Greater Napanee

GREATER FOR MANY REASONS

Request for Proposals

For

Equipment Preselection for the

Napanee Water Pollution Control Plant Upgrade

Request for Proposals No.: **RFP-IS-2023-01**

Issued: **September 5, 2023**

Submission Deadline**: October 2, 2023 @ 11:00:00 local time**

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PART 1 – INVITATION AND SUBMISSION INSTRUCTIONS

1.1 Invitation to Proponents

1.1.1 Invitation

This Request for Proposals (the "RFP") is an invitation by the Town of Greater Napanee (the "Town") to prospective proponents to submit proposals for **The Equipment Preselection for the Napanee Water Pollution Control Plant (Napanee WPCP),** as further described in Section A of the RFP Particulars (Appendix B) (the "Deliverables").

The purpose of this RFP Document is to preselect major equipment and systems required for the Napanee WPCP Upgrades located in Napanee, Ontario. This document provides the proposal requirements for the following, individual, systems which will be preselected through this RFP process:

- System No. 1 – Fine Screening Equipment
- System No. 2 - Vortex Grit Removal Units
- System No. 3 – Waste Activated Sludge Thickener
- System No. 4 – Tertiary Filtration System
- System No. 5 - Ultra-Violet Disinfection System

Specifications for the individual equipment systems are provided in Appendix D; the forms of submission are provided in Appendix C.

Proposals will be examined to pre-select equipment for inclusion in the general contract for the construction of the proposed works as per the General Terms and Conditions for Preselected Equipment (Appendix A). Shop drawings may be purchased by the client from the selected equipment suppliers to facilitate the WPCP design. Once the shop drawings have been received and deemed satisfactory by the Engineer, the Town will provide payment for the shop drawings at the price quoted in the form of proposal completed by the equipment supplier.

For all systems, the Town will not be purchasing the equipment directly. This equipment will be purchased by the General Contractor or one of the sub-contractors through the main WPCP contract. A supplier may bid on the equipment systems described in the specifications; however, no proposals will be accepted on individual equipment described within a system that does not constitute a fully functioning system in accordance with the specification requirements.

1.1.2 Proponent must be Single Entity

The proponent must be a single legal entity that, if selected, intends to negotiate and enter into the contract with the Town. If the proposal is being submitted jointly by two (2) or more separate entities, the proposal must identify only one of those entities as the "proponent". The proponent will be responsible for the performance of the Deliverables.

1.2 RFP Contact

For the purposes of this procurement process, the "RFP Contact" will be via the Bids & Tenders Website. Tenders must be submitted online using https://greaternapanee.bidsandtenders.ca/Module/Tenders/en on the forms provided by the Town.

Proponents and their representatives are not permitted to contact any employees, officers, agents, elected or appointed officials, or other representatives of the Town, other than the RFP Contact, concerning matters regarding this RFP. Failure to adhere to this rule may result in the disqualification of the proponent and the rejection of the proponent's proposal.

1.3 Contract for Deliverables

1.3.1 Type of Contract

The selected proponent will be requested to enter into direct contract negotiations to finalize an agreement with the Town for the provision of the Deliverables. The terms and conditions found in the Form of Agreement (Appendix A) are to form the basis for commencing negotiations between the Town and the selected proponent.

1.3.2 Term of Contract

The term of the agreement will be in effect until the completion of the Deliverables.

1.4 RFP Timetable

1.4.1 Key Dates

Issue Date of RFP	September 5, 2023
Deadline for Questions	September 25, 2023 23:59:59 local time
Deadline for Issuing Addenda	September 28, 2023 23:59:59 local time
Submission Deadline	October 2, 2023 14:00:00 local time
Rectification Period	2 business days
Anticipated Ranking of Proponents	October 31, 2023
Contract Negotiation Period and Notification	5 calendar days
Anticipated Execution of Agreement	November 14, 2023

The RFP timetable is tentative only and may be changed by the Town at any time. For greater clarity, business days means all days that the Town is open for business.

1.5 Submission Instructions

1.5.1 Proposals to be Submitted at Prescribed Location

Contractors shall submit a PDF copy of their submission, with signature, on Bids&Tenders.

Receipt of PDF copy proposals will be confirmed by the time of receipt to the Town's Bids&Tenders website. Proposals received at 11:01:00 am or later will be deemed to be late and rejected.

