

Appendix G

Aero-Mod Treatment Process Support Documentation

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Appendix G

Aero-Mod Treatment Process Support Documentation

G-1: WWTP Proposal



AEROMOD[®]—Sequox[®] ClarAtor[®] SR Diffuser Access System
Wastewater Process Solutions

Eastern Davie County
North Carolina
1.0 MGD Sequox[®] Plus

Wastewater Treatment Plant Proposal

for

Grey Engineering

December 4, 2013

Aero-Mod, Inc.

7927 U.S. Highway 24
Manhattan, KS 66502 USA
Ph: (785) 537-4995
Fax: (785) 537-0813

Specializing in Custom Designed Wastewater Treatment Facilities



Eastern Davie County, NC

Wastewater Treatment Plant Proposal

For

Grey Engineering

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Equipment and Services Cost Estimate
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Layout Drawings

Phase I, Tankage and Equipment Layout
Phase II, Tankage and Equipment Layout
Phase I & Phase II Tankage and Equipment Layout

December 4, 2013

Aero-Mod, Inc.
EQUIPMENT AND SERVICES COST ESTIMATE

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering

Date: 4-Dec-13
Units: English

EQUIPMENT SUPPLIED

AERATION EQUIPMENT

- 3 Aeration/Digester blower package, 100 hp PD (includes sound enclosure) - 230/460 V, 3 ph
- 4 SEQUOX aeration control butterfly valve, pneumatically-actuated
- 4 SEQUOX aeration control butterfly valve, gear-operated
- 40 Wall mounted aeration assembly, Model WA-PF6 - First Stage Aeration Basins
- 40 Wall mounted aeration assembly, Model WA-PS2 - Second Stage Aeration Basins

BIO-P EQUIPMENT

- 1 Aeration control butterfly valve, pneumatically-actuated
- 6 Wall mounted aeration assembly, Model WAD-PS2
- 2 Bio-P Mixers - 230/460 V, 3 ph

CLARIFIER & RAS EQUIPMENT

- 2 Aero-Mod Split-ClarAstor Clarifier System - 1,440 sf/each

DIGESTION & WAS EQUIPMENT

- 2 WAS pump & controls system
- 2 Aeration control butterfly valve, pneumatically-actuated
- 32 Wall mounted aeration assembly, Model WAD-PS2

ELECTRICAL & CONTROLS EQUIPMENT

- 1 SEQUOX Process Control Panel, Model SQC-400 PLC - 115 V wall outlet
- 1 Dissolved Oxygen Analyzer/Probes and Control System (DO₂Ptimizer)
- 3 VFD blower control panels - 460 V, 3 ph
- 2 Bio-P Mixer control panels - 230/460 V, 3 ph
- 2 Air compressor, 3 HP with 60 gallon tank - 230/460 V, 3 ph
- 1 Air compressor auto-drains - 115 V wall outlet
- 1 Regenerative desiccant dryer - 115 V wall outlet

WALKWAYS & ANCILLARY EQUIPMENT

- 600 Wall mounted aluminum-framed walkway & handrail, LF
- 2 Wall mounted stop plates & frames
- LS Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.

SERVICES

- LS Freight to jobsite
- LS Aero-Mod equipment dry inspection, two (2) days
- LS Aero-Mod equipment wet start-up, two (2) days
- LS Operator training school - 2 days at Aero-Mod facilities in Manhattan, KS

	PHASE I
<u>TOTAL BUDGET EQUIPMENT COST</u>	\$1,250,000
<u>ESTIMATED Aero-Mod EQUIPMENT INSTALLATION</u> <i>(Includes Interior Tank PVC Piping)</i>	\$226,000
<u>ESTIMATED CONCRETE TANK COST</u>	\$1,134,000
Concrete for Tank Walls, cy	1,037
Installed Concrete Cost, \$/cy	\$600
Concrete for Tank Slab, cy	915
Installed Concrete Cost, \$/cy	\$500
Grout for Clarifier Bottom, cy	181
Installed Concrete Cost, \$/cy	\$300
<u>ESTIMATED COST</u>	\$2,610,000

PLEASE NOTE THE FOLLOWING

Cost Per Treated Gallon \$2.61

1. Buildings, site work, and auxiliary equipment are not included within this estimate.
2. No RAS/WAS pump station and associated electrical requirements are needed.
3. Yard piping is not required between each Aero-Mod tank.
4. All associated walkways & handrail for the clarifier and tankage are included in the above estimate.

