T·O ENGINEERS

Memorandum

To: City of Cascade Idaho
CC: Paul Scoresby
From: T-O Engineers
Date: November 15, 2019
Re: City of Cascade, ID lagoon system upgrade

This memo is intended to serve as documentation of the design basis for determining upgrade requirements for the City of Cascade (City), Idaho wastewater treatment facility in preparation for the the Cascade River Ranch development.

1.0 Background

The City is planning a new development to the southeast of the town. This new development will consist of 145 single family homes, 11 cottage homes, 46 townhomes, 47 fourplex lots, and four apartment complexes of 16 units each. Twelve (12) commercial lots will also be added near the highway. Though many of the lots will be summer or weekend homes, this design basis will assume that at times, all units will be occupied similtaneously. In addition, approximately 50 existing empty lots are included in the design basis in anticipation of their fill in, which have been distributed between the development phases at 10 EDUs per development phase.

The City of Cascade treatment system consists of a series of three lagoons in series. To add capacity to this system, an increase in the aeration system is proposed. A Pharmer Engineering model of the lagoon system exists from 2007, which the current design is based on. In order to update the model to account for the planned development, the flow and constituent loads from the 2007 model will be added to the estimated flow and constituent loadings for the development. The size of the lagoons will not be changed. The population of Cascade has not changed appreciably since 2007. HRT, aeration requirements, and effluent concentrations will be generated from the model.

In addition, a DynaSand filter and UV disinfection system are proposed to replace the existing rapid infiltration (RI) beds. The City currently operates four (4) RI beds in parallel. These beds have historically not performed to expectations, however in the last several months have been made to operate sufficiently. It is the City's contention that the beds will provide total suspended

solids (TSS) removal from the lagoon effluent and will provide sufficient disinfection to meet the permit requirement. The Idaho Department of Environmental Quality (IDEQ) has asked the City to construct groundwater monitoring wells to prove this claim. These wells are currently under construction. If the wells prove the City's ability to meet their permit with the existing RI beds, the ability of the RI beds to perform under future increased loading is still uncertain given the short period during which the beds have been operational. The beds currently are loaded over a two day period, infiltration occurs in a few days, and bed regeneration is allowed to occur without lagoon discharge for approxiately 3 weeks. In 1986, JUB Engineers designed the RI beds to operate with a 13.2 inch/day application rate.

2.0 Model Development

The lagoon system is comprised of three lagoons in series. The first lagoon is 10.65 MG, the second is 6.05 MG, and the third is 6.66 MG.

The model from 2007 has been modified to reflect an increase in the number of residential properties. The existing flow and contaminant loadings along with the phased increases in flow and loading are summarized in Tables 1 & 2.

From a Schiess and Associates 2016 PER, the maximum month flow to the treatment facility is 0.49 MGD. This value is influenced by large spikes in flow which occur during the spring snowmelt. The City has made progress in combating this inflow. As such, the highest 10% of flowrates from the original dataset has been filtered out to calculate a new maximum month flow of 0.26 MGD. Assuming this flowrate as a starting point, the total lagoon storage after addition of the full Cascade River Ranch development is 51 days. To be conservative, the River Ranch Development will be assumed to be fully occupied during this duration.

A starting point of 220 mg/L for BOD and TSS is assumed, with additional BOD and TSS assigned at a rate of 0.20 lbs/capita/day. This information, along with model outputs, are summarized in Table 2. Commercial loading is estimated at 5 EDUs per commercial lot as a baseline flow, however commercial development will need to be assessed on a case-by-case basis. A single commercial tenet such as a brewery could overload BOD to the lagoons.

The third lagoon cell is estimated to produce 50% additional TSS removal through settling. This is a conservative estimate, however periodic short circulating, pond turnover, or algal blooms may reduce the effluent quality, necessitating secondary filtration via the RI beds or a DynaSand filter.

Table 1: Phased Flowrate Summary

	Lots	EDUs/lot	Total People	Per Capita Usage gpd	Usage gpd
Phase 1					
Commercial	12	5	210	120	25,200
	Units	**Persons/Unit**	**Total People**	**Per Capita Usage gpcd**	**Usage gpd**
Single Family	57	4	228	120	27,360
Multifamily	175	2	350	120	42,000
Empty Lot Fill-In	10	4	40	120	4800
Subtotal	**232**		**618**		**99,360**
Phase 2					
Single Family	49	4	196	120	23,520
Multifamily	28	2	56	120	6,720
Empty Lot Fill-In	10	4	40	120	4,800
Subtotal	**77**		**292**		**35,040**
Phase 3					
Single Family	37	4	148	120	17,760
Multifamily	0	2	0	120	0
Empty Lot Fill-In	10	4	40	120	4,800
Subtotal	**37**		**188**		**22,560**
Phase 4					
Single Family	44	4	176	120	21,120
Multifamily	0	2	0	120	0
Empty Lot Fill-In	10	4	40	120	4,800
Subtotal	**44**		**216**		**25,920**
Phase 5					
Single Family	28	4	112	120	13,440
Multifamily	0	2	0	120	0
Empty Lot Fill-In	10	4	40	120	4,800
Subtotal	**28**		**152**		**18,240**
Grand Total	**418**		**1466**		**201,120**
Total Flows					
Pre-Development			**1004**		**259,000**
After Phase 1			**1622**		**358,360**
After Phase 2			**1914**		**393,400**
After Phase 3			**2102**		**415,960**
After Phase 4			**2318**		**441,880**
After Phase 5			**2470**		**460,120**

Table 2: Lagoon Loading Summary

Per Capita BOD Load	0.20	lbs/capita/day
Per Capita TSS Load	0.20	lbs/capita/day
Per Capita NH3 Load	0.017	lbs/capita/day
Per Capita TP Load	0.0048	lbs/capita/day

		Lagoon Influent		Lagoon Effluent	
		mg/L	lbs/day	mg/L	lbs/day
Pre-Development					
	BOD	220	475	11.6	25
	TSS	220	475	19	41
	NH_3	35	75	18	38
	TP	6.9	15	---	---
After Phase 1					
	BOD	200	599	13	40
	TSS	200	599	21	62
	NH_3	29	86	14	42.4
	TP	6.0	18	---	---
After Phase 2					
	BOD	200	657	14	47
	TSS	200	657	22	72
	NH_3	28	90	17	57
	TP	5.9	19	---	---
After Phase 3					
	BOD	200	695	15	51
	TSS	200	695	23	79
	NH_3	27	94	16	56
	TP	5.8	20	---	---
After Phase 4					
	BOD	200	738	15	57
	TSS	200	738	24	87
	NH_3	26	97	15	54
	TP	5.8	21	---	---
After Phase 5					
	BOD	200	769	16	61
	TSS	200	769	24	93
	NH_3	26	100	14	55
	TP	5.7	22	---	---

*Model did not calculate TP effluent concentration.

3.0 Model Outputs

Whereas in 2007, the lagoon model predicted an oxygen requirement of 784 lbs/day, the model updated for 2019 predicts an oxygen requirement of 1,990 lbs/day at full project buildout. During winter operation, the lagoon system is predicted to produce 61 lbs/day of BOD at 16 mg/L and 93 lbs/day of TSS at 24 mg/L. This operation meets the NPDES permit operating requirement for BOD and for TSS (both are 180 lbs/day at 30 mg/L average monthly limit). E. coli is also included in the NPDES permit, but is not included in the modeling. The NPDES permit requirements are summarized in Table 3.

Table 3: NPDES permit requirements

	Average Monthly Limit	Average Weekly Limit	Instantaneous Maximum Limit
BOD	30 mg/L	45 mg/L	---
	180 lbs/day	270 lbs/day	---
TSS	30 mg/L	45 mg/L	---
	180 lbs/day	270 lbs/day	---
E. Coli Bacteria	126/100 mL	---	406/100 mL

Thus increasing the system aeration will produce the desired effluent quality for BOD and TSS (see Table 2). A PFD of the proposed treatment is provided in Attachment 1. A breakdown of the aeration requirements for the phased approach is provided in Table 4. See Attachment 4 for product literature and pricing of the proposed surface aspirators based on full project buildout. Note that the aeration requirements have increased some since the quote was received. This increase is reflected in the cost estimate, but not the attached literature.

Table 4: Lagoon Aeration Requirements

Oxygen Requirements (AOTR), lbs/day	Lagoon Cell 1	Lagoon Cell 2	Lagoon Cell 3
Phase 1	740	316	156
Phase 2	997	400	188
Phase 3	1,058	470	229
Phase 4	1,110	499	246
Phase 5	1,207	523	261
Number of Aspirators Required			
Phase 1	8	3	1
Phase 2	9	4	2
Phase 3	9	4	2
Phase 4	10	4	2
Phase 5	11	5	2

Twelve aspirators will need to be purchased for phase 1 developmet. Three additional aspirators will need to be purchased for phase 2, and 2 additional aspirators will be purchased or the final

phase. At the 1986 design application rate of 13.2 inches per day, the RI beds should be able to operate even after phase 5 development. Whether or not that application rate is still valid will have to be seen. The RI beds can be reevaluated after Phase 1 completion. At this point more data will be available. The additional utility hookups will also increase the City's abiltiy to finance these system improvements before the implimentation of additional project phases. It is recommended the City develop an updated facility plan corresponding to the completion of the groundwater monitoring with DEQ. This facility plan will include the current monitoring data to determine RI bed effectiveness and what alternative scenerio listed below will be needed.

