000
	Basin Excavation	Cu. Yd.	6,667	$	15.00	$100,000
	Rip-rap on Berm Face with Geotextile Stabilization	Cu. Yd.	540	$	25.00	$13,500
	Sand Filter Bedding	Cu. Yd.	4,444	$	10.00	$44,400
	Yard Piping for Effluent and Valves	L.F.	1,000	$	100.00	$100,000
					Wastewater Effluent Disposal	**$270,000**
9	**Sitework**					
	Earthwork and Grading	C.Y.	50,000	$	15.00	$750,000
	Rock Excavation	C.Y.	500	$	150.00	$75,000
	Erosion Control	L.S.	1	$	10,000.00	$10,000
	Dewatering	L.S.	1	$	10,000.00	$10,000
	Process Yard Piping	L.F.	1,000	$	85.00	$85,000
	Plant Wastewater Collection System (pipe and structure	L.F.	300	$	125.00	$37,500
					Sitework	**$968,000**
10	**Miscellaneous Work**					
	Equipment Spare Parts, Tools and Maintenance Mat.	L.S.	1		$50,000.00	$50,000
	Fire Extinguishers	Ea.	3	$	50.00	$200
	Emergency Eye Wash Station	Ea.	2	$	500.00	$1,000
	MSDS Notebook Cabinet	Ea.	1	$	500.00	$500
	Smoke Detectors	Ea.	4	$	60.00	$200
	Telephone Service to the WWTF	L.S.	1	$	5,000.00	$5,000
	Alarm Autodialer	Ea.	1	$	4,000.00	$4,000
	Back-Up Power Generator	L.S.	1	$	80,000.00	$80,000
	Power Distribution and Lighting	L.S.	1	$	500,000.00	$400,000
	Control Systems	L.S.	1	$	400,000.00	$400,000
	Control Building	S.F.	1,485	$	200.00	$297,000
	Plumbing and HVAC	S.F.	1,485	$	31.00	$46,000
	Laboratory Facilities (equipment, sinks, cabinets, glass)	L.S.	1	$	25,000.00	$25,000
	Pavement	S.Y.	670	$	25.00	$16,800
					Miscellaneous Work	**$1,326,000**
11	**Upate Septage Treatment Plant**					
	Update Existing Septage Treatment Plant	L.S.	1	$	2,500,000.00	$2,500,000
					Upate Septage Treatment Plant	**$2,500,000**
					Construction Subtotal	**$8,824,000**
					Engineering, Permitting, Project Development (25%)	$2,206,000
					Construction Contingencies (25%)	$2,206,000
					TOTAL OPINION OF PROJECT COST	**$13,240,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Subtotal amounts have been rounded to the next $1,000.
3- Overall anticipated project cost has been rounded to the next $10,000.
4- Anticipated costs have been developed based on similar recent projects, and equipment manufacturer's cost data.
5- Contractor's OH&P are included in the unit prices.
6- Start-up and Operator Training is included in the listed equipment costs.
7- Existing Septage Plant Upgrade Costs as reported by Wright-Pierce.

Table No. 11
Decentralized Wastewater Treatment Facility
Anticipated Operation and Maintenance Costs

Decentralized Wastewater System (Site 241 WWTF)

Labor[1]	Hours	4,160	$70.00	$291,200
Administrative	L.S.	1	$25,000.00	$25,000
Laboratory Costs	L.S.	1	$7,000.00	$7,000
Power Use[2]	kW-Hr	352,169	$0.14	$49,300
LP Gas Heat	Gal.	5,000	$4.00	$20,000
Equipment Maintenance Materials[3]	L.S.	1	$14,100.00	$14,100
Chemicals:				
Methanol	Gal.	3,000	$1.50	$4,500
Magnesium Hydroxide	Gal.	4,791	$2.75	$13,200
Polymer	Lbs.	128	$18.00	$2,300
Snow Removal	L.S.	1	$2,500.00	$2,500
Buildings Maintenance	S.F.	1,485	$12.50	$18,600
Maintenance at Tri-Town Septic[6]	L.S.	1	$1,000,000	$1,000,000
			Total Anticipated Annual O&M Cost	**$1,447,700**

Notes:

1- Labor costs include labor burden.
2- Power consumption has been based on motor horsepower and anticipated operating hours.
3- Equipment maintenance cost is bassed on 2% of the total capitol equipment cost.
4- Subtotal amounts have been rounded to the next $100.
5- Total amount has been rounded to the next $1,000.
6- Actual Reported FY 2011 Septage Facility O&M Budget.

