Ingleside WWTP Upgrades

Vortex Grit Removal & Classifier: 46 53 00
Process Equipment Pre-Selection

EVB Engineering
EVB Ref: RFP N° 14 – 2020
Bidding Document for System No. 2 – Vortex Grit Removal & Classifier
Township of South Stormont, ON
Claro Ref: 17089-Q-01

Claro Environmental Technologies
3065 Peugeot, Suite 100, Laval, QC H7L 5C4 Canada

(Bookmarked PDF)

Ingleside WWTP Upgrades
Vortex Grit Removal & Classifier: 46 53 00

Request for Proposal
Process Equipment Pre-Selection

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Ingleside WWTP Upgrades

Vortex Grit Removal: 46 53 00
Process Equipment Pre-Selection

EVB Engineering
EVB Ref: RFP N° 14 - 2020
Township of South Stormont, ON
Claro Ref: 17089-Q-01

claroglobal.com

Project:	Ingleside WWTP Upgrades, ON	**14 September 2020**
Municipal Authority:	Township of South Stormont, ON	**Ref#: Ingleside, NS; 17017-Q-00**
RFP Contact:	EVB Engineering Attention: Jamie Baker, P.Eng., 800 Second St. W., Cornwall, ON K6J 1H6; T.: 613.935.3775 (220); Questions relating to T&C or Technical specifications: jamie.baker@evbengineering.com Closing: 15 September 2020, at 2:00 p.m. local Eastern Daylight Time (EDT).	
Claro Representative: (Ontario)	Scott Lenhardt, P.Eng., Pro Aqua, Inc., 264 Bronte Street South, Unit #7, Milton, ON L9T 5A3; T.: 905.864.9311 (228); C.: 905.330.9244; scott@proaquasales.com.	
Subject:	Supply & Delivery of Vortex Grit Removal & Classifier, Section 46 53 00; Request for Proposals; Township of South Stormont, Ingleside WWTP Process Equipment Pre-Selection, RFP No. 14 - 2020, ON; EVB Engineering. Including all addenda.	

A. Proposal Introduction

Claro has the pleasure of offering a design & costs proposal for the subject grit removal equipment for the Ingleside WWTP. We are proposing two (2) x 360 degree model vortexes that match the arrangement outlined in the RFP document drawings. The system is provided at **special preselection costing and with a 5-year warranty**.

The design embodies a proven grit removal technology and provides for a high level of protection for downstream equipment and tanks. Our grit systems also work in tandem with the screenings filter mat operational philosophy of the proposed Claro 3mm step screens that capture a significant fraction of grit and contaminants in advance of the vortex systems – and thus help to yield a cleaner, drier product with no standing water within the bin and an option to use a hygienic bagging system.

The proposed Claro grit removal system is composed of:

- Two (2) 360-degree forced vortex units that are constituted of all AISI 316L wetted components including: drive tube, paddle system, in-tank grit extraction piping, water scour & air scour piping and solenoids. The paddle system is driven by a hardened steel component planetary gear drive & a Class 1, Div. I-rated 600/3/60 motor. Planetary gear drive has a service factor of >20.

- Two (2) 4x4" self-priming Gorman-Rupp Super T grit pumps (one pump for each vortex unit). The self-priming Gorman-Rupp pump is built with wetted hardened steel construction for better resistance against abrasion. This hardened steel is Grade 4 Austempered Ductile Iron. An optional side channel blower is provided for the vortex air scour to further separate organics from the captured grit, which aims to provide an even cleaner, drier grit product. One side channel blower is provided for duty for both vortex units since it operates infrequently (perhaps 6-15 minutes maximum per day) and is not a critical function item. Air can also be tapped from the existing SBR aeration blower line in lieu (or) the units can also operate without air scour (to be discussed).

- One (1) AISI 316L shaftless spiral grit classifier c/w two (2) hydrocyclones and support stand. The classifier shaftless spiral is made of special Swedish cold rolled micro alloy flat bar with a nominal Brinell Hardness of 225 – the best material for resilience and abrasion resistance for grit extraction applications. Claro employs Swedish micro alloy steel in screenings, grit, dewatered sludge & other conveying applications. Even in grit applications such as grit classifiers and aerated grit tanks, the proposed spiral material has a superior performance to 'chrome alloy,' 44W or Hardox edged welded steel spirals. Service life in screenings applications is typically in excess of 15 years and often significantly greater. Swedish micro alloy spirals at ROPEC (Ottawa, ON) & Moncton, NB aerated grit screws provided 25+ years service before PM replacement. The spiral is supported by Hardox bars welded to a 2mm stainless steel subliner (max. length 1200 mm) for ease of eventual replacement. The proposed shaftless spiral classifier design does not incorporate bottom bearings & seals, which eventually leak and require maintenance that tends to include operator entry into the sedimentation tank. Outlet provided with an optional hygienic bagger. Extended extraction conveyor to match bin location provided if required.

All motors and instrumentation are rated for a minimum Class 1, Div. I explosion-proof environment. All mechanical equipment is fabricated under ISO 9001 & ISO 14001 certification.

The proposed Claro control system is composed of:

- One (1) main control panel including local HOA control stations: we have proposed our recommended grit removal control panel design c/w 12" colour intuitive graphic interface and Allen-Bradley CompactLogix PLC. The panel also includes all starters and other elements for a fully-functional plug-&-play control system as specified.

Thank you for reviewing our proposal materials. If you have comments or questions, please feel free to contact us or Scott Lenhardt of Pro Aqua, our Ontario manufacturer's representative. We will be happy to make modifications to this proposal that reflect your project application needs. We would also be pleased to provide a complete technical presentation in your offices.

Thank you & regards,

Peter Lipert Jr.

Peter Lipert Jr.
General Manager
3065, rue Peugeot,
Suite 100
Laval, QC H7L 5C4 Cell.: 514.562.4575 pjr@claroglobal.com

B. Corporate Experience

i. Information Regarding Claro's Staff

- The following personnel would be most directly involved in the design & implementation of the Ingleside screening application:

1) Lead Designer (& Author of this Proposal): Peter Lipert Jr. (General Manager, Claro): Fourteen (14) years experience with the proposed grit system including controls design & operator training. Peter also has started-up all of the systems currently operating in Canada.
2) Design Review & Support: Daniel De Carufel, P.Eng. (Senior Project Engineer, Claro): 30 years experience in the wastewater treatment field including grit removal & classifier systems.
3) Control Panel Design & Programming: Claude Samson (Franklin Empire Inc): Mr. Samson has designed & programmed all of our control panels for the past 15 years. 20+ years experience in the field. Mr. Samson works at a custom control panel builder nested inside our builder, Franklin Empire. Mr. Samson accompanies the Claro commissioning technician for start-up to ensure that the start-up/SCADA integration unfolds smoothly. There are 3 additional programmers with knowledge & experience of Claro panels & start-up procedures: Jean-François Beland, Laurie Myriam Lavigne, & Sébastien Ouellet.

- Below, the key office personnel who would be supporting the project:

4) Design Review & Support: Peter Lipert Sr. (Technical Director, Claro): Fourteen (14) years experience with the proposed grit removal system. 35 years experience as a designer/inventor in the field of wastewater treatment.
5) Additional Project Management: Teva Forgue (Project Manager, Claro): Twenty (20) years experience in project management & applications design for municipal wastewater and industrial applications.
6) Mellegard & Naij AB, Sweden – brief profile below.

ii. Corporate Profiles & Personnel

This section includes a brief description of the corporate profile of the supplier firm including Canadian representatives and years in the Canadian market. The following is identified: staff and their location, and who will be available for servicing and maintenance assistance after the commissioning of the process equipment is complete.

- Claro Environmental Technologies – Brief Introduction

Claro is a Canadian designer, manufacturer and distributor of OEM wastewater treatment equipment systems. Claro is responsible for overall grit removal system design, commissioning, & aftersales support, including controls, installation supervision, system optimization & operator training.

In addition to the staff dedicated to this project cited above, Claro has extensive experience in the implementation of grit removal systems, is committed to the best value engineering solution at the design phase and conscientious follow-up on an on-going, periodic basis after start-up. Claro has a 24-hour hotline for operations & maintenance advice. The line is typically staffed by Claro General Manager, Peter Lipert. Claro is also 1 hour and 20 minutes drive from Ingleside. We welcome questions & comments at any time.

Experienced local Ontario-based support: Providing treatment solutions and process equipment for the water and wastewater industries for 30 years, Pro Aqua is Claro's Ontario

representative. Pro Aqua offers professional local process equipment support based in Milton, ON – approx. 4 hours & 20 minutes from Ingleside, ON.

Contact Information:

Claro is located in Laval, Quebec (10 minutes outside Montreal); 24-hour tel.: 514.562.4575.

Pro Aqua, Inc.: Claro manufacturer's representative is located at: 264 Bronte Street South, Unit #7, Milton, ON, L9T 5A3; T.: 905.864.9311; https://proaquasales.com

The maintenance requirements for the vortex grit removal units, classifiers & grit pumps are minimal. Spare parts requirements have also proven to be exceptionally low. Once required, however, Claro has the resources to support operators & a full complement of spares for every system that it implements.

Photo of ISO 9001 stainless only shop from Admin/design office's observation window

In addition to screening systems, Claro designs and manufactures fine screening, shaftless spiral conveyor, anaerobic digestion, and heat exchanger & heat recovery equipment (for more information, please see: www.claroglobal.com). Claro has demonstrated its design & project management proficiency by implementing these OEM designs for clients such the City of Edmonton, Gold Bar WWTP (main plant; 6 x 110 ft. dia. digesters + 11 heat exchangers & 2 x 33 m. long aerated grit tank retrofits), Metro Toronto (7 x 110 ft. dia. digesters), Thunder Bay (4 x 70 ft. dia. digesters), London (1 x heat recovery heat exchanger for incinerator ash slurry), City of Laval (2 x aerated grit tank retrofits), Cornwall (2 x automated conveyor sludge outloading system), 8 x 110 ft digesters for the City of Bogotá and other projects. As a technology company, our senior engineering staff offers a flexibility of approach that balances existing methods with a proven track record of innovation and project-specific solutions.

Claro is partnered with an ISO 9001-certified stainless steel-only fabrication shop located in Montreal that fabricates all of our OEM equipment and can address all elements of fabrication on an expedited schedule.

Claro is represented in Canada by:

- Sansom (http://sansom.ca): New Brunswick, Nova Scotia, Newfoundland & Labrador, & Prince Edward Island.
- Brault Maxtech (http://www.braultmaxtech.com/en/index.asp): Québec
- Pro Aqua (http://www.proaquasales.com): Ontario
- Mequipco (http://www.mequipco.com/index.html): Manitoba, Saskatchewan, Alberta, British Colombia & NWT.

Claro is a privately-held, family company that is federally incorporated in Canada. It was founded in 2005 & incorporated in 2006.

2. Form of Proposal

Ingleside WWTP Upgrades

Vortex Grit Removal: 46 53 00
Process Equipment Pre-Selection

EVB Engineering
EVB Ref: RFP N° 14 - 2020
Township of South Stormont, ON
Claro Ref: 17089-Q-01

A. General Proponent Information – Need to update form to include Addenda 2, 3

APPENDIX C – SUBMISSION FORM

A. General Proponent Information

The undersigned hereby acknowledges that he/she, as an officer of the stated corporation, has read and understands the specifications, requirements, and proposed agreement regarding the **Equipment Preselection** for the Ingleside WWTP, Township of South Stormont. He/she further acknowledges that the seller's proposed product, equipment, materials, and services fully meet or exceed those as specified in the Township's RFP. Additionally, the Proponent agrees that all its technical and financial documents and responses to the aforementioned RFP will, at the option of the Township, become a legally binding and essential portion of the final contract agreement between the successful Proponent and the Township following execution of the contract agreement.

The following information must be completed to ensure tender acceptance.

*ADDENDA No. 1 to 4 INCLUSIVE WERE CAREFULLY EXAMINED.

DATED THIS 14th DAY OF September, 2020.

PROPONENT'S COMPANY NAME: Claro Environmental Technologies, Inc. (4382510 Canada Inc.)

ADDRESS: 3065 Rue Peugeot

Suite 100

CITY/ PROVINCE: Laval / QC POSTAL CODE: H7L 5C4

PHONE NO.: +1 514-562-4575 FAX NO.: (E-mail is preferred for speed of reply.)

EMAIL ADDRESS: pjr@claroglobal.com

WEBSITE: www.claroglobal.com

CONTACT NAME (please print): Peter Lipert, Jr.

TITLE (please print): General Manager PHONE NO.: +1 514-562-4575

AUTHORIZED SIGNATURE:

HST REGISTRATION NO: 840776520 RT 0001

WSIB COVERAGE: YES NO (Claro is, however, covered by the Québec equivalent, CNESST and all other required insurances.)

* The proponent shall attach and initial all addenda received during the period and shall take them into consideration when preparing their bid submission. A signed copy of each Addendum must be included with the bid submission. Failure to comply may be cause for rejection of bid submission.

2. Acknowledgment of Non-Binding Procurement Process

The proponent acknowledges that the RFP process will be governed by the terms and conditions of the RFP, and that, among other things, such terms and conditions confirm that this procurement process does not constitute a formal, legally binding bidding process (and for greater certainty, does not give rise to a Contract A bidding process contract), and that no legal relationship or obligation regarding the procurement of any good or service will be created between the Township and the proponent unless and until the Township and the proponent execute a written agreement for the Deliverables.

3. Ability to Provide Deliverables

The proponent has carefully examined the RFP documents and has a clear and comprehensive knowledge of the Deliverables required. The proponent represents and warrants its ability to provide the Deliverables in accordance with the requirements of the RFP for the rates set out in its proposal.

4. Non-Binding Pricing

The proponent has submitted its pricing in accordance with the instructions in the RFP. The proponent confirms that the pricing information provided is accurate. The proponent acknowledges that any inaccurate, misleading, or incomplete information, including withdrawn or altered pricing, could adversely impact the acceptance of its proposal or its eligibility for future work.

5. Addenda

The proponent is deemed to have read and taken into account all addenda issued by the Township prior to the Deadline for Issuing Addenda.

6. Communication with Competitors

For the purposes of this RFP, the word "competitor" includes any individual or organization, other than the proponent, whether or not related to or affiliated with the proponent, who could potentially submit a response to this RFP.

Unless specifically disclosed below under Disclosure of Communications with Competitors, the proponent declares that:

(a) it has prepared its proposal independently from, and without consultation, communication, agreement or arrangement with any competitor, including, but not limited to, consultation, communication, agreement or arrangement regarding:

(i) prices;

(ii) methods, factors or formulas used to calculate prices;

(iii) the quality, quantity, specifications or delivery particulars of the Deliverables;

(iv) the intention or decision to submit, or not to submit, a proposal; or

(v) the submission of a proposal which does not meet the mandatory technical requirements or specifications of the RFP; and

(b) it has not disclosed details of its proposal to any competitor and it will not disclose details of its proposal to any competitor prior to the notification of the outcome of the procurement process.

Disclosure of Communications with Competitors

If the proponent has communicated or intends to communicate with one or more competitors about this RFP or its proposal, the proponent discloses below the names of those competitors and the nature of, and reasons for, such communications:

Not Applicable.

7. No Prohibited Conduct

The proponent declares that it has not engaged in any conduct prohibited by this RFP.

8. Conflict of Interest

The proponent must declare all potential Conflicts of Interest, as defined in section 3.4.1 of the RFP. This includes disclosing the names and all pertinent details of all individuals (employees, advisers, or individuals acting in any other capacity) who (a) participated in the preparation of the proposal; **AND** (b) were employees of the Township within twelve (12) months prior to the Submission Deadline.

If the box below is left blank, the proponent will be deemed to declare that (a) there was no Conflict of Interest in preparing its proposal; and (b) there is no foreseeable Conflict of Interest in performing the contractual obligations contemplated in the RFP.

Otherwise, if the statement below applies, check the box.

❑ The proponent declares that there is an actual or potential Conflict of Interest relating to the preparation of its proposal, and/or the proponent foresees an actual or potential Conflict of Interest in performing the contractual obligations contemplated in the RFP.

If the proponent declares an actual or potential Conflict of Interest by marking the box above, the proponent must set out below details of the actual or potential Conflict of Interest:

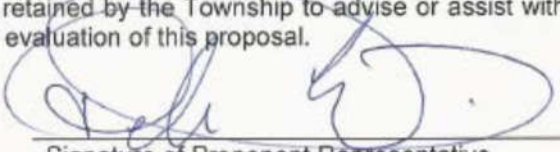
_____

_____

_____

9. Disclosure of Information

The proponent hereby agrees that any information provided in this proposal, even if it is identified as being supplied in confidence, may be disclosed where required by law or by order of a court or tribunal. The proponent hereby consents to the disclosure, on a confidential basis, of this proposal by the Township to the advisers retained by the Township to advise or assist with the RFP process, including with respect to the evaluation of this proposal.



Signature of Proponent Representative

Peter Lipert, Jr.
Name of Proponent Representative

General Manager
Title of Proponent Representative

September 8th, 2020
Date

I have the authority to bind the proponent.

Claro

B. System #2 Submission Forms – Vortex Grit Removal & Classifier

Township of South Stormont Ingleside WWTP Contract No. 14 - 2020	**Vortex Grit Removal Equipment Preselection Form of Proposal**	Project No.19070 Page 1 of 5

PART 1 FORM OF PROPOSAL

(See Clause 24 in General Terms and Conditions for Instructions)

BY: Claro Environmental Technologies (4382510 Canada Inc.)
Suite 100 - 3065 Rue Peugeot
Laval, QC H7L 5C4

TO: The Corporation of the Township of South Stormont

C/O Jamie Baker
Project Manager
EVB Engineering
800 Second Street West
Cornwall, ON K6J 1H6

FOR:

Pre-Selection of System #2: Supply, delivery and commissioning of the Vortex Grit Removal System with Grit Classifier for the Ingleside WWTP, Township of South Stormont.

P1.0 We, the above-named Equipment Supplier, having carefully examined the quotation documents issued by the Engineer, including the General Terms and Conditions, Specifications and other related documents if any, herewith submit in duplicate and in accordance with the Terms and Conditions set out in the aforementioned documents our quotation for the equipment listed hereinafter.

P2.0 We agree that, in case of any conflict between any of the terms and conditions set out in the documents which we submit, together with this Form of Quotation & Schedule and the Terms and Conditions set out in the quotation documents issued by the Engineer, the provisions of the latter documents shall take precedence and shall govern.

P3.0 We agree to the following requirements as noted in the Owners General Terms and Conditions For Preselected Equipment.

.1 Validity period of this Quotation shall be **240 days** from closing date for quotations.

.2 Manuals and Parts Lists are to be supplied as listed in the specifications.

.3 Shop drawings are to be supplied as listed in the specifications.

.4 Services required at site: The Supplier shall be responsible for verifying site conditions including accessibility and minimum clearances for sizing of equipment as well as assistance in commissioning the equipment.

P4.0 The proposal documents include the Submission Form, the Form of Proposal, including all Financial and Technical Details, Schedule, reference sheet from Supplier's recent installation, the General Terms and Conditions, the Request for Proposal documentation and the Technical Specifications.

Claro Environmental Technologies
4382510 Canada Inc.
Name of Supplier

Signature of Authorized Officer

Witness (Name & Signature)
Sean Lapalme P.Eng.
Project Engineer
Claro Environmental Technologies

September 9th, 2020
Date

Please see below & left for seal
Company Seal

Claro Environmental Technologies 4382510 Canada Inc.

1.1 FINANCIAL DETAILS

1. Supply and delivery of the Vortex Grit Removal Units, Grit Pumps and Grit Classifier and the associated equipment complete as specified. 1a. Vortex Grit Units 1b. Grit Pumps 1c. Grit Classifier 1d. Vortex Grit PLC Control Panel (Addendum 4 Line Item)	[redacted]
2. Preparation and delivery of Shop Drawings.	
3. Services at site, including all expenses, as specified in the Technical Specification (46 43 00, 3.4) and Clause 15.0 (Category 2) Commissioning of the Installation for the Grit Removal Systems.	
Total Quoted Price (1+2+3)	
Per diem rate for additional field work not included in the above	
Total Price Valid For	240 Days
Delivery of Shop Drawings	2 - 4 Weeks (or better if required)
Delivery of Equipment for Each Phase (after approved shop drawings)	12 -20 Weeks (or better if required)
*Amount of Currency Exchange USD/CAD	[redacted]
*Additional Amount of Duty Paid (if applicable)	
Percent of Imported Components (if greater than 10%)	
***Please see potential 30,000 CAD deduct if the screening (46 43 00) & grit removal systems (46 53 00) are purchased/shipped together & the start-up days/tasks are considered in common. Additional days will not be charged for completion of start-up of both systems in order to preserve deduct. Note: Deduct applicable only once. - [Optional Adder 01 for air scour solenoid/ball valve: 950 CAD if tapped to blower line; Optional adder 02: side-channel Blower: 4850 CAD.	
*Actual cost in dollars carried in bid must be placed in the spaces provided. *Proponents wishing to submit multiple designs shall complete this form for each submission. *Pricing to be quoted in Canadian Funds.	

Note: **Claro will not request any currency fluctuation adders. The stated prices are firm for the required validity period without exception.

1.2 TECHNICAL DETAILS

.1 Vortex Grit System Description

Parameter	Description
Manufacturer of Vortex Grit Unit	Claro Environmental Technologies
Make of Vortex Grit Unit	Claro VortiClar Forced Vortex
Model of Vortex Grit Unit	Claro FV3000-20.8
# of Vortex Grit Units	Two (2)
Manufacturer of Grit Classifier	Claro Environmental Technologies
Make of Grit Classifier	Claro Shaftless Spiral Grit Classifier
Model of Grit Classifier	CL-250H including 2 Krebs Hydrocyclones
# of Grit Classifier(s)	One (1) serving 2 forced vortex tanks
Manufacturer of Grit Pump	Gorman-Rupp
Make of Grit Pump	Super T Series
Model of Grit Pump	T4AA71S-B – 4" x 4" & ADI Wetted Construction
# of Grit Pumps	Two (2) – direct drive or belt-driven (as preferred / footprint to be discussed)
Effective Flow Rate	0 m^3/d to 26, 500 m^3/d
Required Channel Dimensions	Influent Width: 650 mm Influent Total Depth: 1500 mm approach from screens; 15° inclined vortex inlet 650 mm deep Influent Water Level @ ADF: 245 mm Based on 9" Parshall Influent Water Level @ PF: 595 mm +25 mm Headloss Based on 9" Parshall; vortex inlet coordinated with peak level; 12" Parshall is also acceptable (to be discussed) Effluent Width: 650 mm Effluent Total Depth: 1500 mm Effluent Water Level @ ADF: 245 mm Effluent Water Level @ PF: 595 mm

Parameter	Description
Vortex Grit Removal Unit Removal Efficiency	95 % of grit greater than 50 mesh 85 % of grit greater than 70 mesh 65 % of grit greater than 100 mesh 38 % of grit greater than 140 mesh
Grit Classifier Unit Design Inflow Grit Slurry Rate	10.5 l/s to 15.8 l/s (with hydrocyclone)
% reduction	95 -97% reduction by Volume / Mass (circle) with hydrocyclone
Maximum Daily Grit Load	Approx. 8.5 m^3/d can be conservatively extracted by the CL-250H classifier. Expected max for the peak flow is 1 m3/day. The hydrocyclone captures the percentage as specified i.e. approx. 95% of >50 Microns by Volume/Mass (Circle)

.1 A detailed list of spare parts and parts cost estimate is enclosed. Yes / No (circle one)

.2 Provide weight of vortex grit drive, grit pumps and grit classifier.
Yes / No (circle one)

.3 All drawings, technical data and supporting documentation that fully describe and demonstrate that this quotation meets the required specifications are attached. Yes / No (circle one)

.4 Deviations and/or alternatives are separately noted. Yes / No (circle one)

.5 Provide a detailed estimate of the annual operation and maintenance costs of running the equipment. Yes / No (circle one)

.6 Provide a list of all ancillary components required for a complete operating system which are not supplied with this quotation. State the required design capacity and any pertinent design characteristics for any equipment that must be supplied by the Owner. Yes / No (circle one)

.7 Provide a list of a minimum of five (5) previous installations, noting the closest installation to the Owner, that have been in operation for a minimum of five (5) years, with design conditions similar to those required herein, where possible. Provide the following information for each installation:

- .1 Owner
- .2 Owner contact information
- .3 Contract contact information
- .4 Brief description of the equipment provided
- .5 Capacity of equipment
- .6 Year the equipment was put into operation
- .7 Value of supply contract

END OF SECTION

1.2.2 Claro Contact Reference List

.1 Reference Installation 01: Fort Nelson WWTP, BC – Vortex FV3050-20 (2017)

Claro

Screening & Grit Removal Systems – Installation Photos/Drawings

Fort Nelson, BC - Fine Screening & Grit Removal System (2017)

- **Fine Screening System:** Claro Fine Step Screen (model 2800-400-6mm), Wash Press (model 200-2000 including Discharge Tube & Hygienic Bagger
- **Grit Removal System:** Claro VortiClar™ Forced Vortex (model 3050-20), Grit Pump (model Gorman-Rupp 3X3 Direct Drive Self-Priming), Grit Classifier (model CL-250) & Side-Channel Blower
- **Control Panel System:** Complete plug-&-play PLC control panel with all components for a fuly-functional system including all starters, VFDs, motor protection, surge protection etc.
- Note: System configured for capacity & redundancy expansion with 2nd step screen

• •

- **Grit Removal System:** Claro VortiClar™ Forced Vortex (model 3050-20), Grit Pump (model Gorman-Rupp 3X3 Direct Drive Self-Priming), Grit Classifier (model CL-250) & Side-Channel Blower

screening
grit removal
Claro

Claro

Fort Nelson WWTP, BC
Additional Project Information

Contact Reference 01

Owner: Northern Rockies Regional Municipality, BC

Owner representative (Contact Information):
• Harold de Jong, Utility Supervisor, Northern Rockies Regional Municipality, Town of Fort Nelson;
T.: 250-500-1910; hdejong@northernrockies.ca

Project Overview:

• One (1) Fine Step Screen model 2800-400-6mm rated 216 l/sec; 417 m3/h, One (1) Wash Press model TP-200-2000 rated 1.0 m3/h; Wash press designed to accept second future screen for doubling of flow capacity to 20,000 m3/day; forced vortex system (3000 mm dia.) including self-priming Gorman-Rupp grit pump, side channel blower, grit classifier & common screening & grit removal control panel. New application; hard specified.

Date of Substantial Completion / Start-up:
Fort Nelson WWTP, BC (May 2017)

Capacity:
One (1) Fine Step Screen model 2800-400-6 rated 216 l/sec; 417 m3/h, One (1) Wash Press model TP-200-2000 rated 1.0 m3/h; Vortex peak flow: 26,500 m3/day.

Contract Value: [redacted]

.2 Reference Installation 02: Fort St. John WWTP, BC – Vortex FV4250-53.2 (2018)

Claro

Screening & Grit Removal Systems – Installation Photos/Drawings

Fort St. John, BC - Coarse Pre-Screening, Fine Screening & Grit Removal System (2018)

- **Grit Removal System:** Claro VortiClar™ Forced Vortex (model 4250-53.2), Grit Pump (Model Gorman-Rupp 4X4 Direct Drive Self-Priming), Grit Classifier (model CL-320) & Side-Channel Blower

Claro

Fort St. John, BC
Additional Project Information

Contact Reference 02

Owner: City of Fort St. John, BC

Owner representative (Contact Information):

• Garland Durnford, Superintendent; T.: 250-787-2745; GDurnford@fortstjohn.ca

Project Overview:

Screening and grit removal equipment supply. Grit portion consisted of a model FV4250-53.2 vortex tank, a 4" Gorman-Rupp self-priming pump (direct driven), a side channel blower and a model CL-320 grit classifier. Vortex tank peak flow: 53,200 m^3/day

Date of Substantial Completion / Start-up:

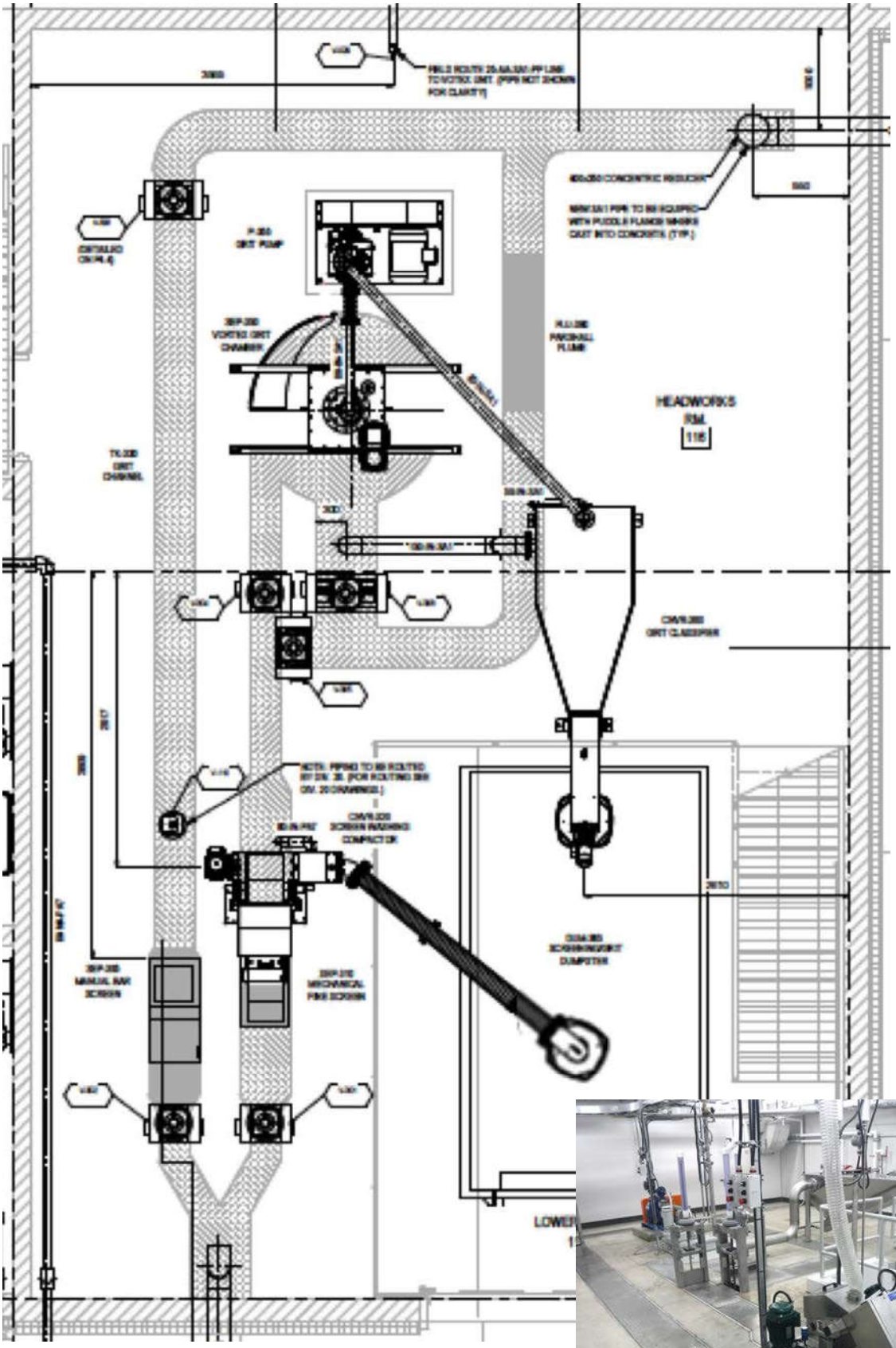
June 2018

Capacity:

Vortex tank: 53,200 m^3/day

Contract Value: [redacted]

.3 Reference Installation 03: Chalk River WWTP, ON (2018)



Chalk River, ON
Additional Project Information

Contact Reference 03

Owner: Canadian Nuclear Laboratories

Owner representative (Contact Information):

Derrick Reynolds, Chalk River WWTP; 286 Plant Road, Chalk River, ON K0J 1J0; T.: 613.584.3311 x 44720; derrick.reynolds@cnl.ca

Project Overview:

One fine step screen and wash press compactor. One vortex grit removal system rated for up to 3,800 m^3/day. System includes one 1900mm diameter vortex tank, one belt driven self-priming grit pump (Gorman-Rupp), side channel blower and grit classifier.