4.0 Alteratives Going Forward

Three scenerios present themselves going forward. Baseline to each scenerio is the installation of appropriate aeration improvements to the lagoon system. First the existing RI beds prove to provide adequate TSS removal and disinfection. In this instance no capital improvements are required apart from lagoon aeration upgrades.

Next, in the first alternative scenerio, the RI beds prove to provide adequate TSS removal at increased flow loading, but do not provide disinfection. In this instance, UV disinfection will be provided between the lagoons and the RI beds. This alternative presents the possibility that potentially turbid lagoon effluent would render the UV disinfection inadequate, placing the City in violation of their discharge permit. It should be noted that the City is currently undertaking a process to verify with DEQ that the RI beds provide disinfection. If this effort fails, the City will need to add the UV disinfection even without new inflow from the proposed development.

In a second alternative scenerio, the RI beds will be found not to provide adequate TSS removal at increased flows. In this case, the beds will be taken off-line and a DynaSand filter will be installed followed by UV disinfection. This alternative incurrs the highest capital cost, but will produce the most constistently high quality effluent and will save the City from maintenance associated with RI bed operation. A cost estimate has been included for this alternative as Attachment 2.

5.0 References

Metcalf and Eddy. (2014). *Wastewater Engineering, Treatment and Resource Recovery*. McGraw Hill, New York.

JUB Engineers. (1986). *City of Cascade Facility Plan Update*.

Schiess & Associates. (2017). *City of Cascade Preliminary Engineering Report for Aeration and Screen Improvements*.

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6.0 Attachments

1.0 Process Flow Diagram
2.0 Opinion of Probable Cost
3.0 DynaSand Quote and Literature
4.0 Surface Aspirators Quote and Literature

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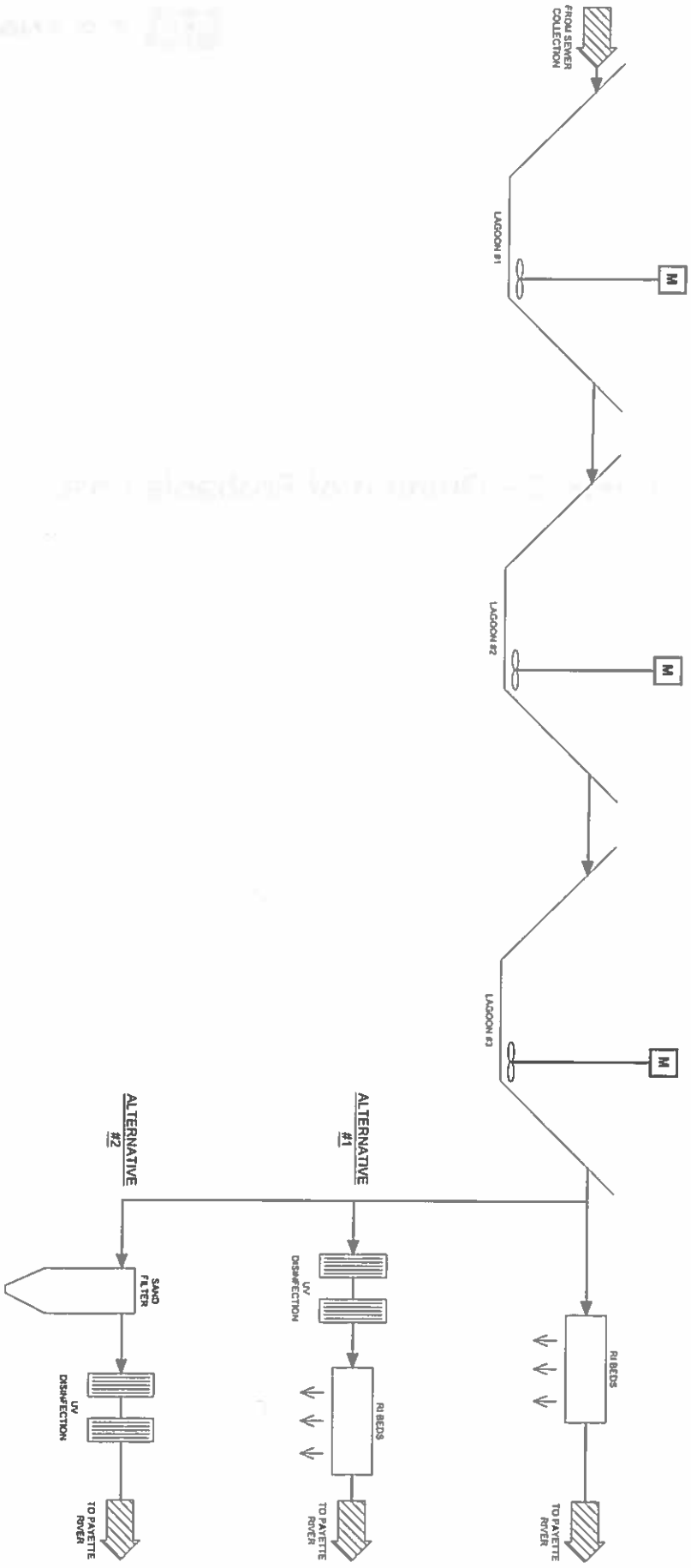
Attachment 1 – Process Flow Diagram



CASCADE RIVER RANCH SUB PHASE I
PROCESS FLOW DIAGRAM

T-O ENGINEERS
CONSULTING ENGINEERS, SURVEYORS & PLANNERS
2471 S. TITANIUM PLACE
MERIDIAN, IDAHO 83642
PHONE (208) 323-2288 WWW.TO-ENGINEERS.COM

SHEET: G0.1

ISSUE FOR CONSTRUCTION

T-O ENGINEERS

Attachment 2 – Opinion of Probable Cost

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade Phase 1

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MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 1							
Lagoon Aspirators							
1.	Surface Aspirating Aerator	12	ea	$8,455.00	20%	$ 121,752.00	
2.	Starter Panel	12	ea	$2,585.00	20%	$ 37,224.00	
	SUBTOTAL					$ 158,976	
Other							
1.	Bring Power to Lagoons	1	ls	$100,000.00	0%	$ 100,000.00	
A	SUBTOTAL					$ 258,976	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 5,179.52	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 25,898	
E	*MECHANICAL*	(% of A)				$ 38,846	
G	SUBTOTAL					$ 328,900	
H	*ALLOWANCE*	(% of G)				$ 16,444.98	
I	*CONTINGENCY*	(% of G)				$ 32,889.95	
J	*CONTR. PROFIT*	(% of G)				$ 32,889.95	
K	SUBTOTAL					$ 411,124	
L	*ENGINEERING DESIGN*	(% of K)				$ 61,669	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					$ 472,793	
	TOTAL ESTIMATED COST					$ 473,000	

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade, Phase 2

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MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 2							
DynaSand Filter							
1.	DynaSand Filter	1	ea	$225,000	20%	$ 270,000.00	
2.	Filter Building	1	ea	$100,000	20%	$ 120,000.00	
3.	Piping, valving, and instrumentation	1	ls	$50,000	20%	$ 60,000.00	
	SUBTOTAL					**$ 450,000**	
UV System							
1.	**UV**						
	UV Disinfectant System	1	ls	$175,000.00	20%	**$ 210,000.00**	
Filter and UV Building							
1.		900	sf	$125.00	0%	**$ 112,500.00**	30'x30' building, 35" tall
Lagoon Aspirators							
1.	Surface Aspirating Aerator	3	ea	$8,455.00	20%	$ 30,438.00	
2.	Starter Panel	3	ea	$2,585.00	20%	$ 9,306.00	
	SUBTOTAL					**$ 39,744.00**	
A	**SUBTOTAL**					**$ 812,244**	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 16,244.88	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 81,224	
E	*MECHANICAL*	(% of A)				$ 121,837	
G	**SUBTOTAL**					**$ 1,031,550**	
H	*ALLOWANCE*	(% of G)				$ 51,577.49	
I	*CONTINGENCY*	(% of G)				$ 103,154.99	
J	*CONTR. PROFIT*	(% of G)				$ 103,154.99	
K	**SUBTOTAL**					**$ 1,289,437**	
L	*ENGINEERING DESIGN*	(% of K)				$ 193,416	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					**$ 1,482,853**	
	TOTAL ESTIMATED COST					**$ 1,483,000**	

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade Phase 4

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MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 1							
Lagoon Aspirators							
1.	Surface Aspirating Aerator	1	ea	$8,455.00	20%	$ 10,146.00	
2.	Starter Panel	1	ea	$2,585.00	20%	$ 3,102.00	
	SUBTOTAL					**$ 13,248**	
A	**SUBTOTAL**					$ 13,248	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 264.96	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 1,325	
E	*MECHANICAL*	(% of A)				$ 1,987	
G	**SUBTOTAL**					**$ 16,825**	
H	*ALLOWANCE*	(% of G)				$ 841.25	
I	*CONTINGENCY*	(% of G)				$ 1,682.50	
J	*CONTR. PROFIT*	(% of G)				$ 1,682.50	
K	**SUBTOTAL**					**$ 21,031**	
L	*ENGINEERING DESIGN*	(% of K)				$ 3,155	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					**$ 24,186**	
	TOTAL ESTIMATED COST					**$ 25,000**	