Table No. 12
Decentralized Wastewater Treatment Facility
Equivalent Uniform Annual Cost Analysis (EUAC)

Decentralized Wastewater System (Site 241 WWTF)

Anticipated Project Capital Cost (Present Worth)	$13,240,000	
Equivalent Uniform Annual Cost (20 year life, 4% interest)		$974,464
Annual Operation and Maintenance Cost		$1,447,700
	Decentralized EUAC	**$2,422,000**

Notes:

1- ENR-CCI for March 2012 is 9267.57.
2- Capital cost does not include permitting.
3- Equipment replacement and maintenance costs are included in the O&M value. Large equipment expected to last for a full 20 years.
4- End of life equipment replacement cost for large equipment is not included.
5- EUAC has been rounded to the nearest $1,000.

Table No. 13
Summary of Sewerage Costs

	Option No. 1 Centralized Sewerage System	Option No. 2 Decentralized Sewerage Systems		
	Site No. 241	Site No. 163	Site No. 111	Site No. 241
Capitol Cost	$24,240,000	$8,510,000	$9,490,000	$13,240,000
O&M Cost	$1,216,000	$548,700	$556,500	$1,447,700
EUAC	$3,000,000	$1,175,000	$1,255,000	$2,422,000
Total EUAC[1]	**$3,000,000**	**$4,852,000**		

1 - Total anticipated annual cost to own and operate for the 20-year design life of the project.
2 - Costs shown in this summary are WWTF and disposal field/basin costs only. Collection systems, pumping, and and septic tanks are not included.

Table No. 14
CENTRALIZED WASTEWATER TREATMENT FACILITY
Basis of Design

Flows and Loadings - Domestic Wastewater

Annual Avg. Flow	0.495 MGD
Annual Avg. I/I (assume 18%)	0.089 MGD
Max. Month Flow	1.044 MGD
Max. 2-day Flow	1.365 MGD
Annual Avg. Influent BOD5	908 lbs/day
Max. Month Influent BOD5	1,916 lbs/day
Max. 2-day Influent BOD5	2,505 lbs/day
Annual Avg. Influent TSS	908 lbs/day
Max. Month Influent TSS	1,916 lbs/day
Max. 2-day Influent TSS	2,505 lbs/day
Annual Avg. Total Kjeldahl Nitrogen	165 lbs/day
Max. Month Total Kjeldahl Nitrogen	348 lbs/day
Max. 2-day Total Kjeldahl Nitrogen	455 lbs/day
Annual Avg. Influent Total P	33 lbs/day
Max. Month Influent Total P	70 lbs/day
Max. 2-day Influent Total P	91 lbs/day

Flows and Loadings - Septage

Annual Avg. Flow	0.031 MGD
Max. Month Flow	0.05 MGD
Max. 2-day Flow	0.075 MGD
Annual Avg. Influent BOD5	905 lbs/day
Max. Month Influent BOD5	1,460 lbs/day
Max. 2-day Influent BOD5	2,189 lbs/day
Annual Avg. Influent TSS	1,293 lbs/day
Max. Month Influent TSS	2,085 lbs/day
Max. 2-day Influent TSS	3,128 lbs/day
Annual Avg. Total Kjeldahl Nitrogen	54 lbs/day
Max. Month Total Kjeldahl Nitrogen	88 lbs/day
Max. 2-day Total Kjeldahl Nitrogen	131 lbs/day
Annual Avg. Influent Total P	8 lbs/day
Max. Month Influent Total P	13 lbs/day
Max. 2-day Influent Total P	19 lbs/day

Flows and Loadings - Combined Wastewater

Annual Avg. Flow	0.615 MGD
Max. Month Flow	1.094 MGD
Max. 2-day Flow	1.44 MGD
Peak Hour	2.23 MGD

Annual Avg. Influent BOD5	1,813 lbs/day
Max. Month Influent BOD5	3,375 lbs/day
Max. 2-day Influent BOD5	4,694 lbs/day
Annual Avg. Influent TSS	2,201 lbs/day
Max. Month Influent TSS	4,001 lbs/day
Max. 2-day Influent TSS	5,632 lbs/day
Annual Avg. Total Kjeldahl Nitrogen	219 lbs/day
Max. Month Total Kjeldahl Nitrogen	436 lbs/day
Max. 2-day Total Kjeldahl Nitrogen	587 lbs/day
Annual Avg. Influent Total P	41 lbs/day
Max. Month Influent Total P	82 lbs/day
Max. 2-day Influent Total P	110 lbs/day