Aero-Mod, Inc.
ACTIVATED SLUDGE DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Act. Sludge Process: SEQUOX-Plus

Date: 4-Dec-13
Units: English

DESIGN CONDITIONS & PARAMETERS

Population Equivalent = 12,510
@ 0.2 lbs/capita

	Influent	Effluent		
Flow, MGD	1.000		Aeration Basin	
BOD5, mg/l	300	5.0 **	Retention Time, hours	27.0
BOD5, lbs/day	2,502	41.7	Aeration Tank Volume, Mgal	1.125
BODL, mg/l	439		Sludge Age, days	15.0
TSS, mg/l	370	5.0 **	Wastewater Temperature, Deg. C	15
TSS, lbs/day	3,086	41.7	Aerobic Digester	
Ammonia-N, mg/l	40	0.5	Volume, % of Aeration Tank	47.5
Ammonia-N, lbs/day	334	4.2	Maximum MLSS, mg/l	15,000
TN, mg/l	N/A	4.0 *	Maximum MLSS, %	1.50%
TN, lbs/day	N/A	33.4	Digester Temperature, Deg. C	15
Phosphorus, mg/l		0.5 ***	Sludge Thickening Tank	
Phosphorus, lbs/day		4.2	Volume, % of Aeration Tank	0.0
Alkalinity as CaCO3, mg/l Net		-282	Maximum MLSS, mg/l	0
			Maximum MLSS, %	0.00%

* Assumes TKN no more than 1.5 mg/L

** Assumes Filtration

*** Assumes Filtration & Chemical Addition

PROJECTED OPERATING CONDITIONS - AERATION BASIN

Mixed Liquor Suspended Solids, mg/l	3,581
Excess MLSS due to Chem. Phos-P Removal, mg/l	0
Mixed Liquor Volatile Suspended Solids, %	73.7%
F/M Ratio, lbs BOD5/lb MLVSS	0.10
F/M Ratio, lbs BOD5/lb MLSS	0.07
Organic Loading, lbs BOD5/1000 cf of tank/day	16.6
Oxygen Requirements (Carbonaceous), mg/l/hr	8.37
Oxygen Requirements (Nitrogenous), mg/l/hr	6.73
MLSS Wasted per Day, lbs/day	2,198
Mass Solids Yield in Process per Mass Influent BOD5, %	88%
MLSS Wasted per Day, gallons/day @ 0.36%	73,604

PROJECTED OPERATING CONDITIONS - AEROBIC DIGESTER

Volatile Solids Reduction in Digester, %	33.9%
Solids Wasted from Digester, lbs/day	1,649
Mass Solids Yield in Process & Digester per Mass Influent BOD5, %	66%
Volume Wasted from Digester, gallons/day	13,179
Digester Sludge Age, days	41
Air Required for Stabilization, cfm	601
Air Required for Aeration Mixing (@20 scfm/1000 cf), scfm	1,429
Power Required for Mechanical Mixing, HP	N/A

Aero-Mod, Inc.
AERATION DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Diffuser Type Used: Tubular EPDM Fine Bubble

Date: 4-Dec-13
Units: English

AERATION BASIN - FIRST STAGE

Flow, MGD	1.000	TSS, mg/l	370
BOD5, mg/l	300	TSS, lbs/day	3,086
BOD5, lbs/day	2,502	SS, Inorganic, mg/l	56
BOD Rate, K	0.10	Ammonia-N, mg/l	40
BODL, mg/l	439	Ammonia-N, lbs/day	334
Consumption			
Oxygen Required for BOD Reduction [MGD * mg/l * 8.34 * 1.2], lbs O2/day		2,252	75%
Oxygen Required for BOD Reduction, lbs O2/hr		93.8	
Oxygen Req'd for NH3-N Reduction [MGD * mg/l * 4.6 * 8.34], lbs O2/day		1,151	75%
Oxygen Required for Ammonia Reduction, lbs O2/hr		<u>48.0</u>	
Actual Oxygen Requirement (AOR), lbs O2/hr		141.8	
Required Oxygen Uptake Rate, mg/l/hr	15.2		
Where:			
AOR	Actual Oxygen Requirement		141.8
C*st	Actual Value of D.O. Saturation		9.09
C*20	Steady State Value of D.O. Saturation		9.09
Alpha	Assumed for Domestic Wastewater		0.60
Theta	Oxygen Transfer Coefficient		1.024
T	Temperature of Water, Degrees C		20
Tau	Oxygen Saturation Value [C*st/C*s20]		1.000
Beta	Assumed for Domestic Wastewater		0.95
Pb	Assumed Site elevation, FASL/psi	950	14.20
Omega	Omega [Pb/Ps]		0.968
C	Dissolved Oxygen Concentration		2.0
Standard Oxygen Transfer Rate (SOTR), lbs O2/hr			
[(AOR * C*20) / (Alpha * Theta^(T-20) * (Tau * Omega * Beta * C*20 - C))]			
338.7			
Oxygen Density (Amount of Oxygen per ft3 of Air), lbs O2/ft3			
0.0175			
Transfer Efficiency for Selected Diffusers per Foot of Submergence, %			
1.60%			
Diffuser Depth Below Water Surface			
14.5			
Aeration Requirement [SOTR / Oxygen Density * SOTE], ft3 air/hr			
83,519			
Aeration Requirement, scfm			
1,392			
Reclaimed from Denitrification, scfm			
<u>212</u>			
Total Aeration Required in Aeration Basin, scfm			
1,180			