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade Phase 5

T-O ENGINEERS

MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 1							
Lagoon Aspirators							
1.	Surface Aspirating Aerator	2	ea	$8,455.00	20%	$ 20,292.00	
2.	Starter Panel	2	ea	$2,585.00	20%	$ 6,204.00	
	SUBTOTAL					$ 26,496	
A	**SUBTOTAL**					$ 26,496	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 529.92	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 2,650	
E	*MECHANICAL*	(% of A)				$ 3,974	
G	**SUBTOTAL**					$ 33,650	
H	*ALLOWANCE*	(% of G)				$ 1,682.50	
I	*CONTINGENCY*	(% of G)				$ 3,364.99	
J	*CONTR. PROFIT*	(% of G)				$ 3,364.99	
K	**SUBTOTAL**					$ 42,062	
L	*ENGINEERING DESIGN*	(% of K)				$ 6,309	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					$ 48,372	
	TOTAL ESTIMATED COST					$ 49,000	

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Attachment 3 – DynaSand Quote and Literature

1401 West Cypress Creek Road
Fort Lauderdale FL 33309-1969

Phone 954.974.6610
Fax 954.974.1809

To: Jon Duerschner
Company: TO Engineers
Tel.: 208-762-3644
E-mail: Jduerschner@to-engineers.com
cc: Brian Frewerd (PM), Ron Maiorana (RSM), Scott Forsling (Rep)
Subject: Parkson DynaSand® Filtration System, Preliminary Design Proposal for Cascade, ID
Application: TSS Removal

Dear Mr. Duerschner,

Thank you for your interest in Parkson's DynaSand® Filtration System. Based upon the data provided for this project, we developed the DynaSand design described in this proposal. We believe that this DynaSand design provides an excellent solution for this application.

We look forward to working with you on this project. Should you have any questions or need clarifications, please do not hesitate to contact me.

Sincerely,

PARKSON CORPORATION

An Axel Johnson, Inc. Company

Rob Troupe

Sr. Applications Eng

rtroupe@parkson.com

954-917-1819

Cascade, ID

Preliminary Design Proposal

September 4, 2019

Table of Contents

1. Design Basis

1.1. Influent and Effluent Information

The proposed system design is based on wastewater influent with the following characteristics:

Table 1.1 – Influent Design Criteria

INFLUENT PARAMETER	UNITS	QUALITY*
Design	GPM	353
Peak TSS	mg/l	45
Site Elevation	ft	4,760
Water Temperature	Deg C	25
pH	-	7.0

**- All values are assumed to be monthly average except where noted.*

Based on the specified influent water quality, Parkson anticipates that the proposed DynaSand system will provide the following effluent quality:

Table 1.2 - Effluent Water Quality

EFFLUENT PARAMETER	UNITS	QUALITY*
Total Suspended Solids (TSS)	mg/l	30

** - All effluent limits may require chemical addition (by others)*

2. DynaSand System Description

The DynaSand filter is an upflow, deep bed, granular media filter with continuous or intermittent backwash. The filter media is cleaned by a simple internal washing system that does not require backwash pumps or storage tanks. The DynaSand filter's deep media bed allows it to handle high levels of suspended solids thereby eliminating the need for pre-sedimentation steps in some applications.

As depicted in the Figure 1, treatment begins when influent feed water enters at the top of the filter and flows downward through an annular space between the feed pipe and airlift housing. The feed is then

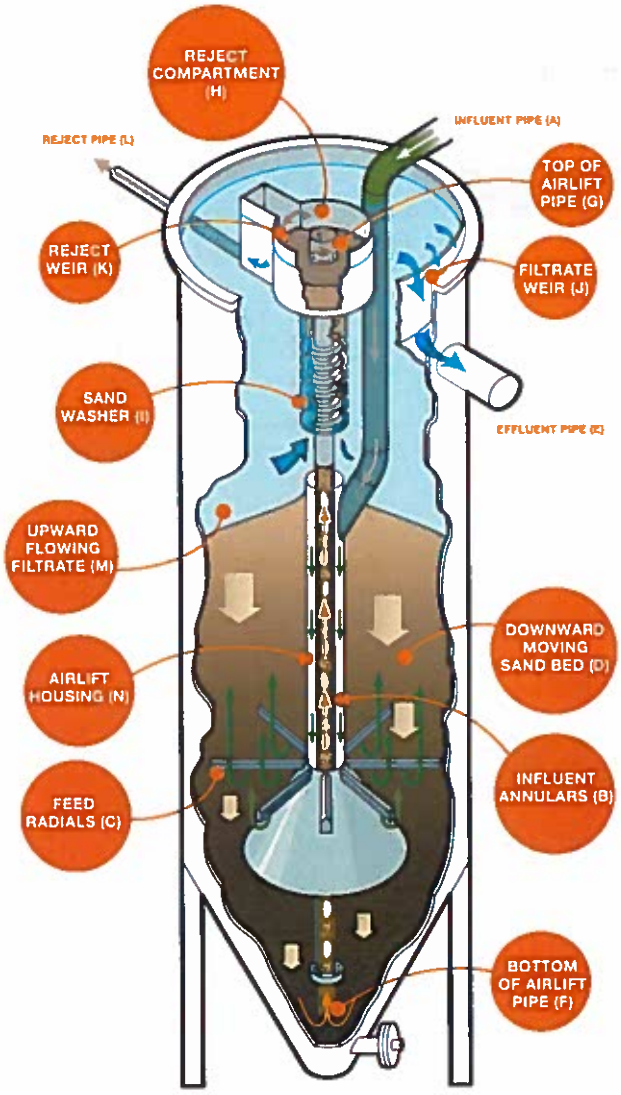


Figure 1. CROSS-SECTIONAL VIEW OF A PARKSON DYNASAND® FILTER

introduced into the media bed through distribution radials, which are open at the bottom. As the influent flows upward through the moving granular bed, the solids are captured in and on the media while clean water continues rising into the filtrate pool above the bed. The filtrate then exits at the top of the filter over the effluent weir.

Simultaneously, the granular media is being cleaned and recycled throughout the filter via an airlift pipe and media washer mechanism. The solids-laden filter media is drawn downward towards the intake of the airlift pipe located in the center of the filter bottom.

A small, steady stream of compressed air is introduced into the airlift bottom, which draws the granular media and solids into the airlift. The solids-laden media is scoured as it rises in the airlift. Upon reaching the top of the airlift, the solids and granular media are released into the central reject compartment.

The heavy filter media grains are returned to the bed after falling through the washer, which consists of several concentric stages. A small amount of filtered water passes upward, hydraulically lifting the solids or "dirt", while allowing the heavier and coarser granular media to fall.

This counter-current flow of filtrate quality water is created by a difference in filtrate and reject weir heights. The cleansed media is then deposited at the top of the filter bed. During normal operation, this method of cleaning provides continuous, uninterrupted flows of filtrate and reject water.

3. DynaSand System Preliminary Design Information

Parkson will supply a DynaSand Filtration System consisting of:

Table 3.1 – DynaSand Design

FILTER COMPONENT	UNITS	VALUE
Filter Design Data		
DynaSand® Filter Tanks	#	1
Filtration area per Tank:	ft2	100
Filtration Surface Area	ft2	100
Hydraulic Loading Rate (Peak Design)	gpm/ft2	3.53
Filter Bed Depth	inches	80
Sand required per module	tons	57
Backwash Cleaning System		
Air Compressor Package		Reciprocating
Compressor Type		Duplex
Number of Compressor Systems	#	1
Air Compressor Size	hp	5
Compressor Rating (@125 psi), each	scfm	9.57
Average Reject Flow per Module (continuous	gpm	17
Peak reject per module	gpm	22
Total air consumption (continuous)	scfm	6
Air Dryer Type		Desiccant
Materials of Construction		
Filter Tank		304 SS

Airlift Pump		PVC
Feed Assembly		304L SS
Reject Compartment		FRP
Hardware		304 SS

4. DynaSand System Scope of Supply

Parkson will supply the following equipment and services for the DynaSand treatment system:

1) All filter internals for each tank consisting of:
   a) feed inlet pipe,
   b) feed distribution radials,
   c) airlift pipe,
   d) internal sand washer,
   e) sand distributor cone,
   f) reject compartment with weir and flume
   g) reject support frame, and
   h) connection hardware.
2) Filtration media meeting AWWA B-100 specifications.
3) Total air compressor system consisting of a total of two (2) air compressors, receiver tank, air dryer, local control panels, and air filters.
4) NEMA 4X air control panel
5) Float switch for low-level shut-off
6) Start-up services including travel and living expenses

5. Cost Estimate and Terms

1) The budget price for the equipment and services supplied is:

   $225,000.00 USD FOB Factory - Equipment & sand freight allowed, taxes extra

2) Terms are 90% net 30 days from shipment; 10% upon startup NTE 180 days (maximum) after shipment
3) Submittals - typically 4-6 weeks after receipt of written order.
4) Equipment Shipment - typically 12-14 weeks after release for fabrication.