Effluent Limits

Avg. Monthly Flow	0.615 MGD
BOD5	30 mg/L
TSS	30 mg/L
Total Nitrogen as N	3 mg/L
Total Phosphorus as P	- Lbs/yr
escherichia coli Bacteria	200/100 ml

Primary Treatment

Screening:	
Type	Fine, ¼-inch Belt Screen
Number of Units	1 Ea.
Motor Size	5 Hp
Bypass	Manual, 1-inch Bar Rack
Location	Headworks Building
Screenings Compaction:	
Type	Screw Compactor
Number of Units	1 Ea.
Motor Size	5 Hp
Location	Headworks Building
Grit Removal:	
Type	Detritor
Number of Units	1 Ea.
Diameter	8 Ft.
Grit Pump	
Type	Centrifugal Recessed Impeller
Number of Units	2 Ea.
Motor Size	5 Hp
Unit Capacity	200 GPM
Grit Classifier	
Type	Cyclone
Number of Units	1 Ea.
Motor Size	2 Hp
Unit Capacity	200 GPM

Septage Receiving

Septage Screening	
Type	Rotary Screen
Number of Units	1 Ea.
Unit Capacity	350 GPM
Motor Size	5 Hp

Septage Storage Tanks

Number of Units	3	Ea.
Design Receiving Volume	50,000	GPD
Equalization	3	Days
Total Volume	150,000	Gallons
Dimensions:		
Length	21	Ft.
Width	21	Ft.
Max. Sidewater Depth	15	Ft.

Septage Pumps

Type	Double Disk	4"
Number of Units	3	Ea.
Unit Capacity	150	GPM
Motor Size	10	Hp

Biological Treatment

Process Type	Sequencing Batch	Reactors
Number of Tanks	4	Ea.
Dimensions:		
Length	48	Ft.
Width	48	Ft.
Max. Sidewater Depth	21	Ft.
Max. Volume Per Basin	0.362	MG
Avg. Sidewater Depth	20	Ft.
Avg. Volume Per Basin	0.34	MG
Min. Sidewater Depth	16	Ft.
Min. Volume Per Basin	0.272	MG
Min. Freeboard	2	Ft.
Treatment Process Components		
Number of Cycles	4	Per Day/Basin
Cycle Duration	6	Hours/Cycle
Food/Mass Ratio	0.083	lbs. BOD5/lbs. MLSS-Day
MLSS Concentration	4500	mg/l @ Min. Water Depth
Hydraulic Retention Time	1.244	Days @ Avg. Water Depth
Decant Flow Rate	1200	GPM @ Max 2-Day Flow
Solids Production		
Solids Retention Time	12.4	Days
Estimated Net Sludge Yield	0.89	lbs. WAS/lbs. BOD5
Estimated Dry Solids Produced	3000	lbs. WAS/Day
Estimated Solids Flow Rate	130	GPM
Aeration System		
lbs. O2/lbs. BOD5	1.25	
lbs. O2/lbs. TKN	4.6	
Actual Oxygen Required	8728	lbs. / Day
Air Flowrate Per Basin	1216	SCFM
Max. Discharge Pressure	10.7	PSIG
Avg. Power Required	1395	KW-Hrs/Day
Aeration Blowers		
Type	Positive	Displacement
Number of Blowers	5	Ea.
Size	50	Hp
Displacement	1,500	SCFM

Chemical Treatment

Suplemental Alkalinity

Type	Magnesium hydroxide	liquid
Storage Tank		
Number of Units	1	Ea.
Volume	2,000	Gallons

Chemical Usage	48 GPD
Pumps	
Type	chemical metering
Number of Units	2 Ea.
Unit capacity	2 gallons per hour

Suplemental Carbon

Type	Methanol
Storage Tank	
Number of Units	1 Ea.
Volume	1,000 Gallons
Chemical Usage	20 GPD
Pumps	
Type	chemical metering
Number of Units	2 Ea.
Unit capacity	1 gallons per hour

Solids Handling

Type	Submersible Solids Handling
Number of Units	2 Ea.
Unit Capacity	130 GPM

Type	Aeration Tanks
Number of Units	2 Ea.
Dimensions:	
Length	48 Ft.
Width	16 Ft.
Max. Sidewater Depth	19 Ft.
Max. Volume Per Basin	109000 Gallons