Date of Substantial Completion / Start-up:

May 2018

Capacity:

3,800 m^3/day

Contract Value:

[redacted]

.4 Reference Installation 04: Virden WWTP, MB (2018)

Virden, MB
Additional Project Information

Contact Reference 04

Owner: Virden, MB

Owner representative (Contact Information):

Ron Routledge, Utilities Manager, Virden WWTP; T.:204.748.2440 x 3, C.: 204.851.2933; virden_sup@mymts.net

Project Overview:

One 2300mm diameter vortex grit tank, two grit pumps (100% redundancy), one grit classifier – model CL-250 – c/w hydrocyclone. Self-supporting grit tank made from stainless steel. Control panel and local HOA stations also provided.

Date of Substantial Completion / Start-up:

July 2018

Capacity:

10,800 m^3/day

Contract Value:

[redacted]

.5 Reference Installation 05: St. Félix-de-Valois WWTP, QC (2019)

screening
grit removal
Claro

Saint-Felix-de-Valois, QC
Additional Project Information

Contact Reference 05

Owner: Municipalité de Saint-Felix-de-Valois

Owner representative (Contact Information):

Alain Ducharme, Director of Public Works, T.: 450.889.5589 x 7721
(Note: French language contact)

Project Overview:

Two (2) step screens, model 2100-550-3 (100% redundancy); Two (2) wash presses c/w bagging system, model 200-700; One (1) vortex grit removal unit, model FV2500-12, one (1) 3” grit pump, one (1) grit classifier, model CL250. Common screening & grit removal control panel.

Date of Substantial Completion / Start-up:

2019

Capacity:

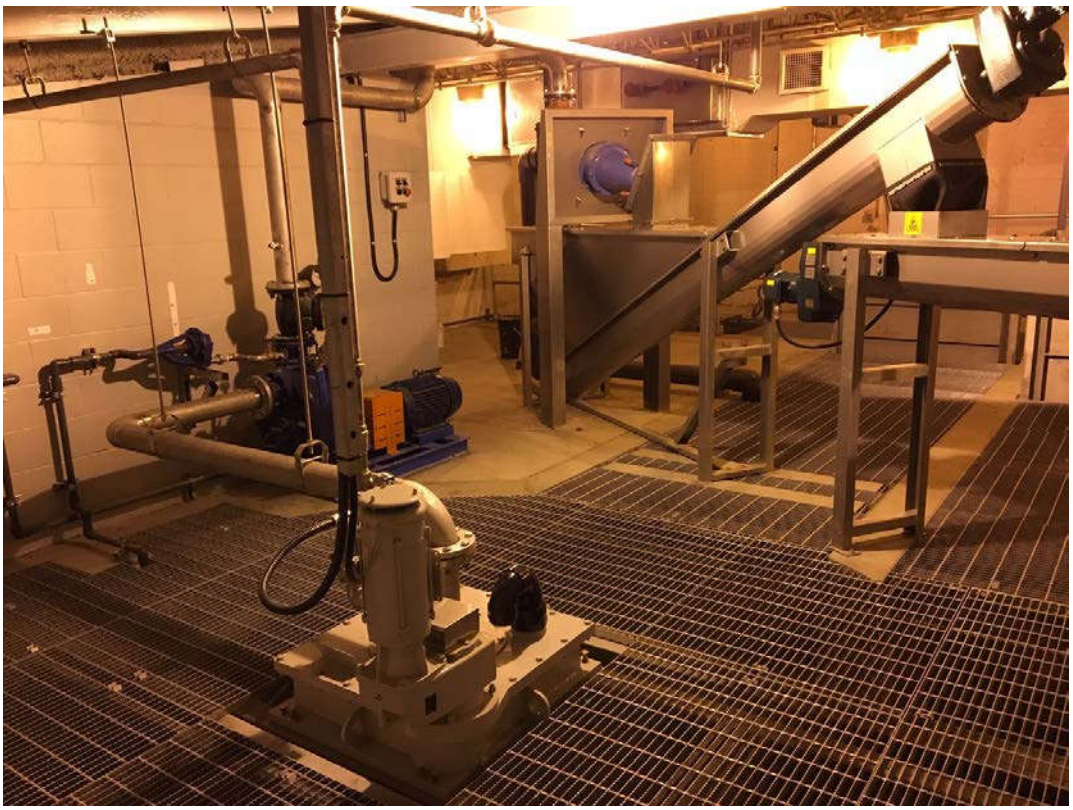
Vortex peak flow: 12,000 m3/day.

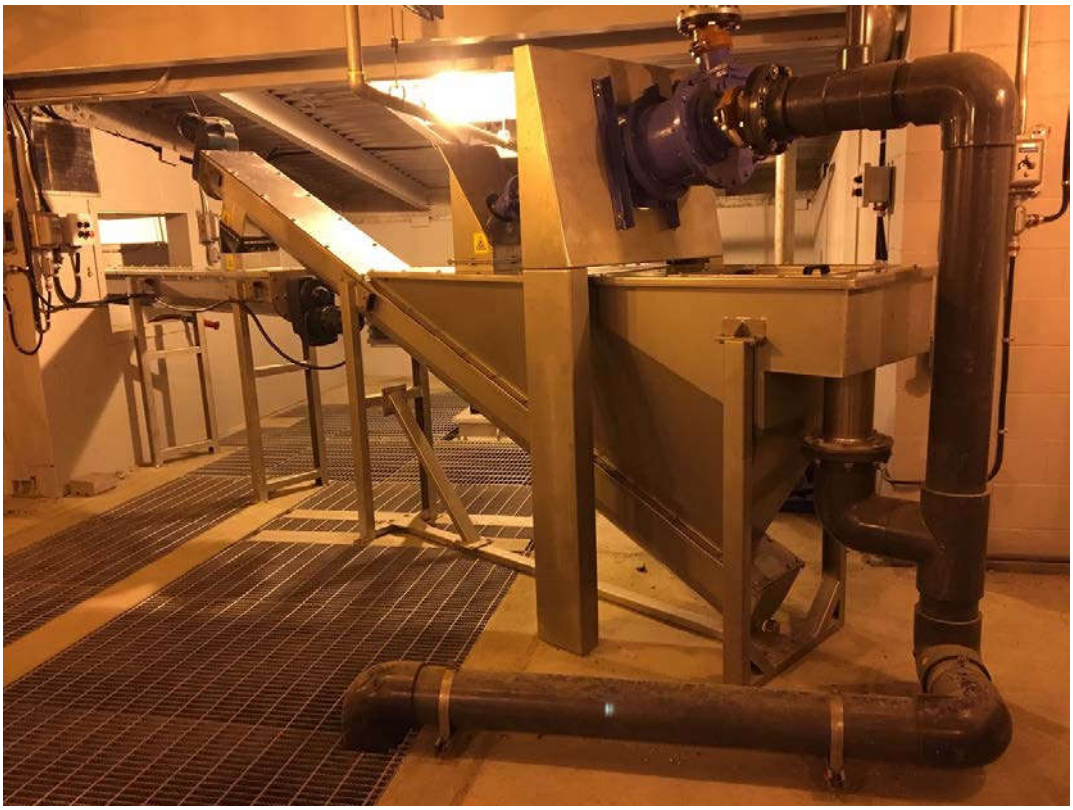
Contract Value:

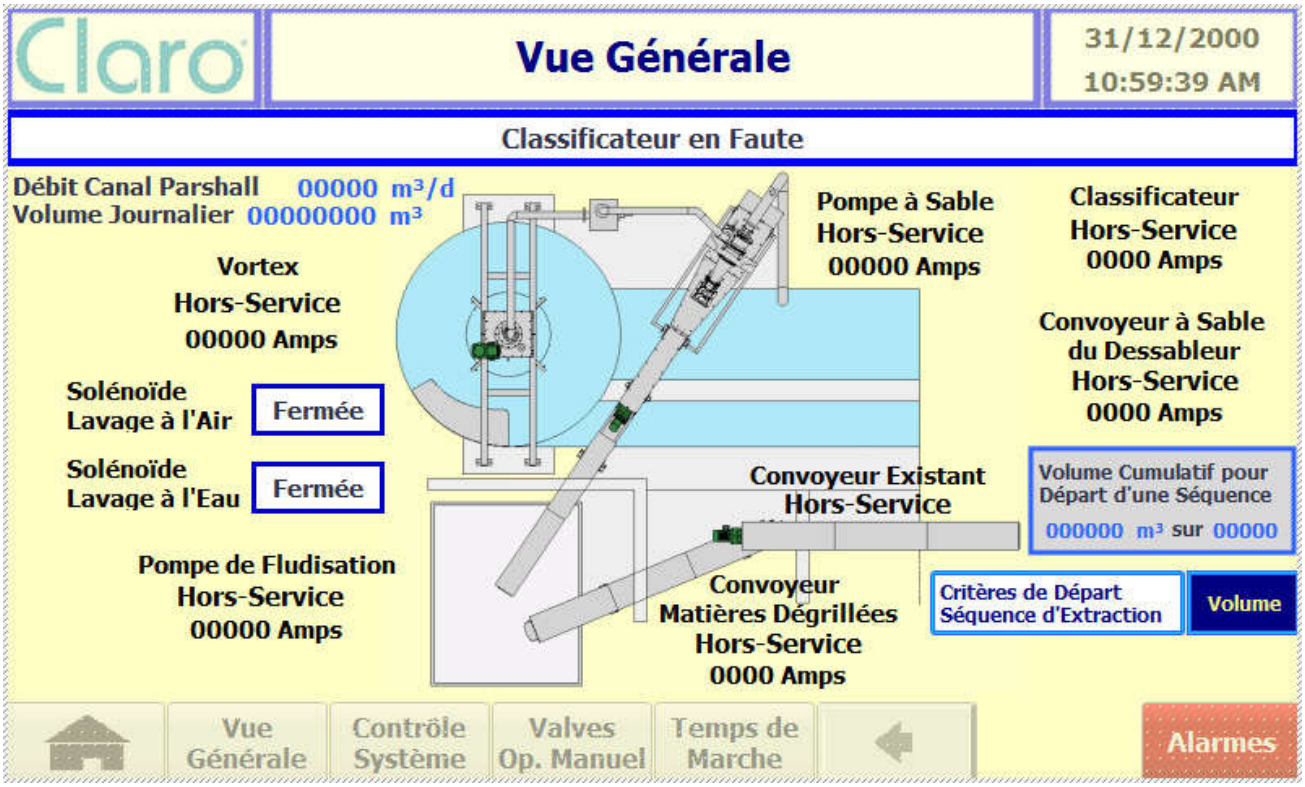
[redacted]

1.2.3 Additional Grit Removal Installation Photographs (to Demonstrate Experience & Capabilities)

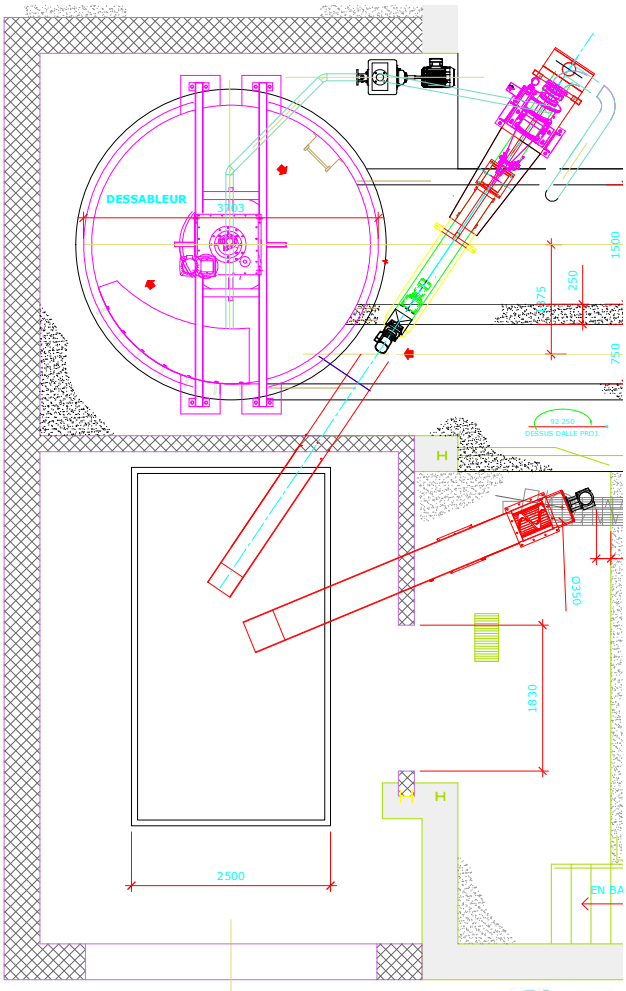
.1 Shawinigan WWTP, QC (2018) – Vortex, Grit Pump, Classifier & Control Panel







- Sample HMI Screen from Shawinigan reflecting overall layout of project.

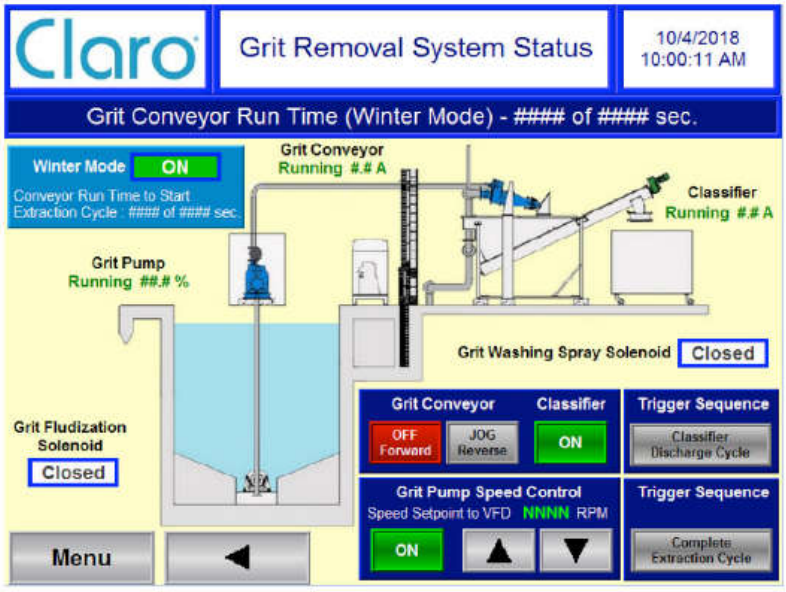


.2 Uxbridge WWTP, MA – Classifier Model CL-250H c/w Hydrocyclone & Stand

Grit Removal Systems – Installation Photos

Uxbridge, MA (2019)

- **Shaftless spiral grit classifier c/w hydrocyclone + independent stand & continuous automatic hygienic bagger; AISI 304L construction**
  - Classifier unit discharges clean & dry grit - no standing water in receiving bin.



- **PLC-based control panel with intuitive graphic interface based on the Uxbridge WWTP project drawings representing all real-time operational values & set points for ease of use & optimization.**

Uxbridge WWTP, MA – Gorman-Rupp Grit Pump, FRP Pump House & Retrofitted Grit Tank & Protected by 6mm Claro Step Screening System

Claro

Grit Removal Systems – Installation Photos

Uxbridge, MA (2019)

- 1 x aerated grit tank shaftless spiral extraction system; capacity 5.6 MGD (883 m3/h); retrofit of chain & bucket system; pushing spiral arrangment:
  - submersible hydraulic motor & power pack
  - abrasion-resistant micro alloy shaftless spiral
  - GR grit pump including heated & insulated FRP enclosure with access doors
  - shaftless spiral grit classifier c/w hydrocyclone & independent stand
  - PLC-based controls with intuitively-designed touch screen interface.

- Photo: drained grit tank with tank-in-operation inset (grating covers removed).

- Grit pump, local controls, heated & insulated FRP enclosure with front & side door access.

- Inset: Hydraulic power pack that drives grit extraction spiral with a special submersible hydraulic motor c/w with pivotting outdoor enclosure.

Claro™

.3 Deseronto, ON (2016)
Modular Screening & Grit Removal System
Claro Fine Step Screening System (6mm) Protecting an In-Tank Aerated Grit Tank System

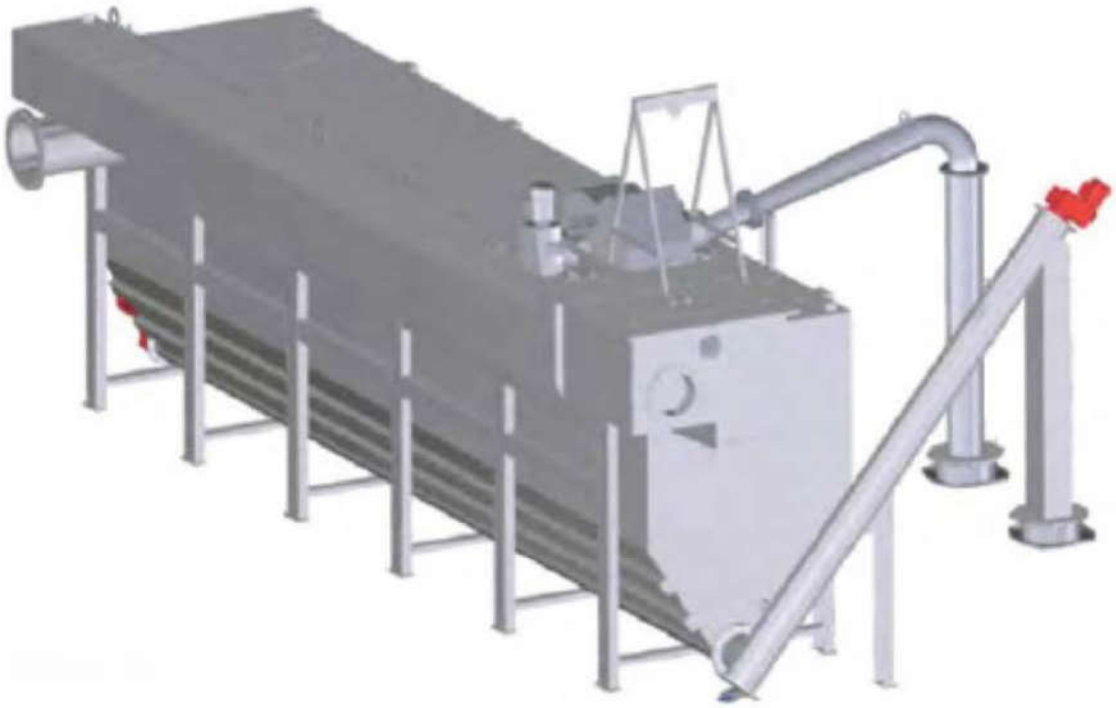
Fine Screening & Grit Removal Systems – Installation Photos/Drawings

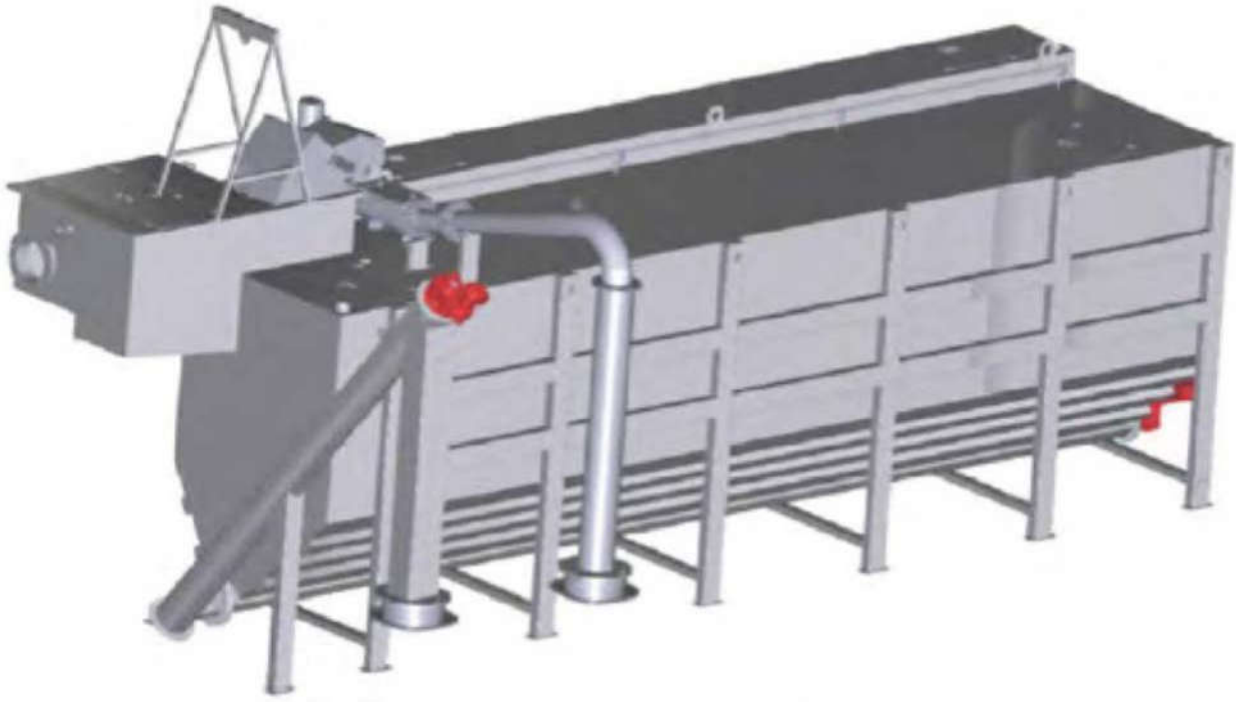
Deseronto, ON (2016)

- 1 x fine step screen (6mm)
- 1 x wash press
- 1 x hygienic bagger
- 1 x aerated grit tank c/w
- 1 x horizontal grit conveyor
- 1 x inclined grit conveyor c/w chute & hygnienic bagger
- 2 x side-channel blowers (duty & standby) for grit tank aeration manifold system
- 1 x manual bar rack & rake & 1 grit by-pass channel
- 1 x integrated screen lift system for ease of maintenance
- 1 x common control panel & local stations
- All 304L construction & special microalloy steel spirals

Claro

Fine Screening & Grit Removal Systems – Installation Photos/Drawings

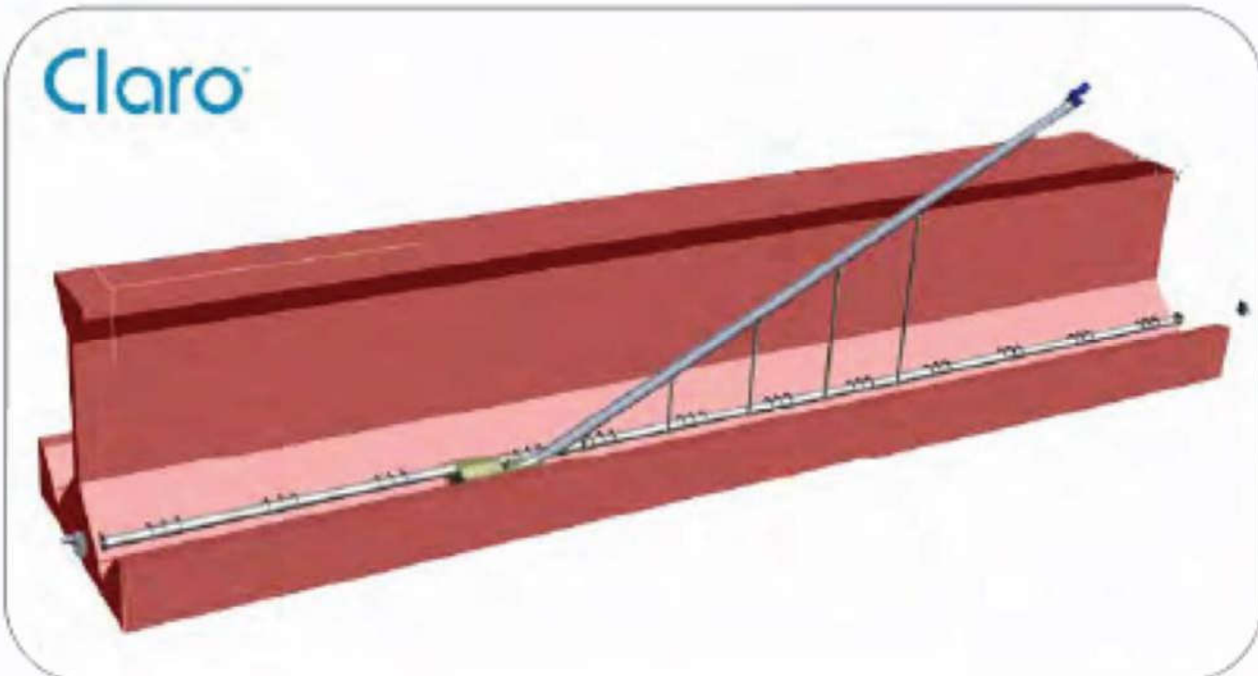




.4 Gold Bar WWTP, AB
Edmonton Main Plant – Aerated Grit Tank Retrofit
Sample Installation Photos (2015-16)

Gold Bar WWTP - Main Plant Edmonton, AB (2015-16)

- **Two 36 m. long aerated grit extraction tanks, each equipped with a shaftless spiral grit extraction system consisting of: two (2) horizontal pushing conveyors (26 m. & 9.5 m) discharging into a specially-designed common sump at approx. 2/3 tank length position. In lieu of a grit pump & separate grit classifier, the client opted for a third shaftless spiral conveyor that extracts, dewaters & discharges the grit into an indoor outloading room. This option also enables signficantly larger diameter debris transport. Special shaft seals that enable packing change without tank drainage & stainless steel-backed low-friction liners implemented. Special extended shaft arrangement at inlet end of tank, which passes under existing influent channel.**



Claro Conveyors

Gold Bar WWTP - Main Plant Edmonton, AB (2015-16)

- **Inclined dewatering & classification conveyor (SC-3) collects grit from the two (2) submerged horizontal grit extraction conveyors (SC-1 & SC-2). The inclined extraction conveyor unit eliminates the use of a grit pump, a separate grit classifier unit & interconnecting piping.**

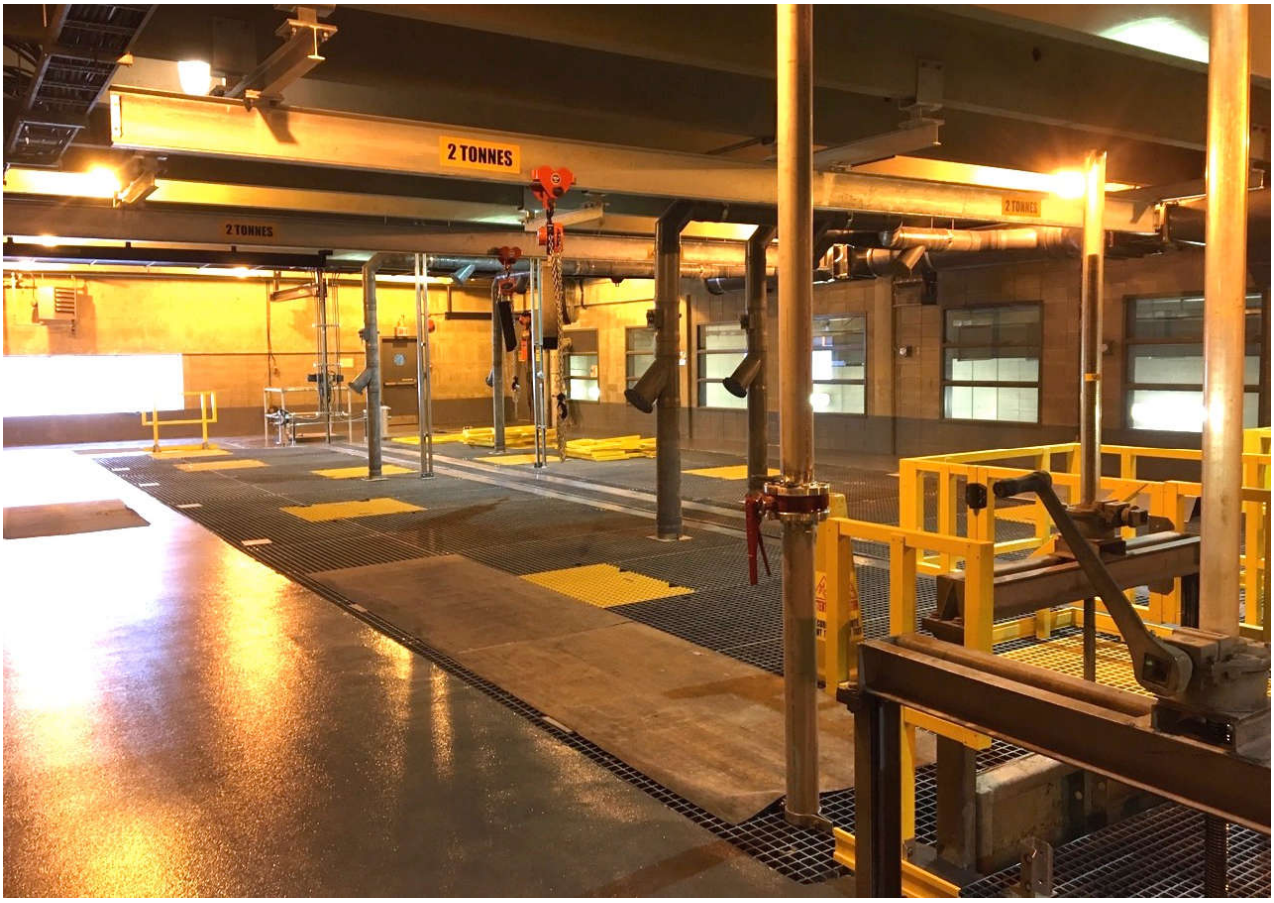
- **View of grit tanks #4 & #5. In addition to full automation of the system, the implementation of a shaftless spiral grit extraction system enables the enclosure of the aerated grit tanks with removable covers and the implementation of an odour control system.**

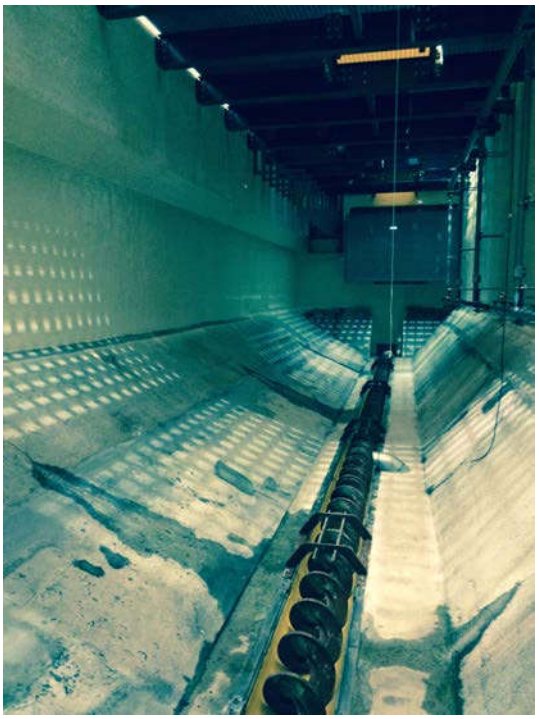
Claro

.5 Medway WWTP, MA – Grit Classifier (2017)

.6 Epping WWTP, NH – Grit Classifier (2019)

.7 Repentigny WWTP, QC (2019 Hard-Specified) – Retrofit of 2 Aerated Grit Tanks including Special Wall Penetration Arrangement & Seal, Special Liner, Grit & Scum Pumps, Special Automatically Decanting Classifier, & Controls)

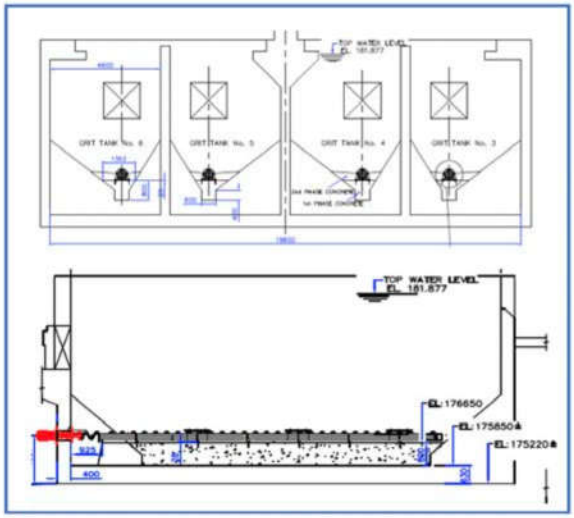


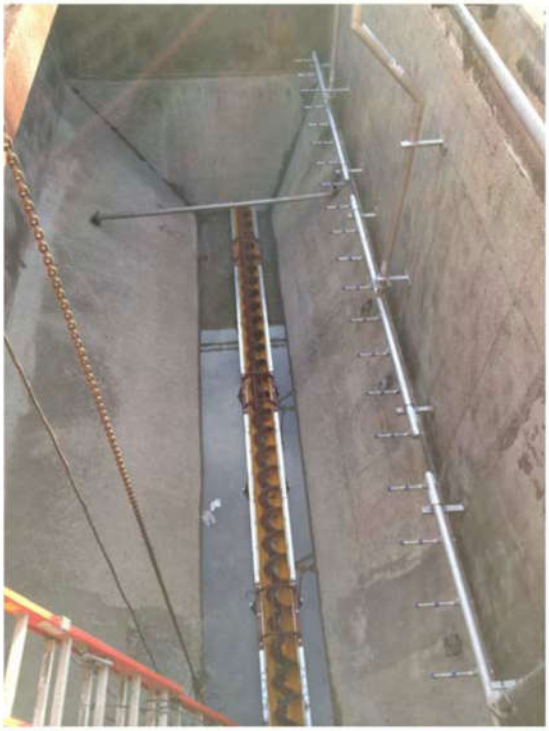


.8

Windsor WWTP, ON

Windsor WWTP, ON
(2017; Retrofit of 4 Aerated Grit Tanks including Special Wall Penetration Arrangement & Seal & Special Liner)





.9

Moncton WWTP, ON

Claro

Claro

C. Design & Supply Schedule Summary + Sample Warranty Statement

i. Technical Submittal:	Technical submittal after notice to proceed within 3-4 weeks or better.
ii. Delivery after Final: Submittal Approval	12-20 working weeks (to be coordinated with installing contractor & client) or better.
iii. Terms of Delivery:	FOB Ingleside, ON; each piece of equipment in a crate (or) on a specially-built wooden pallet. Delivered in a marine container on a conventional transport truck or in a closed dry van.
iv. Warranty:	**5 years** normal running time after start-up & substantial completion.
v. Payment Terms:	As specified in Section GT.20 – Payment of the General Terms and Conditions for Preselected Equipment of RFP N° 14 - 2020.
vi. Proposal Validity:	240 days after the closing date for submission of quotation. Extension of validity on request.