AIR REQUIREMENTS

Aeration Pressure, Inches of water	210		
psi std	7.6		
Assumed air temperature, F	104		
Assumed relative humidity, %	38%		
Minimum Air Required for Mixing, cfm	758		
		Organic	Mixing
		scfm	cfm
Aeration Basin - First Stage - Fine Bubble	1,180	1,329	758
Aeration Basin - Second Stage - Coarse Bubble	636	743	743
Aerobic Digester Tank (alternate aeration)	714	714	714
N/A	0	0	
Bio-P / Fermenter Tank	32	32	32
Clarifier RAS Airlift Pumps & Skimmers	252	252	252
Total Air Required	2,815	3,071	2,500
Total Air Supplied		3,785	

POWER REQUIREMENTS

		Power	
	Unit	Organic	Mixing
Operating Power for Aeration Basin, HP	Blower	97.5	72.2
Operating Power for Digester, HP (Alt. Aeration)	Blower	33.6	33.6
N/A	Blower	0.0	0.0
Operating Power for Bio-P / Selector Tank, HP	Blower	1.5	1.5
Operating Power for Clarifier, HP	Blower	11.9	11.9
Operating Power for Fermenter / Selector Tank, HP	Mixer	3.1	0.0
N/A	N/A	0.0	0.0
Operating Power for Sludge Holding, HP	Mixer	0.0	0.0
Operating Power for Pneumatic System, HP	Air Compr.	0.5	0.5
Total Operating Power, HP		148.0	119.6

Aero-Mod, Inc.
AERATION DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Diffuser Type Used: Stainless Steel Coarse Bubble

Date: 4-Dec-13
Units: English

AERATION BASIN - SECOND STAGE

		<u>Consumption</u>
Oxygen Required for BOD Reduction, lbs O2/day	751	25%
Oxygen Required for BOD Reduction, lbs O2/hr	31.3	
Oxygen Req'd for NH3-N Reduction, lbs O2/day	384	25%
Oxygen Required for Ammonia Reduction, lbs O2/hr	16.0	
Actual Oxygen Requirement (AOR), lbs O2/hr	47.3	
Where:		
AOR	Actual Oxygen Requirement	47.3
C*st	Actual Value of D.O. Saturation	9.08
C*20	Steady State Value of D.O. Saturation	9.08
Alpha	Assumed for Domestic Wastewater	0.75
Theta	Oxygen Transfer Coefficient	1.024
T	Temperature of Water, Degrees C	20
Tau	Oxygen Saturation Value [C*st/C*s20]	1.000
Beta	Assumed for Domestic Wastewater	0.95
Pb	Assumed Site elevation, FASL/psi	950
Omega	Omega [Pb/Ps]	0.966
C	Dissolved Oxygen Concentration	2.0
Standard Oxygen Transfer Rate (SOTR), lbs O2/hr		
[(AOR * C*20) / (Alpha * Theta^(T-20) * (Tau * Omega * Beta * C*20 - C))]		90.4
Oxygen Density (Amount of Oxygen per ft3 of Air), lbs O2/ft3		0.0175
Transfer Efficiency for Selected Diffusers per Foot of Submergence, %		0.75%
Diffuser Depth Below Water Surface		15.0
Aeration Requirement [SOTR / Oxygen Density * SOTE], ft3 air/hr		45,949
Aeration Requirement, scfm		766
Reclaimed from Denitrification (50% assumed), scfm		130
Total Aeration Required in Aeration Basin, scfm		636

AIR REQUIREMENTS

Aeration Pressure, Inches of water	204
psi std	7.4
Assumed air temperature, F	104
Assumed relative humidity, %	36%
Minimum Air Required for Mixing, cfm	743

	<u>scfm</u>	<u>icfm</u>
Aeration Basin - Second Stage	636	743

Aero-Mod, Inc.
CLARIFIER DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Clarifier Type Used: Split-ClarAfor

Date: 4-Dec-13
Units: English

FLOW CONDITIONS

Design Flow, MGD	1.000	
Peaking Factor, hourly	3.50	3.5 MGD
Duration, min	60	
Peaking Factor, sustained	2.50	2.5 MGD
Aeration Tank Volume, Mgal	1.125	
MLSS, mg/l	3,581	
Avg. RAS Recycle Rate, %	100%	

EQUIPMENT SIZING & SELECTION

Number of Clarifiers	2	Surface Area per Clarifier, sf	1,440
Clarifier Unit Model	24480	Total Surface Area, sf	2,880
Clarifier Unit Length, ft	24	Total Weir Length, ft	270
Clarifier Unit Width, ft	20	Tank Wall Depth, ft	18.0
Number of Units per Clarifier	3	Tank Water Depth, ft	16.0

SURFACE OVERFLOW RATE

	<u>Design</u>
Design Flow, gpd/sf	347
Peak Sustained Flow, gpd/sf	868
Max. Flow Allowed Through Clarifier Orifice, gpd/sf	1,000

WEIR OVERFLOW RATE

Design Flow, gpd/lin. ft	3,704
Maximum Flow, gpd/lin. ft	10,667

SOLIDS LOADING RATE

Design Flow, lbs/day/sf	20.7
Maximum Flow, lbs/day/sf	40.2

RETENTION TIME - including RAS

Design Flow, hr	4.1
Maximum Flow, hr	1.4

PEAK FLOW HANDLING - IN-BASIN SURGE STORAGE

Hourly Peak Flow, MGD	3.500	Vol. of In-Basin Surge Storage, gal	41,333
Max. Flow Through Clarifier, MGD	2.880	Capacity of Surge Storage, hr.	1.60
Stored Peak Flow, gpm	431		

PEAK FLOW HANDLING - SIDE LINE SURGE TANK

Hourly Peak Flow, MGD	3.500	Volume of Surge Tank	0
Max. Flow Through Clarifier, MGD	2.880	Capacity of Surge Tank, hr.	0.00
Diverted Peak Flow, gpm	431		
		Hourly peak capacity, hr.	1.60

Aero-Mod, Inc.