Sludge Handling Pumps

Number of Units	2 Ea.
Unit Capacity	110 GPM

Sludge Dewatering

Number of Units	1 Ea.
Back Drive Motor	7.5 Hp
Main Drive Motor	30 Hp
Maximum Hydraulic Throughput	80 GPM
Capacity	800 dry lbs./Hour

Polymer System

Number of Units	1 Ea.
Polymer Type	Organic Liquid Polymer
Polymer Injection System	Mix and Feed System
Polymer Usage	8 Pounds Per Dry Ton of Solids

Disinfection

Type	Ultraviolet Disinfection
Number of Units	2 Ea.
UV Min. Dose (@ end of lamp life)	40 mJ/cm2
Max. Power Consumption	5 kW

Pumping

Screened Influent Pumping

Number of Units	3 Ea.
Unit Capacity	300 GPM
Motor Size	10 Hp

Effluent Pumping	
Number of Units	3 Ea.
Unit Capacity	300 GPM
Motor Size	15 Hp
Scum Pumping	
Type	Submersible Wet Well
Number of Units	2 Ea.
Unit Capacity	30 GPM
Motor Size	2.5 Hp
Plant Water	
Number of Units	2 Ea.
Unit Capacity	150 GPM
Motor Size	20 Hp
On-Site Wastewater Pump Station	
Number of Units	2 Ea.
Unit Capacity	100 GPM
Motor Size	5 Hp
Odor Control System	
Average H2S Concentration	4 PPM
Peak H2S Concentration	10 PPM
Air Flow for Odor Control	7500 SCFM
Wastewater Effluent Disposal	
Type	Rapid Infiltration Basins
Design Application Rate	7.7 GPD/SF @ Max. Month Flow
Total Area Required	142000 SF
Number of Units	10 Ea.
Area Per Unit	20,000 SF
Factor of Safety	1.4

Table No. 15
SITE 163 - DECENTRALIZED WASTEWATER TREATMENT FACILITY
Basis of Design

Site 163 Flows and Loadings - Domestic Wastewater

Annual Avg. Flow	0.190	MGD
Max. Daily Flow	0.33	MGD
Annual Avg. Influent BOD5	348	lbs/day
Max. Month Influent BOD5	605	lbs/day
Annual Avg. Influent TSS	348	lbs/day
Max. Month Influent TSS	605	lbs/day
Annual Avg. Total Kjeldahl Nitrogen	63	lbs/day
Max. Month Total Kjeldahl Nitrogen	110	lbs/day
Annual Avg. Influent Total P	13	lbs/day
Max. Month Influent Total P	22	lbs/day

Effluent Limits

BOD5	30	mg/L
TSS	30	mg/L
Total Nitrogen as N	3	mg/L
Total Phosphorus as P	-	Lbs/yr
Escherichia coli Bacteria	200/100	ml

Biological Treatment

Process Type	Sequencing Batch	Reactors
Number of Tanks	2	Ea.
Dimensions:		
Length	39	Ft.
Width	26	Ft.
Max. Sidewater Depth	21	Ft.
Max. Volume Per Basin	0.159	MG
Avg. Sidewater Depth	18	Ft.
Avg. Volume Per Basin	0.134	MG
Min. Sidewater Depth	13.5	Ft.
Min. Volume Per Basin	0.102	MG
Min. Freeboard	2	Ft.
Treatment Process Components		
Number of Cycles	4	Per Day/Basin
Cycle Duration	6	Hours/Cycle
Food/Mass Ratio	0.062	lbs. BOD5/lbs. MLSS-Day
MLSS Concentration	4500	mg/l @ Min. Water Depth
Hydraulic Retention Time	1.033	Days @ Avg. Water Depth
Decant Flow Rate	767	GPM @ Max 2-Day Flow
Solids Production		
Solids Retention Time	18.3	Days
Estimated Net Sludge Yield	0.736	lbs. WAS/lbs. BOD5
Estimated Dry Solids Produced	350	lbs. WAS/Day
Estimated Solids Flow Rate	50	GPM
Aeration System		

lbs. O2/lbs. BOD5	1.25	
lbs. O2/lbs. TKN	4.6	
Actual Oxygen Required	995	lbs. / Day
Air Flowrate Per Basin	563	SCFM
Max. Discharge Pressure	9.7	PSIG
Avg. Power Required	335	KW-Hrs/Day