6. Supplemental Information (attachments)

6.1. DynaSand Brochures

6.2. Typical DynaSand Drawings

Parkson™
Treating Water Right

DynaSand®

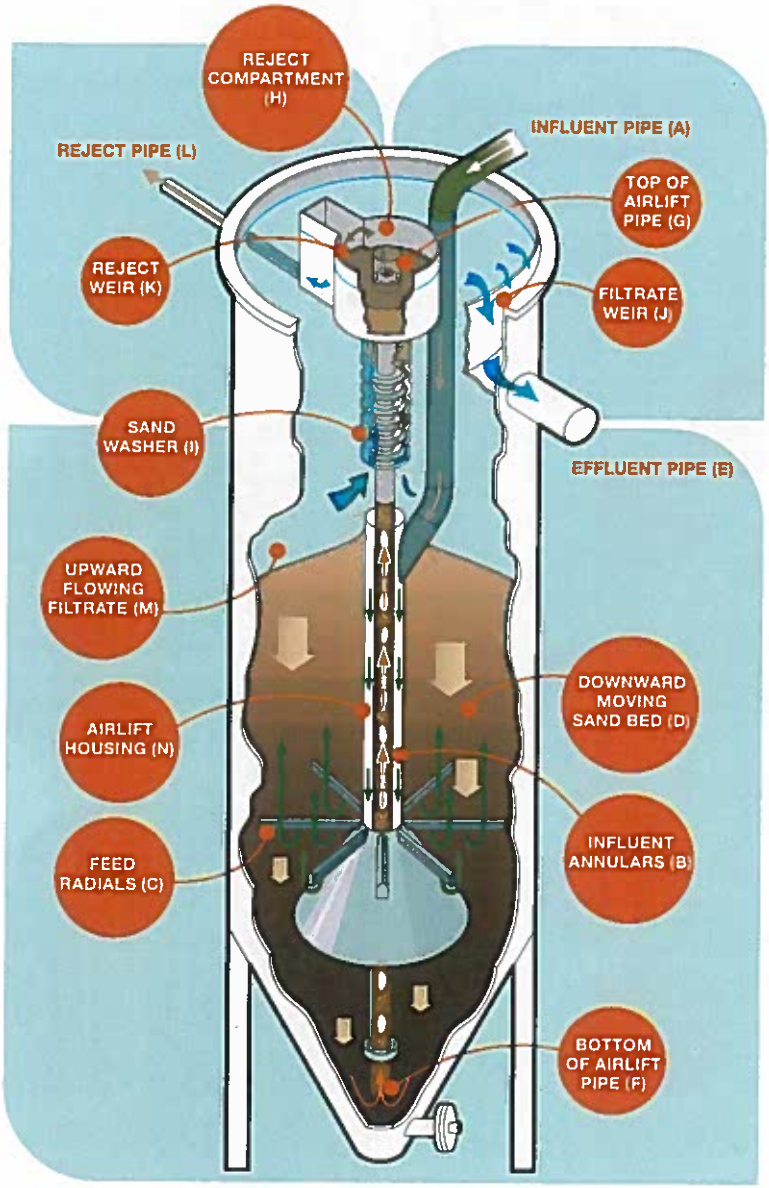
Continuous, Upflow, Granular Media Filter

- Continuously cleaned sand bed
- Low power requirement
- Elimination of ancillary backwash equipment
- Reduced operator attention

Great performance, low maintenance

The DynaSand® filter is an upflow, deep bed, granular media filter with continuous backwash. The filter media is cleaned by a simple internal washing system that does not require backwash pumps or storage tanks. The absence of backwash pumps means low energy consumption.

The DynaSand® filter's deep media bed allows it to handle high levels of suspended solids. This heavy-duty performance may eliminate the need for pre-sedimentation or flotation steps in the treatment process in some applications.



The DynaSand® filter is available in various sizes and configurations. This flexibility allows for customization to fit specific site and application requirements.

DynaSand® Filter Principles of Operation

Influent Filtration

Influent feed is introduced at the top of the filter (A) and flows downward through an annular section (B) between the influent feed pipe and airlift housing. The feed is introduced into the bottom of the sand bed through a series of feed radials (C) that are open at the bottom. As the influent flows upward (M) through the downward moving sand bed (D), organic and inorganic impurities are captured by the sand. The clean, polished filtrate continues to move upward and exits at the top of the filter over the filtrate weir (J) and out through the effluent pipe (E).

Sand Cleaning

The sand bed containing captured impurities is drawn downward into the center of the filter where the airlift pipe (F) is located. A small volume of compressed air is introduced at the bottom of the airlift, drawing the sand into the airlift pipe. The sand is scoured within the airlift pipe at an intensity of 100-150 SCFM/ft2. The effectiveness of this scouring process is vastly greater than what can be expected in conventional sand filtration backwash. The scouring dislodges any solid particles attached to the sand grains.

The dirty slurry is pushed to the top of the airlift (G) and into the reject compartment (H). From the reject compartment, the sand falls into the sand washer (I) and the lighter reject solids are carried over the reject weir (K) and out the reject pipe (L). As the sand cascades down through the concentric stages of the washer, it encounters a small amount of polished filtrate moving upward, driven by the difference in water level between the filtrate pool and the reject weir. The heavier, coarser sand grains fall through this small countercurrent flow while the remaining contaminants are carried back up to the reject compartment. The clean, recycled sand is deposited on the top of the sand bed where it once again begins the influent cleaning process and its eventual migration to the bottom of the filter.

DynaSand® Filter Configurations

The DynaSand® filter is available as either stand alone package units or in a modular concrete design. The package units are constructed of either 304 SST or FRP. Materials of construction for the internal components of both package and concrete units are SST and/or FRP. Filters are available in 40" standard bed or 80" deep-bed design depending on the nature of the application.

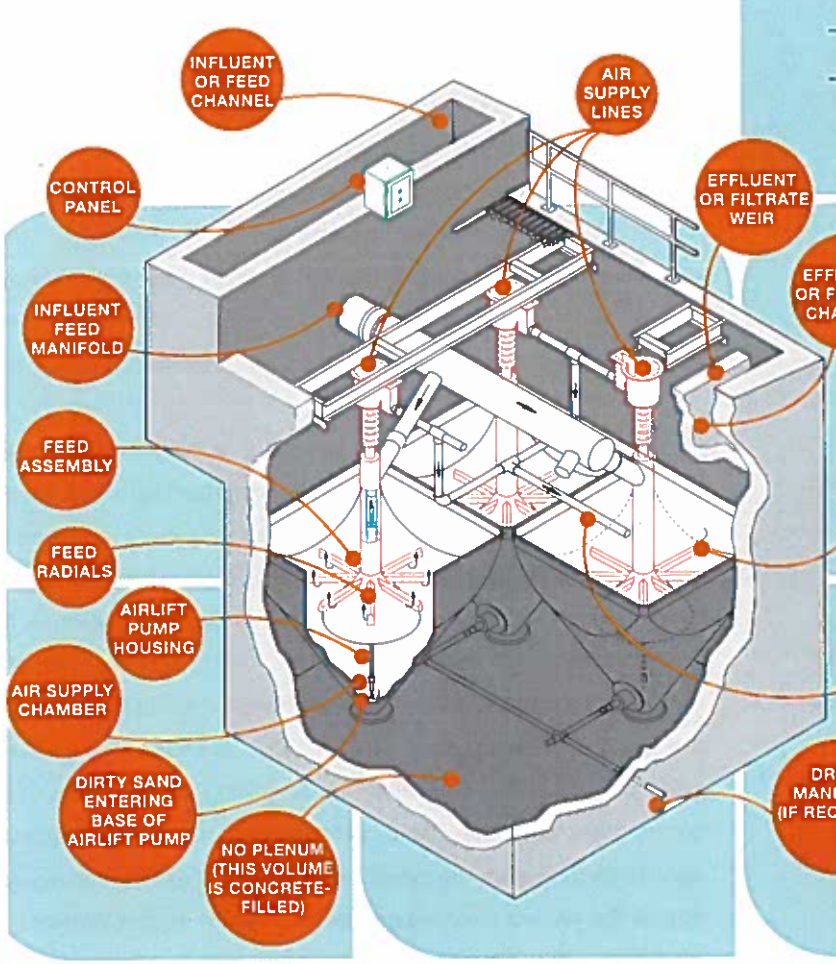
Concrete modules are frequently used for high flow capacity systems by placing multiple modules into a common filter cell. The modules in a filter cell share a common filter bed where cones at the bottom of each module distribute sand to their respective airlifts and sand washers. A concrete DynaSand® installation can be designed for any size filter area. This enables the technology to be applied to any size water or wastewater treatment plant. Since all filter beds are being continuously cleaned, the pressure drop remains low and even throughout all the filters. Equal pressure drop ensures even distribution of feed to each filter without the need for splitter boxes or flow controls. Therefore, a typical multiple unit installation can use a common header pipe with feed connections and isolation valves for each filter.