TANKAGE DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Tank Construction: Cast-in-Place Concrete

Date: 4-Dec-13
Units: English

BIO-P / SELECTOR TANK Volume Required, gal **125,000**

Number of Tanks	2	Tank Width, ft	17.0
Tank Wall Height, ft	18.0	Tank Length, ft	29.375
Tank Water Depth, ft	16.0	Total Volume, gallons	119,530
Freeboard, ft	2.0	Retention Time (Design + RAS), min.	86

AERATION TANK Volume Required, gal **1,125,000**

Tank Wall Height, ft	18.0	Number of Trains	2
Tank Water Depth, ft	16.0	Number of Stages	2

<i>Stage 1</i>		<i>Stage 2</i>	
Number of Tanks	2	Number of Tanks	2
Tank Length, ft	71.5	Tank Length, ft	132.75
Tank Width, ft	33.1	Tank Width, ft	17.5
Area of Each Tank, sf	2,368	Area of Each Tank, sf	2,323
Total Volume, gallons	566,909	Total Volume, gallons	556,063

Total volume provided, gal **1,122,972**

CLARIFIER TANK

Number of Tanks	2	Tank Width, ft	60.0
Tank Wall Height, ft	18.0	Tank Length, ft	24.0
Tank Water Depth, ft	16.0	Total Volume, gallons	344,678

AEROBIC DIGESTER TANK Volume Required, gal **534,375**

Number of Tanks	2	Tank Width, ft	51.875
Tank Wall Height, ft	18.0	Tank Length, ft	42.0
Tank Water Depth, ft	16.5	Total Volume, gallons	537,803

OVERALL TANKAGE DIMENSIONS

Total Length, ft	178.500	Wall Thickness, in	15.0
Total Width, ft	107.500	Floor Thickness, in	15.0
Total Area, sf	19,189	Total Concrete for Walls, cy	1,037
Total Wall Length, lin. ft	1,245	Total Concrete for Slab, cy	915
		Total Grout for Clarifier, cy	181

Aero-Mod, Inc.
FILTRATION DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE I)
Engineer: Grey Engineering
Filter Model Used: UL 1603CS

Date: 4-Dec-13
Units: English

DESIGN PARAMETERS

Influent Flow Rate, from clarifier	1.000 MGD
Flow Peaking Factor, from clarifier	2.88
Influent TSS, maximum from clarifier	30.0 mg/l
Number of Filtration Systems	2
Number of Filter Modules per Filtration System	3
Number of Stainless Steel Filter Disks per Filter Module	2
Total Number of Filter Disks	12
Filtration Area, Total	264 sf
Filtration Rate at Design Flow Rate	2.63 gpm/sf
Filtration Rate at Peak Flow Rate	7.58 gpm/sf
Effluent TSS, maximum from filter	<5 mg/l
Effluent Turbidity, NTU	2 NTU

FILTER DIMENSIONS

Backwash Pump Rate	100 gpm
Backwash Head at Filter	58.0 psi
Backwash Pump Required	2
Motor Size	7.5 hp
Filter Module Dimensions (Less Piping, Nominal)	
Filter Module Dimensions (Less Piping, Nominal)	
Filter Length	8'-0" ea
Filter Width	5'-5" ea
Filter Height	6'-2" ea

BUDGET PRICE FOR EQUIPMENT INCLUDING STARTUP

\$386,667

Aero-Mod, Inc.
EQUIPMENT AND SERVICES COST ESTIMATE

Project: Eastern Davie County, North Carolina (PHASE II)
Engineer: Grey Engineering

Date: 4-Dec-13
Units: English

EQUIPMENT SUPPLIED

AERATION EQUIPMENT

- 2 Aeration/Digester blower package, 100 hp PD (includes sound enclosure) - 230/460 V, 3 ph
- 4 SEQUOX aeration control butterfly valve, pneumatically-actuated
- 4 SEQUOX aeration control butterfly valve, gear-operated
- 40 Wall mounted aeration assembly, Model WA-PF4 - First Stage Aeration Basins
- 40 Wall mounted aeration assembly, Model WA-PS2 - Second Stage Aeration Basins

BIO-P EQUIPMENT

- 1 Aeration control butterfly valve, pneumatically-actuated
- 6 Wall mounted aeration assembly, Model WAD-PS2
- 2 Bio-P Mixers - 230/460 V, 3 ph