Chemical Treatment

Suplemental Alkalinity

Type	sodium bicarbonate	liquid
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Chemical Usage	5 to 30	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	1	gallons per hour

Suplemental Carbon

Type	Methanol	
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Design Dosage	550	lbs/day of COD equivalent
Chemical Usage	60	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	7.5	gallons per hour

Solids Handling

Sludge Handling Pumps

Type	Progressive Cavity	SBR Transfer Pump
Number of Units	2	Ea.
Unit Capacity	130	GPM

Sludge Storage

Type	Aeration	Tanks
Number of Units	2	Ea.
Dimensions:		
Length	10	Ft.
Width	10	Ft.
Max. Sidewater Depth	19	Ft.
Max. Volume Per Basin	14000	Gallons

Sludge Handling Pumps

Type	Progressive Cavity	Centrifuge Feed Pump
Number of Units	2	Ea.
Unit Capacity	110	GPM

Disinfection

Type	Ultraviolet	Disinfection
Number of Units	2	Ea.
UV Min. Dose (@ end of lamp life)	40	mJ/cm2
Max. Power Consumption	3.15	kW

Pumping

Influent Pumping

Type	Wet Well	Submersible
Number of Units	6	Ea.
Unit Capacity	Varies per	Disposal Field

Effluent Pumping

Type	Wet Well	Submersible
Number of Units	6	Ea.
Unit Capacity	Varies per	Disposal Field

Scum Pumping

Type	Wet Well	Submersible
Number of Units	2	Ea.
Unit Capacity	20	GPM

Plant Water

Type	Centrifugal	
Number of Units	2	Ea.
Unit Capacity	50	GPM

On-Site Waste Pump

Type	Wet Well	Submersible
Number of Units	2	Ea.
Unit Capacity	20	GPM

Odor Control System

Type	Peroxide	Injection System
Assumed H2S Concentration	5	mg/l
Volume of Peroxide	10	lb/day
Storage Tank for 50% peroxide		
Number of Units	1	Ea.
Volume	30	Gallons
Chemical Usage	2	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.

Wastewater Effluent Disposal

Type	Soil	Absorption System
Design Application Rate	3	GPD/SF @ Max. Month Flow
Total Area Required	110000	SF
Effective Area per Disposal Trench	700	SF
Number of Disposal Trenches Needed	157	Ea.

Table No. 16
SITE 111 - DECENTRALIZED WASTEWATER TREATMENT FACILITY
Basis of Design

Site 111 Flows and Loadings - Domestic Wastewater

Annual Avg. Flow	0.265	MGD
Max. Daily Flow	0.46	MGD
Annual Avg. Influent BOD5	485	lbs/day
Max. Month Influent BOD5	844	lbs/day
Annual Avg. Influent TSS	485	lbs/day
Max. Month Influent TSS	844	lbs/day
Annual Avg. Total Kjeldahl Nitrogen	88	lbs/day
Max. Month Total Kjeldahl Nitrogen	153	lbs/day
Annual Avg. Influent Total P	18	lbs/day
Max. Month Influent Total P	31	lbs/day

Effluent Limits

BOD5	30	mg/L
TSS	30	mg/L
Total Nitrogen as N	3	mg/L
Total Phosphorus as P	-	Lbs/yr
Escherichia coli Bacteria	200/100	ml

Biological Treatment

Process Type	Sequencing Batch	Reactors
Number of Tanks	2	Ea.
Dimensions:		
Length	39	Ft.
Width	26	Ft.
Max. Sidewater Depth	21	Ft.
Max. Volume Per Basin	0.159	MG
Avg. Sidewater Depth	18	Ft.
Avg. Volume Per Basin	0.134	MG
Min. Sidewater Depth	13.5	Ft.
Min. Volume Per Basin	0.102	MG
Min. Freeboard	2	Ft.
Treatment Process Components		
Number of Cycles	4	Per Day/Basin
Cycle Duration	6	Hours/Cycle
Food/Mass Ratio	0.062	lbs. BOD5/lbs. MLSS-Day
MLSS Concentration	4500	mg/l @ Min. Water Depth
Hydraulic Retention Time	1.033	Days @ Avg. Water Depth
Decant Flow Rate	767	GPM @ Max 2-Day Flow
Solids Production		
Solids Retention Time	18.3	Days
Estimated Net Sludge Yield	0.736	lbs. WAS/lbs. BOD5
Estimated Dry Solids Produced	350	lbs. WAS/Day
Estimated Solids Flow Rate	50	GPM
Aeration System		

lbs. O2/lbs. BOD5	1.25	
lbs. O2/lbs. TKN	4.6	
Actual Oxygen Required	995	lbs. / Day
Air Flowrate Per Basin	563	SCFM
Max. Discharge Pressure	9.7	PSIG
Avg. Power Required	335	KW-Hrs/Day