• Note: RFQ specifications terms to take precedence over the proposal stated terms if they conflict.

Sample Warranty Text excerpt:

vii. **Warranty:** All equipment or parts covered by this quotation are guaranteed to be free from defective material and workmanship, under normal use and service, for a period of five (5) years. Unless otherwise indicated in the quotation, this guarantee does not cover wear of normal wearing parts unless wear of such part has resulted from defective material and workmanship. In the event of any defects developing within the stated period, under normal and proper use, Claro is to be notified promptly in writing, and upon receipt of our written consent, the parts are to be returned promptly to Claro at Claro's shipping expense. If Claro's inspection indicates defective material or workmanship, the parts will, at Claro's option, either be repaired or replaced without charge and shipped back to Ingleside at Claro's expense. Note: Corrective or other work, or expenditures of any kind must be authorized by Claro in writing prior to the commencement of such work or prior to committing to such expenditures, without exception.

3. Technical Proposal

Ingleside WWTP Upgrades

Vortex Grit Removal: 46 53 00
Process Equipment Pre-Selection

EVB Engineering
EVB Ref: RFP N° 14 - 2020
Township of South Stormont, ON
Claro Ref: 17089-Q-01

3. Technical Proposal

A. Drawings – plans, sections and general arrangement drawings showing dimensions, weights, materials of construction and general details for each piece of process equipment.

i. Detailed Scope of Supply, Materials of Construction & Weights

Item 1: Two (2) VortiClar™ Vortex Units — Model FV3000-20.8

• 1a) Vortex:

• Diameter: 3000mm; Capacity: up to 26,500 m^3/day. Facility peak flow of 20,800 m^3/day (based on the higher instantaneous peak of L/sec value of 0.24 L/sec). Thus, the proposed standard-sized vortex unit will provide for additional retention time and augmented separation efficiency.

- Mixer drive unit: SEW gear drive & Baldor motor: 0.75 kW (1 HP), 600V, 3 Phase, 60Hz, Cl 1, Div. 1 mounted on planetary gear drive unit with hardened gears (elevated service factor) that drives the vortex paddle system & supports the grit extraction piping assembly. Planetary gear drive, paddle system & grit extraction piping assembly is bolted on a concrete bridge that forms an integrated part of the concrete tank (concrete tank & bridge by others). Top of tank also includes half-moon cut-outs for installation of chosen grating or checker plate for tank access/inspection (chosen grating or checker plate by others in order to maintain consistency with other channel coverings).
- One (1) paddle mixer assembly in AISI 316L; 4 adjustable bolt-on paddles.
- One (1) grit extraction piping assembly within vortex tank in AISI 316L. Grit extraction piping is modular and integrates air scour and water fluidization lines.
- Drive unit painted according to SEW std. OS2 in RAL 6005.
- Solenoid valves for air scour & water scour in AISI 304 stainless steel, Class 1, Div. 1. & two (2) corresponding isolation ball valves in AISI 316 stainless steel.
- Special Claro teardrop deflector plate for bolting to inside of concrete grit tank, AISI 316L.
- Weight of planetary gear drive: approx. 175 kgs
- Weight of paddle system: approx. 80 kg.
- Minimum Grit Removal Efficiency as follows:

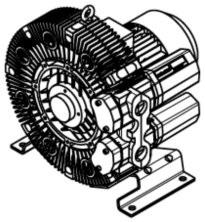
Grit Removal Efficiency Table		
Percentage	Microns	Mesh
95%	≥ 300 Micron	≥ 50 Mesh
85%	≥ 210 Micron & < 300	≥ 70 Mesh & < 50
65%	≥ 150 Micron & < 210	≥ 100 Mesh & < 70
38%	≥ 100 Micron & < 150	≥ 140 Mesh & < 100

• 1b) Two (2) Self-Priming Grit Pumps – Gorman Rupp – T4A71S-B (Wetted ADI):

- Gorman-Rupp pump assemblies. Pump Model T4A, 4" inch flanged, self priming pump, gray iron casing, GR hard iron 8.07” impeller, standard seal, mounted on steel base with guard & powered by 7.5 HP (Preliminary HP; final to be determined in light of final equipment arrangement & corresponding TDH). Severe Duty Type, premium efficiency 600/3/60 TEFC motor, Class 1, Div. 1. with a belt arrangement.

- Capacity: 15.8 l/sec (250 USGPM); TDH: 40 ft. (conservative)
- Size Inlet/Outlet: 4” x 4” (101 mm x 101 mm), Flanged.
- Maximum Operating Pressure 86 psi (593 kPa)
- Semi-Open Type, Two Vane Impeller: GR hard-iron.
- Handles 3” (76 mm) Diameter Spherical Solids.
- Impeller Shaft: Alloy Steel 4150.
- Shaft Sleeve: Alloy Steel 4130.
- Replaceable Wear Plate: Hardened Alloy Steel.
- Removable Adjustable Cover Plate: Gray Iron 30; 35 lbs. (16 kg)
- Flap Valve: Neoprene w/Nylon and Steel Reinforcing.
- Seal Plate: G-R Hard Iron.
- Bearing Housing: Gray Iron 30.
- Radial/Thrust Bearings: Open Single Row Ball.
- Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.
- Flanges: Gray Iron 30.
- Gaskets: Buna-N, Compressed Synthetic Fibres, Vegetable Fibre, PTFE, Cork and Rubber.
- O-Rings: Buna-N.
- Hardware: Standard Plated Steel.
- Brass Pressure Relief Valve.
- Bearing and Seal Cavity Oil Level Sight Gauges.
- All controls and motor starter elements included in proposed control panel components below.

• 1c) [OPTION] <u>One (1) Air Scour Blower Package</u>:



- Option: Air scour can aid in further separating organics and producing an even cleaner, dryer grit product. This small quiet blower is offered as an option. Air can also be tapped from an existing source of compressed air. Operation is for a short time – perhaps 30 seconds – before the water scour and grit extraction sequence begins. Air is not critical for good operation, however, it offers operators additional treatment flexibility at very low cost. We have provided well-functioning vortex units with & without air scour. To be discussed. A separate cost is provided in the costing section for consideration.
- One (1) Side Channel Blower Elmo Gardner Denver, 2BH7510, 3.4 Hp, 575V/3/60 for installation in non-classified control room environment.
- Mounting base included.
- 1x silencer filter, 1.5" NPT c/w paper element.
- 1x spring safety pressure relief valve, 1.5" NPT (200-0510).
- 1x check valve 1-1/2", EPDM seat.
- 1x flexible sleeve including clamp.
- Pressure gauge: Winter 2.5", 1/4" NPT 0-15 psig.
- Isolating valve for the pressure gauge.
- Noise level: 62dB(A) (no ear protection required; normal speech at 1 meter is 68 dB(a)); operation time: max. 15 min per day.
- Air flow to the air scour is controlled by a solenoid valve for each vortex unit; two (2) AISI 316 isolation ball valves also provided.

- Note: If an existing air source is available (e.g. from an aeration blower), this source can be tapped

Item 2: One (1) Common Claro Shaftless Spiral Grit Classifier — Model CL-250H

- Classifier Capacity: accommodates 250 gpm to each hydrocyclone. The grit classifier accepts concentrated grit slurry flow discharged from the hydrocyclones underflow.
- Grit classification conveyor trough & sedimentation tank in 3mm thick AISI 316L; covers/lids in 2 mm thick AISI 316L; c/w:
- Bolt-on covers & hinged inspection access lid with quick release.
- Necessary supports/support frame, bolts, gaskets, & anchors.
- Material: AISI 316L — tank, trough & lids, & supports.
- Length Trough excl. drive unit: 4094 mm.
- Inclination of Grit Trough: 25°.
- Width Tank: approx. 590 mm.
- Sediment Outlet 250 mm x 250 mm with extension for hygienic bagging system. AISI 316L 3mm thick.
- Fluid Inlet: 2 x 100 mm (4”) dia.; AISI 316L inlets adapted to hydrocyclones’ apex output.
- Fluid Outlet: 150 mm (6”) dia.; flanged ANSI B16.5 Class 150; AISI 316L.
- Drain with 2” dia. AISI 316 stainless steel ball valve.
- Trough Liner: Hardox bars installed on four (4) AISI 316L stainless steel U-subliners installed into the grit extraction trough under square, trough-length stainless steel retaining bars or other retaining mechanism not requiring bolts, screws, rivets or glue. Each section approx. 1.2 m long max. for ease of handling during eventual replacement. Liners preinstalled in classifier. Alternately, we can provide the 10 mm thick UHMW liners as specified. The suggested Hardox will last significantly longer in this application however.
- Spiral of Special Swedish Micro alloy Abrasion-Resistant Steel for both grit auger & classifier shaftless spiral: Nominal 220 Brinell Hardness. Dia. 215 mm. Main spiral & insert spiral for strength & additional reduction of material fall back. Pitch 66%.
- Drive station c/w motor mounting flange:
- Gear Drive: SEW c/w NEMA adapter.
- Power: 1 HP, CSA 575V, 3 Phase, 60Hz; Class 1, Div. 1. motor.
- Final Gearbox Speed: approx. Approx. 6.0 rpm; intermittent operation for max. dryness.
- Wash system including: spray nozzle, 120V x ½” slow closing solenoid valve (AISI 316), ½” 316SS isolation ball valve, ½” wye strainer c/w flushing valve.
- Lifting lugs for ease of installation.
- Odor control connection with cap, 100 - 200 mm as preferred; AISI 304.
- One (1) hygienic bagging system dispenser with 90m lg. bag magazine for the hygienic bagging of grit (stainless steel adapter c/w ABS bag holder & hardware).
- Cable pull switch is indicated in the specification and is included if preferred; note: the pull cable is typically not required since the classifier is CE rated for safety (all covers bolted & inspection hatches equipped with operator-safe grating).

- A motion detector is called for in the specification and is included if preferred; Milltronics MFA-4P rotation (zero speed) sensor & transmitter controller.
  - One (1) Motion Failure Alarm Controller, NEMA 4X polycarbonate enclosure for installation in non-explosion-proof environment.
  - One (1) Motion Sensing Probe XPP-5 with 15 m (49.2 ft) cable, CSA, Class 1 Div. 1, Group A, B, C & D for mounting on conveyor. Mounting bracket supplied loose; installation on site by others.
- Grit classifier fabricated under ISO 9001 certification.

Item 3: Two (2) FLSmidth-Krebs Hydrocyclone(s) Including Independent Stand — Model D10LB-844-SDM

- Two (2) Krebs Model D10LB-844-SDM Hydrocyclones.
- Capacity: up to 256 USGPM (0.97 m3/min); 97% grit slurry flow reduction.
- Complete with fabricated carbon steel housings, replaceable neoprene liner for all housing sections (adapted for grease & fats – a better selection than gum rubber), a nihard vortex finder, 9.6 sq. in. neoprene inlet head liner and a fixed 2.25" neoprene apex liner. The inlet and overflow connections are standard Victaulic grooves. Also included are quick release toggle clamps for the apex and 1.25" pressure gauge connections on the inlet adapters.
- Including independent support stand for the new hydrocyclone unit in AISI 316L; independent support stand provides for better access to classifier internals.
- Pressure gauge assembly complete with a protective diaphragm, 0 to 30 psi dial and 1.25" connection.
- Victaulic connections including one 4" Victaulic flange for the cyclone inlet; one 6" Victaulic 11.25˚ elbow, one 6" Victaulic coupling, and one 6" Victaulic flange for the cyclone overflow.
- Cyclone supply piping & liquid overflow outlet piping by others.

Item 4: One (1) Grit System Control Panel & Local HOA Stations

- General Overview: Control panel provides for the automatic and manual control of the grit removal system including intuitively designed graphic touch screen interface for ease of system optimization & use. Graphic interface provides a real-time overview of the system's operation: e.g. stage of operational sequence (mode), all set-points, real-time values as the system approaches current timer set points, real-time influent levels & start-level setpoints, real-time torque/motor amperage readings, stage in control sequence & status reporting, solenoid on/off status, record of alarm conditions & other operational data. Other PLCs, enclosures, features & component preferences quoted on request. Panel can be designed to precisely suit client preferences.
  - Control panel including the following general features:
  - Allen-Bradley CompactLogix PLC.
  - NEMA 4-12 painted steel enclosure for installation outside of explosion-proof requirement area (Dimensions: approx. 60" + 12"-1/8" stand x 60" x 12"). Self-supporting floor mount.
  - Intuitively-designed graphic touch screen interface HMI; 12" Colour Allen-Bradley PanelView Plus 7.

- Starters for vortex drive (2, forward only), grit classifier (1, reversible), grit pump (2, forward only); & side-channel blower (1, forward only) included in control panel.
- Surge protector for protection of PLC.
- UPS to maintain power to PLC, I/O, HMI and Ethernet Communications for at least 20 minutes.
- Loss-of-phase detector to further protect all motors.
- Current transformer for amperage reading of the vortexes (2), grit pumps (2), classifier (1) & blower (1) motors.
- Ethernet/Scada connectivity, data exchange table & control panel & HMI programming included. HMI graphics provided to Scada integrator on request.
- One (1) combination local Man/Off/Auto + Forward/Reverse + E-Stop switch in Class 1, Div. 1 cast aluminum enclosure (classifier x1).
- Five (5) combination local Man/Off/Auto + E-Stop switches in Class 1, Div. 1 enclosures (for grit vortex x2, grit pump x2, & side-channel blower x1).
- Six (6) local power lock-out switches for operator safety; power lock-outs for each motor also provided on main control panel door.
- One (1) grit classifier tank level sensor (vibrating fork type).
- Control panel built under CSA & ISO 9001 certification.

Item 5: Spare Parts (As Specified)

.1 One (1) set of control panel indicator bulbs
.2 Two (2) sets of control panel fuses
.3 One (1) set of wear liners for grit classifier
.4 Two (2) sets of gaskets for grit classifier
.5 One set of special accessories or tools for the adjustment or removal of parts (metric ratchet set – no other tools required)

Item 6: Claro Technical Submittal, Installation Instructions & Commissioning Services, and O&M Manuals (as specified)

- Complete technical submittal including Acad layout drawings & design calculations.
- Operation & maintenance manuals in print format & bookmarked PDF.
- Installation supervision, commissioning, and operator training instructions for grit removal system by experienced Claro technician for start-up as specified:

.1 2 Person days for installation assistance and inspection; 2 trips.
.2 3 Person days for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation; 2 trips.
.3 2 Person days for pre-start-up classroom or site training; 2 trips.
.4 2 Person days for facility start-up and post start-up training of Owner's personal; 2 trips. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by Owner and Contract Administrator.

Item 6: Shipping, Insurance & Brokerage to Ingleside, ON (Project Site) Included

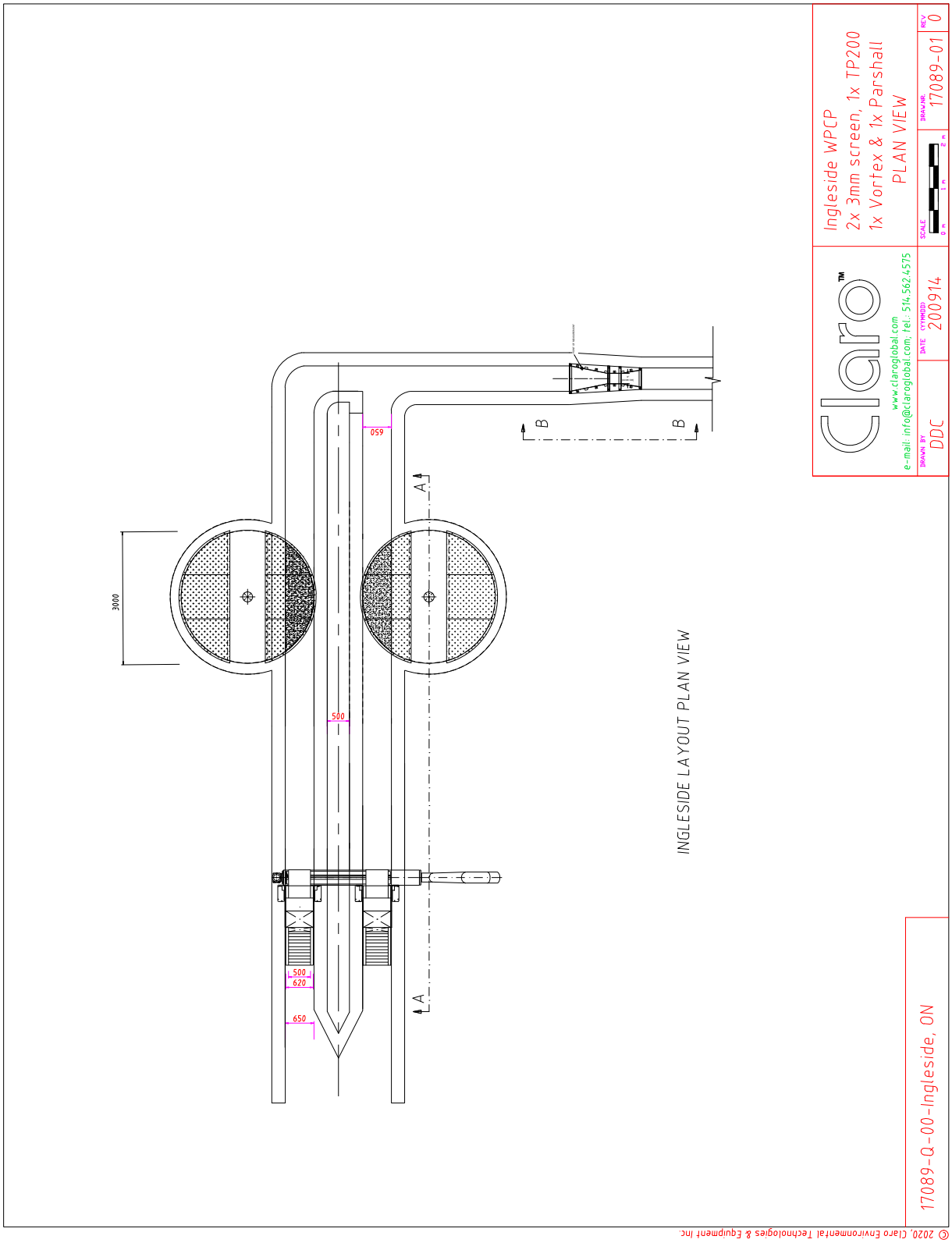
Equipment & Services by Others

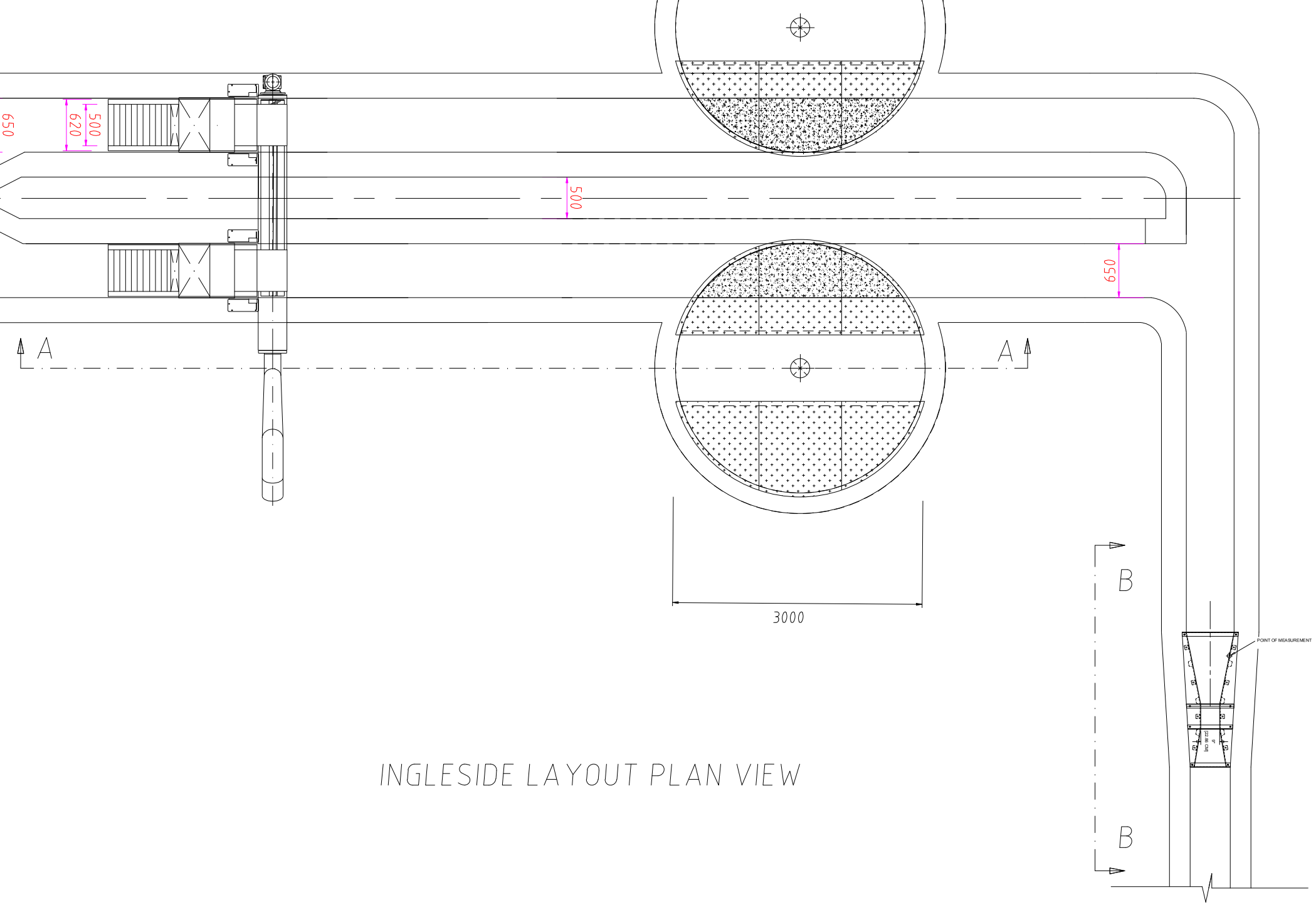
Contractor or others to install the above-listed equipment & furnish auxiliary items as follows:

- Off-loading, storage on site, installation and start-up & testing of above-listed and other associated equipment under Claro supervision.
- Field installation of grit removal equipment including construction of concrete vortex tank(s) according to Claro suggested dimensions including concrete bridge for support of vortex planetary gear drive. Site assembly & installation of vortex drive + paddles and grit removal extraction piping system interior and exterior to vortex, grit pumps, air & water supply piping & control panel.
- Installation of Class 1, Division 1 complaint motors – motors arrive on site separately from equipment. Stainless steel mounting bolts by Claro.
- Bolts/Anchors for bolting mechanical equipment to room floor. Chemical cartridges (if required).
- Power supply and control wiring between main control panel, local HOA stations, each vortex motor, classifier motor, grit pump motors, side channel blower motor (if utilized), control panel, and plant PLC (if selected).
- All junction boxes & additional wiring for power or controls wiring.
- The classifier is equipped with a 100mm vent that can be connected to the headworks room odour-control vacuum system. This pipe connection will enable the odour-control system to draw odour directly from the classifier, if desired. Flexible odour-control piping by others, if desired/applicable.
- All supply or transfer piping between equipment including grit extraction transfer piping between vortex top-of-grit extraction piping flange, grit pump, and grit classifier/hydrocyclone inlet. Water hammer arrester or other instrumentation, if specified.
- [Option] Air scour air supply piping from side channel blower to air scour piping connection located at top of vortex. Plant service water supply & piping to water scour piping connection at top of vortex.
- Other civil works as required.
- Vortex tank in concrete and all other civil or other works by others. All items not specifically cited in this proposal. Claro would be happy to discuss the details of its scope of supply.

ii. Plans, Sections & General Arrangement Drawings

.1 General Layout & Implantation Drawings – Ingleside, ON





INGLESIDE LAYOUT PLAN VIEW

Claro™

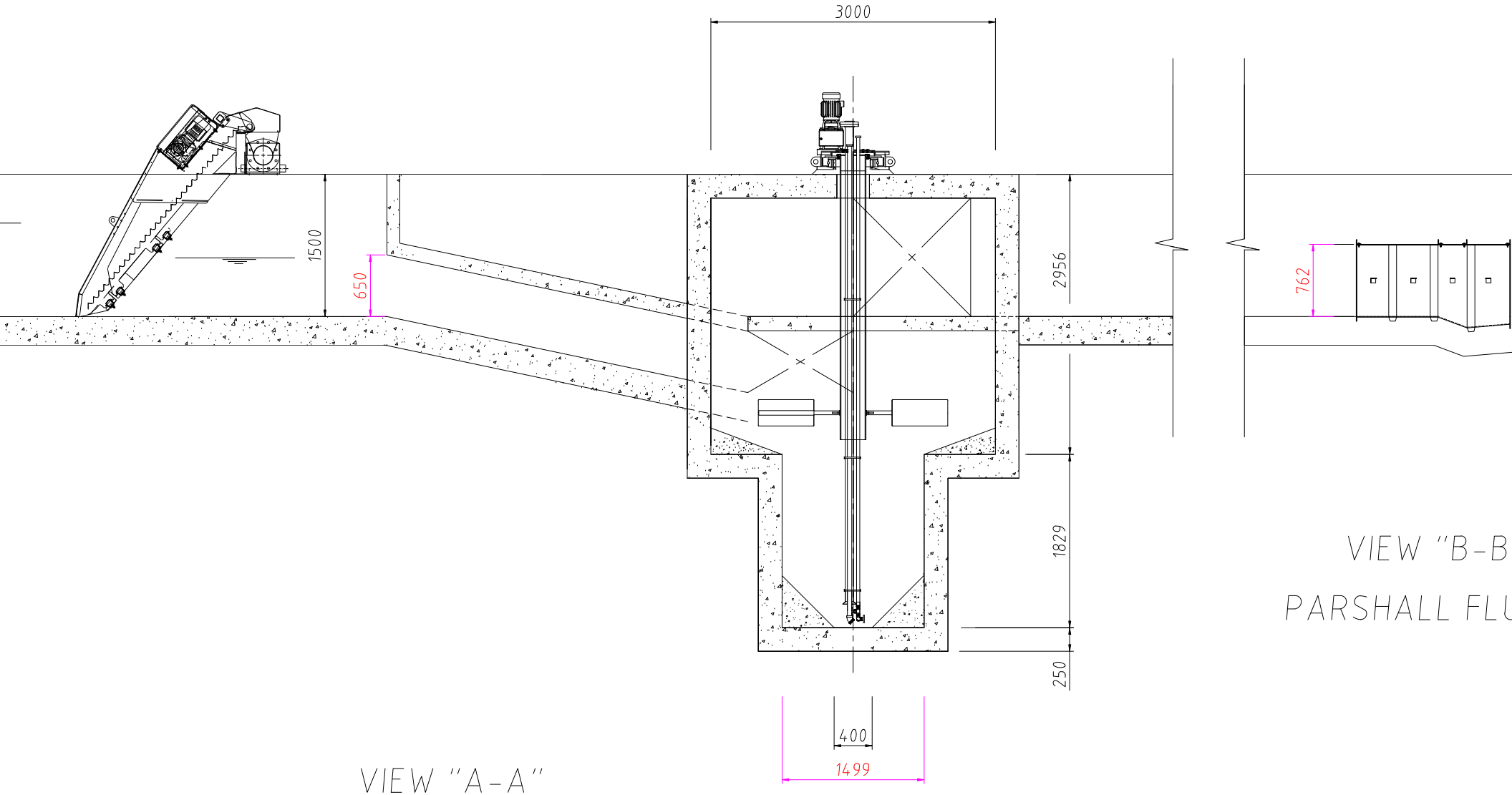
Ingle
2x 3

Ingleside WPCP
2x 3mm screen, 1x TP200
1x Vortex & 1x Parshall
SECTION VIEW

Claro™
www.claroglobal.com
e-mail: info@claroglobal.com; tel.: 514.562.4575

DRAWN BY: DDC
DATE CYYMMDD: 200914
SCALE: 0 1 2 m
DRAWING: 17089-02
REV: 0

17089-Q-00-Ingleside, ON



VIEW "A-A"