CLARIFIER & RAS EQUIPMENT

- 2 Aero-Mod Split-ClarAstor Clarifier System - 1,440 sf/each

DIGESTION & WAS EQUIPMENT

- 2 WAS pump & controls system
- 2 Aeration control butterfly valve, pneumatically-actuated
- 32 Wall mounted aeration assembly, Model WAD-PS2

ELECTRICAL & CONTROLS EQUIPMENT

- 0 SEQUOX Process Control Panel, Model SQC-400 PLC - 115 V wall outlet
- 1 Dissolved Oxygen Analyzer/Probes and Control System (DO₂Ptimizer)
- 2 VFD blower control panels - 460 V, 3 ph
- 2 Bio-P Mixer control panels - 230/460 V, 3 ph
- 0 Air compressor, 3 HP with 60 gallon tank - 230/460 V, 3 ph
- 0 Air compressor auto-drains - 115 V wall outlet
- 0 Regenerative desiccant dryer - 115 V wall outlet

WALKWAYS & ANCILLARY EQUIPMENT

- 600 Wall mounted aluminum-framed walkway & handrail, LF
- 2 Wall mounted stop plates & frames
- LS Interior tank installation materials - SS brackets, SS bolts, PVC wall inserts, pneumatic tubing, misc.

SERVICES

- LS Freight to jobsite
- LS Aero-Mod equipment dry inspection, two (2) days
- LS Aero-Mod equipment wet start-up, two (2) days
- LS Operator training school - 2 days at Aero-Mod facilities in Manhattan, KS

	<u>PHASE II</u>
<u>TOTAL BUDGET EQUIPMENT COST</u>	\$1,120,000
<u>ESTIMATED Aero-Mod EQUIPMENT INSTALLATION</u> <i>(Includes Interior Tank PVC Piping)</i>	\$209,000
<u>ESTIMATED CONCRETE TANK COST</u>	\$1,045,000
Concrete for Tank Walls, cy 889	
Installed Concrete Cost, \$/cy \$600	
Concrete for Tank Slab, cy 915	
Installed Concrete Cost, \$/cy \$500	
Grout for Clarifier Bottom, cy 181	
Installed Concrete Cost, \$/cy \$300	
<u>ESTIMATED COST</u>	\$2,374,000

PLEASE NOTE THE FOLLOWING

Cost Per Treated Gallon \$2.37

1. Buildings, site work, and auxiliary equipment are not included within this estimate.
2. No RAS/WAS pump station and associated electrical requirements are needed.
3. Yard piping is not required between each Aero-Mod tank.
4. All associated walkways & handrail for the clarifier and tankage are included in the above estimate.

Aero-Mod, Inc.
FILTRATION DESIGN CALCULATIONS

Project: Eastern Davie County, North Carolina (PHASE II)
Engineer: Grey Engineering
Filter Model Used: UL 1603CS