Chemical Treatment

Suplemental Alkalinity

Type	sodium bicarbonate	liquid
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Chemical Usage	5 to 30	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	1	gallons per hour

Suplemental Carbon

Type	Methanol	
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Design Dosage	550	lbs/day of COD equivalent
Chemical Usage	60	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	7.5	gallons per hour

Solids Handling

Sludge Handling Pumps

Type	Progressive Cavity	SBR Transfer Pump
Number of Units	2	Ea.
Unit Capacity	130	GPM

Sludge Storage

Type	Aeration	Tanks
Number of Units	2	Ea.
Dimensions:		
Length	10	Ft.
Width	10	Ft.
Max. Sidewater Depth	19	Ft.
Max. Volume Per Basin	14000	Gallons

Sludge Handling Pumps

Type	Progressive Cavity	Centrifuge Feed Pump
Number of Units	2	Ea.
Unit Capacity	110	GPM

Disinfection

Type	Ultraviolet	Disinfection
Number of Units	2	Ea.
UV Min. Dose (@ end of lamp life)	40	mJ/cm2
Max. Power Consumption	3.15	kW

Pumping

Influent Pumping

Type	Wet Well	Submersible
Number of Units	6	Ea.
Unit Capacity	Varies per	Disposal Field

Effluent Pumping

Type	Wet Well	Submersible
Number of Units	6	Ea.
Unit Capacity	Varies per	Disposal Field

Scum Pumping

Type	Wet Well	Submersible
Number of Units	2	Ea.
Unit Capacity	20	GPM

Plant Water

Type	Centrifugal	
Number of Units	2	Ea.
Unit Capacity	50	GPM

On-Site Waste Pump

Type	Wet Well	Submersible
Number of Units	2	Ea.
Unit Capacity	20	GPM

Odor Control System

Type	Peroxide	Injection System
Assumed H2S Concentration	5	mg/l
Volume of Peroxide	10	lb/day
Storage Tank for 50% peroxide		
Number of Units	1	Ea.
Volume	30	Gallons
Chemical Usage	2	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.

Wastewater Underground Effluent Disposal

Type	Soil	Absorption System
Design Application Rate	3	GPD/SF @ Max. Month Flow
Total Area Required	153000	SF
Effective Area per Disposal Trench	700	SF
Number of Disposal Trenches Needed	219	Ea.

Table No. 17
SITE 241 - DECENTRALIZED WASTEWATER TREATMENT FACILITY
Basis of Design

Site 241 Flows and Loadings - Domestic Wastewater

Annual Avg. Flow	0.173	MGD
Max. Daily Flow	0.3	MGD
Annual Avg. Influent BOD5	317	lbs/day
Max. Month Influent BOD5	550	lbs/day
Annual Avg. Influent TSS	317	lbs/day
Max. Month Influent TSS	550	lbs/day
Annual Avg. Total Kjeldahl Nitrogen	58	lbs/day
Max. Month Total Kjeldahl Nitrogen	100	lbs/day
Annual Avg. Influent Total P	12	lbs/day
Max. Month Influent Total P	20	lbs/day

Septage Facility Flows and Loadings - Septage

Annual Avg. Flow	0.042	MGD
Max. Month Flow	0.05	MGD
Max. 2-day Flow	0.075	MGD
Annual Avg. Influent BOD5	1,226	lbs/day
Max. Month Influent BOD5	1,460	lbs/day
Max. 2-day Influent BOD5	2,189	lbs/day
Annual Avg. Influent TSS	1,751	lbs/day
Max. Month Influent TSS	2,085	lbs/day
Max. 2-day Influent TSS	3,128	lbs/day
Annual Avg. Total Kjeldahl Nitrogen	74	lbs/day
Max. Month Total Kjeldahl Nitrogen	88	lbs/day
Max. 2-day Total Kjeldahl Nitrogen	131	lbs/day
Annual Avg. Influent Total P	11	lbs/day
Max. Month Influent Total P	13	lbs/day
Max. 2-day Influent Total P	19	lbs/day

** Septage flows are not used in this basis of design because the Tri Town Septage Plant will be Upgraded*

Effluent Limits

BOD5	30	mg/L
TSS	30	mg/L
Total Nitrogen as N	3	mg/L
Total Phosphorus as P	-	Lbs/yr
Escherichia coli Bacteria	200/100	ml

Biological Treatment

Process Type	Sequencing Batch	Reactors
Number of Tanks	2	Ea.