SCREEN AND VORTEX

VIEW "B-B

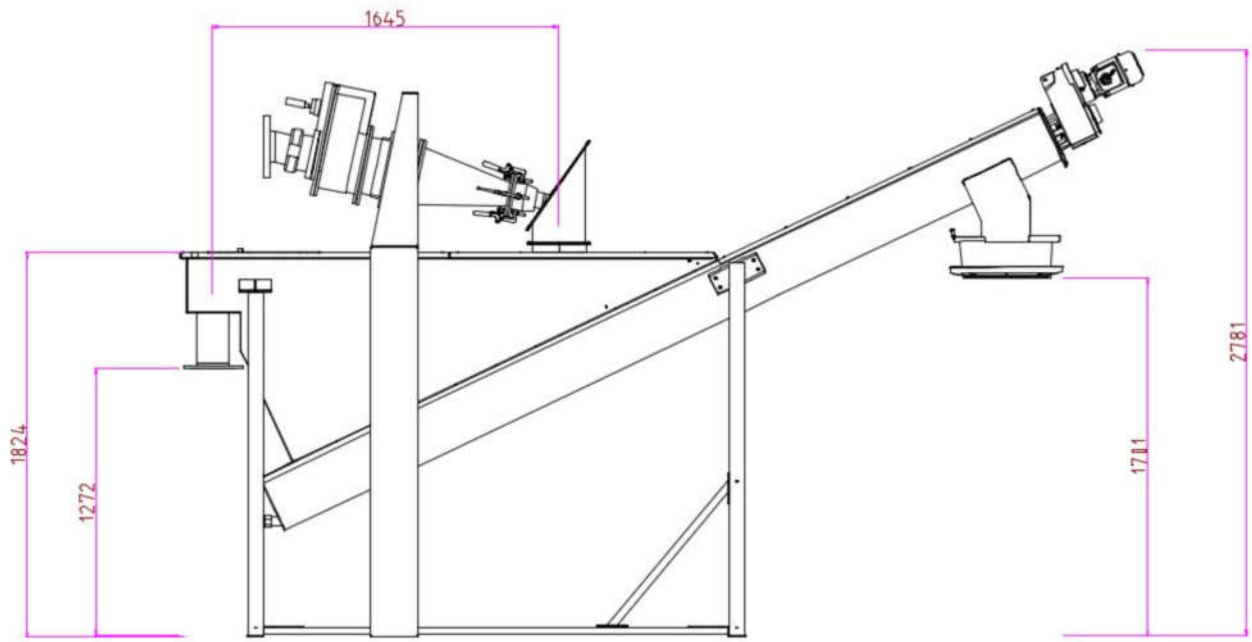
PARSHALL FLU

Claro™

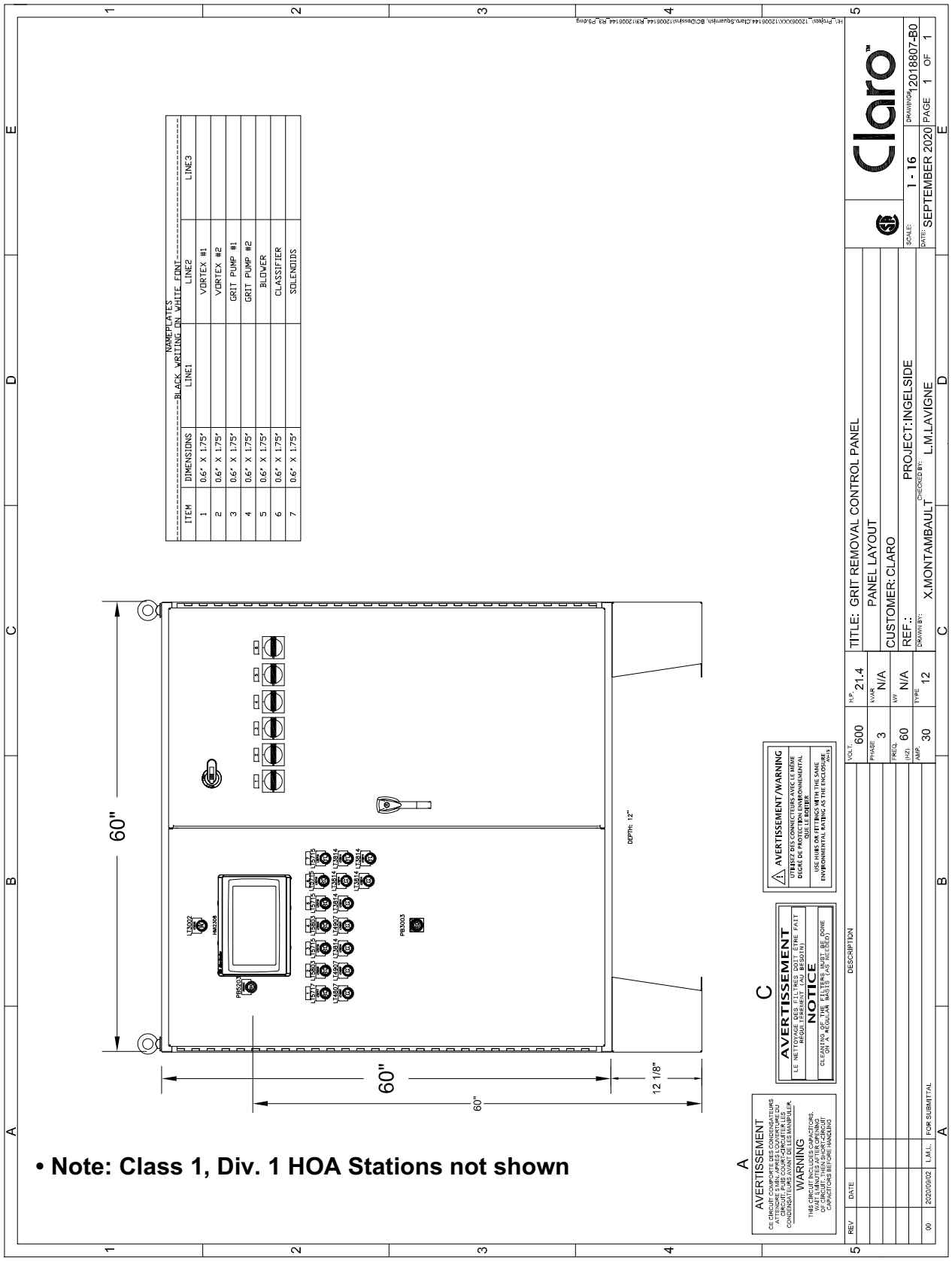
Ingle

2x 3

.2 Grit Classifier – Sample Drawing & Photograph: One (1) Common Claro Shaftless Spiral Grit Classifier — Model CL-250H c/w One (1) Hydrocyclone & Stand; Proposed Unit will integrate 2 Hydrocyclones Similar to the Moncton, NB Unit Pictured Below



.3 Control Panel – Sample Drawings & Dimensions



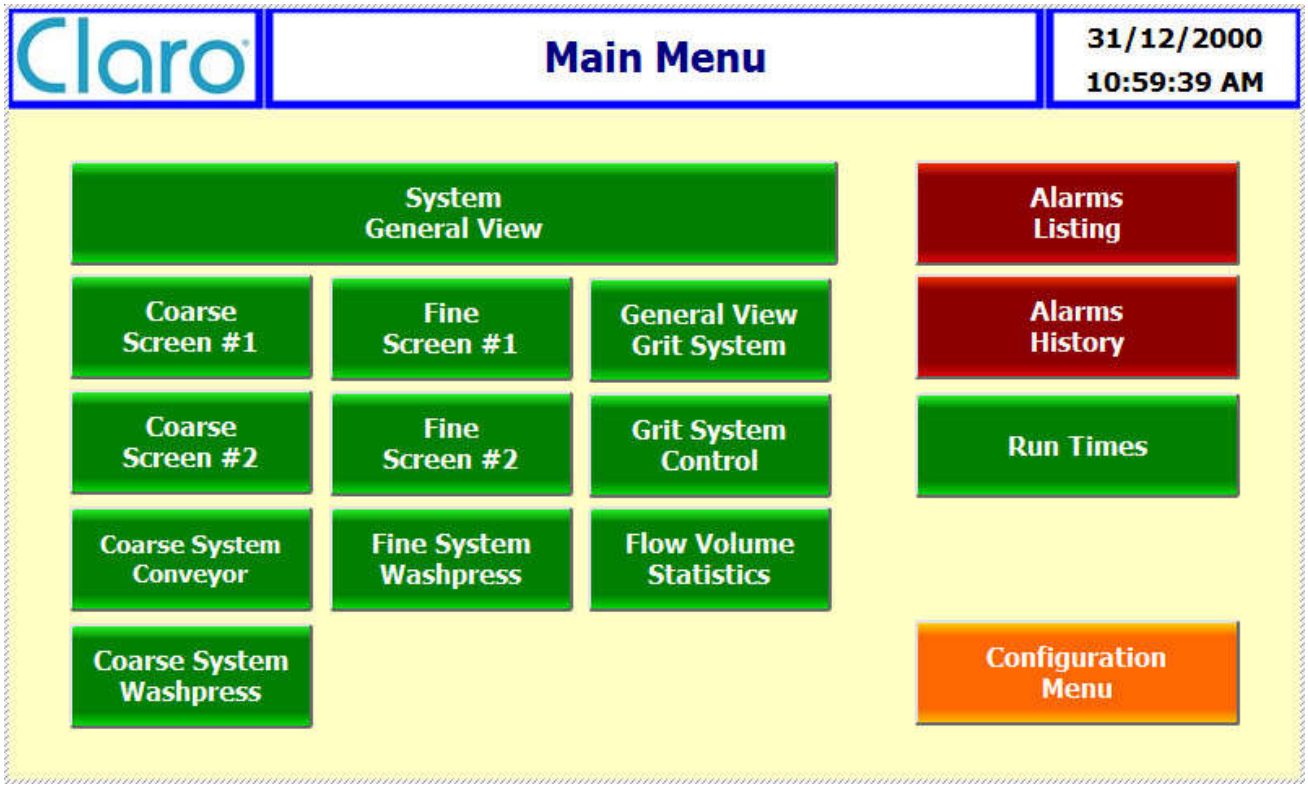
• **Note: Class 1, Div. 1 HOA Stations not shown**

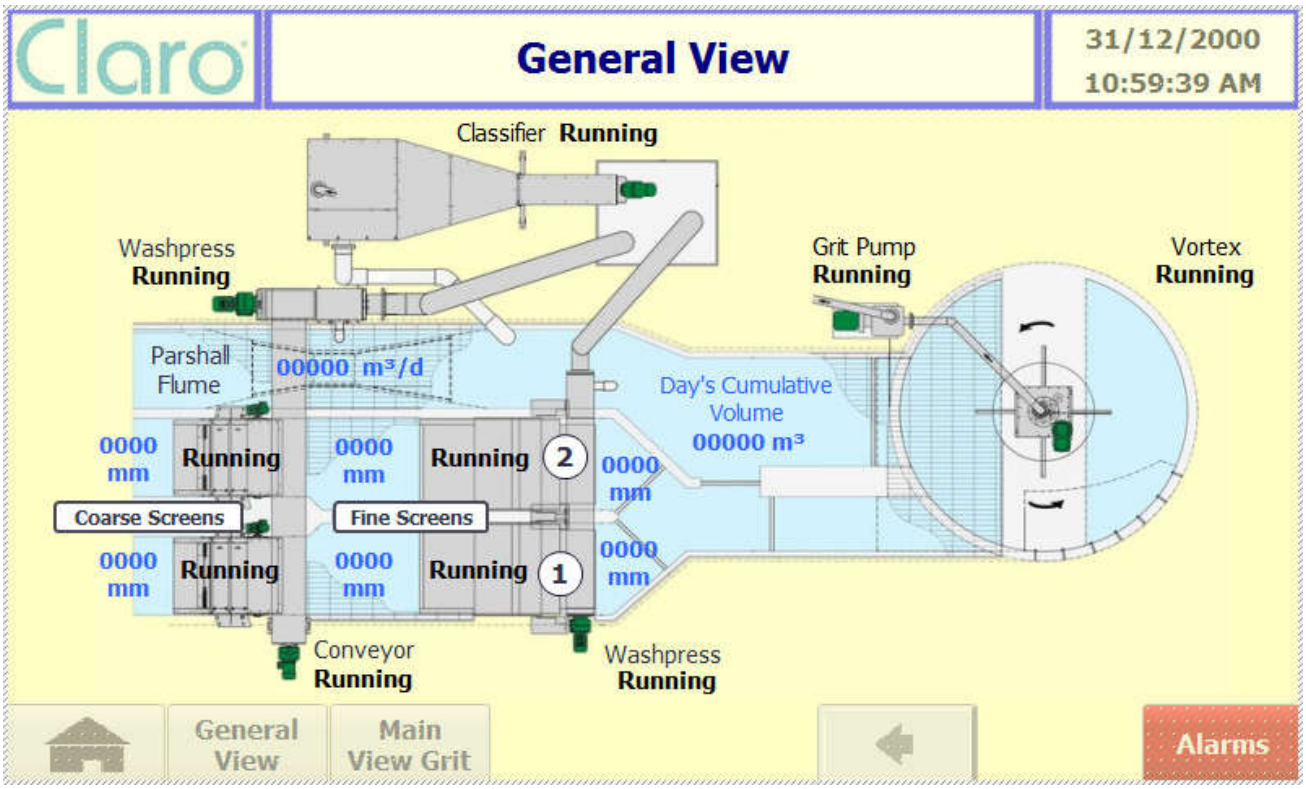
.4 P&ID Drawing (Preliminary)

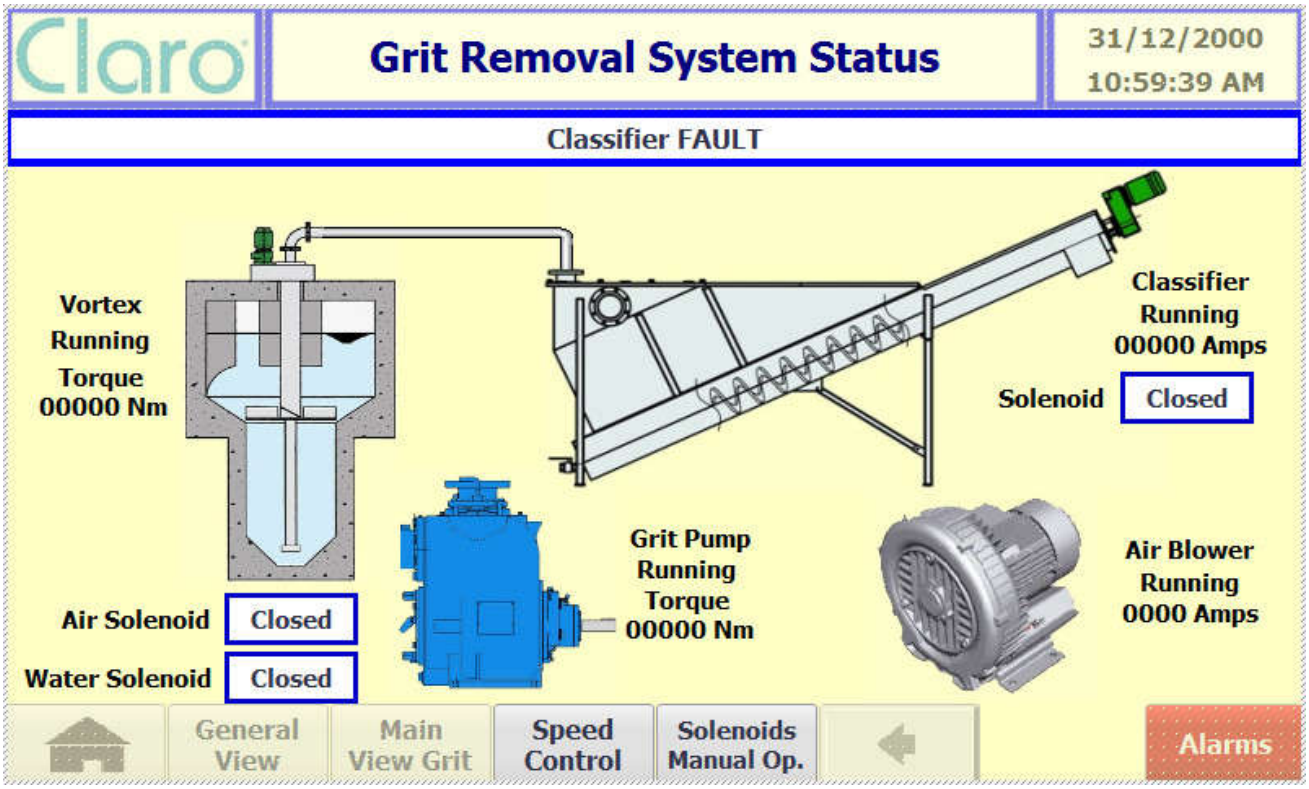
• Note: Side Channel Blower / air scour (or) can be replaced by a tap from the main blower line or is optional (to be discussed).

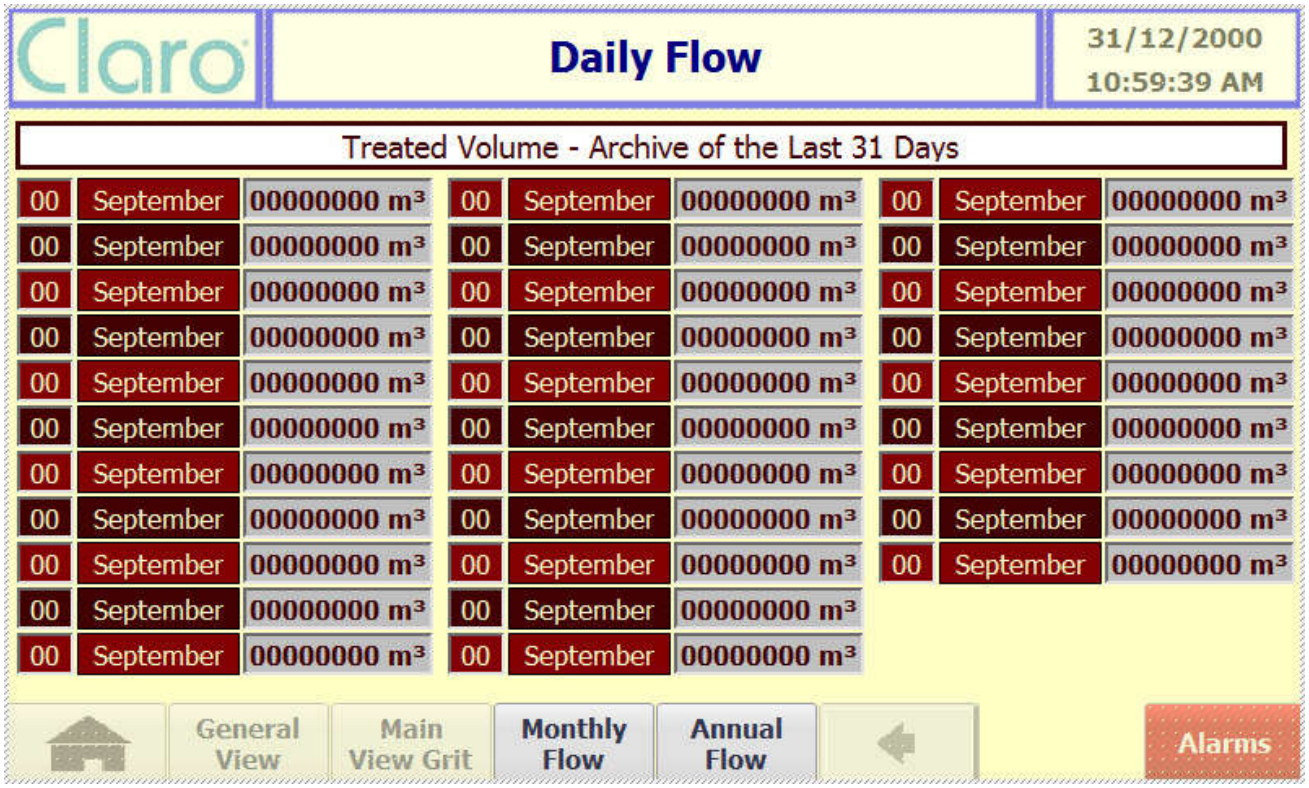
.5 Control Panel – Sample HMI Touch Screens (Samples from Fort St. John WWTP, BC)

- Note: Sample HMI Touch Screens for 1 grit removal tank, 1 grit pump, 1 blower and 1 grit classifier.