Features

- Continuously cleaned sand bed
- No underdrains or screens
- Sand washed with filtrate
- No level control
- Internal, vertical airlift
- Low power requirements

Benefits

- No shutdown for backwash cycles
- Elimination of ancillary backwash equipment
- No flow control valves, splitter boxes, or backwash controls
- No short-circuiting
- Optimum sand-washing efficiency
- Superior filtrate quality
- Reduced operator attention
- Minimizes overall pressure-drop
- Reduces potential for pluggage
- Significantly reduces wear/maintenance
- Can be easily maintained without filter shutdown
- Up to 70% less compressed air vs. other self-cleaning filters

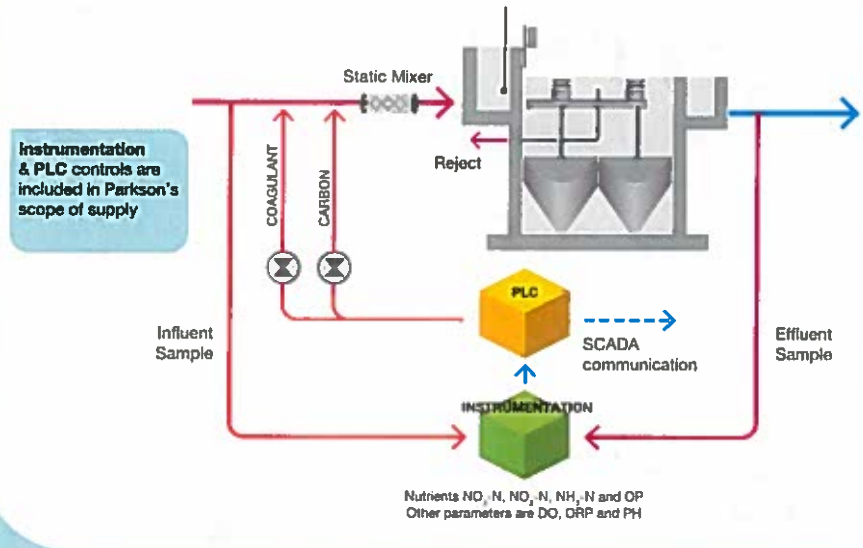



DynaSand® filter above ground package units


DynaSand® filter modules in concrete basin

DynaSand® ENR System Overview

Key component of process control and monitoring for meeting low limits



DynaSand® Filter Applications

- Tertiary filtration
- Algae removal
- Potable water (turbidity and color)
- Oil removal
- Process water
- Brine filtration
- Metal finishing
- Cooling tower blowdown
- Steel mill scale
- Chemical processing
- Phosphorus removal
- Product recovery
- Denitrification
- Cryptosporidium and Giardia removal
- Surface water
- Ground water
- Arsenic removal
- Effluent reuse

DynaSand® Continuous Filtration Process

Water and wastewater treatment in conventional plants typically involves flocculation, clarification and filtration. Direct filtration eliminates clarification but still requires flocculation. The DynaSand® filter utilizes a proprietary process known as Continuous Contact Filtration. The DynaSand® filter's 80" media bed depth provides greater hydraulic residence times and more opportunity for floc formation and attachment. Thus, coagulation, flocculation and separation can be performed within the sand bed, eliminating the need for external flocculators and clarifiers. Equipment savings can be substantial, up to 85% compared to conventional treatment and 50% compared to direct filtration. The DynaSand® Continuous Contact Filtration process is better suited to remove small floc, which can help reduce chemical requirements by 20-30% over conventional treatment.

Applications

The DynaSand® filter is currently providing exceptional treatment in over 8,000 installations worldwide in a wide variety of applications.

Typical Data	Loading rate (gpm/ft2)	Influent solids	Filtrate solids
Tertiary Filtration	3-5	20-50 ppm SS	5-10 ppm SS
Potable Water – Turbidity	4-5	10-30 NTU	0.1-0.5 NTU
Potable Water – Color	4-5	10–120 ACU	1-5 ACU
Process Water	5	10-30 NTU	0.1-0.5 NTU
Metal Finishing	4-6	20-50 ppm SS	2-5 ppm SS
Steel Mill Scale	8-10	50-300 ppm SS	5-10 ppm SS
Phosphorus Removal	3-5	<1 ppm Total P	<0.1 ppm Total P
Algae Removal	2-4	100 ppm SS	10-20 ppm SS
Denitrification	3-4	10-15 ppm TN	<3 ppm TN
Oil Removal	2-6	<50 ppm O&G	5-10 ppm O&G

Parkson™ Treating Water Right

50 YEARS 2010

Fort Lauderdale
Chicago
Montreal
Kansas City
Dubai

1.888.PARKSON
technology@parkson.com
www.parkson.com

FILT-DSF_061212

NOZZLE SCHEDULE				
LTR	SIZE INCHES	FACE	SERVICE	REMARKS
A	12	RF	INLET	FEED
B	14	RF	OUTLET	FILTRATE
C	3	RF	OUTLET	REJECT
D	1	NPT	INSIDE DRAIN	VALVE
E	3	NPT	VENT	PIPE
F	3/8	NPT	CUSTOMER AIR	SEE NOTE-5

NOTES:

1. THIS DRAWING TO BE USED FOR GENERAL INFORMATION ONLY. NOT FOR CONSTRUCTION.
2. MATERIAL OF CONSTRUCTION:
   - TANK : 11 GA., 304 S.S.
   - AIRLIFT: PVC
3. WEIGHTS
   - TANK EMPTY: 7,200#
   - TANK W/WET SAND: 146,450#
   - TANK W/SAND & WATER: 192,000#
4. 56.0 TONS SILICA SAND REQUIRED.
5. AIR REQ'D FOR THE OPERATION OF FILTER 6.0 SCFM @ 39 PSI

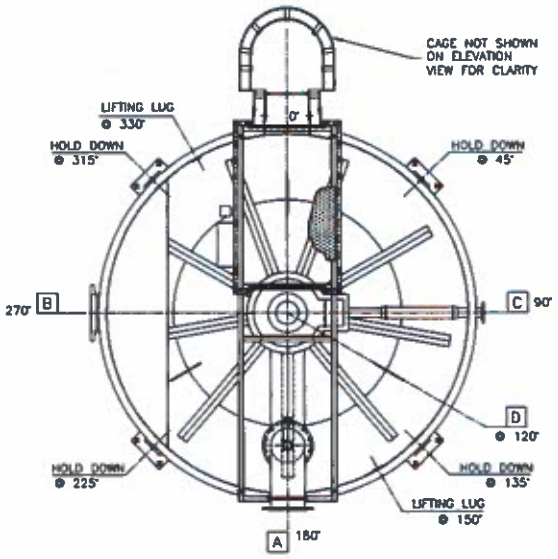
SPECIAL NOTES

1. THE SUPPORTING CONCRETE PAD MUST BE LEVEL.
2. APPLY (1 IN.) MIN. GROUT UNDER EACH BASE PLATE AND UNDER THE CONE AT CENTER.
3. SEE INSTALLATION INSTRUCTIONS BEFORE SETTING GROUT.
4. CUSTOMER ANCHOR BOLT PROJECTION TO INCLUDE GROUT, BASE PLATE (1 IN.) THICK, PLUS WASHER AND NUT.

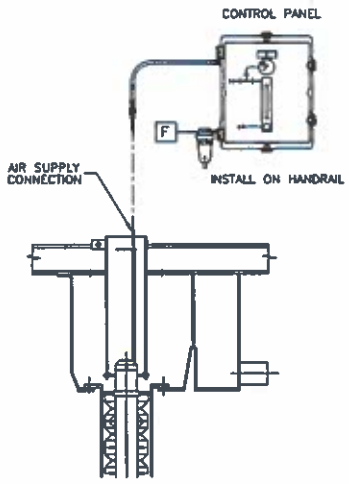
LOADING CONDITIONS
STATIC LOADING

FILTER FULL OF WATER AND SAND:
LOAD UNDER EACH BASE PLATE IS APPROX. 38.4 KIPS
LOAD UNDER CONE AT CENTER IS APPROX. 38.4 KIPS

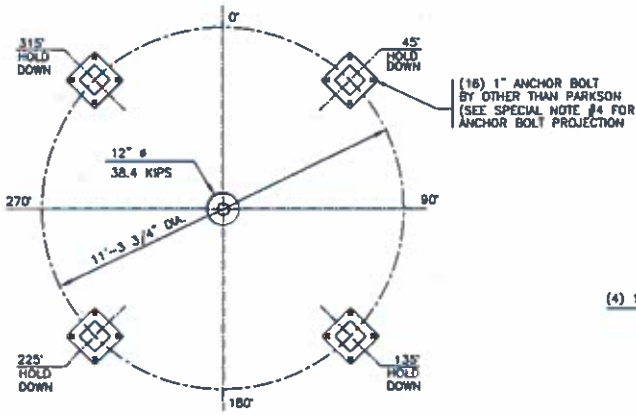
SEISMIC FORCES FROM ZONE 4 MAY CREATE AN OVERTURNING MOMENT OF 324.0 FT.-KIPS AT THE BASE OF THE UNIT. THE LOADS ACTING ON EACH ANCHOR BOLT WILL THEN BE ~800# IN TENSION AND 2,450# IN SHEAR.