On the closing day, commencing approximately 15 minutes after the closing time, the emails will be opened, and the tenders will be read and recorded publicly by a representative from the Owner and their agent in the location stated in the tender advertisement. Tenders will then be checked and analyzed and a report making recommendation to the Owner will be completed.

1.5.2 Proposals to be Submitted on Time

Proposals must be submitted at the location set out above on or before the Submission Deadline as identified in Section 1.4 RFP Timetable. Proposals submitted after the Submission Deadline will be rejected.

1.5.3 Proposals to be Submitted in Prescribed Format

Proponents should submit one (1) electronic copy of their proposal. If there is a conflict or inconsistency with the submittal of the electronic copy of the proposal, it is the proponent's responsibility to confirm successful delivery to the location identified in the RFP. At no time is it the owners or their agent's responsibility to facilitate delivery of the submission, i.e. We assume no liability for the successful delivery of the proposal. All submitted documentation shall be printed in high quality and perfectly legible; duplicated, illegible copies may result in rejection of the proposal. Proposals should be prominently marked with the RFP title and number (see RFP cover), with the full legal name and return address of the proponent.

1.5.4 Amendment of Proposals

Proponents may amend their proposals prior to the Submission Deadline by submitting the amendment in a sealed package prominently marked with the RFP title and number and the full legal name and return address of the proponent to the location set out above. Any amendment should clearly indicate which part of the proposal the amendment is intended to amend or replace.

1.5.5 Withdrawal of Proposals

At any time throughout the RFP process until the execution of a written agreement for provision of the Deliverables, a proponent may withdraw a submitted proposal. To withdraw a proposal, a notice of withdrawal must be sent to the RFP Contact and must be signed by an authorized representative of the proponent. The Town is under no obligation to return withdrawn proposals.

[End of Part 1]

PART 2 – EVALUATION, NEGOTIATION AND AWARD

2.1 Stages of Evaluation and Negotiation

The Town will conduct the evaluation of proposals and negotiations in the following stages:

2.2 Stage I – Mandatory Submission Requirements

Stage I will consist of a review to determine which proposals comply with all of the mandatory submission requirements. If a proposal fails to satisfy all of the mandatory submission requirements, the Town will issue the proponent a rectification notice identifying the deficiencies and providing the proponent an opportunity to rectify the deficiencies. If the proponent fails to satisfy the mandatory submission requirements within the Rectification Period, its proposal will be rejected. The Rectification Period will begin to run from the date and time that the Town issues a rectification notice to the proponent. The mandatory submission requirements are set out in Section C of the RFP Particulars (Appendix B).

2.3 Stage II – Evaluation

Stage II will consist of the following two sub-stages:

2.3.1 Mandatory Technical Requirements

The Town will review the proposals to determine whether the mandatory technical requirements as detailed in the in Section D of the RFP Particulars (Appendix B) have been met. If a proposal fails to satisfy all of the mandatory technical requirements, the Town will issue the proponent a rectification notice identifying the deficiencies and providing the proponent an opportunity to rectify the deficiencies. The rectification process for these requirements may occur after any rectification process for mandatory submission requirements. Proposals that do not satisfy the mandatory technical requirements within the Rectification Period will be rejected.

2.3.2 Non-Price Rated Criteria

The Town will evaluate each qualified proposal on the basis of the non-price rated criteria as set out under Initial Evaluation Criteria in Section F of the RFP Particulars (Appendix B).

2.4 Stage III – Pricing

Stage III will consist of a scoring of the submitted pricing of each qualified proposal in accordance with the price evaluation method set out in Section G of the RFP Particulars (Appendix B). The evaluation of price will be undertaken after the evaluation of mandatory requirements and rated criteria has been completed.

In the event that a proponent's pricing appears to be abnormally low in relation to the Deliverables, the Town may require the proponent to provide a detailed explanation of the pricing information to account for the low level of price and confirm that all requirements in respect of the Deliverables have been taken into account. If the proponent is unable to satisfactorily account for the abnormally low pricing, the Town may reject the proposal. The Town may also reject any proposal that contains unbalanced pricing. Pricing may be considered unbalanced where nominal or significantly understated prices are proposed for some elements of the Deliverables and inflated prices are proposed for other elements of the Deliverables. Unbalanced pricing includes, but is

not limited to, “front-loaded” pricing which contains inflated pricing for Deliverables to be provided or completed at the beginning of the contract, offset by understated pricing for Deliverables to be provided or completed later in the contract.