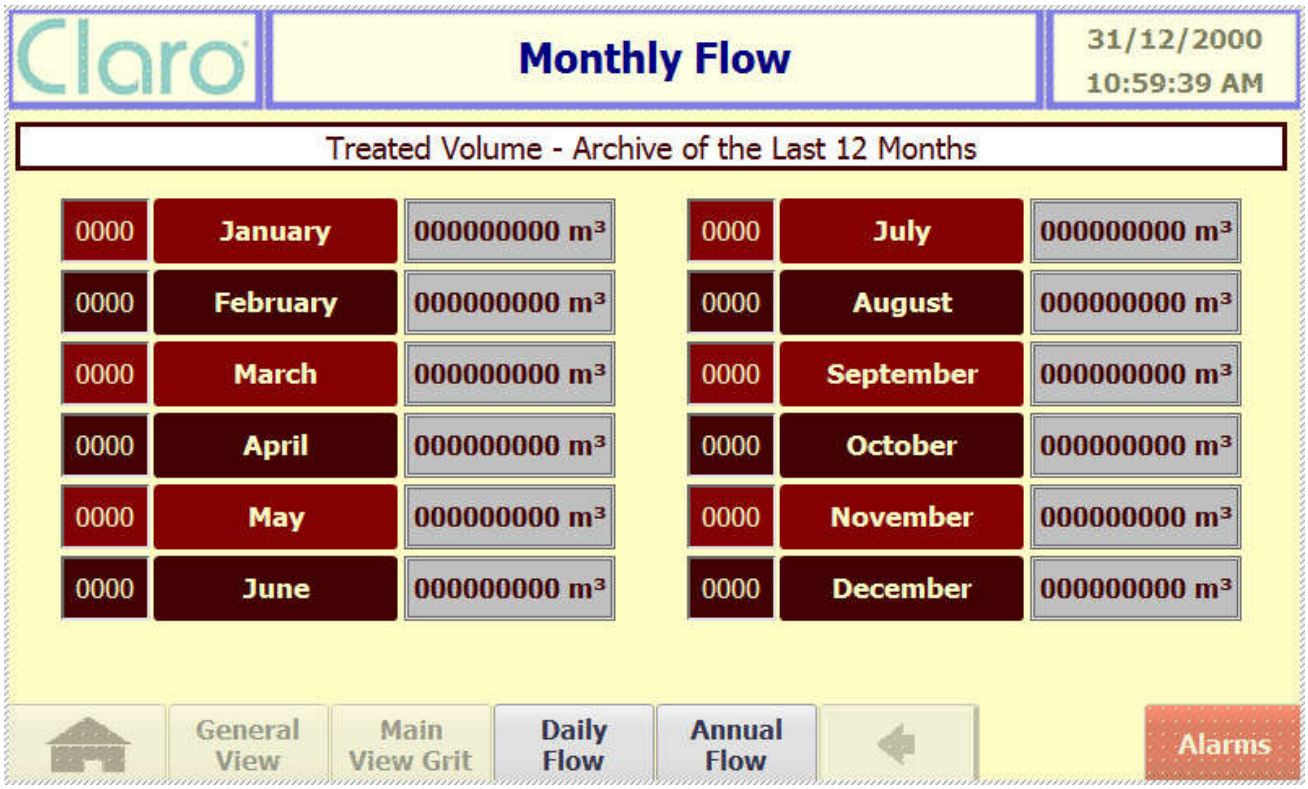


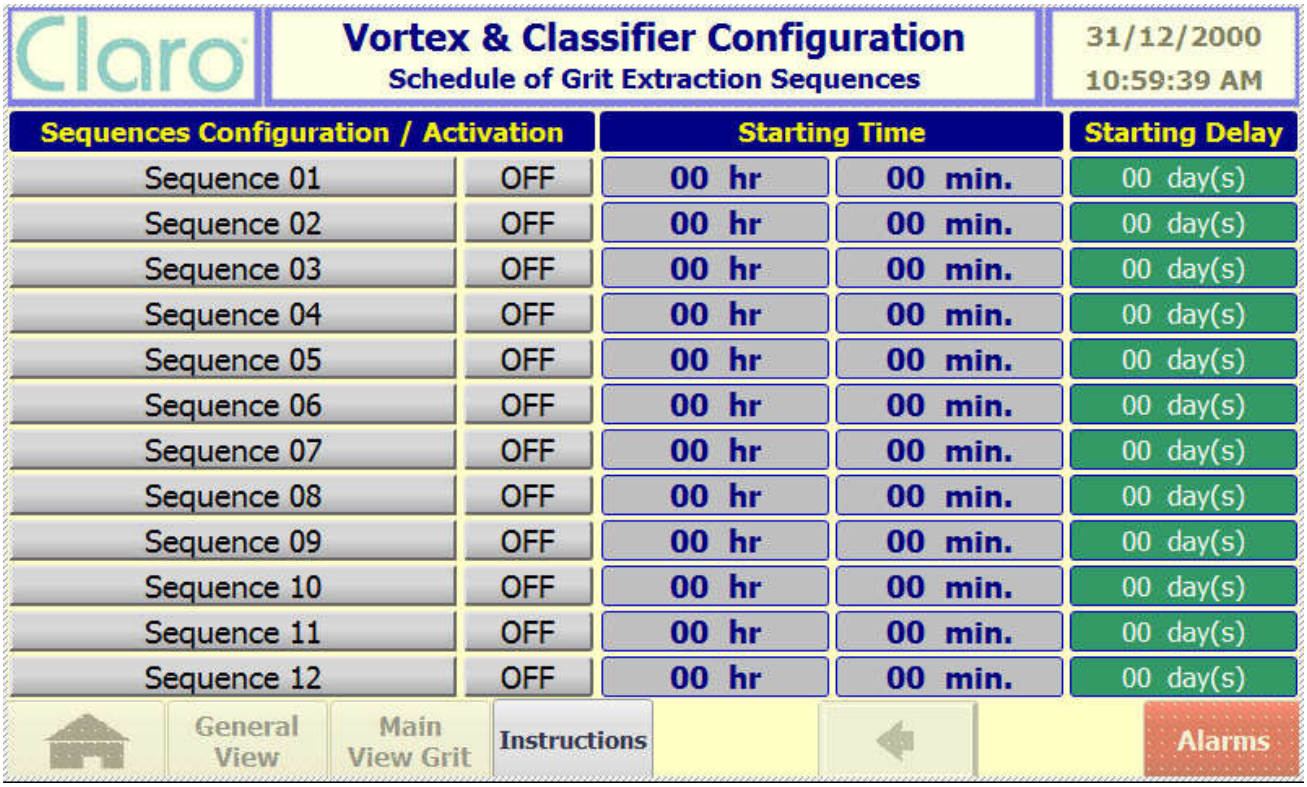


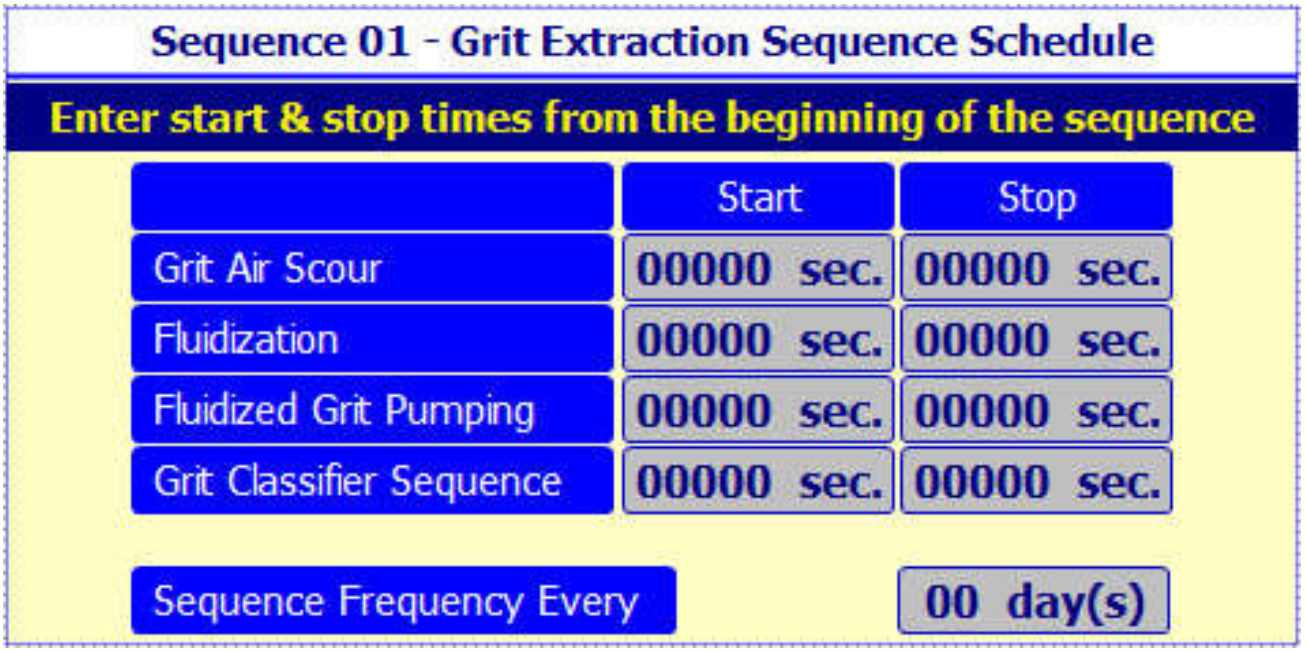


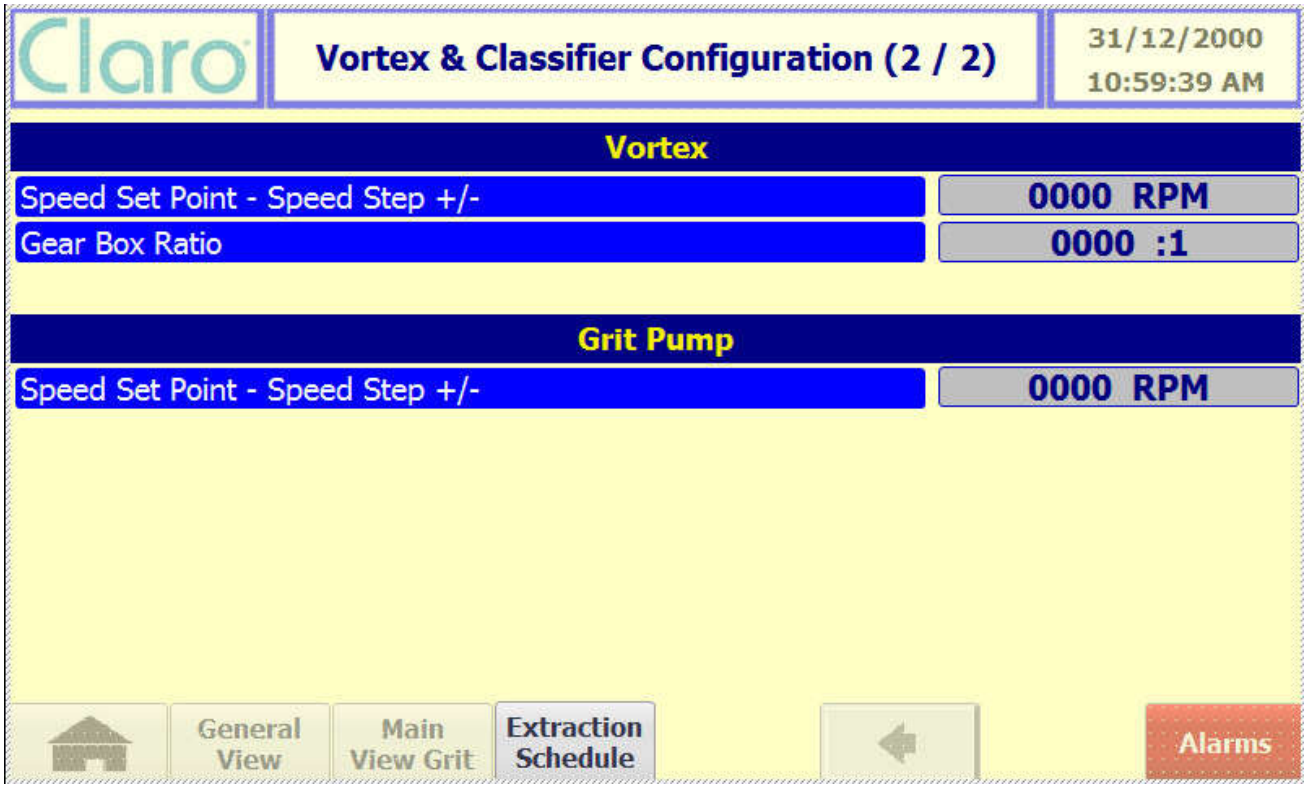


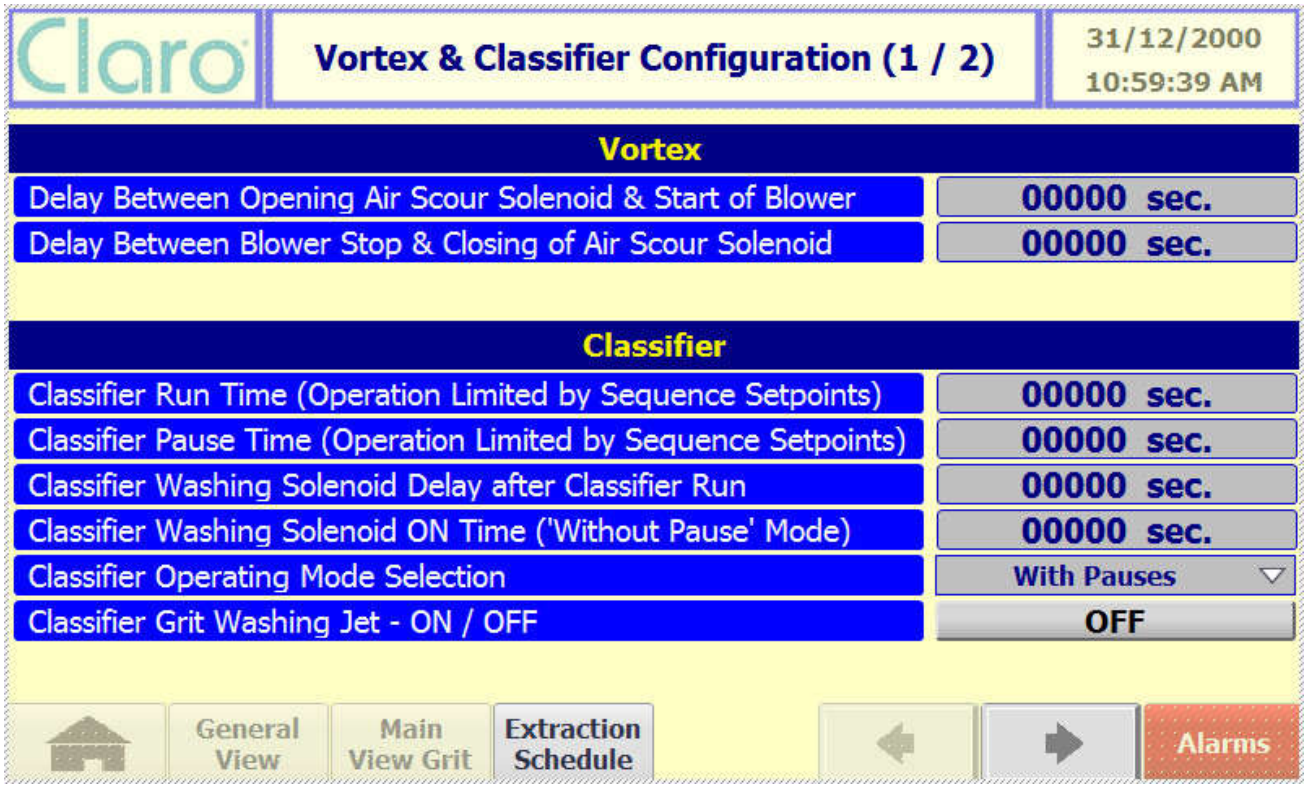
Claro

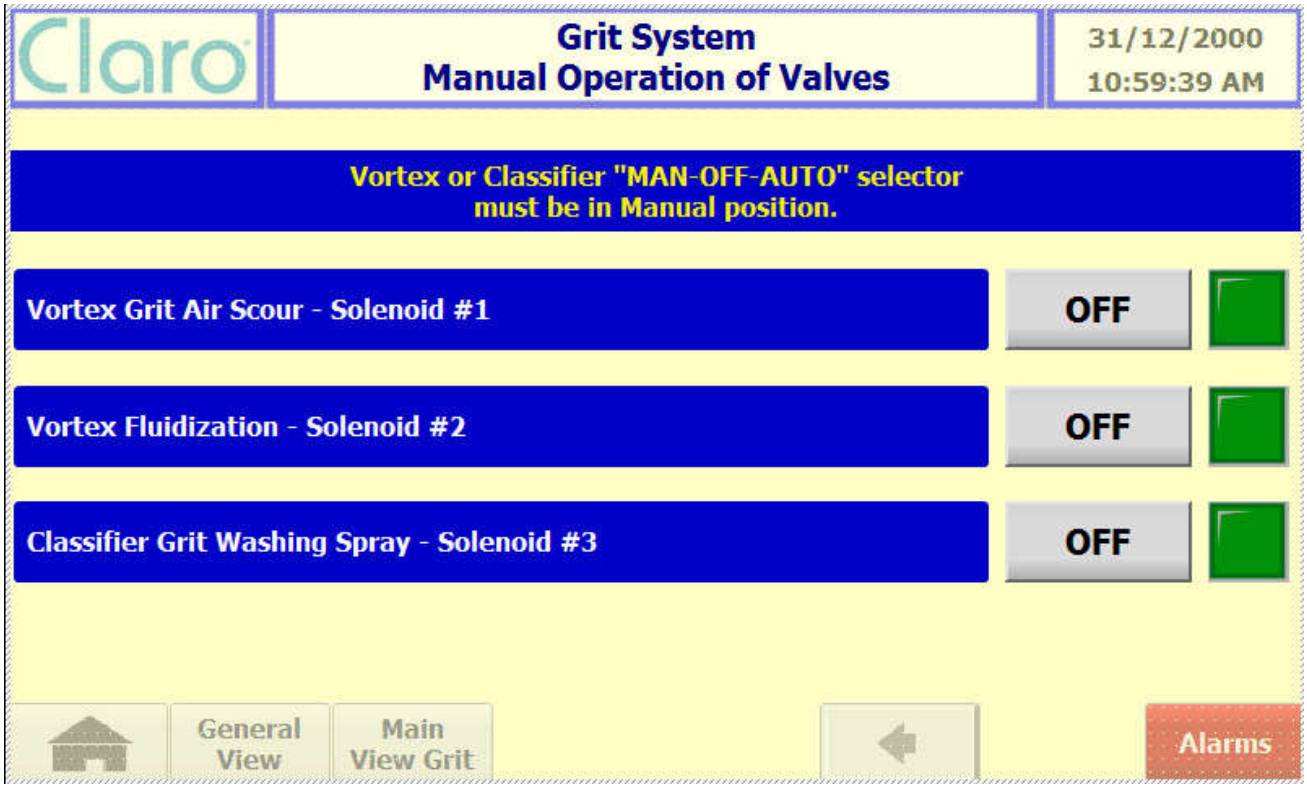


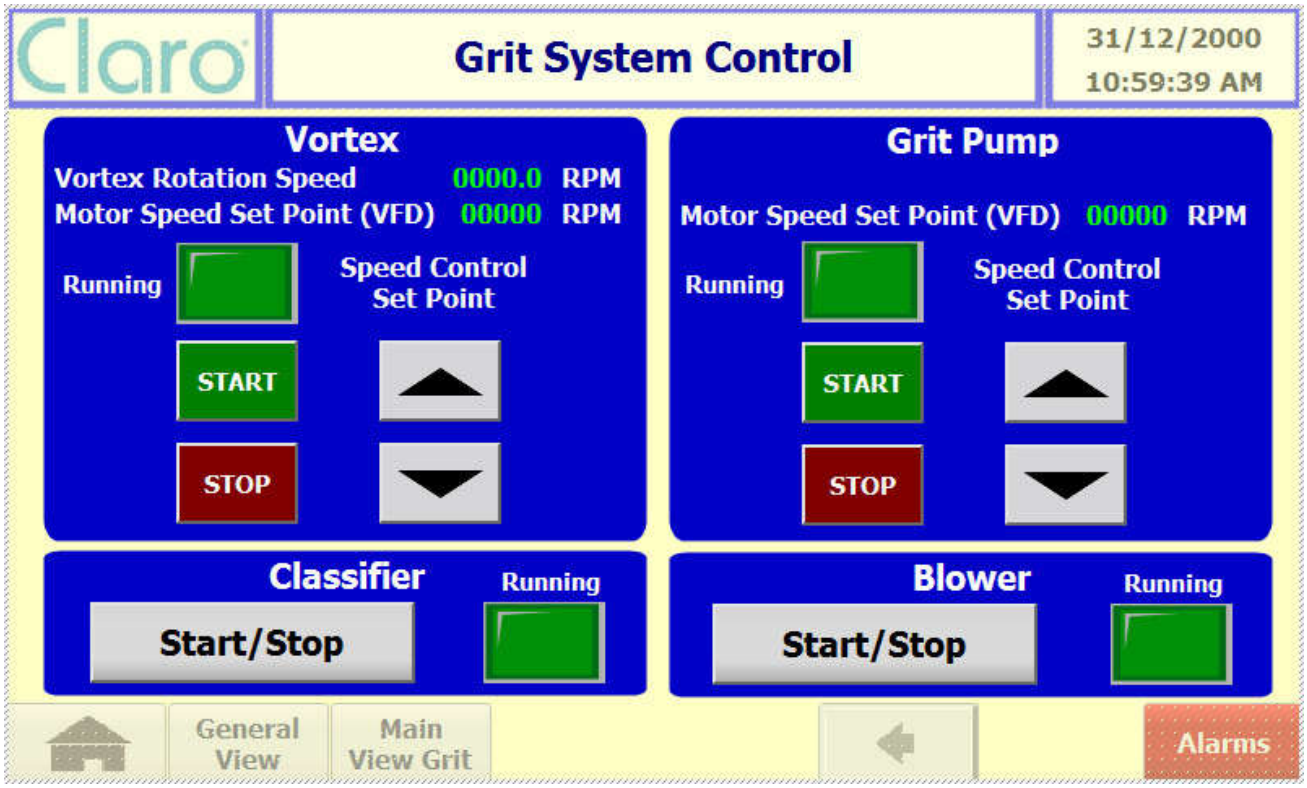












iii. Sample Control Narrative – Ingleside, ON (Preliminary):

Control Sequence Operation Description for 2 Vortex Units, 2 Grit Pumps & 1 Grit Classifier

Project Outline: Two (2) vortex tanks accumulate grit that is intermittently extracted through respective grit pumps to one (1) grit classifier. The classifier then discharges the grit into a bin.
The programming & HMI design aims to provide an easy-to-use intuitive graphic interface that provides a real-time overview of the system's operation.

A. Automatic Operation

All duty operation switches in AUTO position.

1. The new control panel includes programming and HMI screens representing the vortex tanks, the grit pumps and the grit classifier provided by Claro. The proposed sequence is as follows:

2. The vortex tank motors run continuously. After a pre-set time, a grit extraction sequence is initiated by the control system for one of the vortex tanks. The [optional] air scour solenoid valve is opened for an operator adjustable time and then closes. The fluidization line solenoid valve is subsequently opened after an adjustable delay for an operator adjustable time. The respective grit pump is started for an operator adjustable time. The 2 units typically operate in series. The classifier is then started for an operator-adjustable duration. An adjustable delay between the extraction sequence starting and the operation of the classifier can be implemented to further enable grit settling in the classifier settling tank. Once the grit pump run time ends, the fluidization solenoid valve is closed.
    i. An option is provided that enables the classifier to run for an adjustable time (or) for a series of short run and pause cycles (the run & pause time is adjustable as is the number of run/pause cycles). The aim of classifier settings is to extend the retention time of the grit above water line in the inclined classifier grit conveyor in order to promote maximum dryness. The grit conveyor will also be able to run in intermittent mode in order to diminish runtimes and further augment grit dryness. All modes and set points are adjustable.

- Note: Grit extraction schedule is adjustable and can be targeted and optimized based on season and day vs. night flows. The vortex systems of the size of Ingleside's will operate perhaps 3 - 6 times per day maximum rather than every hour on the hour like other system controls. Claro provides maximum flexin=bility and no black box elements.

B. Manual Operation:

1. When the first vortex tank's local HOA station selector switch (MAN / OFF / AUTO + EMERGENCY STOP) is in the <<Manual>> position, the first vortex tank motor will run.
2. When the second vortex tank's local HOA station selector switch (MAN / OFF / AUTO + EMERGENCY STOP) is in the <<Manual>> position, the second vortex tank motor will run.
3. When the first grit pump's local HOA station selector switch (MAN / OFF / AUTO + EMERGENCY STOP) is in the <<Manual>> position, the first grit pump will run.
4. When the second grit pump's local HOA station selector switch (MAN / OFF / AUTO + EMERGENCY STOP) is in the <<Manual>> position, the second grit pump will run.
5. When the classifier's local HOA station selector switches (MAN / OFF / AUTO + FORWARD/REVERSE + EMERGENCY STOP) are in the << Manual >> & << Forward >> position, the classifier operates in forward.
6. When the classifier's local HOA station selector switches (MAN / OFF / AUTO + FORWARD/REVERSE + EMERGENCY STOP) are in << Manual >> & << Reverse >> position, the classifier operates in reverse until the spring-loaded selector is released.
7. [Option]: When the air blower's local HOA station selector switch (MAN / OFF / AUTO + EMERGENCY STOP) is in the <<Manual>> position, the blower will run.
8. Any in-field emergency stop (i.e. classifier) halts the respective machine in both Manual & Auto modes. The control panel door E-stop halts all equipment.
9. Resetting/clearing alarms: Reset by push button (RESET) on the main panel and by pulling mushroom into original position, if it was depressed. Clearing of alarms are also effected by clearing the alarm status message represented on the HMI.
10. An alarms page lists current active alarm conditions. An Alarms History page logs a history of alarms.
11. All alarm status messages are available to Scada. All alarm levels are adjustable via the HMI (& Scada, if selected).
12. A watch dog feature enables Scada to monitor the health of the control panel PLC.
13. Back-in-Service Courtesy Alarm: If either of the grit pumps is left in OFF or Man at the local HOA while its respective vortex is running, an alarm will sound after an adjustable time delay.
14. Back-in-Service Courtesy Alarm: If the grit classifier is left in OFF or Man at the local HOA while either grit pump is activated, an alarm will sound after an adjustable time delay.

C. Failure Alarm (Overload Function):

1. Vortex: A current transformer (CT) in the main panel senses the amperage readings on the vortex motor in order to protect the unit from possible jam. There is a warning amperage level alarm & a high amperage shutdown alarm. If the warning level alarm setpoint of the amperage sensor is reached, the control panel issues an alarm. If the amperage sensor reaches the high amperage shutdown setpoint, the vortex is shut down and an alarm is issued. A low current reading during operation indicates a possible detachment/breakage. In this scenario an alarm is issued, however, the vortex is allowed to continue operating (i.e. no shut-down).

2. Grit Pumps: A current transformer (CT) in the main panel senses the torque readings on each pump motor in order to protect each unit from possible damage. There is a warning amperage level alarm & a high amperage shutdown alarm. If the warning level alarm setpoint of the amperage sensor is reached, the control panel issues an alarm. If the amperage sensor reaches the high amperage shutdown setpoint, the pump is shut down and an alarm is issued. A low current reading during

operation indicates a possible direct coupling detachment/breakage of the belts and/or pulleys. In this scenario an alarm is issued, however, the pump is allowed to continue operating (i.e. no shut-down).

3. Classifier: A current transformer in the main panel senses the amperage readings on the classifier motor in order to protect the unit from possible jam. There is a warning amperage level alarm & a high amperage shutdown alarm. If the warning level alarm setpoint of the amperage sensor is reached, the control panel issues an alarm. If the amperage sensor reaches the high amperage shutdown setpoint, the classifier is shut down and an alarm is issued. A low current reading during spiral operation indicates a possible spiral detachment/breakage. In this scenario an alarm is issued, however, the classifier is allowed to continue operating (i.e. no shut-down).
4. [Option]: Side Channel Blower: If a side channel blower is implemented, this unit is also protected by a current transformer (CT).

D. Real-Time Readings/Trends

- The HMI screen interface will have a page(s) graphically & numerically representing the real-time values for the torque/current motor(s) torque readings, all the respective set points, and the current stage in the operational sequence for the grit removal system. The graphics representing the vortex, pumps & classifier will be adapted from the project drawings in order to faithfully reflect the Ingleside WWTP system.

- A trends page records:
  a) the number of motor starts for the grit pumps, blower & classifier
  b) the total amount of time each motor has run
  c) total number of treatment cycles completed for the classifier
  d) Scada can log this activity across time and provide graphs representing activity over time on a separate trends page (equipment run times & treatment cycle count etc.)

iv. Deviations Listing (Separate Listing As Specified)

- The proposed grit removal system including 2 forced vortexes, 2 grit pumps, 1 grit classifier & 1 control panel are in conformity with the performance, quality, and intent of the project specifications. The following deviations reflect our standard stainless steel classifier design and a possible option for additional grit product scouring.

  - Deviation 1: Our standard CL-250 classifier incorporates an AISI 316L trough & hopper body in 3mm AISI 316L rather than in 6mm thickness. Our design is structurally sound and has a proven longevity in many applications across Canada and abroad. We would, however, be happy to provide a thicker hopper & trough at a nominal adder. We believe that the 6mm requirement is more suitable for mild steel classifier units to protect against corrosion wear. Our adder for this thickness would be 4,000 CAD, however, we do not believe that it is required.

  - Deviation 2: We have proposed an optional air scour in the forced vortex units as a means of further separating organics from the final grit product. This approach is only an option and that may be

3. Technical Proposal (Continued)

B. Work (Install & Supply) to Be Completed by the Installing Contractor

• Note: The following provides an overview outline of requirements & installation procedures (not an exhaustive listing).

Contractor Installation Requirements Outline

Introduction: The following is an outline of the installation requirements for the Claro grit removal equipment for the Ingleside WWTP application. A Claro representative will be on site to provide final installation advice and check the installation.

I: <u>Installation of Mechanical Equipment – Outline</u>:

- The vortex internal assembly will arrive partially assembled on a specially built pallet. Instructions to complete the assembly will be provided prior to delivery. The gear case and drive tube are to be mounted on the concrete bridge that spans the concrete vortex tank. The gear case is to be anchored to the bridge with four (4) anchors (by others). Once the gear case and drive tube are mounted to the bridge, the assembly can be completed by attaching the paddles. The paddles are mounted to the drive tube with brackets and bolts provided by Claro. Final adjustments are made at the anchors to bring the vortex assembly to the required plumb position. Claro on-site installation inspection/assistance will ensure proper alignment. Gear drives arrive preinstalled and filled with oil as required. As Ingleside WWTP is a Class 1, Div. I installation, the CSA Class 1, Div. I motors will arrive on site separately for bolting to the respective gear drive NEMA adapter, which is preinstalled on the gear drive. Stainless steel mounting bolts & key provided by Claro.
- As the Ingleside WWTP is a Class 1, Div. I installation, the grit classifier arrives with the gear drive pre-installed. The motor, however, arrives separately for bolting to the classifier. The classifier is provided with support legs that are to be bolted to the floor slab. Each leg is to be mounted on one bolt. Levelling of the classifier is accomplished by adjusting the bolts, if required. The classifier is supplied with sufficient lifting lugs for a controlled lift during installation. Stainless steel mounting bolts & key provided by Claro.
- The grit pumps arrive on site with motor preinstalled and on a skid. The grit pump assemblies are to be installed in the locations as shown in the contract drawings. Each pump assembly is provided with anchoring points. Anchors by others. Piping is by others as per approved submittal and contract drawings.
- The classifier arrives on site with an independent hydrocyclone stand provided loose. Installer mounts the hydrocyclones as shown in the Claro installation instructions (bolt-on assembly) and completes the inlet/outlet piping as shown in the approved submittal and the contract drawings .

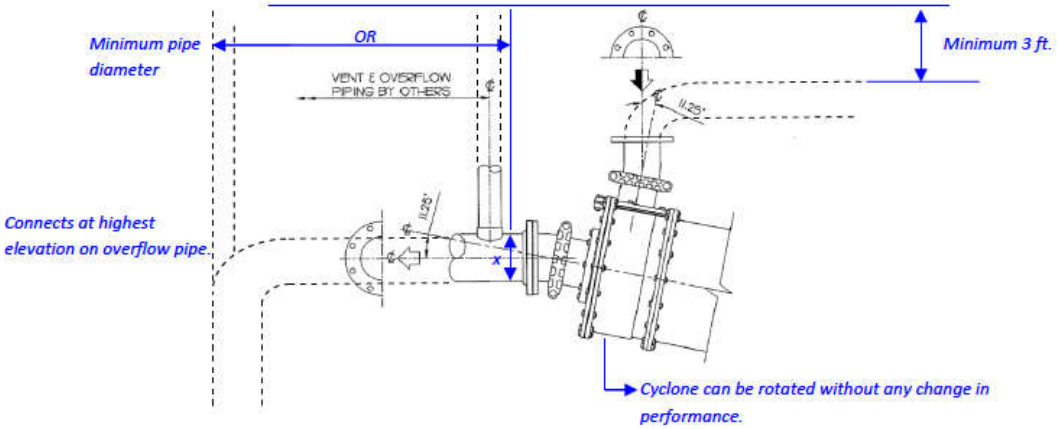
• Continued on following page →

- Recommended hydrocyclone piping: In order to ensure proper function of the hydrocyclones, please review the following information from the manufacturer regarding piping and venting.

Important note siphon prevention. Siphoning can occur if the overflow pipe (stream with water with grit removed) path goes below the elevation of the cyclone inlet/inlet pipe. Siphoning disrupts cyclone operation and must be prevented. The most common method is a vent pipe. The vent should connect on the run from the cyclone overflow to the elbow (the highest elevation on the cyclone overflow pipe). The vent pipe should be at least half of the overflow pipe diameter and extend at least 3 feet above the level of the pipe top elevation on the inlet to the cyclone.

Below sketch showing the siphon vent setup as it relates to the cyclone.

Siphon vent setup or some siphon prevention required to prevent siphoning if overflow pipe goes below cyclone inlet maximum elevation.



- To assist with piping design and installation, Claro will provide drawings showing the position of the cyclone overflow connections with the installation instructions.

II: Power Supply & Control Wiring Summary:

- Each vortex unit has the following electrical elements.
  a) One (1) motor (forward only, 600V/3/60).
  b) One (1) combination Man/Off/Auto + latchable E-Stop button local station. Rated Class 1, Div. I (wired back to control panel).
  c) [Option] One (1) air scour solenoid in Class 1, Div. I (120 VAC) wired back to control panel.
  d) One (1) water scour solenoid in Class 12, Div. I (120 VAC wired back to control panel.
  e) One (1) local power lockout disconnect station in Class 1, Div. I enclosure (wired back to control panel) provided by others as specified in Addendum 1.

- Each grit pump has the following electrical elements:
  f) One (1) motor (forward only, 600V/3/60).
  g) One (1) combination Man/Off/Auto + latchable E-Stop button local station. Rated Class 1, Div. I (wired back to control panel).
  h) One (1) local power lockout disconnect station in Class 1, Div. I enclosure (wired back to control panel) provided by others as specified in Addendum 1.

- The grit classifier has the following electrical elements:
  i) One (1) reversible motor (600V/3/60) (wired back to control panel).
  j) One (1) combination Man/Off/Auto + Forward/Off/Reverse + latchable E-Stop button local station. Rated Class 1, Div. 1 (wired back to control panel).
  k) One (1) high level sensor –vibronic fork as specified.
  l) One (1) local power lockout disconnect station in Class 1, Div. I enclosure (wired back to control panel) provided by others as specified in Addendum 1.

- [Option] Side channel blower has the following electrical elements:
  m) One (1) motor (forward only, 600V/3/60) (wired back to control panel).
  n) One (1) combination Man/Off/Auto + Forward/Off/Reverse + latchable E-Stop button local station. Rated Class 1, Div. 1 (wired back to control panel).
  - Alternatively, a solenoid can be implemented that taps the lower air supply line (or) the air scour feature can be eliminated.

III: Service Water Supply Requirements Summary:

General: Service water will be required for grit fluidization in each vortex tank. The recommended flow conditions (flow & pressure) are as specified and available in the RFP document i.e. 55 PSIG.

C. Grit Removal System Training Agenda (Duration: approx. 2.5 hours) – Ingleside WWTP, ON

Part 1: Mechanical Overview – Vortex Unit & Classifier

• <u>Classroom</u>

a. Review mechanical components of vortex unit & classifier – power point slides;
b. Questions / comments are welcomed throughout the classroom presentation and at its conclusion;

• Duration of classroom portion is approx. 90 minutes.

• <u>Grit Room – Walk Through & Demo of Installed Equipment</u>

c. Re-cap of vortex unit operational philosophy with the installed equipment used for illustration;
d. Demonstrate movement of grit unit paddles
e. Review regular maintenance inspection requirements as defined in the O&M manual with the installed equipment used for illustration;
f. Review safety requirements related to the vortex unit, grit pumps, [optional] blower and classifier i.e. power lock-outs & local E-Stop;
g. Review of how the grit classifier is coordinated with the vortex units;
h. Re-cap the classifier's major components (motor & gear drive, hydrocyclones, washing zone, solenoids and water jet, spiral, drain, discharge & hygienic bagger);
i. Re-cap the controls narrative/stages of operation of the classifier;
j. Review maintenance inspection procedures with the installed equipment used for illustration;
k. Demonstrate how to install a hygienic bag magazine on the bagger unit and how to tie off the bag in a manner that isolates the operator from the screenings material;

Part 2: Control Panel Overview – Vortex Grit Removal System

a. Review the major components and features of the control panel including the operation of the HMI, which can be used to control all control narrative settings, alarm settings, & transmitter settings;
b. Review of system visualization screens;
c. Review of settings input screens;
d. Review of alarm and transmitters settings input screens;
e. Review of possible alarms and their significance;
f. Review of motor starter panel internals including torque sensors, current transformers, thermal overloads, starters, etc.;

• Hand-outs: All visual materials will be presented in film & powerpoint slide format with a reinforcement/re-cap of training items via a review of the installed equipment. Claro will bring a portable projector. Training will require a classroom with white wall or projector screen & one extension cord with two (2) x 120V outlets.

D. Brochures / Catalog Cuts: Vortex Unit, Classifier, Grit Pump & Auxiliary Equipment

i. Claro Vortex – Brochure

Claro

Screening & Grit Removal

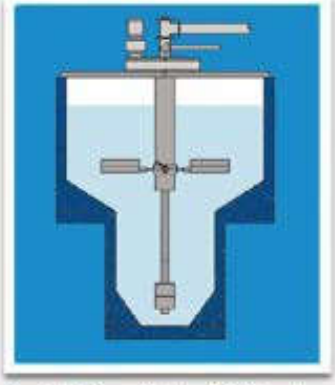
VortiClar™ Forced Vortex Grit Chamber / Sand Trap

Claro VortiClar™ forced vortex grit removal systems deliver high grit removal efficiencies across a wide range of daily flow capacities. An engineered hydraulic design removes fine grit & other debris particles, separates organic from inorganic material, & reduces grit accumulation in downstream basins, channels, weirs, & piping. The extraction of grit also significantly reduces wear on mechanical equipment.

The unit is composed of a centrifugal flow chamber; weir baffles; an energy-efficient axial flow impeller with a single, dual speed, or VFD motor; a quiescent sediment collection chamber & a choice of grit extraction approaches: airlift, high quality grit pump, or a patented grit extraction system that eliminates the need for a grit classifier or grit washer. Ideal for small footprint requirements.

Design features & advantages

- Efficient organics/inorganics separation & fine grit capture
- Exceptionally small foot print & variety of configurations available:
  - elevated, stand-alone config.: stainless steel tank with all components of unit accessible from support platform c/w optional operator-safe walkways
  - low-profile config.: all components of unit accessible & concrete-embedded vortex
- Low maintenance, low operating cost, low energy consumption
- Fully automated & fully-enclosed hygienic operation
- Optional variable frequency drive (VFD) on vortex for performance optimization
- Small & large capacities
- Indoor & outdoor installation
- No submerged bearings
- Optional vortex air and/or water grit scouring system
- For cost-effective retrofits/conversion of aerated grit tanks please see Claro Aerated Grit Tank Extraction Spiral Systems



Vorticlar™ Forced Vortex Grit Chamber with airlift arrangement (other grit extraction approaches available)

Vorticlar™ Forced Vortex Grit Chamber gear drive and airlift arrangement

ii. Claro Shaftless Spiral Grit Classifier – Brochure

Claro

Screening & Grit Removal

Shaftless Spiral Grit Classifiers, In-Line Grit Screws, & Cyclones

Claro grit classifiers effectively separate, settle, & wash grit contained in wastewater flows. The trapezoidal sedimentation tank, internal baffle arrangement, & low RPM of the shaftless spiral minimizes turbulence for optimal fine particle sedimentation & extraction. Odor-control is achieved by scrubbing the grit of organics and by the installation of a totally enclosed hygienic bagger. The unit is totally enclosed. The overflow weir, where treated liquid is returned to the plant, is also conveniently positioned outside of the sedimentation tank & equipped with a hinged inspection cover—no need to open the settling tank cover for inspection.