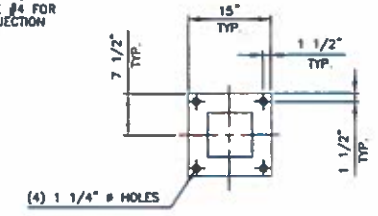
PLAN VIEW



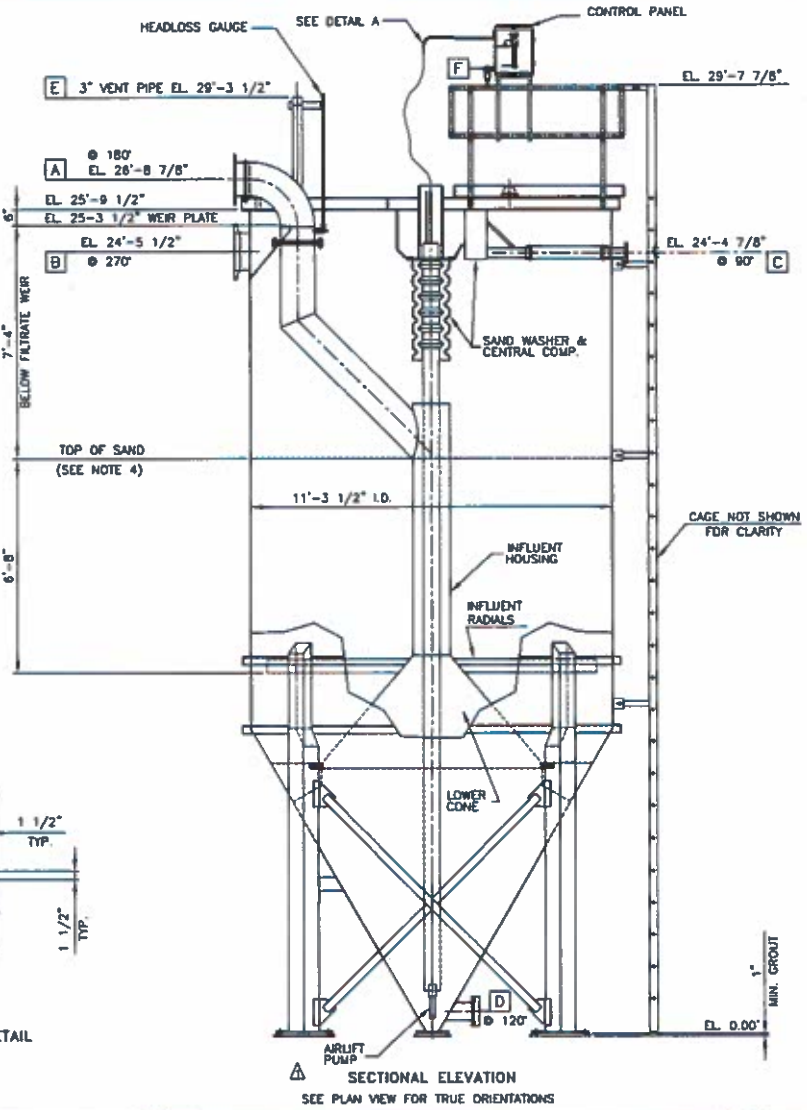
DETAIL A
INST. PANEL TO AIRLIFT CONN.
SCHEMATIC



PLAN VIEW



BASE PLATE DETAIL



⚠ SECTIONAL ELEVATION
SEE PLAN VIEW FOR TRUE ORIENTATIONS

PARKSON CORPORATION
DynaSand® Filter

DSF, 100FT2, DBTF, SS
SALES DRAWING

PROJECT NUMBER:
PROJECT NAME:
DRAWING FILE NUMBER: 004864-01
REVISION: -

SIGNATURES		DATE
DRAWN:	F. J. CAMARGO	02-11-99
CHECKED:	P. TATASCIORE	02-11-99
APPROVED:	P. TATASCIORE	02-11-99

SIZE: B SCALE: 1/4"=1'-0"

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN FEET AND INCHES
TOLERANCE: ±

REVISION	DESCRIPTION	BY:	CHECKED:
DATE: 7-19-04	CHANGED AIRLIFT TO PVC	RMR	FJC
APPROVED:		FJC	

THE OWNER, PROJECT ENGINEER, AND ALL OTHERS INVOLVED WITH THE PROJECT DESIGN MUST IMPLEMENT AND FOLLOW ALL SAFETY STANDARDS REQUIRED BY LOCAL, STATE AND FEDERAL LAWS WHEN INCORPORATING PARKSON CORPORATION EQUIPMENT INTO THE OVERALL PROJECT DESIGN. PARKSON CORPORATION WILL NOT BE RESPONSIBLE FOR LOCATION AND/OR PLACEMENT OF EQUIPMENT IN THE PLANT DESIGN, NOR IS PARKSON RESPONSIBLE FOR PLANT SAFETY DESIGN AND FOR THE FAILURE TO FOLLOW APPROPRIATE SAFETY PRECAUTIONS IN THE OPERATION AND MAINTENANCE OF PARKSON CORPORATION EQUIPMENT.

T·O ENGINEERS

Attachment 4 – Surface Aspirators Quote and Literature

9/10/2019

Jon Duerschner
T O Engineers
1998 W Judith Ln
Boise, ID 83705

Cascade, ID Lagoons

Proposal Number: ASI-008009-2019-09-10

Dear Jon,

We would like to thank you for your interest in Fluence products. After reviewing your lagoon requirements, we are pleased to recommend our TORNADO® Surface Aspirating Aerator/Mixer for the Cascade, ID Lagoon Project.

We have included specifications, drawings, and a brochure for your consideration.

Feel free to contact us with any questions you may have.

Thank you and have a nice day!

Dina Palumbo
Product Sales Manager, USA

Value from Water

fluencecorp.com
Direct +1 763.746.9271
Main +1 800.879.3677
7135 Madison Avenue West
Minneapolis, MN 55427

Table of Contents

1. Technical Data

This proposal is confidential. It was prepared by Fluence, based on request for quotation. It is being furnished solely for the confidential use of the individual/organization named above, who agrees that it shall not be reproduced, copied, lent, or otherwise transmitted, directly or indirectly, to any other individual or organization, except for the purpose for which it was specifically furnished.

1.1 TORNADO® Surface Aspirating Aerator/Mixer

The TORNADO® Aerator provides high oxygen transfer and intensive mixing capabilities. The TORNADO® aerator's turbulent directional mixing and jet propulsion discharge assures that oxygen is quickly blended with the wastewater for unmatched oxygen transfer. The intense action of the jet propulsion shears wastewater solids to increase treatment performance and provide better contact for the oxygen and wastewater bacteria.

1.2 Recommendation

1.2.1 Cell 1

Cell 1 is trapezoidal with the dimensions of 720' (top length) x 535' (bottom length) x 475' (width) x 5.5' deep and has a detention time of approximately 23 days. The influent flow is 353gpm and has an oxygen requirement of 924lbs/day (AOTR). This will require 38HP to provide the oxygen. Therefore, we recommend utilizing eight (8) 5HP TORNADO Aerators throughout the lagoon. This will not only provide the oxygen needed for treatment, but it will also provide odor control.

The units should be placed in an orientation that encourages the best mixing throughout the basin to provide the best treatment and prevent dead spots from occurring which will encourage odors.

1.2.2 Cell 2

The rectangular Cell 2 is 325' x 475' x 5.8' deep and has a detention time of approximately 12 days. This basin requires 404lbs/day of oxygen (AOTR) to provide treatment. Therefore, we recommend utilizing four (4) 5HP TORNADO Aerators to provide the 17HP required for treatment. Similarly, to Cell 1, this will also provide odor control for the basin. The aerators should be placed in an orientation that encourages a circular pattern for the best mixing and treatment of the wastewater.

1.2.3 Cell 3

The final Cell 3 is also rectangular with the dimensions 323' x 475' x 6.2' deep. The oxygen requirement for this basin is 250lbs/day and is much lower than the first two cells. Therefore, we recommend utilizing two (2) 5HP TORNADO Aerators. These can be placed in opposing directions on the same line or in opposite corners to encourage a circular pattern. Odor control was not requested and will not be met with 10HP.

2. Scope of Supply

2.1 Scope of Supply

2.1.1 TORNADO Aerators

Fourteen (14)	5HP TORNADO® Surface Aspirating Aerator/Mixer each including:
	• One (1) 230/460V/3PH/60Hz Motor • One (1) 2 Pontoon Float System • One (1) 1-Year Non-Prorated Warranty

2.1.2 Optional Control Panel

Fourteen (14)	Combination Disconnect Starter Panel each including:
	• One (1) Class J Fused Disconnect with Handle and Fuses • One (1) NEMA 4X Stainless Steel Enclosure • One (1) 230 or 460 V/3PH/60Hz/5HP starter with related motor controls • One (1) Green LED Running Light • One (1) Red LED Fault Light • One (1) Start-Stop Selector Switch • 5-85kA SCCR • UL508A

2.2 Items Not Supplied by Fluence

All items below are EXCLUDED from this proposal and are the responsibility of the CUSTOMER. These are to be completed by others or specifically agreed to in writing by Fluence and included in the pricing section of the final version of the proposal.

- All aspects of final assembly and installation of the equipment at the project site, including field mounting of the equipment, electrical wiring and power connections, start-up and commissioning, filling of the tanks, and checking and testing of the components and systems. Float systems are delivered unassembled and **field assembly is required.** **Assembly and installation is to be supplied by others.**

- Control accessories such as electrical disconnects, motor starters or run timers are not included and are to be supplied by others.
- Electrical accessories such as electrical cable, electrical cable hangers, motor cable grips or strain reliefs are not included and are to be supplied by others.
- Soft starts and VFDs are highly recommended for any unit over 10 horsepower. Soft starts and VFDs are not included in proposal and are to be supplied by others.
- Mooring accessories such as mooring cable, mooring clips and thimbles, and mooring posts are not included and are to be supplied by others.
- The CUSTOMER will be responsible for supplying the design and equipment for the mooring posts for soil site conditions. Fluence can provide typical installations along with aerator forces being applied to the mooring posts.
- Unless stated otherwise all equipment is quoted EXW (Ex Works) Factory Minneapolis, Minnesota USA. All aspects of shipping from the factory to the project site including loading at the factory, overland shipping to port of export, sea shipping to nearest port of entry, loading and unloading, overland delivery to and unloading at the project site are not included.
- The CUSTOMER assumes responsibility for any alterations to the proposal, in design, materials, manufacture, or otherwise, as such alterations may affect the contract price, the delivery schedule, and the performance of components and the entire plant.
- Additional aerator accessories may be needed (not included in price) in the event the water level will fluctuate more than three (3) feet, these include but are not limited to: swing arms, low level legs, anti-erosion shields and anti-vortex shields. This is equipment is available upon request.