2.5 Stage IV – Ranking and Contract Negotiations

2.5.1 Ranking of Proponents

After the completion of Stage III, all scores from Stage II and Stage III will be added together and the proponents will be ranked based on their total scores. The top-ranked proponent will receive a written invitation to enter into direct contract negotiations to finalize the agreement with the Town. In the event of a tie, the selected proponent will be the proponent [with the highest score on the non-price rated criteria OR with the lowest price].

2.5.2 Contract Negotiation Process

Any negotiations will be subject to the process rules contained in the Terms and Conditions of the RFP Process (Part 3) and will not constitute a legally binding offer to enter into a contract on the part of the Town or the proponent, and there will be no legally binding relationship created with any proponent prior to the execution of a written agreement. The terms and conditions found in the Form of Agreement (Appendix A) are to form the basis for commencing negotiations between the Town and the selected proponent. Negotiations may include requests by the Town for supplementary information from the proponent to verify, clarify, or supplement the information provided in its proposal or to confirm the conclusions reached in the evaluation, and may include requests by the Town for improved pricing or performance terms from the proponent.

2.5.3 Time Period for Negotiations

The Town intends to conclude negotiations and finalize the agreement with the top-ranked proponent during the Contract Negotiation Period, commencing from the date the Town invites the top-ranked proponent to enter negotiations. A proponent invited to enter into direct contract negotiations should therefore be prepared to satisfy the pre-conditions of award listed in Section E of the RFP Particulars (Appendix B), provide requested information in a timely fashion and conduct its negotiations expeditiously.

2.5.4 Failure to Enter into Agreement

If the pre-conditions of award listed in Section E of the RFP Particulars (Appendix B) are not satisfied or if the parties cannot conclude negotiations and finalize the agreement for the Deliverables within the Contract Negotiation Period, the Town may discontinue negotiations with the top-ranked proponent and may invite the next-best-ranked proponent to enter into negotiations. This process will continue until an agreement is finalized, until there are no more proponents remaining that are eligible for negotiations, or until the Town elects to cancel the RFP process.

2.5.5 Notification of Negotiation Status

Other proponents that may become eligible for contract negotiations may be notified at the commencement of the negotiation process with the top-ranked proponent.

[End of Part 2]

PART 3 – TERMS AND CONDITIONS OF THE RFP PROCESS

3.1 General Information and Instructions

3.1.1 Proponents to Follow Instructions

Proponents should structure their proposals in accordance with the instructions in this RFP. Where information is requested in this RFP, any response made in a proposal should reference the applicable section numbers of this RFP.

A proponent who submits conditions, options, variations, or contingent statements either as part of its proposal or after receiving notice of selection, may be disqualified.

3.1.2 Proposals in English

All proposals are to be in English only.

3.1.3 No Incorporation by Reference

The entire content of the proponent's proposal should be submitted in a fixed format, and the content of websites or other external documents referred to in the proponent's proposal but not attached will not be considered to form part of its proposal.

3.1.4 Past Performance

In the evaluation process, the Town may consider the proponent's past performance or conduct on previous contracts with the Town or other institutions.

3.1.5 Information in RFP Only an Estimate

The Town and its advisers make no representation, warranty, or guarantee as to the accuracy of the information contained in this RFP or issued by way of addenda. Any quantities shown or data contained in this RFP or provided by way of addenda are estimates only, and are for the sole purpose of indicating to proponents the general scale and scope of the Deliverables. It is the proponent's responsibility to obtain all the information necessary to prepare a proposal in response to this RFP.

3.1.6 Proponents to Bear Their Own Costs

The proponent will bear all costs associated with or incurred in the preparation and presentation of its proposal, including, if applicable, costs incurred for interviews or demonstrations.

3.1.7 Proposal to be Retained by the Town

The Town will not return the proposal or any accompanying documentation submitted by a proponent.

3.1.8 No Guarantee of Volume of Work or Exclusivity of Contract

The Town makes no guarantee of the value or volume of work to be assigned to the successful proponent. The agreement to be negotiated with the selected proponent will not be an exclusive

contract for the provision of the described Deliverables. The Town may contract with others for goods and services the same as or similar to the Deliverables or may obtain such goods and services internally.