Mounted above the fluid & submerged spiral, the drive unit has very low power requirements. Also, no maintenance-prone bearings or seals under water. Low spiral RPM, special alloy shaftless spiral (Brinnel 220 min.), & low friction trough liners deliver extended, maintenance-free operation. Special liners & quick-release clips make liner replacement a snap and eliminate expensive & difficult-to-change hardox bars.

Hydrocyclones: Integrated single & double hydrocyclones in a broad range of sizes & configurations are available for higher flows. Hydrocyclone units range from 3- 24 inches (80 -600 mm) in diameter and are supplied in a variety of housings, liners, & component materials to suit application requirements.

In-Line Grit Screws: In-line grit & scum extraction conveyor systems that share many of the advantages of Claro's classifier design also available.

Design features & advantages

- high performance design for better protection of downstream equipment from grit abrasion & sedimentation
- Broad range of flow capacities
- Heavy duty construction in stainless steel, special steel, or acid-resistant steel.
- No bearings or seals under water
- Low installation & maintenance costs
- Special low-friction grit collection trough liners with quick-release hold-down clips
- Totally enclosed design, organics scrubbing, & hygienic bagger for effective odor control
- Easily-accessible weir c/w inspection cover
- More effective sedimentation & less maintenance than shafted screw units
- Complete systems for sole-supplier responsibility

Shaftless Spiral Grit Classifier (front view)

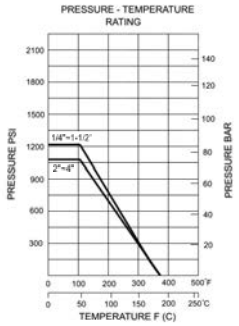
Shaftless Spiral Grit Classifier (discharge view with hygienic bagger)

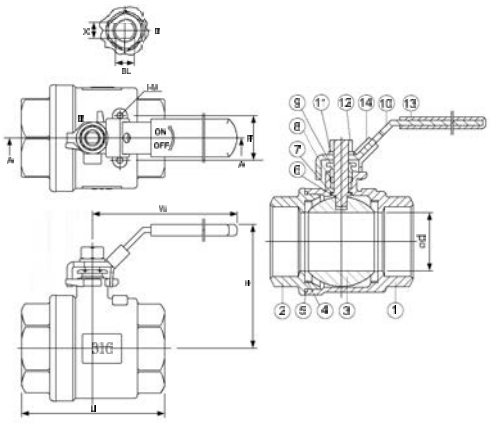
iii. Ball Valves (Full Port; AISI 316 – 2 x 1½” for Fluidization Lines; [Option] 2 x 1” for Air Scour Lines; 1 x ½” for Classifier Washing Line; 1 x 2” for Classifier Drain Connection)

NVC

1000 WOG - 2 PIECE FULL PORT STAINLESS STEEL BALL VALVE

FIG. V-21





Compliance: MSS SP-110
Blow-out proof stem
Threaded ends: ANSI B1.20.1
Size range: ¼” to 4”
Pressure ¼” to 4”: 1000 psi (WOG)

Materials:

No.	Part Name	Specification
1	Body	ASTM A351-CF8M
2	End Cap	ASTM A351-CF8M
3	Ball	ASTM A351-CF8M
4	Seat	PTFE
5	Joint Gasket	PTFE
6	Stem	ANSI 316
7	Thrust Washer	PTFE
8	Stem Packing	PTFE
9	Gland Nut	ANSI 304
10	Handle	ANSI 430
11	Stem Washer	AISI 304
12	Stem Nut	AISI 304
13	Handle Sleeve	Plastic
14	Lock Device	AISI 304

Options:
- M: Tapped Mounting pad
- P: equipped with Pneumatic actuator
- U: UNC or UNF threads for mounting pad
- L: Locking Device

Dimensions:

Size		⌀d		L		H		P		W		X	BL	I-M	CV	Weights	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	mm	in			lb	kg
¼”	8	0.46	11.6	1.75	44.5	2.01	51	.98	25	3.74	95	5	5/16”	2-M6xP1.0	6.6	.46	.21
⅜”	10	0.50	12.7	1.75	44.5	2.01	51	.98	25	3.74	95	5	5/16”	2-M6xP1.0	7.9	.48	.22
½”	15	0.59	15	2.24	57	2.09	53	.98	25	3.74	95	5	5/16”	2-M6xP1.0	11.2	.50	.228
¾”	20	0.79	20	2.56	65	2.34	59.5	.94	24	4.33	110	6.5	⅜”	2-M6xP1.0	21	.93	.442
1”	25	0.96	25	2.99	76	2.87	73	1.32	33.5	5.31	135	8	7/16”	2-M6xP1.0	35	1.55	.706
1¼”	32	1.26	32	3.44	87.5	3.11	79	1.50	38.1	5.31	135	8	7/16”	2-M6xP1.0	57	2.33	1.06
1½”	40	1.50	38	4.02	102	3.56	90.5	1.50	38.1	6.50	165	9	½”	2-M6xP1.0	80	3.70	1.68
2”	50	1.97	50	4.84	123	3.88	98.5	1.50	38.1	6.50	165	9	½”	2-M6xP1.0	150	5.96	2.71
2½”	65	2.56	65	6.14	156	5.14	130.5	2.20	56	8.46	215	12	¾”	4-M6xP1.0	265	11.55	5.25
3”	80	3.15	80	7.24	184	5.61	142.5	2.20	56	8.46	215	12	¾”	4-M6xP1.0	415	18.92	8.60
4”	100	3.94	100	9.84	250	6.83	173.5	2.48	63	12.80	325	16	1”	4-M6xP1.0	780	42.6	19.32

06/22/15

UNIFIEDALLOYS

Claro

iv. Solenoid Valves – Full Port, AISI 316 – 2 x 1½" for Air Scour Lines, 2 x 1½" for Fluidization Lines

ASCO® Red-Hat®

Pilot Operated
General Service Solenoid Valves
Brass or Stainless Steel Bodies
3/8" to 2 1/2" NPT

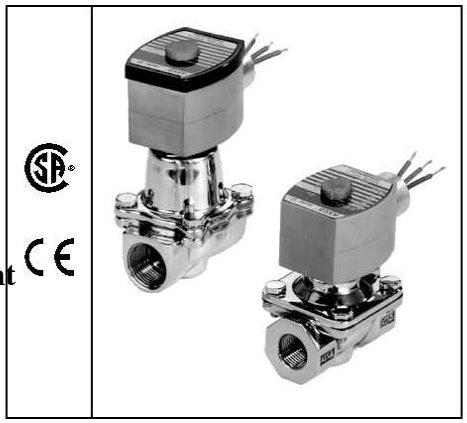
NC
NO

2/2 SERIES 8210

Features

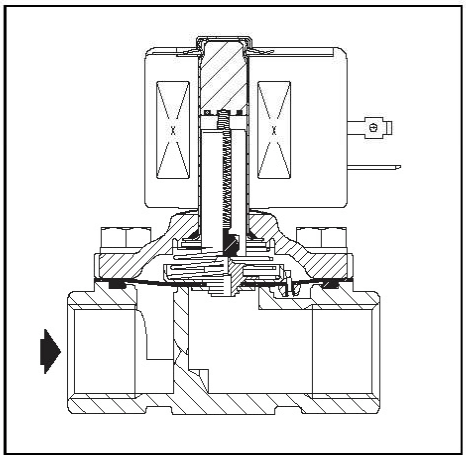
- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage.
- High Flow Valves for liquid, corrosive, and air/inert gas service.
- Industrial applications include:
  - Car wash
  - Air compressors
  - Pumps
  - Laundry equipment
  - Industrial water control

Note: Claro Will furnish 316 equivalent as specified



Construction

	Valve Parts in Contact with Fluids	
Body	Brass	304 Stainless Steel
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver



Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
H	30.6	-	-	-	-	74073	-	74073
F	40.6	-	-	-	-	238910		238914

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages available when required.

Solenoid Enclosures

Standard: Red-Hat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; Red-Hat - Type I.
Optional: Red-Hat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.
(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B57, 8210B58, and 8210B59. Valves not available with Explosionproof enclosures.)
See Optional Features Section for other available options.

Nominal Ambient Temperature Ranges:

Red-Hat II/
Red-Hat AC: 32°F to 125°F (0°C to 52°C)
Red-Hat II DC: 32°F to 104°F (0°C to 40°C)
Red-Hat DC: 32°F to 77°F (0°C to 25°C)
(104°F/40°C occasionally)
Refer to Engineering Section for details.

Approvals:

CSA certified. Red-Hat II meets applicable CE directives.
Refer to Engineering Section for details.

SERIES
8210

ASCO®

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi) Min.	Max. AC Air-Inert Gas	Max. AC Water	Max. AC Light Oil @ 300 SSU	Max. DC Air-Inert Gas	Max. DC Water	Max. DC Light Oil @ 300 SSU	Max. Fluid Temp. °F AC	Max. Fluid Temp. °F DC	Brass Body Catalog Number	Brass Body Constr. Ref. No. ④	Brass Body UL ⑤ Listing	Stainless Steel Body Catalog Number	Stainless Steel Body Constr. Ref. No. ④	Stainless Steel Body UL ⑤ Listing	Watt Rating/Class of Coil Insulation ⑦ AC	Watt Rating/Class of Coil Insulation ⑦ DC
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	3/8	1.5	①	150	125	-	40	40	-	180	150	8210G73 ③	1P	●	8210G36 ③	1P	●	6.1/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G93	5D	○	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G1	6D	○	-	-	-	6.1/F	11.6/F
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G6	5D	○	-	-	-	17.1/F	-
1/2	7/16	2.2	①	150	125	-	40	40	-	180	150	8210G15 ③	2P	●	8210G37 ③	2P	●	6.1/F	11.6/F
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G94	5D	○	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G87	7D	●	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G2	6D	○	-	-	-	6.1/F	11.6/F
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G7	5D	○	-	-	-	17.1/F	-
1/2	3/4	4	5	-	300	-	-	300	-	180	125	8210G227	5D	○	-	-	-	17.1/F	40.6/H
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G88	7D	●	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G9	9D	○	-	-	-	6.1/F	11.6/F
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G95	8D	○	-	-	-	10.1/F	11.6/F
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G3	11D	○	-	-	-	6.1/F	11.6/F
3/4	3/4	6	0	-	-	-	200	180	180	-	77	8210B26 ② ‡	10P	-	-	-	-	-	30.6/H
3/4	3/4	6	0	350	300	200	-	-	-	200	-	8210G26 ② ‡	40P	●	-	-	-	16.1F	-
1	1	13	0	-	-	-	100	100	80	-	77	8210B54 ‡	31D	-	8210D89	15D	-	-	30.6/H
1	1	13	0	150	125	125	-	-	-	180	-	8210G54	41D	●	8210G89	45D	●	16.1/F	-
1	1	13	5	150	150	100	125	125	125	180	150	8210G4	12D	○	-	-	-	6.1/F	11.6/F
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G27 ‡	42P	●	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G78 ②	13P	-	-	-	-	17.1/F	-
1 1/4	1 1/8	15	0	-	-	-	100	100	80	-	77	8210B55 ‡	32D	-	-	-	-	-	30.6/H
1 1/4	1 1/8	15	0	150	125	125	-	-	-	180	-	8210G55	43D	●	-	-	-	16.1/F	-
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G8	16D	○	-	-	-	6.1/F	11.6/F
1 1/2	1 1/4	22.5	0	-	-	-	100	100	80	-	77	8210B56 ‡	33D	-	-	-	-	-	30.6/H
1 1/2	1 1/4	22.5	0	150	125	125	-	-	-	180	-	8210G56 ‡	44D	●	-	-	-	16.1/F	-
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G22	18D	●	-	-	-	6.1/F	11.6/F
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	●	-	-	-	6.1/F	11.6/F
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G33	23D	●	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G11 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G34	23D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G30	37D	●	10.1/F	11.6/F
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G12 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G35	25D	●	-	-	-	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G38	38D	●	10.1/F	11.6/F
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C13	24D	●	-	-	-	-	16.8/F
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G13	46D	●	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B57 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210D14	26D	●	-	-	-	-	16.8/F
1	1	13	5	150	150	125	-	-	-	180	-	8210G14	47D	●	-	-	-	16.1/F	-
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B58 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D18	28D	●	-	-	-	-	16.8/F
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G18	48D	●	-	-	-	16.1/F	-
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B59 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	1 1/4	22.5	5	-	-	-	125	125	125	-	180	8210D32	29D	●	-	-	-	-	16.8/F
1 1/2	1 1/4	22.5	5	150	150	125	-	-	-	180	-	8210G32	49D	●	-	-	-	16.1/F	-
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210103	30P	●	-	-	-	-	16.8/F
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	●	-	-	-	16.1/F	-
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210104	27P	●	-	-	-	-	16.8/F
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-			16.1/F	-

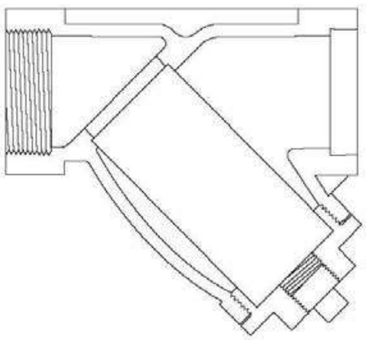
Notes:
① 5 psi on Air; 1 psi on Water.
② Valve provided with PTFE main disc.
③ Valve includes Ultem (G.E. trademark) piston.
④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
⑤ ○ Safety Shutoff Valve; ● General Purpose Valve. Refer to Engineering Section (Approvals) for details.
⑥ Valves not available with Explosionproof enclosures.
⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
⑧ AC construction also has PA seating.
⑨ No disc-holder.
⑩ Stainless Steel disc-holder.
‡ Must have solenoid mounted vertical and upright.

Claro

v. Y-Strainer ½” dia. (IFC, Model Y300TSST, 50 mesh, AISI 316 stainless steel cast body & screening basket); Utilized if Service Water is Plant Effluent

ISLIP FLOW CONTROLS Inc.

IFC Series Y150 and Y300 Cast Steel Threaded and Socket Weld Y-Strainers



Design Features:

- Strainers are available with threaded (N.P.T.) or socket weld inlet/outlet connections.
- Strainer body meets applicable ASME Standard..
- One piece precision investment cast body.
- Strainers equipped with threaded cover cap that utilize a flat gasket seal.
- Upper and lower machined seats.
- 304 SS perforated screens are standard.
- Drain/Blow-off connection furnished with plug as standard.
- Generous screen area and properly proportioned straining chamber to minimize initial pressure drop while maximizing time between cleanings.

Parts List and Standard Materials

Part	Carbon Steel	Stainless Steel
Body	A216-WCB	A351-CF8M
Cap	A216-WCB	A351-CF8M
Screen [1]	304SS	304SS
Plug [2]	A105	A182-316
Gasket [1]	Teflon	Teflon

Notes: 1. Recommended Spares.
2. Materials of equivalent strength may be substituted at manufacturer's option.

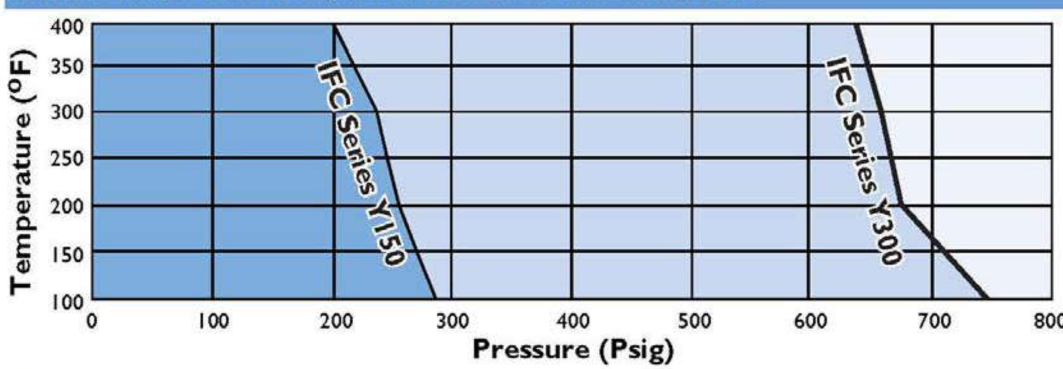
Upper Pressure Limits (Non-Shock)

IFC Model (Threaded)	Body Material	M.A.W.P. psig (Bars)
Y150TST	WCB	285 (19.65)
Y150TSST	CF8M	275 (18.96)
Y300TST	WCB	740 (51.02)
Y300TSST	CF8M	720 (49.64)

Lower Temperature Limits

Body Material	Lower Limit ¡F (¡C)
WCB	-20 (-28.9)
CF8M	-20 (-28.9)

Pressure Temperature Chart (in accordance with ASME B16.34, WCB)



Note: Teflon limited to 400°F maximum sustained operating temperature.
When operating IFC series Y150 and Y300 cast steel strainers at higher temperatures please consult factory.

Tel. 905-335-8777 Fax. 905-335-0977 Toll Free Tel. 1-866-872-0072 Toll Free Fax. 1-866-872-0073

vi. Grit Pump

Specification Data	G-R Hard Iron Fitted Basic Pump	Sec. 55	PAGE 2140C DECEMBER 2013

CDS

Self Priming Centrifugal Pump

Super T SERIES
VARIOUS PATENTS APPLY

Model T4A71S-B

Size 4" x 4"

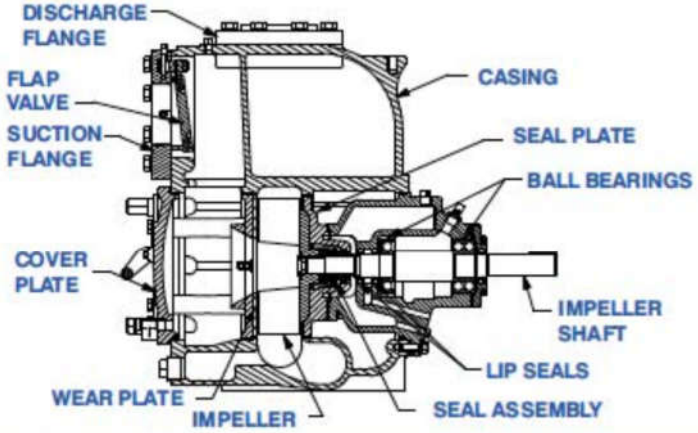
5 YEAR WARRANTY SUPER T SERIES

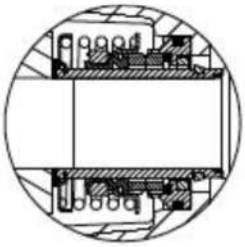
PUMP SPECIFICATIONS

Size: 4" x 4" (101 mm x 101 mm) NPT - Female.
Casing: Gray Iron 30.
Maximum Operating Pressure 86 psi (593 kPa).*
Semi-Open Type, Two Vane Impeller: G-R Hard Iron.
Handles 3" (76,2 mm) Diameter Spherical Solids.
Impeller Shaft: Alloy Steel 4150.
Shaft Sleeve: Alloy Steel 4130.
Replaceable Wear Plate: Hardened Alloy Steel.
Removable Adjustable Cover Plate: Gray Iron 30; 41 lbs. (18 kg).
Flap Valve: Neoprene w/Nylon and Steel Reinforcing.
Seal Plate: G-R Hard Iron.
Bearing Housing: Gray Iron 30.
Radial Bearing: Open Single Row Ball.
Thrust Bearing: Open Double Row Ball.
Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.
Flanges: Gray Iron 30.
Gaskets: Buna-N, Compressed Synthetic Fibers, Vegetable Fiber, PTFE, Cork, and Rubber.
O-Rings: Buna-N.
Hardware: Standard Plated Steel.
Brass Pressure Relief Valve.
Bearing and Seal Cavity Oil Level Sight Gauges.
Optional Equipment: Metal Bellows Seal. Automatic Air Release Valve. 120V/240V Casing Heater. High Pump Temperature Shutdown Kit. G-R Hard Iron Casing. High Chrome Cast Iron Impeller. Self-Cleaning Wear Plate.
Gray Iron 30 Suction and Discharge Spool Flanges:
4" ASA **(Specify Model T4A71S-B /F).**
100 mm DIN 2527 (PN 16) **(Specify Model T4A71S-B /FM).**

**Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*

Shown with Optional Suction & Discharge Spool Flanges (Available in ASA or DIN Standard Sizes).





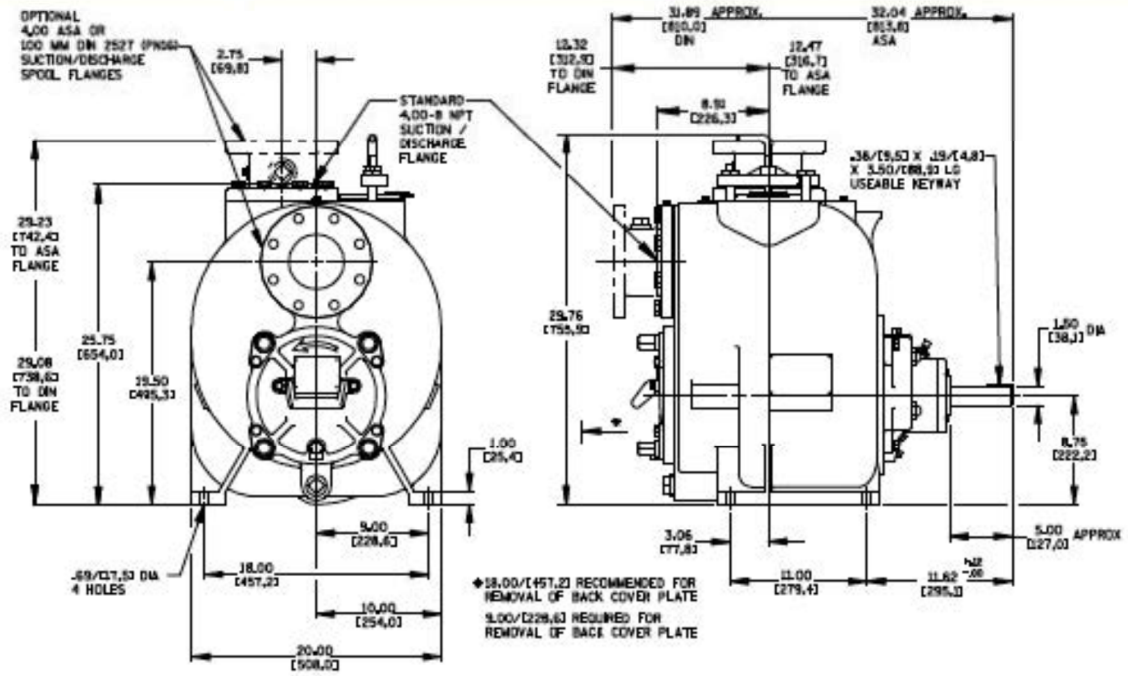
SEAL DETAIL

Cartridge Type, Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*

GR GORMAN-RUPP PUMPS

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA
www.grpumps.com
Specifications Subject to Change Without Notice
Printed in U.S.A.

Specification Data	APPROXIMATE DIMENSIONS and WEIGHTS	NET WEIGHT: 585 LBS. (265 KG.)*
SECTION 55, PAGE 2140C		SHIPPING WEIGHT: 624 LBS. (283 KG.)*
		EXPORT CRATE: 22.7 CU. FT. (0,64 CU. M.)
		*ADD 15 LBS. (6,8 KG.) W/EACH SPOOL FLANGE



NOTE: OPTIONAL ASA OR DIN STANDARD SUCITON & DISCHARGE SPOOL FLANGES AVAILABLE.

screening grit removal Claro

Claro

• Gorman-Rupp Air Release Valve (Supplied by Claro) – Typical Installation Drawing & Principle of Operation

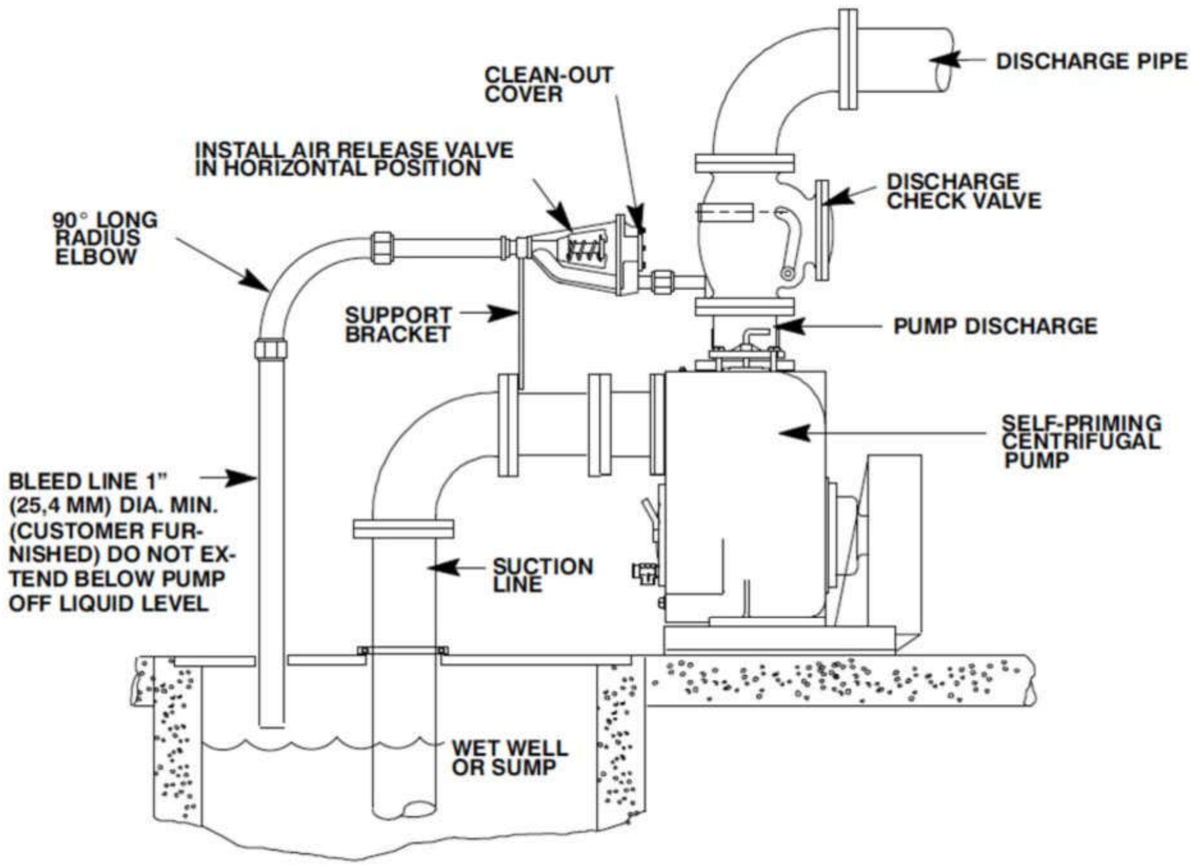


Figure B—1. Typical Automatic Air Release Valve Installation

THEORY OF OPERATION

Review all SAFETY information in Section A.

A self-priming centrifugal pump **will not prime** if there is sufficient static liquid head to hold the discharge check valve closed. Self-priming pumps are not air compressors. During the priming cycle, air from the suction line must be vented to atmosphere on the discharge side. It is therefore necessary to open the discharge side of the pump to atmospheric pressure and allow the air to bleed off during ther priming cycle. If the bleed line is not closed after the pump is primed, liquid would be forced back to the wet well under the full working pressure of the pump. This wasteful recirculation of liquid is controlled by the Automatic Air Release Valve.

When properly installed and correctly adjusted to the specific hydraulic operating conditions, the Automatic Air Release Valve will permit air to escape, and will close automatically when the pump is fully primed and pumping at full capacity.

Figures C–1 and C–2 show a cross-sectional view of the valve, and a corresponding description of operation.

Air from the pump casing passes through the valve to the wet well during the priming cycle (Figure C–1).

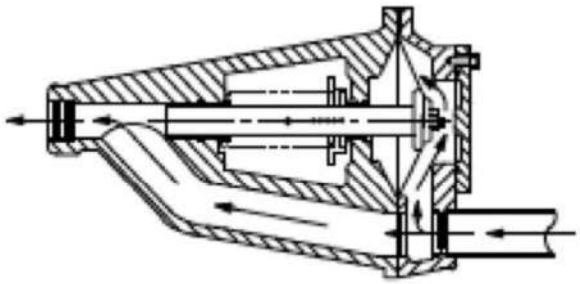


Figure C–1. Valve in Open Position

When the pump is fully primed, pressure resulting from flow against the valve diaphragm compresses the spring and closes the valve (Figure C–2). The valve will remain closed, reducing the bypass of liquid to 1 to 5 gallons (3,8 to 19 liters) per minute, until the pump loses its prime or stops.

WARNING!

Some leakage (1 to 5 gallons [3,8 to 19 liters] per minute) will occur when the valve is fully closed. Be sure the bypass line is directed back to the wet well or tank to prevent hazardous spills.

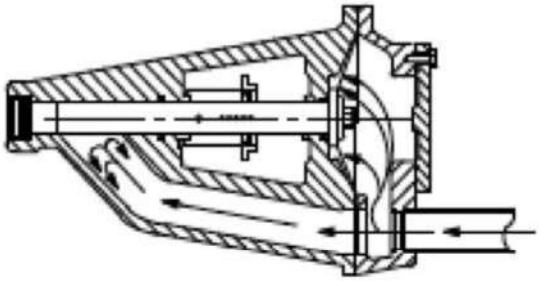


Figure C–2. Valve in Closed Position

When the pump shuts down, the spring returns the diaphragm to its original position. Any solids that may have accumulated in the diaphragm chamber settle to the bottom and are flushed out during the next priming cycle.

NOTE

The valve will remain open until the total dynamic discharge head exceeds the static discharge head. The range of the valve closing pressure is established by the tension rate of the spring as ordered from the factory. Valve closing pressure can be further adjusted to satisfy system requirements by moving the spring retaining pin up or down the plunger rod to increase or decrease tension on the spring. Contact your Gorman-Rupp distributor or the Gorman-Rupp Company for additional information.

vii. Hydrocyclones

Krebs® gMAX® Hydrocyclone
Finer particle separation with patented technology.