3. Prices and Terms

3.1 Prices

Equipment (Prices Ex-Works Minneapolis, MN and in US Dollars)	Unit Price	TOTAL
Fourteen (14) 5HP TORNADO® Surface Aspirating Aerator/Mixers (See details in Scope of Supply – Section 2.1.1)	**$8,455**	**$118,370**
Fourteen (14) Control Panels (See details in Scope of Supply – Section 2.1.2)	**$2,585**	**$36,190**
	Grand Total	**$154,560**

PRICES

Unless otherwise specified in this proposal, all prices are in U.S. Dollars, Ex-Works Fluence factory, Minneapolis, MN.

TAXES AND FEES

The above prices do not include any local, state, federal or country taxes, permits or fees, clearance through customs and custom duties, fees or charges for permits, letters of credit, nor any finance or related charges and fees. All these costs will be added to the total price and paid by the CUSTOMER.

PROPOSAL ACCEPTANCE

This proposal is offered for acceptance within thirty (30) days from date of this quotation. Prices are subject to review thereafter. Prices become fixed, upon receipt of a signed copy of the CUSTOMER Acceptance Page (at the end of this proposal) and/or a Purchase Order. Prices may be extended for another thirty (30) days upon receipt of a signed copy of a Letter of Intent (LOI) by the CUSTOMER.

SUB-CONTRACT CONDITIONS, RETENTIONS, AND LIQUIDATED DAMAGES

Fluence does not accept Sub-Contract Conditions, Retentions, nor Liquidated damages.

STARTING ON A PROJECT

Fluence will NOT start working on a project until both, the CUSTOMER and Fluence, have fully executed and signed an order and all transfer of monies have been satisfactorily completed.

COMPLETION OF SUBMITTAL DOCUMENTS

In general, completion of the submittal documents takes one (1) to four (4) weeks after the CUSTOMER and Fluence have fully executed and signed an order and all transfer of monies have been satisfactorily completed.

COMPLETION OF MANUFACTURING OF EQUIPMENT

In general, completion of manufacturing of the equipment listed above will take approximately five (5) to six (6) weeks after receipt of approved submittal documents. However, actual number of weeks may increase or decrease depending on volume production at the time of receipt of the approved submittal documents.

ACT OF GOD, FORCE MAJEURE

Fluence shall not be liable for delays caused by fires, acts of God, strikes, labor difficulties, and acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond the Fluence's control.

3.2 Terms and Conditions

Subject to the approval of the Fluence Credit Department, the following apply:
Twenty-Five percent (25%) down with purchase order. Balance of seventy-five (75%) due NET 30 days from shipment of equipment.
Interest in the amount of one and one-half percent (1-1/2%) per month will be added to all invoices not paid by their due dates.

DELAYS BY CUSTOMER:
If, for any reason, CUSTOMER delays approval of submittal documents beyond thirty (30) days after submitting of submittal documents, then Fluence reserves the right to adjust the contract price upwards to reflect any cost increases.
If, for any reason, CUSTOMER delays completion of manufacturing, then pro-rata payments are due according to percentage of completion.
If, for any reason, CUSTOMER delays shipment, then payment of the balance together with any storage, insurance, and other associated fees become due plus a twenty percent (20%) administrative fee.
CANCELLATION CHARGES:
If CUSTOMER elects to cancel the order, after its acceptance by Fluence, then CUSTOMER must pay all expenses incurred by Fluence to execute the Purchase Order as follows:
All out-of–pocket expenses plus a 20% administrative fee. These include expenses to purchase materials and services, consulting fees, transportation, lodging, and meals, communications, and other expenses.
All personnel time to cover research, design, engineering, purchasing, manufacturing, travel, project management, and other tasks, all in accordance with the table below:

Milestone	*% of Order Value*
Before submittal approval	30%
After Submittal Approval	60%
After Release to manufacturing	100%

BACK CHARGES:

Fluence does NOT accept any back charges by CUSTOMER without written authorization prior to commencement of any work or task.

CHANGE ORDERS:

CUSTOMER agrees to authorize all change orders in writing, and further agrees to assume responsibility for any cost increases, changes in delivery schedule, and possible performance changes.

TITLE AND LIEN RIGHTS:

The equipment shall remain personal property, regardless of how affixed to any realty or structure until the equipment has been fully paid for including any notes given therefore. In the event of CUSTOMER's default, Fluence has the right to repossess such equipment.

4. Equipment Warranty

Fluence warrants for a period of ***twelve (12) months from startup, not to exceed eighteen (18) months from date of shipment***, the new equipment of its own manufacture to be free from defects in material and workmanship under normal use and service when used and maintained in accordance with Operation and Maintenance Instruction Manual supplied by Fluence. Fluence 's obligation under this warranty being limited to repairing or replacing, at its option, any part found to its satisfaction to be defective, providing that such part is, upon request, returned to Fluence's factory, freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect or from improper operation, maintenance, installation, modification, or adjustment.

This warranty is subject to the following conditions:

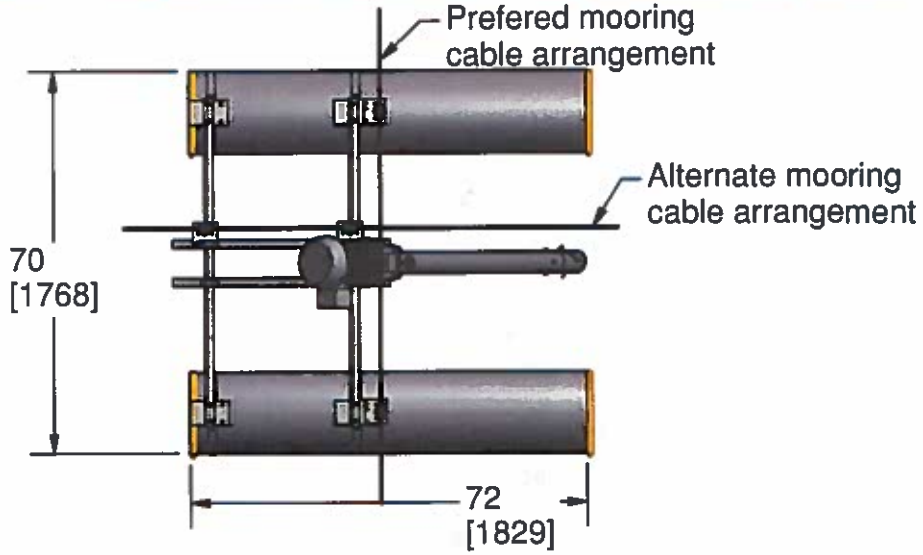
1. Purchaser understands, agrees and accepts this warranty. Such acceptance shall be indicated by all applicable parties signing and returning a copy of this document to Fluence. Warranty period begins as stated above but is not activated or valid until all material is paid for in full to Fluence and the signed original has been returned to Fluence. Fluence will then return a copy of the official, activated warranty statement to all signing parties.
2. This warranty is made for the benefit of Purchaser (municipality or end user) and when applicable to the Purchaser's agent (contractor) only. This warranty is non-transferable and non-assignable.
3. Any repaired or replacement item supplied under this warranty shall be warranted as provided herein only for the remainder of the warranty period applicable to the original purchase.
4. This warranty expressly excludes defects or damage caused by Acts of God such as, but not limited to; falling objects, external forces, explosion, fire, riot, civic commotion, acts of war, or vandalism. It also excludes; mishandling by Purchaser, excess wear, excessive corrosion, fatigue, abuse, or failure caused by lack of maintenance, or caused by freight damage, improper storage, contact with foreign objects, use in highly corrosive, highly abrasive or high temperature solutions, excess foam, or use in solutions with high levels of large suspended solids.
5. Fluence shall have the absolute discretion to either repair or replace the failed item. The work so performed shall be done using Fluence practices and materials. Fluence, herewith reserves the right to approve and/or negotiate any contract for any such work not performed by Fluence.
6. **IT IS UNDERSTOOD AND AGREED THAT FLUENCE'S LIABILITY HEREIN, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE, SHALL NOT EXCEED THE COSTS OF THE PURCHASE PRICE PAID TO FLUENCE AND UNDER NO CIRCUMSTANCES SHALL FLUENCE, BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, LIQUIDATED, CONSEQUENTIAL, OR OTHER TYPES OF DAMAGES INCLUDING ON-SITE LABOR. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR APPLICATION.**