3.2 Communication after Issuance of RFP

3.2.1 Proponents to Review RFP

Proponents should promptly examine all of the documents comprising this RFP and may direct questions or seek additional information in writing by email to the RFP Contact on or before the Deadline for Questions. No such communications are to be sent or initiated through any other means. The Town is under no obligation to provide additional information, and the Town is not responsible for any information provided by or obtained from any source other than the RFP Contact. It is the responsibility of the proponent to seek clarification from the RFP Contact on any matter it considers to be unclear. The Town is not responsible for any misunderstanding on the part of the proponent concerning this RFP or its process.

3.2.2 All New Information to Proponents by Way of Addenda

This RFP may be amended only by addendum in accordance with this section. If the Town, for any reason, determines that it is necessary to provide additional information relating to this RFP, such information will be communicated to all proponents by addendum. Each addendum forms an integral part of this RFP and may contain important information, including significant changes to this RFP. Proponents are responsible for obtaining all addenda issued by the Town.

3.2.3 Post-Deadline Addenda and Extension of Submission Deadline

If the Town determines that it is necessary to issue an addendum after the Deadline for Issuing Addenda, the Town may extend the Submission Deadline for a reasonable period of time.

3.2.4 Verify, Clarify, and Supplement

When evaluating proposals, the Town may request further information from the proponent or third parties in order to verify, clarify or supplement the information provided in the proponent's proposal. The Town may revisit, re-evaluate, and rescore the proponent's response or ranking on the basis of any such information.

3.3 Notification and Debriefing

3.3.1 Notification to Other Proponents

Once an agreement is executed by the Town and a proponent, the other proponents may be notified directly in writing and will be notified by public posting of the outcome of the procurement process.

3.3.2 Debriefing

Proponents may request a debriefing after receipt of a notification of the outcome of the procurement process. All requests must be in writing to the RFP Contact and must be made within thirty (30) days of such notification. The RFP Contact will contact the proponent's representative

to schedule the debriefing. Debriefings may occur in person at the Town's location or by way of conference call or other remote meeting format as prescribed by the Town.

3.3.3 Procurement Protest Procedure

Any proponent with concerns about the RFP process is required to attend a debriefing prior to proceeding with a protest.

If, after attending a debriefing, the proponent wishes to challenge the RFP process, it should provide written notice to the RFP Contact in accordance with applicable procurement protest procedures. The written notice must contain:

(a) a clear statement as to which procurement the proponent wishes to challenge;

(b) a clear explanation of the proponent's concerns with the procurement, including specifics as to why it disagrees with the procurement process or its outcome; and

(c) the proponent's contact details, including name, telephone number and email address.

The Town will send an initial response to acknowledge receipt of the proponent's notice and indicate the date by which the Town will provide the proponent with a formal response.

3.4 Conflict of Interest and Prohibited Conduct

3.4.1 Conflict of Interest

For the purposes of this RFP, the term "Conflict of Interest" includes, but is not limited to, any situation or circumstance where:

(a) in relation to the RFP process, the proponent has an unfair advantage or engages in conduct, directly or indirectly, that may give it an unfair advantage, including but not limited to:

  (i) having or having access to confidential information of the Town in the preparation of its proposal that is not available to other proponents;

  (ii) having been involved in the development of the RFP, including having provided advice or assistance in the development of the RFP;

  (iii) receiving advice or assistance in the preparation of its response from any individual or entity that was involved in the development of the RFP;

  (iv) communicating with any person with a view to influencing preferred treatment in the RFP process (including but not limited to the lobbying of decision makers involved in the RFP process); or

  (v) engaging in conduct that compromises, or could be seen to compromise, the integrity of the open and competitive RFP process or render that process non-competitive or unfair;

(b) in relation to the performance of its contractual obligations under a contract for the Deliverables, the proponent's other commitments, relationships, or financial interests:

(i) could, or could be seen to, exercise an improper influence over the objective, unbiased, and impartial exercise of its independent judgement; or

(ii) could, or could be seen to, compromise, impair, or be incompatible with the effective performance of its contractual obligations.