Date: 4-Dec-13
Units: English

DESIGN PARAMETERS

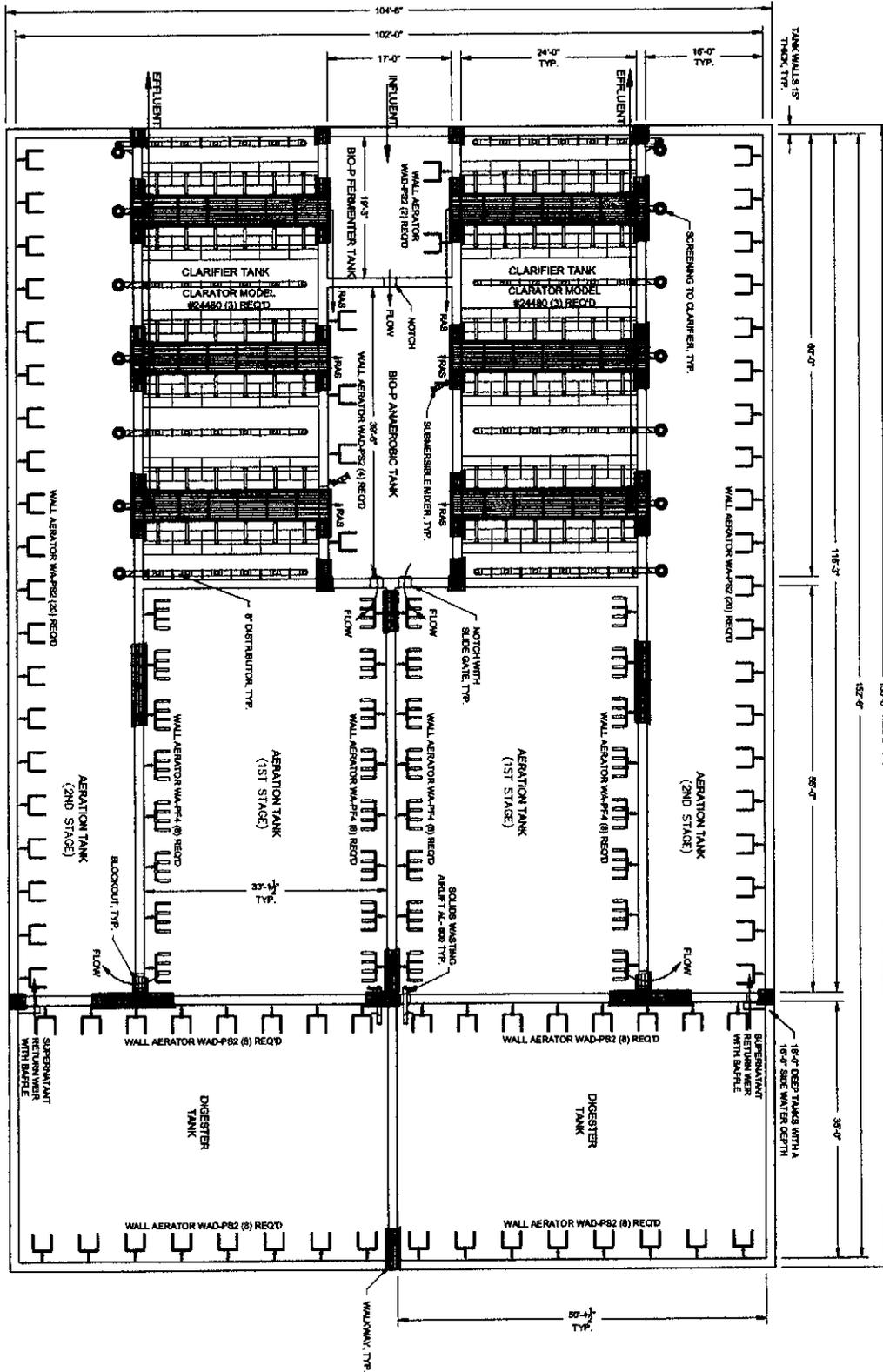
Influent Flow Rate, from clarifier	1.000 MGD
Flow Peaking Factor, from clarifier	2.88
Influent TSS, maximum from clarifier	30.0 mg/l
Number of Filtration Systems	1
Number of Filter Modules per Filtration System	3
Number of Stainless Steel Filter Disks per Filter Module	2
Total Number of Filter Disks	6
Filtration Area, Total	132 sf
Filtration Rate at Design Flow Rate	5.26 gpm/sf
Filtration Rate at Peak Flow Rate	15.15 gpm/sf
Effluent TSS, maximum from filter	<5 mg/l
Effluent Turbidity, NTU	2 NTU

FILTER DIMENSIONS

Backwash Pump Rate	100 gpm
Backwash Head at Filter	58.0 psi
Backwash Pump Required	1
Motor Size	7.5 hp
Filter Module Dimensions (Less Piping, Nominal)	
Filter Module Dimensions (Less Piping, Nominal)	
Filter Length	8'-0" ea
Filter Width	5'-5" ea
Filter Height	6'-2" ea

BUDGET PRICE FOR EQUIPMENT INCLUDING STARTUP

\$225,000



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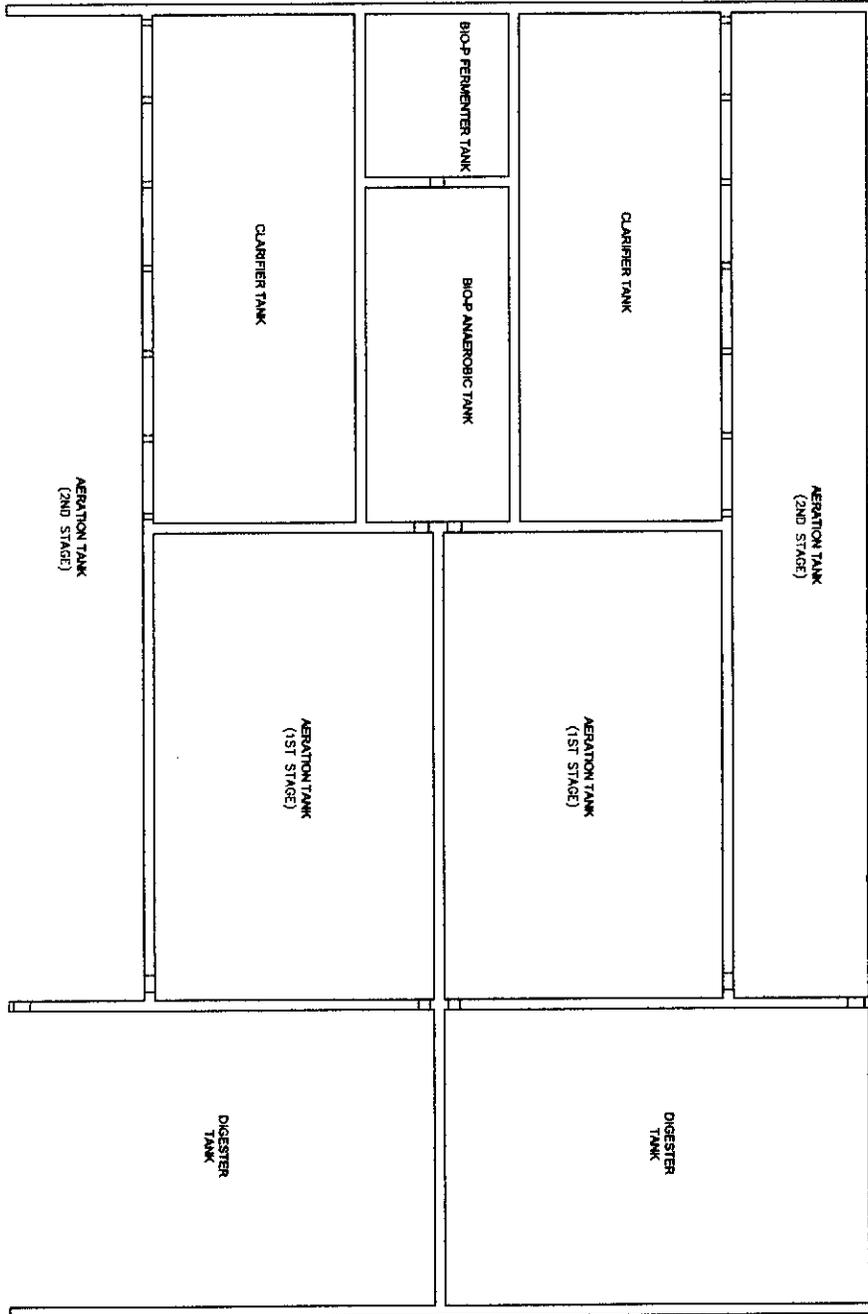
Aero - Mod, Inc.