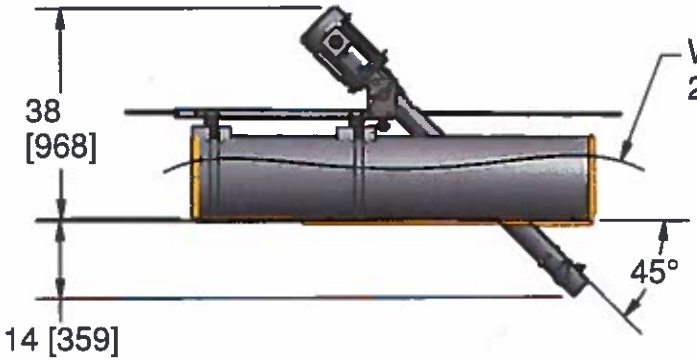
7. All claims made under this warranty must be made to Fluence within thirty (30) days after Purchaser shall have reasonably discovered the subject defect. Fluence, must be given a reasonable opportunity to inspect any material claimed to be defective. Upon determination by Fluence, that a claimed failure is covered under this warranty, and should Fluence choose to have the Purchaser handle the repair locally, the Purchaser shall obtain two (2) competitive bids for the work involved. Fluence, shall have the right to obtain additional bids at its sole cost. If Fluence elects to have any repair performed pursuant to any such bid, Fluence shall pay Purchaser the full amount of such bid, after receiving a written release from Purchaser of further claims concerning the specific complained condition. The Purchaser agrees to "render friendly assistance" during the claim processing period.
8. This warranty will be effective only if normal maintenance as set forth in the Operations Manual is followed. Fluence reserves the right to ask for and review maintenance records to support the Purchaser's claim.
9. During the warranty period the purchaser is responsible for shipping to and from designated repair facility along with any site related costs associated with removal and reinstallation of equipment.
10. No terms or conditions other than those stated herein, and no agreement or understanding, oral or written, in any way purporting to modify this warranty shall be binding on Fluence, unless made in writing and signed by its authorized representative. Further, the seller's salespeople and the seller's agents may have made oral statements about the merchandise described in this warranty. Such statements do not constitute warranties, shall not be relied on by the buyer and are not part of the contract for sale or warranty. The entire warranty is embodied in this writing. This warranty shall be governed by and construed and enforced in accordance with the laws of the State of Minnesota (USA). Fluence, Purchaser, Purchaser's Agent and End User agree that any legal action commenced relative to this warranty will be venued in the courts, State or Federal, located in the State of Minnesota (USA).
11. Wastewater characterization is an important element in the evaluation of existing facilities for optimizing performance and available treatment capacity. Without comprehensive wastewater characterization, facilities may either be under-or overdesigned, resulting in inadequate or inefficient treatment.

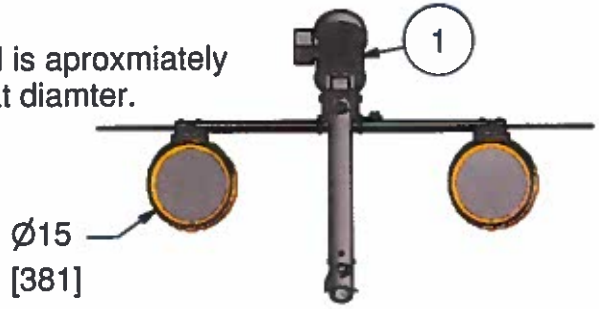
5. Customer Acceptance

For pricing and any information regarding this proposal, please contact Fluence:

Submitted By:	Accepted By:
Dina Palumbo Product Sales Manager, US Operations Fluence 7135 Madison Avenue West Minneapolis, MN 55427-3601 USA Direct: 763-746-9271 Fax:763-746-8408	Authorized Purchaser Name and Title, Company/Organization, Complete Address, Phone Number, Email address
Signature	Signature
Date: September 10, 2019	Date:







NOTES:
1) FLOATS SHIPPED UNASSEMBLED, ASSEMBLY BY OTHERS.
2) MOORING PLATES CABLE & CABLE CLIPS NOT INCLUDED, AVAILABLE IN A KIT
3) NORMAL USEAGE IS FROM 45° TO 60°. AT ANGLES APPROCHING 30° A VORTEX SHIELD WILL BE NEEDED.
4) USE LOW LEVEL LEGS IF USED IN LESS THAN 3.5FT OF WATER.
5) Inch [mm]

PARTS LIST

ITE	QT	PART NO	DESCRIPTION	MASS [LBS]
1	1	37020	Motor 5/3/460/60	113.56 lbmass
2	1	72152K	Kit: 2 Float System	157.359 lbmass
3	1	84905K	Kit Tornado 5/60 For NEMA Motor 1-1/8" Shaft	64.619 lbmass

DRAWN fishburnk	DATE 7/20/2009
CHECKED fishburnk	DATE
ENG APRV'D	DATE
MFG APRV'D	DATE
ORDER NO	CUSTOMER
NAME OR LOCATION	

RWL Water

7135 MADISON AVE W GOLDEN VALLEY MN 55427 U.S.A.
PHONE: (800)879-3677, FAX: (763)746-8408

MATERIAL

SURFACE FINISH

MANUFACTURING NOTES (WHERE APPLICABLE):
- BREAK CORNERS AND SHARP EDGES
- REMOVE BURRS
- CLEAN AND PASSIVATE WELDS

DEFAULT TOLERANCES
FRACTIONAL +/- 1/64 DECIMAL X.X +/- 0.1 X.XX +/- 0.03 X.XXX +/- 0.005 ANGULAR +/- 1°

TITLE
Kit 2 Float System With 5Hp TORNADO

THIRD ANGLE PROJECTION
SCALE: VIEW LEVEL

SIZE
A

DRAWING/PART NUMBER
07200905

SHEET 1 OF 1

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade, Phase 2, Just Aeration

T-O ENGINEERS

MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 2							
Lagoon Aspirators							
1.	Surface Aspirating Aerator	3	ea	$8,455.00	20%	$ 30,438.00	
2.	Starter Panel	3	ea	$2,585.00	20%	$ 9,306.00	
	SUBTOTAL					$ 39,744.00	
A	**SUBTOTAL**					$ 39,744	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 794.88	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 3,974	
E	*MECHANICAL*	(% of A)				$ 5,962	
G	**SUBTOTAL**					$ 50,475	
H	*ALLOWANCE*	(% of G)				$ 2,523.74	
I	*CONTINGENCY*	(% of G)				$ 5,047.49	
J	*CONTR. PROFIT*	(% of G)				$ 5,047.49	
K	**SUBTOTAL**					$ 63,094	
L	*ENGINEERING DESIGN*	(% of K)				$ 9,464	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					$ 72,558	
	TOTAL ESTIMATED COST					$ 73,000	

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade, UV Disinfectant System

T-O ENGINEERS

MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 2							
UV System							
1.	UV						
	UV Disinfectant System	1	ls	$175,000.00	20%	$ 210,000.00	
Filter and UV Building							
1.		900	sf	$125.00	0%	$ 112,500.00	30'x30' building, 35" tall
A	SUBTOTAL					$ 322,500	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 6,450.00	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 32,250	
E	*MECHANICAL*	(% of A)				$ 48,375	
G	SUBTOTAL					$ 409,575	
H	*ALLOWANCE*	(% of G)				$ 20,478.75	
I	*CONTINGENCY*	(% of G)				$ 40,957.50	
J	*CONTR. PROFIT*	(% of G)				$ 40,957.50	
K	SUBTOTAL					$ 511,969	
L	*ENGINEERING DESIGN*	(% of K)				$ 76,795	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					$ 588,764	
	TOTAL ESTIMATED COST					$ 589,000	

Opinion of Probable Construction Cost

City of Cascade, Idaho

Lagoon System Upgrade, DynaSand Filter System

T-O ENGINEERS

MARK-UPS:	Percentage
MOBILIZATION	2%
OVERTIME ALLOWANCE	0%
ELECTRICAL/INSTRUMENTATION	10.0%
MECHANICAL	15.0%
ALLOWANCE	5%
CONTINGENCY	10%
CONTR. INSURANCE / PROFIT	10%
ENGINEERING DESIGN	15%
CONSTRUCTION MGMT	0%

not included

PROJECT : Cascade WWTP Upgrades
FACILITY : City of Cascade, ID WWTP
Cascade, Idaho
DATE: 9/3/2019
By: C. Hipwell
LEVEL: Budget Level (+30%,-10%)

NOTE:

NO.	DESCRIPTION	QTY	Unit	Unit Cost	Installation	TOTAL	Comment
PHASE 2							
DynaSand Filter							
1.	DynaSand Filter	1	ea	$225,000	20%	$ 270,000.00	
2.	Filter Building	1	ea	$100,000	20%	$ 120,000.00	
3.	Piping, valving, and instrumentation	1	ls	$50,000	20%	$ 60,000.00	
	SUBTOTAL					$ 450,000	
A	**SUBTOTAL**					$ 450,000	
B	*MOBIL./DEMOBIL.*	(% of A)				$ 9,000.00	
C	*OVERTIME ALLOWANCE*	(% of A)				$ -	
D	*ELECTRICAL/INSTRUMENTATION*	(% of A)				$ 45,000	
E	*MECHANICAL*	(% of A)				$ 67,500	
G	**SUBTOTAL**					$ 571,500	
H	*ALLOWANCE*	(% of G)				$ 28,575.00	
I	*CONTINGENCY*	(% of G)				$ 57,150.00	
J	*CONTR. PROFIT*	(% of G)				$ 57,150.00	
K	**SUBTOTAL**					$ 714,375	
L	*ENGINEERING DESIGN*	(% of K)				$ 107,156	
M	*CONSTRUCTION MGMT*	(% of K)				$ -	
	SUBTOTAL					$ 821,531	
	TOTAL ESTIMATED COST					$ 822,000	