FLSMIDTH KREBS

Krebs® gMAX® hydrocyclones

gMAX performance

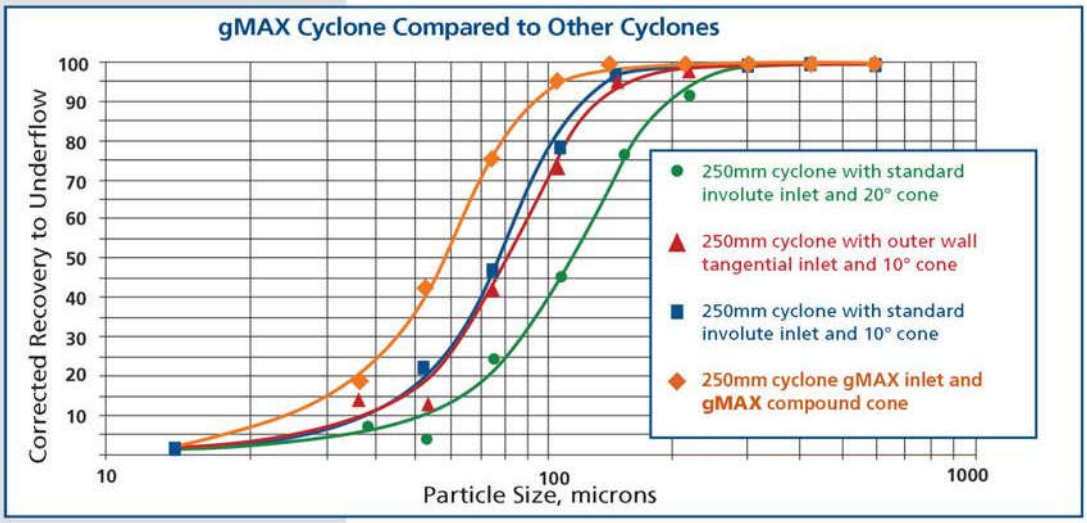
- Finer, sharper particle separations at high capacities
- Fewer cyclones needed for optimal performance
- Easy maintenance
- Works with existing installations

gMAX applications

- Minerals processing
- Oil Sands
- Water Treatment
- Chemicals
- Pulp & Paper
- Automotive
- Oil Refining

FLSmidth Krebs leads the separation technology for mining and industrial applications since 1952.

Optimum cyclone performance relies on minimizing turbulence while maximizing tangential velocity. The gMAX® cyclone focuses on these two important factors, significantly advancing cyclone performance. To achieve these two design criteria, the gMAX incorporates performance-enhancing improvements to the inlet head, cylinder section, cones, and apex.



Innovative hydrocyclone design

gMAX inlet head

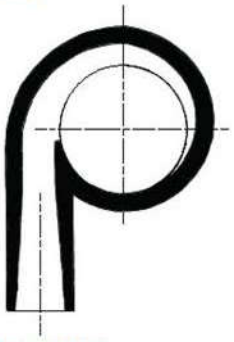
- Contoured ramped inlet pre-classifies feed and reduces turbulence
- Reduced turbulence minimizes coarse solids bypass to overflow
- Less turbulence reduces wear

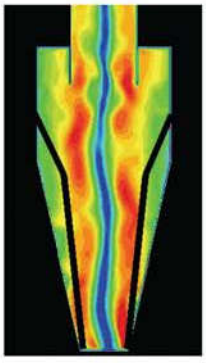
Inlet head design

The innovative gMAX® inlet has replaced the former Krebs involute feed inlet design improving upon what had been the state-of-the-art design for over 30 years. A commitment to continuous improvement like this is why FLSmidth Krebs is the world leader in cyclones, and why we continue to push the limits of separation technology.

The outer wall involute design entrance pre-classifies the feed solids prior to entering the main body of the cyclone. The inlet head of the gMAX also includes an improved vortex finder and top cover plate liner design.

These improvements result in less mis-placed material to the overflow and dramatically increased wear life. This longer wear life combined with premium ceramics in the lower parts of the cyclone, will greatly increase intervals between complete cyclone rebuilds.





Cone design

Through the use of CFD analysis, FLSmidth Krebs has designed the gMAX® cyclone with sharper upper cones followed by longer angled lower cones.

This combination maximizes tangential velocity in the upper part of the cyclone. It also provides a long residence time in the critical separation zones in the lower part of the cyclone. This results in a substantially finer separation with fewer fines in the underflow and less coarse bypass to overflow.

One Source

Krebs® gMAX® Hydrocyclones

www.flsmidthkrebs.com

04-204 Rev 10/19/2016 ijr-us

Optional Liner Materials Available

- BPC rubber
- Neoprene
- Nitrile
- Chlorobutyl
- Alumina
- Nitride bonded silicon carbide ceramic
- Reaction bonded silicon carbide ceramic
- Sintered alpha silicon carbide ceramic

Fabricated/Cast/Molded Unlined Cyclone Materials

- 304L/316L SS
- Duplex 2205
- CD4MCU
- Monel
- Inconel
- Nickel
- Hastelloy
- Other metal alloys
- Polyurethane*

** see bulletin #9-201 molded polyurethane cyclones*

PAINT WEAR TESTS: gMAX vs. Outer Wall Tangential

To validate the reduced turbulence and wear characteristics predicted using computational fluid dynamics (CFD) on the gMAX inlet head design, layers of paint in different colors were applied to the gMAX inlet head liner (left insert) and to a competitor's outer wall tangential inlet head liner (right insert). The components were assembled onto cyclones and slurry was pumped through them in FLSmidth Krebs' cyclone laboratory. The resulting wear patterns show a dramatic reduction and wear as a result of the improved gMAX geometry.

World-class Service & Hydrocyclone Test Facilities

FLSmidth Krebs has provided superior classification and separation solutions using hydrocyclone technology since 1952. Our unparalleled technical staff of experienced engineers will quickly and thoroughly evaluate your potential applications and provide detailed recommendations and performance estimates. In the event you have an application that requires testing for validation, our hydrocyclone test lab is equipped and staffed to provide prompt testing at low cost. Arrangements can be also be made to run test cyclones at your site.

For more information on any of our products please contact one of our **Regional Sales Offices** below.

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krebseurope@flsmidth.com

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FLSmidth KREBS

FLSmidth KREBS

KREBS® HYDROCYCLONES FOR SEWAGE / WASTE WATER TREATMENT

Excelling in separation solutions since 1952

INDUSTRIAL SEPARATION INSERT # WWT
REV_10/20/2016_ljr-us

SEWAGE / WASTE WATER TREATMENT PROCESS

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krebsindia@flsmidth.com

Johannesburg, South Africa
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krebsafrica@flsmidth.com

www.flsmidthkrebs.com

viii. High Water Level Probe Model Number & Specification Data: Endress + Hauser Liquiphant Vibronic Fork Sensor Model FTL 51-TAE2CB1E1A

Endress+Hauser
People for Process Automation

Item	Qty.	Unit	Ordercode Description
0010	1	PC	FTL51-F7JW7/0 FTL51-TAE2CB1E1A **Liquiphant M FTL51** Link to the product information: *www.ca.endress.com/FTL51* Point level/density, vibronic. Extension tube. Application: liquids. Point level: :: Millimeter precision switch point. :: Application safety: independent of liquid attribute, independent of build up. Density: Continuous measurement. :: Measure directly in the tank / pipe.
		T	Approval: CSA C/US XP Cl I,II,III Div.1 Gr.A-G, zone 1,2
		AE2	Process Connection: NPS 2" Cl.150 RF, 316/316L flange ASME B16.5
		CB	Probe Length; Type: 12.00 in; 316L, Ra<3.2um/126uin
		1	Electronics; Output: FEL51; SIL 2-wire 19-253VAC
		E1	Housing; Cable Entry: F27 NEMA Type 4X/6P Encl. 316L; NPT3/4 thread
		A	Additional Option: Basic version

E. O&M & Installation Manuals – Vortex Unit (Synoptic Format)

i. Vortex Unit (Sample)

• Please see following pages →

VortiClar™ Forced Grit Vortex

O&M Manual

Installation – Operation – Care

Fort St. John, BC

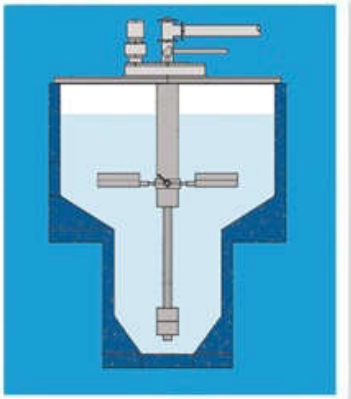
VortiClar™ Forced Vortex Grit Chamber / Sand Trap

Claro VortiClar™ forced vortex grit removal systems deliver high grit removal efficiencies across a wide range of daily flow capacities. An engineered hydraulic design removes fine grit & other debris particles, separates organic from inorganic material, & reduces grit accumulation in downstream basins, channels, weirs, & piping. The extraction of grit also significantly reduces wear on mechanical equipment.

The unit is composed of a centrifugal flow chamber; weir baffles; an energy-efficient axial flow impeller with a single, dual speed, or VFD motor; a quiescent sediment collection chamber & a choice of grit extraction approaches: airlift, high quality grit pump, or a patented grit extraction system that eliminates the need for a grit classifier or grit washer. Ideal for small footprint requirements.

Design features & advantages

- Efficient organics/inorganics separation & fine grit capture
- Exceptionally small foot print & variety of configurations available:
  - elevated, stand-alone config.: stainless steel tank with all components of unit accessible from support platform c/w optional operator-safe walkways
  - low-profile config.: all components of unit accessible & concrete-embedded vortex
- Low maintenance, low operating cost, low energy consumption
- Fully automated & fully-enclosed hygienic operation
- Optional variable frequency drive (VFD) on vortex for performance optimization
- Small & large capacities
- Indoor & outdoor installation
- No submerged bearings
- Optional vortex air and/or water grit scouring system
- For cost-effective retrofits/conversion of aerated grit tanks please see Claro Aerated Grit Tank Extraction Spiral Systems



Vorticlar™ Forced Vortex Grit Chamber with airlift arrangement (other grit extraction approaches available)

Vorticlar™ Forced Vortex Grit Chamber gear drive and airlift arrangement

Contents

- Please see Appendices section of the global O&M manual for additional arrangement / layout drawings & motor/gear drive specification information.

Introduction

The Claro Operation & Maintenance manual is intended to provide operations staff with a clear description of the vortex grit chamber and its components. This manual also contains important instructions on how to install & start-up the vortex unit and maintenance advice. All who come in contact with the vortex grit removal system including its auxiliary equipment including blower, grit pump and/or classifier/grit washer equipment should comply with the safety precautions, warnings, regulations and other instructions in this manual as well as local provincial/state and facility regulations and safety practices.

This Operation & Maintenance manual must be available to all personnel involved in the vortex system's installation, commissioning, operation, service / maintenance and transportation.

Claro Environmental Technologies assumes that the personnel responsible for or working with this equipment are familiar with local regulations regarding the work safety environment and especially safety regulations and practices for sewage treatment plants and other applicable regulations.

Never start installation or assembly prior to reading and fully understanding the contents of this manual. The safety instructions and warnings are especially important. If personnel have any comments or questions, please feel free to contact Claro. Personnel should never enter into the tank or be in proximity to openings on the tank covers where a fall risk is present without turning the vortex paddle system 'Off' and locking out power at the control panel. Serious injury or death will result if the paddle system should start in the presence of personnel within the tank.

It is forbidden to use the vortex tank in any other manner or for purposes other than those described in this manual.

N.B. Claro cannot be held responsible for damage caused by negligent handling of the machine or neglect of the directives outlined in this manual. If personnel have comments or questions, please feel free to contact Claro. We are here to help !

Claro's responsibility is limited or ceases once:

- The machine or any individual component is loosened or disassembled without Claro consent and/or advice
- Parts that do not belong to the vortex are integrated into the machine

- Parts that are not original spare parts are installed without Claro's approval
- Lubrication schedules are not followed

Modification, renovation or re-build of the machine is not permitted without written consent of Claro Environmental Technologies. Please feel free to contact Claro for advice. We are here to help !

Note: The vortex system is composed of several major components including a grit pump, an air blower, and a grit classifier. The respective O&M manuals included in this global manual should be reviewed and understood before operation / maintenance of the system.

1. About the Grit Vortex Unit

General: The Claro VortiClar™ forced grit vortex unit is designed to mechanically separate fine & larger particle sand and grit from wastewater or process water. The vortex paddle system operates continuously for the purpose of grit removal. Auxiliary equipment such as water scour, air scour (if applicable), grit pump (or, alternately, a grit air lift), and grit classifier (or, alternately a grit washer) run intermittently on a schedule controlled by the Claro control panel.

Grit includes sand, gravel, cinder, or other heavy solid materials that are "heavier" (higher specific gravity) than the organic biodegradable solids found in municipal or other wastewaters. Grit also includes eggshells, bone chips, seeds, coffee grounds, and large organic particles, such as corn niblets or other food waste that have the aforementioned higher specific gravity. Removal of grit prevents unnecessary abrasion and wear of mechanical equipment, grit deposition in pipelines and channels, and accumulation of grit in anaerobic digesters and aeration or other basins.

Principle of Operation:

1. Vortex Grit Chamber

The influent is introduced tangentially into one side of the vortex chamber where impeller paddles turn at a predetermined rate and thus create a 'forced vortex' hydraulic pattern. This circular hydraulic motion in conjunction with the installation angle of the paddle system causes the organics to separate from the grit, be drawn upwards with the effluent and subsequently exit the tank via the vortex outlet. Heavier grit particles drop &, via centrifugal forces, migrate to the tank walls where they drop to a lower collection chamber. The grit slurry material is scoured with air before removal in an effort to further remove & re-suspend organics and enable an exit from the tank for downstream treatment. After the air scour, a water scour is introduced. Water scour has 2 functions: 1) further remove and re-suspend organics and 2) fluidize the grit slurry to a lower Dry Solids percentage (DS) content in order that the grit pump will be able to successfully

pump the slurry. Note: the air scour stops & pauses before the grit pump operates in order to avoid the pump drawing in air. Also, the water scour runs for a short time before the grit pump is called upon to start in order to ensure that air has dissipated and that the grit is suitably fluidized. The water scour continues to run during the full grit pump run time. Grit pump run time has been set by the Claro Technician in order to ensure that no grit accumulation takes place in the vortex's lower sedimentation chamber and to ensure that the grit piping between the vortex & pump and between the pump & the grit classifier are clear of grit slurry.

An inclined deflector plate is bolted to the inside of the vortex tank immediately downstream of the tank's inlet. The deflector plate directs incoming influent flow downwards into the middle section of the vortex tank as a means of preventing short-circuiting of flow that could otherwise interfere with optimal grit removal. By avoiding short-circuiting of flow to the vortex's outlet, the influent flow and its entrained grit stays within the vortex tank for the recommended retention/sedimentation time among other design criteria.

The pumped grit slurry enters into the grit classifier where the grit is allowed to sediment into the shaftless spiral conveyor at its base. The shaftless spiral conveyor removes the captured grit slurry and deposits this material into a continuous hygienic bag and grit bin. Operation of the grit classifier extraction conveyor is typically intermittent in order to decant as much moisture from the slurry as possible. A grit washing jet can also be actuated in order to further wash organics from the grit slurry before discharge, if required.

The Claro grit vortex & auxiliary equipment are designed for fully automatic operation. Please see the annotated HMI screens section in the Appendices section of this manual for a description of control system setpoint flexibility. Please also see control panel drawings and component catalog cuts for a full As-Built documentation of the physical aspects of the control system.

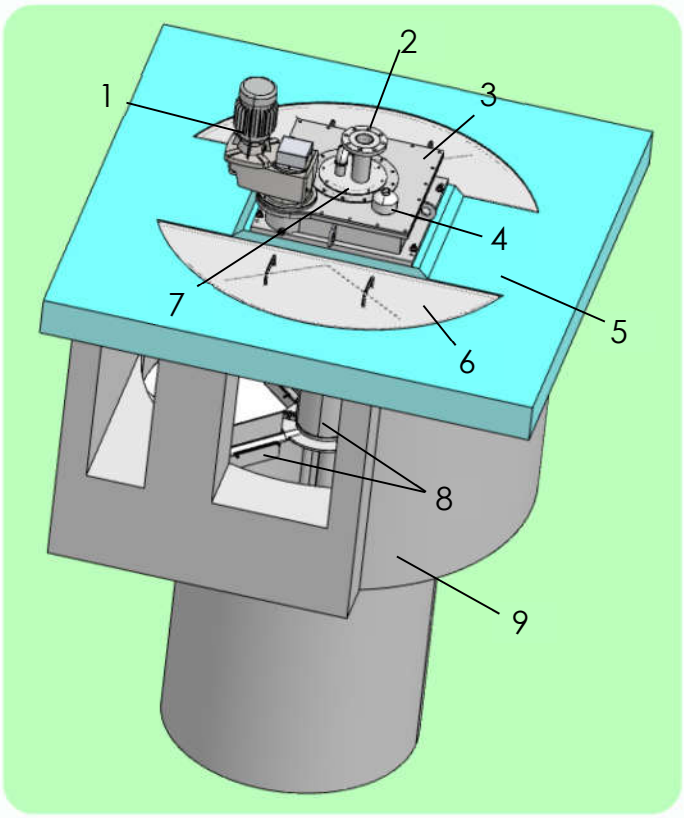
Claro grit vortex systems are designed in a range of model sizes in order to suit the peak plant flow. The model number is expressed as follows: [Diameter]-[Rated Capacity]. Thus, the vortex at Fort St. John, model FV 4250-53.2, has a diameter of 3050 mm & a rated capacity of 53,200 m3/day.

1.1 Structure & Function

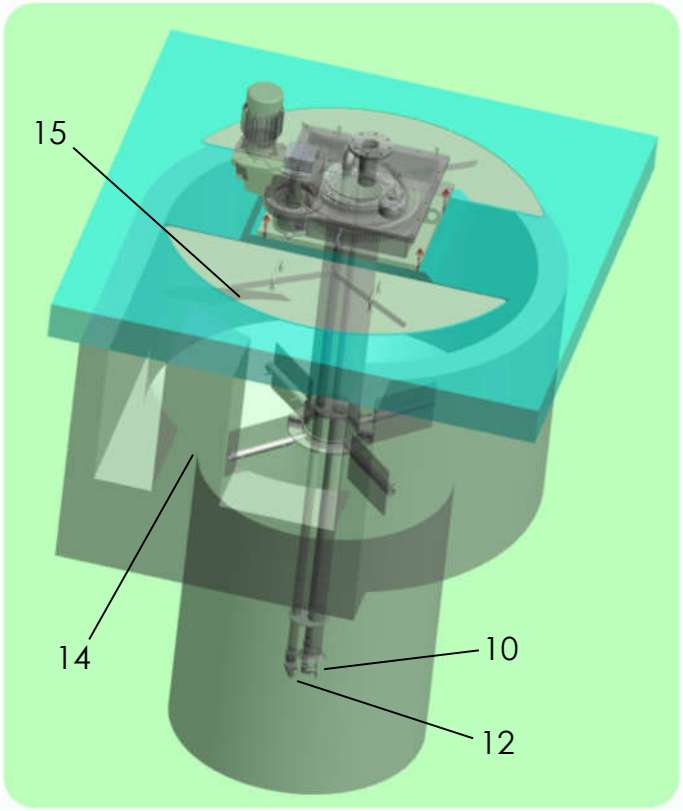
The Claro grit vortex consists of the following components:

• Please see following page →

Forced Grit Vortex – Typical In-Concrete Arrangement



1. Motor & gear drive
2. Grit extraction piping
3. Planetary gear drive (also can include a stainless steel H-support bridge that supports the planetary gear drive above the vortex tank)
4. Oil fill & oil level verification dip stick
5. Concrete support bridge (or) HSS stainless steel H-support bridge
6. Removable checker plate with drop handles
7. Circular stainless steel top plate with air scour (if present) & grit scour / fluidization line connections
8. Paddle system drive Tube & Adjustable Paddles
9. Conical concrete tank according to Claro dimensions



10. Air Scour System piping inside the vortex tank & including solenoid, ball valve, & 'Snap Cap' coarse bubble diffusers. Air supply is from a blower or, alternately, can originate from a tapped aeration system or other equipment blower supply line
11. Air Scour Blower (not shown)
12. Water Scour piping inside the vortex tank & including solenoid, ball valve
13. Grit pump (or, alternately, an air lift assembly) (not shown)
14. Vortex tank in concrete (by contractor) or supplied as a modular stainless tank with supports
15. Deflector Plate

- Vortex General Arrangement – please see equipment drawings in the appendices section of this manual for more information.

1.2 Use

The Claro grit vortex system is designed to mechanically separate fine & larger particle sand and grit from wastewater or process water.

It is forbidden to use the grit vortex for any purpose other than the purpose cited above without written consent from Claro. Please also inform Claro if design conditions change significantly or if a change in performance is noted. Claro would be pleased to help.

2. Safety

The safety section in this manual contains important safety information and should be followed closely. There is a risk of personal injury or other damage if the safety instructions are not followed.

Before any work is started, the personnel who will perform the work or related personnel must read this safety section.

2.1 General Safety Precautions

- It is forbidden to use the vortex for other than its intended purpose.
- All personnel who operate the vortex & its auxiliary equipment must have read and understood this manual, especially the safety section.
- Rebuilding and/or modification of the machine is prohibited without written consent from Claro. Please feel free to contact Claro – we are here to help !
- Exercise caution when walking on top of the vortex tank when checker plate hatches are open or when opening hatches. Use certified safety restraints, safety area isolation tape, and procedures in accordance with local and facility regulations when working near the vortex tank when covers are open or removed. Consider turning the rotating paddles off at the HOA (Selector to 'Off' & press E-stop) and locking out power with a padlock at the main control panel in these circumstances. Serious injury or death can result from a fall into an operating vortex tank.
- Before cleaning, servicing or dismantling any aspect of the system, the Vortex HOA selector switch selector should be 'Off',

the E-stop engaged and, most importantly, the vortex motor power locked out at the main control panel. Serious injury or death can result from an operator coming into contact with the operating paddles of the vortex tank.

- N.B. Remember that the vortex system works in conjunction with other machines/systems. These machines/systems – including the grit pump, air blower, water scour & the grit classifier – can start without warning. It is important to read the manuals of this auxiliary equipment and to ensure that this equipment is 'Off' and locked-out when working on the machine.
- In addition to the directives specified herein, the safety regulations and practices that apply at the local plant level shall be followed. State, provincial and/or national regulations shall also be followed.
- All vortex protecting elements and covers must be mounted and locked / bolted in position before starting the vortex grit removal system.
- All anchor bolts, safety instrumentation (e.g. amperage protection), local control stations including E-stop and, if applicable, safety railings must be present and in good/operable condition before starting the vortex system.

2.2 During Operation

- Work on the vortex is forbidden when it is in operation.
- Keep in mind that the vortex paddle system can be started from a stopped position remotely and that the grit pump (or, alternately, air lift), grit air scour blower, grit water scour, & classifier can start automatically and without notice.
- Protective plates and covers for the top of the vortex and all piping shall be installed and bolted in position. All guards on the grit pump shall also be in position
- The oil dip stick & cover of the vortex planetary gear drive shall be secured in place during operation.

2.3 Machine Safety Protections

- The grit vortex system is equipped with bolted & hinged protective checker plate lids. These elements should always be installed when the machine is in operation.
- Avoid dropping tools or other unscreened debris into the vortex as this material can cause injury, damage the machine and/or

block the grit extraction piping inlet positioned at the bottom of the tank.

- Change planetary gear drive & drive station gear drive oil with the recommended oil type on the schedule shown in the respective sections included in this manual. The main control panel reports operation times of all equipment, including the vortex, in order to help coordinate inspection & maintenance routines. Well-maintained equipment provides for a safer system that is less likely to be out of service.

WARNING: The vortex can be started remotely and major auxiliary equipment such as the grit pump, blower/air scour, water scour, and grit classifier starts automatically and without notice. An HOA station for manual operation & E-stop capability is provided local to the vortex. Ideally, the operator will be able to see the effect of manual operation when using the HOA.

It is forbidden to clean the vortex paddles or other elements while the unit is in operation or not positively lock-out of operation with a padlock.

2.4 Electrical Work

Electrical work must be performed by a licensed electrician and in accordance with applicable laws, regulations and rules. Work shall also be carried out in accordance with facility regulations.

- To avoid accidents including fatal electrical shock, it is important that the electric motors, instruments and cables are in good working order with no breaks or other anomalies.
- Electrical cables should be routed so that there is no risk of wear against any moving or sharp/abrasive parts.
- All equipment and instruments should be grounded. Humid environments and wastewater applications carry an increased risk of accidents caused by electric current. Remember that the vortex system is a high voltage system.
- When replacing or repairing an electrical component, the power supply must always be turned off and the relevant switch and/or breaker element padlocked before starting work.

It is forbidden to connect the machine to a live electrical power source while installation or other work on the machine is in progress.

3. Storage, Transportation & Packaging

3.1 Scope of Delivery (Typical)

The typical vortex supply includes:

1. Motor & Gear Drive (typically pre-installed on the planetary gear drive)
2. Planetary Gear Drive (also can include a stainless steel H-support bridge that supports the planetary gear drive above the vortex tank)
3. Paddle System Drive Tube & Adjustable Paddles
4. Air Scour System piping inside the vortex tank & including solenoid, ball valve, & 'Snap Cap' coarse bubble diffusers. Air supply is from a blower or, alternately, can originate from a tapped aeration system or other equipment blower supply line
5. Air Scour Blower
6. Water Scour piping inside the vortex tank & including solenoid, ball valve
7. Grit pump (or, alternately, an air lift assembly)
8. Deflector Plate
9. Vortex tank in concrete (by contractor) or supplied as a modular stainless tank with supports

3.2 Storage

Storage of the vortex components may be made for a short period and only in / on its original packaging/pallet(s). Ensure that the vortex components are stored in an indoor environment and not exposed to freezing. If outdoor storage is unavoidable, please contact Claro. Before the vortex components are kept in storage / out-of-service for an extended period, please contact Claro for additional storage instructions and advice.

3.3 Transportation

Transportation shall be made in a manner that ensures that the vortex components are secured from falling or other mishap damage. Typically, the vortex components are delivered to the project site on a flat bed truck and secured on a specially-built pallet. N.B. Lifting the machine components over personnel is absolutely forbidden. Suitably trained staff should perform lifting, loading, load securing, unloading and driving of the transport truck.

3.4 Packaging

The packaging (pallets or crating) is specially-designed and adapted for the delivered vortex equipment and provides maximum protection. Ensure that the packaging is not damaged when the delivery is received. If the packaging or equipment is damaged, please document with photographs & contact Claro.

4. Assembly & Installation

Experienced installation personnel must carry out the installation in a professional manner. All electrical wiring must be performed by a qualified electrician and must comply with current CSA, UL or other applicable regulations.

4.1 Assembly / Installation

Please refer to the equipment drawings included in the Appendices section of the global O&M manual. Additional installation instructions for each project are provided to the installer in advance of delivery. The following outlines the central principles of a correctly installed vortex system:

- The vortex planetary gear drive, paddle system & grit extraction piping must be installed at the center of the vortex tank and perfectly level & plumb. This assembly must also be at the level/position indicated on the project & submittal drawings.
- The elevations of the air scour coarse bubble diffusers and the water scour piping assembly within the lower grit collection area of the vortex tank must reflect the levels shown in the project & submittal drawings.
- Small final adjustments of elevation, level & plumb-ness can be effected at the planetary gear drive levelling bolts that are located on each corner of the unit. The unit is secured with bolts to the stainless steel H-beam support (or, alternately, to the reinforced concrete vortex bridge that forms part of the concrete tank and floor).
- If installed on a reinforced concrete vortex bridge, the gap that remains between the planetary gear drive and the bridge should be filled with non-shrink grout once proper positioning is achieved.
- The air scour, if present, has a stainless steel ANSI B16.5 flange located near the center of the planetary gear drive that is accessible from the top of the vortex tank. Piping from the blower is attached to this flange as shown on the project & submittal drawings including a pressure gauge with isolating ball valve.
- The water scour has a stainless steel ANSI B16.5 flange located near the center of the planetary gear drive that is accessible from the top of the vortex tank. Piping from the plant service water source is attached to this flange as shown on the project & submittal drawings including a pressure gauge with isolating ball valve. The minimum pressure at the water scour

input point at the base of the vortex tank is 40 psi. If service air is being tapped from an alternate air supply line (as opposed to a dedicated blower/compressor), air flow must be measured &, if necessary, trimmed in order to match the capacity of the 'Snap Cap' coarse air diffusers.

- Depending on the depth of the vortex unit and the available ceiling height above the tank, the grit extraction, air scour (if present), & water scour piping can be provided in modular bolt-together sections including intermediary gaskets. The paddle system drive tube can also be unbolted from the planetary gear drive. The paddles are typically supplied loose. Thus, either most of the assembly including planetary gear drive, drive tube and all piping elements are installed into the vortex tank in one piece (& paddles installed subsequently) or these modular components can be bolted into place and/or bolted together, one-by-one, and lowered via the center of the planetary gear drive into final position. All hardware & gaskets are provided for this assembly. A stainless steel top plate integrates the grit extraction piping flange, the air scour flange (if present), and the water scour connecting flange.
- Once the drive tube is properly secured and the entire assembly is installed, the paddles system is bolted onto the drive tube at the elevation indicated on the Claro submittal drawings/installation instructions. Paddles are bolted into position by having the installer enter the vortex tank. N.B. follow all safety precautions for this installation procedure including power lock-out, fall prevention procedures, and the provision of a temporary walking surface for the installer in the conical vortex tank.
- Bolt the deflector plate at the inlet to the vortex tank at the location, elevation and angle shown in the Claro submittal drawings/installation instructions. In concrete tanks, the deflector is bolted to the inner wall surface of the tank. If a modular steel vortex tank application, an integrated flange & bolts will be provided for securing the deflector plate.
- In order to ensure that no influent enters into a blower unit, air scour piping (if present) must be at an elevation that is above the maximum liquid level in the vortex tank.

- All grit extraction, air scour (if present), & water scour piping must be properly supported. It is also recommended that grit extraction piping be supplied either in flanged sections or with Victaulic-type couplings for ease of disassembly/inspection. Long-radius elbows are recommended where elbows are required. Use two x 45 degree elbows in lieu of 90 degree elbows where possible. Also, remember to make provision for the grit pump pressure gauges on the piping both upstream and downstream of the grit pump – these are typically ½" couplings that are then reduced to match the pressure gauge diameter. Please see technical submittal for information on pressure gauges, pipe diameters and other pertinent information.
- Install all electrical connections as per project drawings & Claro technical submittal (mechanical & electrical sections).
- Ensure all bolts are properly tightened & that debris has been removed from the vortex tank at the end of installation and before start-up.

4.2 Electrical Installation

Electrical work must be performed by a licensed electrician and in accordance with applicable rules, regulations & laws.

Before reading and acting on the information in this section, please read section 2.4 in its entirety in order to ensure personnel safety. Please also see the As-Built control panel drawings included in the Appendices section of this manual. The following overview indicates the typical connections for a system that includes a Claro-designed control panel.

- The vortex motor is connected to the Claro control panel (typically 575/60/3 or 460/60/3 or, alternately, other voltages as specified/required such as 208/60/3).
- The air scour solenoid, if present, is connected to the Claro control panel (either 24VDC or 120V).
- The water scour solenoid is connected to the Claro control panel (either 24VDC or 120V).
- All auxiliary equipment is typically connected to the Claro control panel including: grit pump, blower (if present), and grit classifier. Local HOA stations are also typically connected to the Claro control panel. Please see As-Built control panel drawings for a summary of all field connections.
- Ensure that all connections follow all applicable electrical codes and conform to the project explosion-proof classification.