7827 U.S. Highway 24
 Manhattan, Kansas 66502

PHONE: (785) 537-4995
 FAX: (785) 537-0813

Drawn by: JB CHK by: Scale: NTS Date: 04-25-13

Title: EASTERN DAVIE COUNTY W.W.T.P
 NORTH CAROLINA
 1.0 MGD PHASE 1



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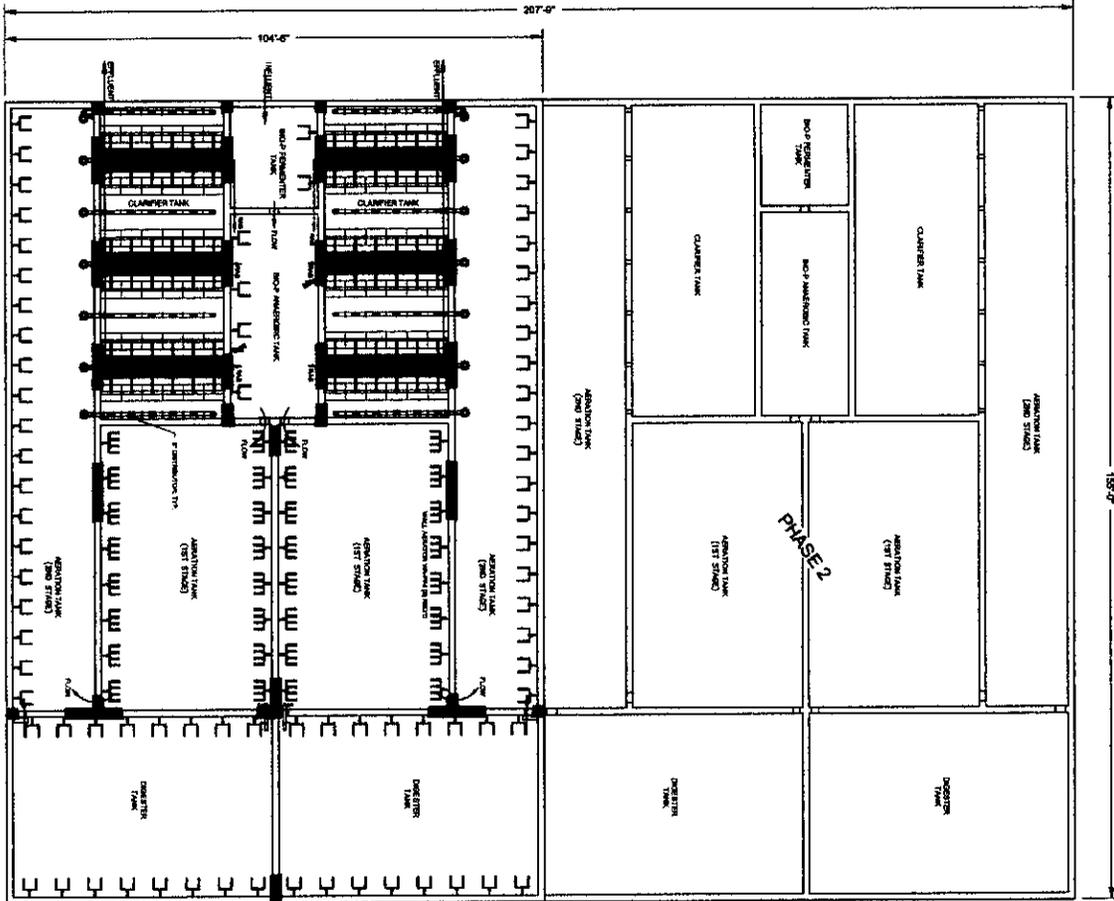
Aero - Mod, Inc.