3.4.2 Disqualification for Conflict of Interest

The Town may disqualify a proponent for any conduct, situation, or circumstances, determined by the Town, in its sole and absolute discretion, to constitute a Conflict of Interest as defined above.

An existing supplier of the Town may be precluded from participating in the RFP process in instances where the Town has determined that the supplier has a competitive advantage that cannot be adequately addressed to mitigate against unfair advantage. This may include, without limitation, situations in which an existing supplier is in a position to create unnecessary barriers to competition through the manner in which it performs its existing contracts, or situations where the incumbent fails to provide the information within its control or otherwise engages in conduct obstructive to a fair competitive process.

3.4.3 Disqualification for Prohibited Conduct

The Town may disqualify a proponent, rescind an invitation to negotiate, or terminate a contract subsequently entered into if the Town determines that the proponent has engaged in any conduct prohibited by this RFP.

3.4.4 Prohibited Proponent Communications

Proponents must not engage in any communications that could constitute a Conflict of Interest and should take note of the Conflict of Interest declaration set out in the Submission Form (Appendix C).

3.4.5 Proponent Not to Communicate with Media

Proponents must not at any time directly or indirectly communicate with the media in relation to this RFP or any agreement entered into pursuant to this RFP without first obtaining the written permission of the RFP Contact.

3.4.6 No Lobbying

Proponents must not, in relation to this RFP or the evaluation and selection process, engage directly or indirectly in any form of political or other lobbying whatsoever to influence the selection of the successful proponent(s).

3.4.7 Illegal or Unethical Conduct

Proponents must not engage in any illegal business practices, including activities such as bid-rigging, price-fixing, bribery, fraud, coercion, or collusion. Proponents must not engage in any unethical conduct, including lobbying, as described above, or other inappropriate communications; offering gifts to any employees, officers, agents, elected or appointed officials,

or other representatives of the Town; deceitfulness; submitting proposals containing misrepresentations or other misleading or inaccurate information; or any other conduct that compromises or may be seen to compromise the competitive process provided for in this RFP.

3.4.8 Supplier Suspension

The Town may suspend a supplier from participating in its procurement processes for prescribed time periods based on past performance or based on inappropriate conduct, including but not limited to the following:

(a) illegal or unethical conduct as described above;

(b) the refusal of the supplier to honour its submitted pricing or other commitments;

(c) engaging in litigious conduct, bringing frivolous or vexatious claims in connection with the Client's procurement processes or contracts, or engaging in conduct obstructive to a fair competitive process; or

(d) any conduct, situation, or circumstance determined by the Town, in its sole and absolute discretion, to have constituted an undisclosed Conflict of Interest.

In advance of a decision to suspend a supplier, the Town will notify the supplier of the grounds for the suspension and the supplier will have an opportunity to respond within a timeframe stated in the notice. Any response received from the supplier within that timeframe will be considered by the Town in making its final decision.

3.5 Confidential Information

3.5.1 Confidential Information of the Town

All information provided by or obtained from the Town in any form in connection with this RFP either before or after the issuance of this RFP

(a) is the sole property of the Town and must be treated as confidential;

(b) is not to be used for any purpose other than replying to this RFP and the performance of any subsequent contract for the Deliverables;

(c) must not be disclosed without prior written authorization from the Town; and

(d) must be returned by the proponent to the Town immediately upon the request of the Town.

3.5.2 Confidential Information of Proponent

A proponent should identify any information in its proposal or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by the Town. The confidentiality of such information will be maintained by the Town, except as otherwise required by law or by order of a court or tribunal. Proponents are advised that their proposals will, as necessary, be disclosed, on a confidential basis, to advisers retained by the Town to advise or assist with the RFP process, including the evaluation of proposals. If a proponent has any questions about the collection and use of personal information pursuant to this RFP, questions are to be submitted to the RFP Contact.

3.6 Procurement Process Non-Binding

3.6.1 No Contract A and No Claims

This procurement process is not intended to create and will not create a formal, legally binding bidding process and will instead be governed by the law applicable to direct commercial negotiations. For greater certainty and without limitation:

(a) this RFP will not give rise to any Contract A–based tendering law duties or any other legal obligations arising out of any process contract or collateral contract; and

(b) neither the proponent nor the Town will have the right to make any claims (in contract, tort, or otherwise) against the other with respect to the award of a contract, failure to award a contract or failure to honour a proposal submitted in response to this RFP.