5. Operation

5.1 Automatic Operation

1. The vortex paddle system operates continuously 24/7.
2. Grit extraction routines are effected via the 'Schedule of Grit Extraction' sequences input screen, which can be accessed via the 'Classifier & Vortex Configuration (2/2)' input screen (button located at bottom of aforementioned screen). A maximum of 12 extraction sequences per 24 hours can be selected. Each extraction sequence enables the operator to select precisely the nature of the sequence including limiting the sequence to an air scour and/or water scour (i.e. without grit extraction). Please see annotated HMI screens included in the Appendices section for additional information.
3. A typical sequence begins with an air scour of the accumulated grit in an effort to further remove & re-suspend organics.
4. After the air scour, a water scour is introduced. Water scour has 2 functions: 1) further remove and re-suspend organics and 2) fluidize the grit slurry to a lower Dry Solids percentage (DS) content in order that the grit pump will be able to successfully pump the slurry. Note: the air scour stops before the grit pump operates in order to avoid the pump drawing in air. Also, the water scour runs for a short time before the grit pump is called upon to start in order to ensure that air has dissipated and that the grit is suitably fluidized. The water scour continues to run during the full grit pump run time.
5. The grit pump starts a short time after water scour/fluidization begins. The grit pump's run time has been set by the Claro Technician in order to ensure that no grit accumulation takes place in the vortex's lower sedimentation chamber and to ensure that the grit piping between the vortex & pump and between the pump & the classifier are clear of grit slurry. The grit pump system is powered by a VFD in the Claro control panel that enables operators to optimize the flow capacity of the grit pump. The Claro Technician has set the VFD/pump speed at an optimal level. The aim of this VFD setting is to enable the grit pump to effectively remove the fluidized grit at the base of the vortex while providing for a low liquid crest at the grit classifier weir, which provides for the minimum amount of turbulence within the grit classifier and thus the maximum removal of

material. Note: the grit pump will take some time to prime before influent is visible in the grit classifier. At Fort St. John, the priming time was observed to be approximately 0.5 - 1 minute. The discharge of influent at between 1 - 5 gallons per minute via the Gorman-Rupp air release valve is normal during pump operation. Please refer to the Gorman-Rupp O&M manual included in this global O&M manual for further details on pump operation & maintenance.

6. The grit classifier starts shortly after the grit pump starts and continues to operate intermittently until after the completion of the grit pumping routine. One of the key objectives of grit classifier operation is to produce a clean grit product with a minimum of liquid content. To this end, the Claro control panel enables the grit classifier to run intermittently – with pause times that enable the grit moisture to run back into the sedimentation tank before grit discharges into the bagger. A grit washing jet is also available for additional washing of the grit before discharge, if required.
7. Please also see description of control narrative and annotated HMI touch screen images included in the Appendices section of this O&M manual.

5.2 Manual Operation

- When the local HOA control station selector is in Manual, the vortex will function in forward until the selector is returned to Off or Auto.
- When the E-Stop is pressed at the local HOA station, the vortex paddle system will stop. If the E-stop is pull-out / disengaged, the vortex will not start of its own accord. The operator must return the HOA to 'Auto' and then press 'Start' at the Claro control panel. The 'Start' button is located on the 'Grit System Control' HMI screen. Please also see description of control narrative and annotated HMI touch screen images included in the Appendices section of this O&M manual.
- The vortex solenoids can be operated manually from the 'Grit Manual Valves Operation' HMI screen. The Vortex HOA must be in 'Manual' position for this manual control of the valves to be enabled.
- The blower, grit pump & grit classifier can be operated in manual from their respective HOA stations. The blower & grit pump can be

operated in forward only. The grit classifier can be operated in forward or reverse. N.B. Do not run the classifier in reverse for more than required short spiral operation bumps since grit will be pushed and cycle at the base of the classifier and cause un-necessary wear and material accumulation. Classifier equipment should void after each grit extraction sequence. Avoid grit material build-up within the grit classifier.

- The blower, grit pump & grit classifier have E-stops on their respective local HOA stations that will shut down the respective piece of equipment. N.B. Equipment can automatically restart when the E-stop pushbutton is pulled back into non-engaged position. Alternately, equipment may need to be restarted at the 'Grit System Control' HMI screen.
- The blower can be turned On or Off from the 'Grit System Control' HMI screen. The local HOA of the blower, however, must be in 'Auto' position.
- The grit pump can be turned On or Off from the 'Grit System Control' HMI screen. The local HOA of the grit pump, however, must be in 'Auto' position.
- The grit classifier can be turned On or Off from the 'Grit System Control' HMI screen. The local HOA of the grit pump, however, must be in 'Auto' position.
- General Note: Daily operation of all grit removal equipment must be in automatic mode rather than in manual mode. Manual mode operation at the HMI or at the HOA stations is provided for short/temporary oversight, testing & maintenance tasks only. Manual operation must also be under continual operator supervision. Follow all best-practice safety routines & regulations including motor lock-out during inspection & maintenance tasks as required.

5.3 Overload/Alarms

- The grit vortex motor is protected by an amperage detector that is integrated within the VFD. The alarm setting is effected on the 'Alarms Configuration (2/4)' page.
- Reset of all alarms is effected by clearing the alarm on the HMI screen. Alarms are recorded in the 'Alarms History' HMI page. Alarms that remain active are listed on the 'Active Alarms' page. Date & time of each alarm is indicated on each respective page.

5.4 Other Elements

The local HOA control station should enable the Vortex to run in manual and integrate an emergency E-stop that stops the vortex paddle system. If Claro has furnished the control panel system these elements will be present. Please see control panel drawings included in the Appendices section.

6. Settings

6.1 Default Values

Claro will provide initial start-up settings for all of the component equipment that constitute your application. If you have comments or questions about control settings, please contact Claro – we would be glad to help and further outline the nature and rationales informing the controls equipment and controls set points. A record of final set points (completed at start-up) will be furnished as an appendix to this manual. Please also see description of control narrative and annotated HMI touch screen images included in the Appendices section of this O&M manual.

7. Regular Verifications & Maintenance

For maintenance inspection and/or maintenance work, all safety regulations must be followed. It is absolutely forbidden to carry out service or maintenance work on the vortex (or auxiliary component equipment) while it is operation. Main power lock-out switch(es) must be turned off and locked with a padlock.

- Please also see Gorman-Rupp grit pump, blower (if present) & grit classifier O&M manuals for supplementary inspection & maintenance schedules/practices.

7.1 Weekly

Check for the following items:

- Ensure that there are no abnormal noises during operation.
- Ensure that grit is being discharged by the grit classifier – if not, verify that the grit classifier is operating correctly, that the grit vortex grit extraction piping and/or the grit pump is clear of blockage and, lastly, that the lower grit accumulation chamber is free of debris.
- Verify that there is no visible oil leakage from the vortex gear drive or from the planetary gear drive. Please see planetary gear drive section below for additional information on the operation and maintenance of this core component of the vortex system.

7.2 Monthly

- Although rare, verify that the paddle system has not accumulated excess screenings debris on its paddles. Some debris is not critical to the operation of the system. Shut down & lock-out the power of the system & auxiliary equipment components and remove excess debris with a rake or other tool. If the system is protected by a Claro fine screen, debris removal should be rare, however, checking the operation of the paddle system should be effected on a monthly basis.
- Check oil level in planetary gear drive via oil dip stick. Shut off & lock-out equipment when checking oil. Add oil as necessary. Do not overfill.

7.3 Yearly

- A thorough review of the vortex grit tank system should be performed once a year. Please also see Gorman-Rupp grit pump, blower (if present) & grit classifier for yearly maintenance inspection recommendations.

    - Redirect flow away from the vortex by opening the by-pass gate and by closing the vortex inlet and outlet gates.
    - Drain the vortex tank to its bottom with a submersible pump.
    - Verify if there is large debris or residual finer debris in the bottom collection area of the vortex tank. Some smaller residual material is normal. The grit extraction piping inlet should not be obstructed with material and the collection well area should be majority empty / clean. Remove accumulated large stones or other debris, if present. Consider using a vacuum truck as a means of drawing out large debris since entering the tank is considered a closed space entry and the conical walls of the tank will be slippery. If a significant amount of debris is found in the lower collection well, please document with photographs & contact Claro. We will suggest increasing the grit pumping & fluidization time and/or other remedies.
    - Verify the state of the paddle system – that the paddles blades remain at 45 degrees and that they are free of debris. Clean as required.
    - Verify the tightness of all bolts at the planetary gear drive.
    - Verify the tightness of all bolts that retain the grit extraction piping and the air (if present) and water scour flanged connections.
    - Check for oil leakage at the vortex gear drive & the planetary gear drive.
    - Inspect oil & check oil level in the vortex planetary gear drive by checking the drip stick. Stop & lock-out equipment when effecting oil verifications. Verify the operating hours of the vortex gear drive and the planetary gear drive relative to the recommended oil change schedule. Drain and replace oil as recommended. Note the operating hours at which the oil was changed. Note the next recommended oil change requirement. Change oil before the scheduled oil change date rather than after the recommended date.
    - Change planetary gear drive oil a minimum of every two (2) years as suggested in the oil change schedule.
    - Clean surface of motor, gear drive & planetary gear drive of accumulated dirt, if present. Clean checker plate of debris.

- Safety Instrumentation: Test the vortex motor high torque alarm signal by setting the alarm to a level under the normal operating amperage e.g. 0.5 Amps. Verify that no equipment, tool or personnel are present in the tank. Observe all recommended safety practices and beware of fall risk as serious injury or death can result from falling into an operating vortex tank. Consider closing all checker plate hatches and the use of area isolation 'Danger' safety tape. Start the vortex paddle system and observe if the high torque alarm is issued by the control panel. Return the alarm setting to the regular amperage value once the test is complete.
- Safety Instrumentation: Start the vortex and test the HOA E-stop push button.
- Refill the vortex tank by opening the outlet gate, the inlet gate and closing the by-pass gate. Once full of screened influent & all safety covers are in closed/bolted/locked position, restart the vortex paddle system. Verify that all auxiliary equipment including the grit pump, blower (if present) & grit classifier are in 'Auto' and ready for service (i.e. no Faults or other condition/status).

Please review 'Vortex Planetary Gear Drive Assembly Information – Model Claro S25-GCD-50' included below for detailed information on the Vortex planetary gear drive, a core component of the grit vortex system.

If you have comments or questions, please feel free to contact Claro – we are here to help !

Before restarting operation of the vortex, all protective covers must be reinstalled & safety equipment operational.

7.4 Vortex Planetary Gear Drive Assembly Information – Model Claro S25-GCD-50

A. General Information & Maintenance Schedule

1. Lubrication & Maintenance Schedule

The Claro planetary drive unit supports & rotates the drive tube and paddle system. The planetary gear drive unit will be affixed either to the vortex tank concrete bridge that forms an integrated part of the facility's floor slab structure or to an H-support bridge made of HSS beam that straddles the concrete or stainless steel tank structure.

The planetary gear unit is made up of several speed reducers coupled together. Each speed reducer is entirely enclosed and lubricated. The recommended lubricants and lubrication change intervals are listed in this sub-section. Proper care of your drive unit will ensure long, trouble free machine life. Always maintain proper oil levels and follow the recommendations in this manual. Remember to also check the regular (Nord) gear drive manual for the recommended oil change schedule. The Nord gear drive, which forms part of the drive station, and the planetary gear drive are different pieces of equipment requiring different maintenance attention /oil change schedules.

The model number of your planetary gear drive unit is: **Claro S25-GCD-50**.

Lubrication Schedule*		
	Primary Speed Reducer	**Main Gear Housing**
Storage (>90 days)	Check for spills.	Rotate the main gear-bearing
Every Month	Inspect oil and oil level. Add or change if necessary.	Inspect oil and oil level. Add or change if necessary.
Every 1 Year	Inspect oil.	Change oil.
Every 2 Years	Change lubricant. Overhaul if required.	

Lubricant Quantities					
	Model	**Lubricant Quantity**	**Level (Depth)**	**Lubricant Type**	**As Shipped**
Helical (Nord) Gearbox	SK3282	4.3 qt / 4.06 l.	Full	Type 3	Full
Main Gear Housing	S25-GCD-50	2 gal 7.57 l.	2.25"	Type 5	Empty

• Please see oil 'Type' table included below.

* Service intervals should be reduced if the drive is exposed to severe environment conditions such as high humidity, dust, dirt, and corrosive atmospheres. In high humidity atmospheres, periodically check the main gear housing for condensate accumulation and drain as necessary. The screening & grit removal room air change/ventilation system will help preclude this type of condensation.

- Main Planetary Gear Housing Oil Change Procedure:

  Turn the vortex paddle drive system off & positively cut control and power supply connections by locking out the vortex motor at the control panel (and at the local in-field lock-out station, if applicable). For further safety, adjust the vortex local HOA switch to 'Off' & press the E-Stop.

  Drain the oil by opening the drain valve or removing the drain plug. Replace plug/valve before adding new oil. Dispose of old oil according to local regulations / best practices. Add new oil through the oil fill cap located on the top plate of the planetary gear drive until the level reaches the recommended range on the dipstick. Do not overfill.

- Storage:
  If the vortex planetary drive unit is to be stored for longer than 90 days, fill main gear housing with recommended lubricant. Drain before installation & refill before start-up.

2. Recommended Lubricants

Oil Type	Temperature Range	ISO / NLGI Grade	Castrol		Mobil		Chevron		Shell	Citgo	(Others)
1	See Note 1	32	Hyspin AWH-M 32	Hyspin HVI 32	DTE 13M	Univis N 32	-------		Tellus Oils T 32	-------	-------
2	0 to 125 °F (-17 to 51 °C)	00	HD Lithium 00		Mobilgrease XHP 005		Delo Grease EP 00		-------	-------	Mystik: Centra-Lube
	-30 to 125 °F (-34 to 51 °C)	00	SHL 00**		Mobilith SHC 007**		-------		-------	-------	Amsoil: Semi-Fluid 00 Synth. EP**
3	15 to 105 °F (-10 to 40 °C)	220	EP Gear Lubricant 220	Alpha SP 220	Mobilgear 600 XP 220		Meropa 220	Gear Compounds EP 220	Omala Oil 220	EP Compounds 220	-------
	-30 to 125 °F (-34 to 51 °C)	220	Isolube EP 220**	Alphasyn EP 220**	Mobilgear SHC 220**		Tegra Gear Oil 220**		Omala Fluid HD 220**	Citgear Synthetic EP 220**	-------
4	0 to 125 °F (-17 to 51 °C)	2	Castrol Molub-Alloy 4086/460-2	Castrol Molub-Alloy 860/460-2 ES	-------		-------		Retinax CMX 2	Lithoplex CM 2	Exxon: Ronex Extra Duty Moly 2
5	30 to 125 °F (-1 to 51 °C)	680	EP Gear Lubricant 680	Alpha SP 680	Mobilgear 600 XP 680		Meropa 680	Gear Compounds EP 680	Omala Oil 680	EP Compounds 680	-------
	0 to 50 °F (-17 to 10 °C)	150	EP Gear Lubricant 150	Alpha SP 150	Mobilgear 600 XP 150		Meropa 150	Gear Compounds EP 150	Omala Oil 150	EP Compounds 150	-------
	0 to 125 °F (-17 to 51 °C)	680	Isolube EP 680**		Mobilgear SHC 680**		Tegra Gear Oil 680**		-------	Citgear Synthetic EP 680**	-------
	-30 to 50 °F (-34 to 10°C)	150	Alphasyn EP 150**		Mobilgear SHC 150**		Tegra Gear Oil 150**		Omala Fluid HD 150**	Citgear Synthetic EP 150**	-------
6	-30 to 125 °F (-34 to 51 °C)	2	Spheerol EPL 2		Mobilux EP 2		Multifak EP 2		Alvania EP 2	Premium Lithium EP-2	Mobil: Mobilith SHC-100
7	-30 to 125 °F (-34 to 51 °C)	2	-------		Polyrex EM		SRI 2		Stamina RLS	-------	Chevron: Black Pearl EP 2

Note 1: The minimum startup oil temperature for the listed Type 1 oils is 20°F. The maximum allowable operating oil temperature is 130°F for these oils.
Note 2: ** Indicates optional synthetic lubricants

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3. Components List

Planetary Gear Drive – Model Number: S25-GCD-50

Item #	Description	Manufacturer	CLARO (D) PN	Manufacturer PN	Qty.	Ref. Dwg
1	Machine Frame	CLARO (D)	175-8003-S25GCD		1	
2	Main Gear Bearing, 25.25" PD, 101T	CLARO (D)	138-0300-025		1	
3	Output Hub	CLARO (D)	175-8300-S25GCD		1	
4	Top Plate	CLARO (D)	175-6001-S25GCD		1	
5	Primary Speed	CLARO (D)			1	
5.1	Electric Motor, 2 hp, 208/3/60, Exp Proof	Baldor	149-IDXM7037T-5	IDXM7037T-5	1	
5.2	Pinion, 21T, 4DP	CLARO (D)	143-0021-4		1	
5.3	Helical Gearbox,	Nord	162-SK3282AF11	SK3282	1	
5.4	Pinion Shaft	CLARO (D)	175-SH4814100		1	
5.5	Snapring, 3" External	Waldes	120-5100-300	5100-300	1	
6	Cover Plate	CLARO (D)	175-8000-0D68		1	

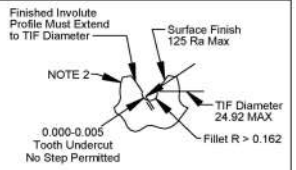
- Please see Appendices section of this global O&M manual for additional arrangement / layout drawings & motor/gear drive specification information.

GEAR DATA	
TOOTH FORM	Involute Stub
PITCH DIAMETER	25.25"
DIAMETRAL PITCH	4
PRESSURE ANGLE	20 deg
NUMBER OF TEETH	101
ADDENDUM	0.200"
DEDENDUM	0.250"
DIMENSION OVER - 0.420" DIA. PINS	25.753"-25.774"
SPAN ACROSS 12 TEETH	8.820"-8.827"
ARCH TOOTH THICKNESS	0.370"-0.378"
ABOVE TOOTH THICKNESS WILL PRODUCE 0.014"-0.022" BACKLASH CUT INTO GEAR	
AGMA QUALITY NO.	6

BEARING DATA	
BEARING CONTACT ANGLE	60°
BALL SIZE	1", WITH SPACERS
BEARING RACE HEAT TREATMENT	IND. HARDENED HRC 58-62, GROUND
LUBRICATION	OIL BATH
FREE STATE TURNING TORQUE	<25 FT-LBS
CLEARANCE, AXIAL AND RADIAL	<0.010"

NOTES:
1. All diameters on a common centerline to have a maximum total runout to each other of 0.010" FIM unless otherwise noted.
2. Break all sharp edges not specified to a radius or a chamfer of 0.010"-0.020". Visual inspection of this dimension is satisfactory.
3. Permanently mark point of minimum backlash on gear.
4. Gears to be bi-directional.
5. Maximum machined surface roughness 125AA except as noted.
6. Heat treatment induction harden:
   A. Tooth to tooth induction harden per AGMA 2004-B89
   B. Flank and root pattern Type A per AGMA 2001-C95
   C. Surface hardness HRC 52-60 after finishing.
   D. Effectivecase depth 0.080"-0.125" after finishing.
   E. Core Hardness 248-302 BHN.
7. Unless otherwise noted, dimension apply to completely finished parts.
8. Stamp or etch PO and serial number on this surface. (ex. PO12345-01)
9. Corrosion protection adequate for one year storage to be supplied by vendor.
10. Shipping protection adequate to guard against physical damage to be supplied by vendor.
11. Provide quality inspection report verifying compliance with this drawing. Must specifiy material used, teeth and raceway hardness, tru involute form TIR.
12. Ball loading plug must be sealed oil tight.
13. Unspecified tolerance ±0.010"

TOOTH PROFILE CONTROL



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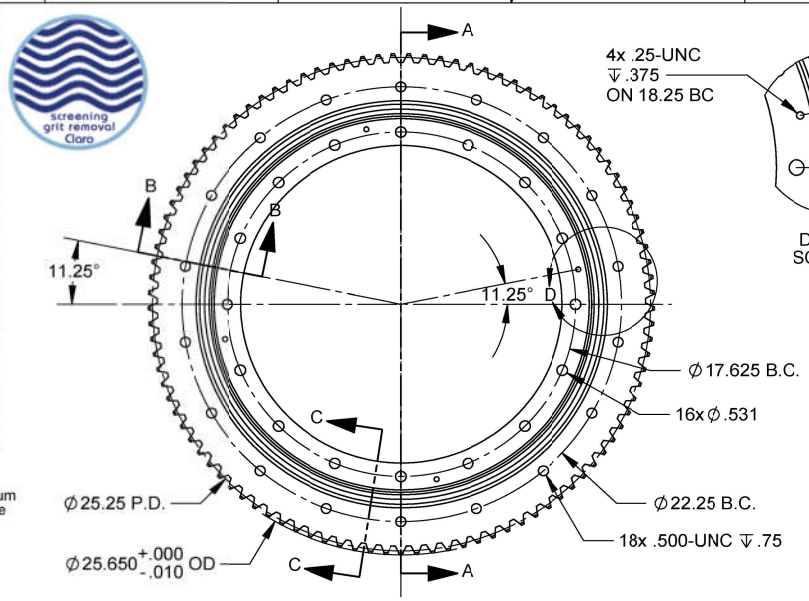
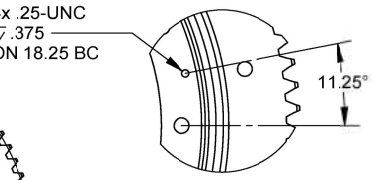
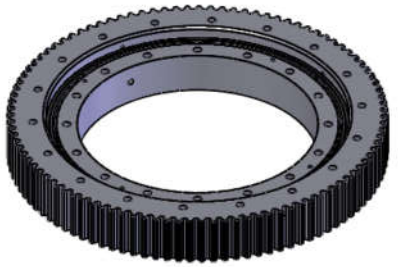
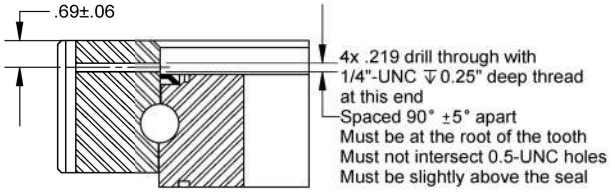


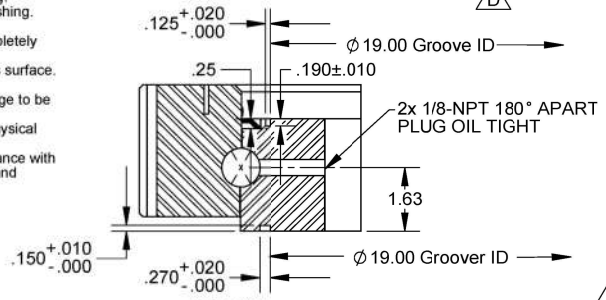


DETAIL D
SCALE 1 : 4

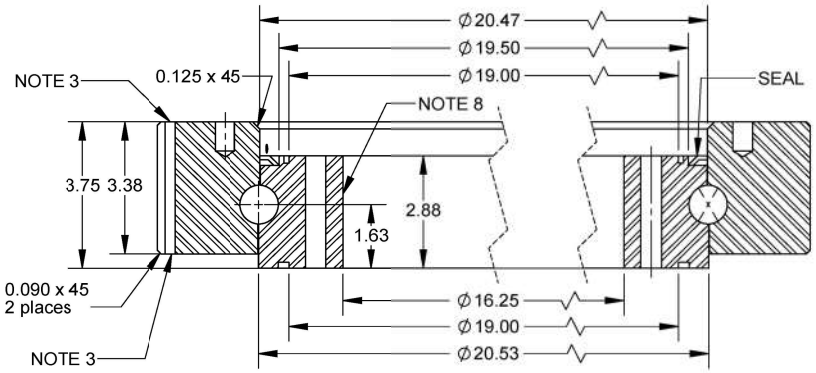




SECTION C-C
SCALE 1 : 3



SECTION B-B
SCALE 1 : 3



SECTION A-A
SCALE 1 : 3

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	ADDITION OF DIMENSION	08/10/94	
B	REVISED FORMAT/ADDED BEARING DATA BLOCK	01/04/99	
C	REMOVE 20.5 INCH PILOT	10/08/09	AJB
D	Converted to SW, new format. New heat treatment details and notes. Removed inner raceway pilct. Removed vertical lubrication hole.	6/21/2012	PMK
E	Added oil dam groove, o-ring grove, oil return holes, recessed seal.	3/26/2013	PMK

		NAME	DATE
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES			
INTERPRET GEOMETRIC TOLERANCING PER:	DRAWN	DWE	03/10/94
DO NOT SCALE DRAWING	CHECKED		
P.N. 138-0300-025	ENG APPR.		

MATERIAL: 4140 or approved equal

COMMENTS:

SCALE: 1:6 | WEIGHT:236.87 lbs | SHEET 1 OF 1

Claro

TITLE: 25.25" PD External Gear-Bearing, 4 DP,101T, Involute Stub

SIZE	DWG. NO.	REV
B	00000290	E

- Please see Appendices section of the global O&M manual for additional arrangement / layout drawings & motor/gear drive specification information.

4. Other Considerations

Ingleside WWTP Upgrades

Vortex Grit Removal: 46 53 00
Process Equipment Pre-Selection

EVB Engineering
EVB Ref: RFP N° 14 - 2020
Township of South Stormont, ON
Claro Ref: 17089-Q-01

A. Recommended Spare Parts

Vortex tank units:

- No spares recommended other than recommended gear drive manufacturer oil.

Grit Pumps:

Component	Cost (CAD)
Impeller Assembly	[redacted]
Wear Plate	

Grit Classifier:

Component	Cost (CAD)
Trough Liner	[redacted]

Replacement of the above parts is rare and not anticipated in the first 5 years of operation.

Note: Above prices do not include local shipping costs or applicable tax.

B. Operation Requirements / Estimated Operational Costs

- **Information provided in this section aims to allow the Owner and Engineer to assess the ongoing operation requirements for the grit removal equipment. We provide the following information:**

Annual Power Consumption

Assumptions:

- Each vortex tank motor runs 24 hr/day.
- Each tank will undergo 3 - 6 extractions per day (adjustable). Extractions will alternate between tanks.
- Each extraction will cause the respective grit pump motor to run for approximately 10 minutes.
- Each extraction will cause the grit classifier motor to run for approximately 10 minutes.
- Cost for electricity: $0.12 per kWh (estimated)

Equipment	Motor Size (kW)	Motor Efficiency (%)	Hrs/Day Operation	Total kWh/year	Total Cost (CAD)
Vortex Tank 1	0.75•	85.5	24	7684	922.08
Vortex Tank 2	0.75	85.5	24	7684	922.08
Grit Pump 1	5.6	90	1	2271	272.52
Grit Pump 2	5.6	90	1	2271	272.52
Classifier	0.75	85.5	2	320	38.40
				20230	**2427.60**

Motor sizes are preliminary. Grit pump final motor size will depend on extraction piping arrangement. For the sake of this power consumption analysis, a 5.6 kW (7.5HP) has been assumed.

Anticipated Maintenance Requirements

.1 Preventative Maintenance Inspection Schedule Outline

- The grit pumps and classifier function intermittently—only when an extraction sequence is initiated. Typical runtimes range from approx. 40-60 minutes per 24 hours. This low-wear philosophy ensures that wear parts have extended service life.

Recommended maintenance attention is comprised of:

- Typical visual & aural inspection of the equipment on a weekly basis.
- Verification of all gear drives for levels/seal leaks during rounds including visual inspection of grit pump bearings oil site-glass levels. Replacement of oil as per manufacturer recommendations. A reminder alarm can be implemented in the control panel to cue gear drive oil replacement based on operation time if each piece of equipment, if preferred.
- Verification of proper extraction function by triggering an extraction of a respective grit tank at the HMI quarterly
- Verification of the grit classifier liner condition once a year.
- Verification of vortex tank & paddles once a year.
- Note: Claro follows up with operators periodically to see how the system is functioning and in order to review/prompt maintenance inspection practice.

C. Ancillary Components (by others/owner)

Fasteners

All anchors for securing the equipment to the floor are to be provided by others.

Service water

The vortex grit tanks require service water for fluidizing the collected grit prior to and during extraction. Others will be responsible for providing service water at the specified flow and pressure to the connections on the Claro equipment. All interconnecting piping, pumps (booster or otherwise), water hammer arrestor, instruments (in addition to those provided by Claro – see scope of supply above), etc. will be the responsibility of others.

Compressed Air

Claro suggests an optional air scour of the settled grit prior to extraction in order to further remove organics. If the plant has a compressed air source, this could be used to supply the vortex tanks air scour lines. If there is no compressed air source, Claro can provide a side channel blower to provide the necessary air. In order to bid to the specifications, Claro has not included a side channel blower in its base bid offer. Should the owner wish to include air scouring of the grit Claro has provided a cost adder for the side channel blower.

In either case (existing compressed air or side channel blower), Claro will provide a solenoid valve and isolating ball valve for each vortex tank. All interconnecting piping, instruments (pressure regulators, filters and other pneumatic items) shall be by others.

Extraction Components

All interconnecting piping between the vortex grit tank extraction port and grit pump inlet & grit pump outlet and classifier inlet is to be provided by others. Pump connections are 4” in diameter.

Civil Works, isolation Gates & Checker Plate
All civil works including the vortex tanks and channels are by others. Checker plate by others as per Addendum No. 1. Gates by others as per addendum No. 1.

Parshall flume
Claro would be happy to provide a fiberglass Parshall flume for installation downstream of the grit vortex tanks on request.

D. Support Services Provided by the Supplier.

.1 Here is a point-form listing of the support services provided for installation, start-up, and follow-up:

- Complete technical submittal as specified including design & installation tips checklist.
- Timely support/technical advice, including office visit(s) to consultant on request, during the pre- &/or post-selection design phase of the project if required.
- Coordination of delivery with installing contractor including offloading instructions.
- Complete installation instructions/tips check list, & prestart-up checklist.
- A Claro start-up technician, typically Peter Lipert Jr., and the designer and programmer of the subject control panel, typically Claude Samson (Franklin Empire), will be on site to verify the mechanical and controls installation. Having both technicians offers flexibility and assurance that the start-up will proceed well. For instance, programming updates can be effected on site if, for instance, the Scada integrator needs an extra requirement or if operators would like an extra feature added to the HMI. Scada connectivity is verified/tested. All controls narrative sequences are re-tested. The system is then observed for a minimum of one day after influent is introduced in order to optimize settings to reduce runtimes, wash water use, power consumption & to increase life of wearable parts.
- Complete operations and maintenance requirements training review in a classroom setting (or virtual to limit exposure during the Covid-19 pandemic) & in the field c/w video, slides and practical review of the installed treatment system.
- After start-up Claro technician follows up with operators in order to ensure that system is running well. A 24-hour phone line is available for operations questions/comments. Note: if no immediate pick-up, operators are asked to leave a message for momentary call back. Claro technician has a photograph of each HMI screen with latest settings so that an operator can be guided though a setting change by phone, if requested.
- Periodic follow-up with operators.
- If a VPN connection is provided by the Scada designer, Claro can support the control panel and operators from Montreal with immediate login. Access to be controlled by operators.

End of Proposal Document (R0)