7927 U.S. Highway 24
 Manhattan, Kansas 66502

PHONE: (785) 537-4995
 FAX: (785) 537-0813

Drawn by: JB Cell by: Scale: NTS Date: 07-24-13

Title:
 EASTERN DAVIE COUNTY W.W.T.P
 NORTH CAROLINA
 1.0 MGD PHASE 2



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Aero - Mod, Inc.

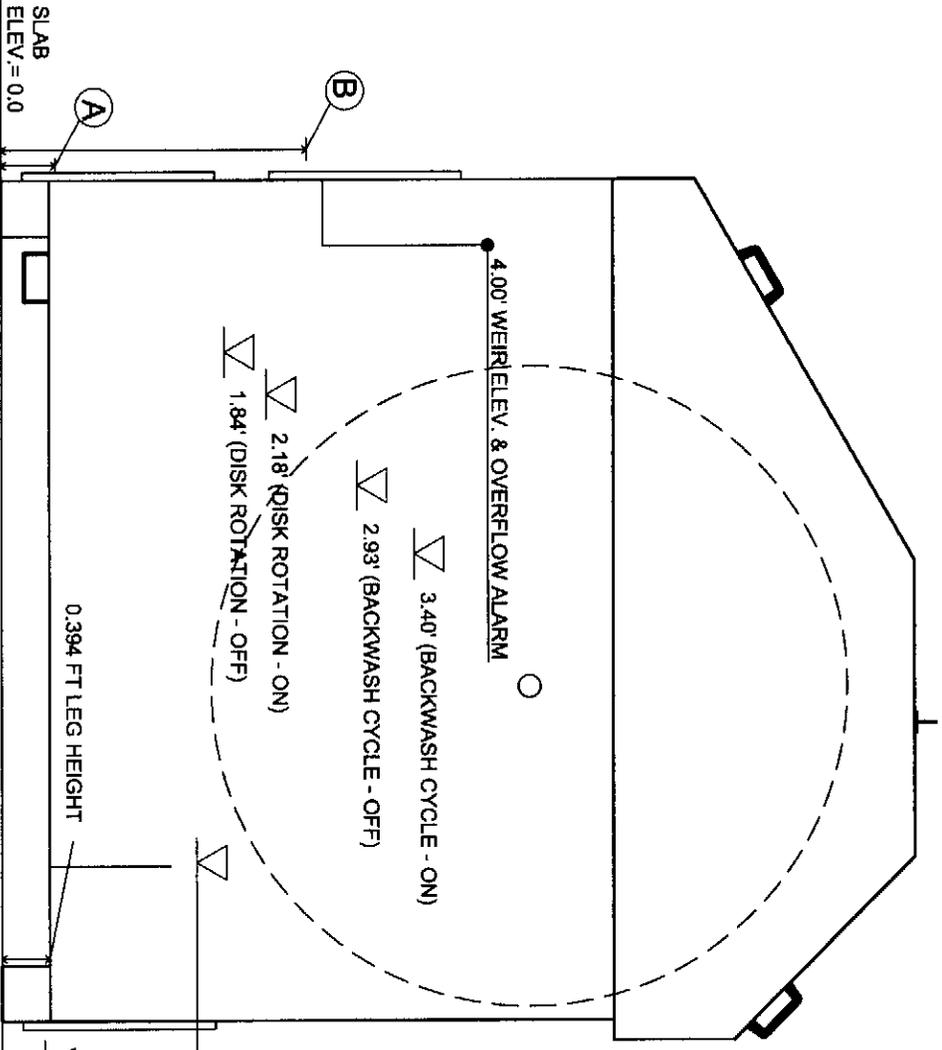
7927 U.S. Highway 24
 Manhattan, Kansas 66502

PHONE: (785) 637-4996
 FAX: (785) 637-0813

Drawn by: JB Check by: Scale: NTS Date: 07-24-13

Title: EASTERN DAVIE COUNTY W.W.T.P.
 NORTH CAROLINA
 1.0 MGD PHASE 2

NOTE: ALL ELEVATIONS ARE MEASURED FROM SLAB



INVERT DIMENSIONS

FILTER MODEL	INFLUENT A (ft)	OVERFLOW B (ft)
1601CS	0.44	2.47
1602CS	0.43	2.48
1603CS	0.45	2.52
1604CS	0.45	2.51
1605CS	0.43	2.50
1606CS	0.45	2.40
1608CS	0.45	2.40
1609CS	0.45	2.50
1610CS	0.45	2.50
1612CS	0.45	2.50

1.60' (CRESTING) / MAXIMUM PEAK TAILWATER

PREFERRED PEAK TAILWATER ELEVATION = 0.35'

SLAB ELEV. = 0.0

NOVA WATER TECHNOLOGIES
 15000 W. 15th Ave., Suite 100
 Denver, CO 80202
 (303) 751-1100
 www.novawater.com

NOVA # T.B.D.
 DATE: 3/25/13
 DIMENSIONS: SAE
 PROJECT ENGINEER: K.G. & B.L.

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