3.6.2 No Contract until Execution of Written Agreement

This RFP process is intended to identify prospective suppliers for the purposes of negotiating potential agreements. No legal relationship or obligation regarding the procurement of any good or service will be created between the proponent and the Town by this RFP process until the successful negotiation and execution of a written agreement for the acquisition of such goods and/or services.

3.6.3 Non-Binding Price Estimates

While the pricing information provided in proposals will be non-binding prior to the execution of a written agreement, such information will be assessed during the evaluation of the proposals and the ranking of the proponents. Any inaccurate, misleading, or incomplete information, including withdrawn or altered pricing, could adversely impact any such evaluation or ranking or the decision of the Town to enter into an agreement for the Deliverables.

3.6.4 Cancellation

The Town may cancel or amend the RFP process without liability at any time.

3.7 Governing Law and Interpretation

These Terms and Conditions of the RFP Process (Part 3):

(a) are intended to be interpreted broadly and independently (with no particular provision intended to limit the scope of any other provision);

(b) are non-exhaustive and will not be construed as intending to limit the pre-existing rights of the parties to engage in pre-contractual discussions in accordance with the common law governing direct commercial negotiations; and

(c) are to be governed by and construed in accordance with the laws of the province of Ontario and the federal laws of Canada applicable therein.

[End of Part 3]

APPENDIX A

1 - FORM OF AGREEMENT

2 - NOVATION AGREEMENT

3 - GENERAL TERMS AND CONDITIONS FOR PRE-SELECTED EQUIPMENT

FORM OF AGREEMENT

This agreement, made in _____this _____day of _____ in _____.

BETWEEN: The Corporation of the Town of Greater Napanee
(hereinafter called the "Owner")

- and -

_____.
(hereinafter called the "Equipment Supplier")

WITNESSETH

That the Owner and Equipment Supplier in consideration of the fulfillment of their respective promise and obligations herein set forth covenant and agree with each other as follows:

ARTICLE 1

a. A general but not necessarily complete description of the work is as follows: _____
_____.

b. The Equipment Supplier shall, for the prices set out in the Form of Submission and except as otherwise specifically provided, provide at no additional cost to the Owner all and every kind of labour, machinery, plant, structures, materials, appliances, articles and things necessary for the due execution and completion of all the work set out in this Agreement and shall forthwith according to the instructions of the Engineer, commence the works and diligently execute the respective portions thereof, and deliver the works complete in every particular to the Owner within the time specified in the Contact.

ARTICLE 2

In case of any inconsistency or conflict between the provisions of this Agreement and the Plans or Specifications or General Conditions or Submission Forms or any other submitted document forming part of the proposal or further written agreement, the provisions of such documents shall take precedence and govern in the following order, namely:

1. This agreement
2. Addendum, if any
3. Request for Proposal
4. Amendments to General Conditions
5. General Conditions
6. Equipment Specifications
7. Contract Drawings

8. Submission Forms

ARTICLE 3

Where any notice, direction or other communication is required to be or may be given or made by one of the parties hereto to the other or to the Engineer or to his agent, it shall be deemed sufficiently given or made if mailed or delivered in writing to such party or to the Engineer at the following addresses:

The Owner: The Corporation of the Town of Greater Napanee
99-A Advance Avenue
Napanee, ON K7R 3Y5

The Equipment Supplier:

The Engineer: EVB Engineering
800 Second Street West
Cornwall, ON K6J 1H6

Where any such notice, direction or other communication is given or made to the Engineer, a copy thereof shall likewise be delivered to any agent of the Engineer appointed in accordance with the General Conditions of this Agreement and where any such notice, direction or other communication is given or made to such agent a copy thereof shall likewise be delivered to the Engineer.

ARTICLE 4

No implied contract of any kind whatsoever by or on behalf of the Owner shall arise or be implied by or inferred from anything in this Agreement contained, nor from any position or situation of the parties at any time, it being clearly understood that the express covenants and agreements herein contained made by the Owner shall be the only covenants and agreements upon which any rights against the Owner may be founded.