Dimensions:		
Length	39	Ft.
Width	26	Ft.
Max. Sidewater Depth	21	Ft.
Max. Volume Per Basin	0.159	MG
Avg. Sidewater Depth	18	Ft.
Avg. Volume Per Basin	0.134	MG
Min. Sidewater Depth	13.5	Ft.
Min. Volume Per Basin	0.102	MG
Min. Freeboard	2	Ft.
Treatment Process Components		
Number of Cycles	4	Per Day/Basin
Cycle Duration	6	Hours/Cycle
Food/Mass Ratio	0.062	lbs. BOD5/lbs. MLSS-Day
MLSS Concentration	4500	mg/l @ Min. Water Depth
Hydraulic Retention Time	1.033	Days @ Avg. Water Depth
Decant Flow Rate	767	GPM @ Max 2-Day Flow
Solids Production		
Solids Retention Time	18.3	Days
Estimated Net Sludge Yield	0.736	lbs. WAS/lbs. BOD5
Estimated Dry Solids Produced	350	lbs. WAS/Day
Estimated Solids Flow Rate	50	GPM
Aeration System		
lbs. O2/lbs. BOD5	1.25	
lbs. O2/lbs. TKN	4.6	
Actual Oxygen Required	995	lbs. / Day
Air Flowrate Per Basin	563	SCFM
Max. Discharge Pressure	9.7	PSIG
Avg. Power Required	335	KW-Hrs/Day

Chemical Treatment

Suplemental Alkalinity		
Type	sodium bicarbonate	liquid
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Chemical Usage	5 to 30	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	1	gallons per hour

Suplemental Carbon		
Type	Methanol	
Storage Tank		
Number of Units	1	Ea.
Volume	500	Gallons
Design Dosage	550	lbs/day of COD equivalent
Chemical Usage	60	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.
Unit capacity	7.5	gallons per hour

Solids Handling

Sludge Handling Pumps

Type	Submersible Solids Handling
Number of Units	2 Ea.
Unit Capacity	130 GPM

Sludge Storage

Type	Aeration Tanks
Number of Units	2 Ea.
Dimensions:	
Length	10 Ft.
Width	10 Ft.
Max. Sidewater Depth	19 Ft.
Max. Volume Per Basin	14000 Gallons

Sludge Handling Pumps

Type	Progressive Cavity Centrifuge Feed Pump
Number of Units	2 Ea.
Unit Capacity	110 GPM

Disinfection

Type	Ultraviolet Disinfection
Number of Units	2 Ea.
UV Min. Dose (@ end of lamp life)	40 mJ/cm2
Max. Power Consumption	3.15 kW

Pumping

Influent Pumping

Type	Wet Well Submersible
Number of Units	6 Ea.
Unit Capacity	Varies per Disposal Field

Effluent Pumping

Type	Wet Well Submersible
Number of Units	6 Ea.
Unit Capacity	Varies per Disposal Field

Scum Pumping

Type	Wet Well Submersible
Number of Units	2 Ea.
Unit Capacity	20 GPM

Plant Water

Type	Centrifugal
Number of Units	2 Ea.
Unit Capacity	50 GPM

On-Site Waste Pump

Type	Wet Well Submersible
Number of Units	2 Ea.
Unit Capacity	20 GPM

Odor Control System

Type	Peroxide	Injection System
Assumed H2S Concentration	5	mg/l
Volume of Peroxide	10	lb/day
Storage Tank for 50% peroxide		
Number of Units	1	Ea.
Volume	30	Gallons
Chemical Usage	2	GPD
Pumps		
Type	chemical metering	
Number of Units	2	Ea.

Wastewater Effluent Disposal

Type	Rapid	Infiltration Basins
Design Application Rate	7.7	GPD/SF @ Max. Month Flow
Total Area Required	39000	SF
Number of Units	3	Ea.
Area Per Unit	13000	SF