ARTICLE 5

The Supplier declares that in submitting a proposal for the works and in entering into this Agreement they have either investigated for themselves the character of the work and all local conditions that might affect their proposal or their acceptance or performance of the work, or that not having so investigated, they acknowledge that their responsibility under the Agreement is in no way reduced or limited thereby and, in either case, they are willing to assume and does hereby assume all risk of conditions arising, developing, or being revealed in the course of the work which might or could make the work, or any items thereof, more expensive in character, or more onerous to fulfill, than was contemplated or known when the tender was made or the Agreement signed. The Supplier also declares that they did not and does not rely upon information furnished by any

methods whatsoever by the Owner or its officers, employees or agents, being aware that any information from such sources was and is approximate and speculative only, and was not in any manner warranted or guaranteed by the Owner.

ARTICLE 6

The Contract shall apply to and be binding on the parties hereto and their successors, administrators, executors and assigns and each of them.

IN WITNESS THEREOF the parties hereto have hereunto set their hands and seals the day and year first above written or caused their corporate seals to be affixed, attested by the signature of their proper officers, as the case may be.

Owner:

Per: _____

Per: _____

_____

*Witness as to Signature of Contractor (Seal)

Address_____ Supplier:

_____

_____ Per: _____

Occupation _____ Per: _____

(Seal)

*Not necessary if corporate seal is affixed.

NOVATION AGREEMENT

BETWEEN: The Corporation of the Town of Greater Napanee
(hereinafter referred to as "ASSIGNOR")

AND: _____
(hereinafter referred to as "ASSIGNEE")

AND: _____
(hereinafter referred to an "VENDOR")

WHEREAS:

1. Assignor entered into certain contracts with the Vendor, dated _____, for the provision of _____. The term "Supply Contracts" as used in this Agreement means the above contract(s), and purchase order(s), including all modifications, made between the Assignor and the Vendor, before the effective date of this Agreement (whether or not performance or payment has been completed and releases executed if the Vendor of the Assignor has any remaining rights, duties or obligations under these contracts and purchase orders.) Include in the term "Supply Contract" are also modifications made under the terms and conditions of the contracts and purchase orders between the Assignor and the Vendor, on or after the effective date of this Assignment;

2. It is a requirement of the Supply Contracts that the Vendor enter into a Novation Agreement with the General Contractor (Assignee) selected by the Assignor;

3. Assignor shall enter into Contract _____ with Assignee dated _____, for _____;

4. It is a requirement of the Construction Contract that the Assignee enter into a Novation Agreement with Vendor so that the Vendor becomes a subcontractor to Assignee;

5. The Vendor is willing to consent to the assignment of the Supply Contracts recited above, and to recognize and accept Assignee as a party of the Supply Contracts in the place of and instead of the Assignor;

NOW THEREFORE in consideration of the premises and of the mutual agreements hereinafter contained the parties agree as follows:

1. The Assignee and Vendor agree to be bound by the terms of the Supply Contracts, with the Assignee assuming all the rights, obligations and liabilities of the Assignor as set out therein.

2. The Assignee ratifies all previous actions taken by the Assignor with respect to the Supply Contracts, with the same force and effect as if the action had been taken by the Assignee.

3. The Assignee hereby releases, discharges, covenants to commence legal action, and agrees to indemnify and save and hold harmless the Assignor, with respect to any losses that may result from signing this Novation Agreement.

4. The Vendor retains all the rights and obligations set out in the Supply Contracts and henceforth accepts the Assignee in place of the Assignor.

5. The Vendor recognizes the Assignee as the Assignors successor in the interest in and to the Supply Contracts. The Vendor agrees that henceforth it is a subcontractor to the Assignee in respect of the Construction Contract.

6. The Vendor hereby releases the Assignor from all of the Assignors covenants, conditions, obligations, and liabilities under the Supply Contracts and from all clams of every nature whatsoever arising therefrom, excepting only those claims, if any, already notified to the Assignor in writing, and acknowledges that it will henceforth look only to the Assignee for the discharge of the Assignors obligation thereunder and that only the Assignee may exercise the rights of the Assignor thereunder. By executing this Novation Agreement, the Vendor acknowledges that as of the date hereof, the Vendor is not aware of any claims against the Assignor arising from the Supply Contracts.

7. The parties hereto shall, from time to time and at all times hereafter, without further consideration, execute this Novation Agreement and deliver all required Shop Drawing Submittal documents as shall be reasonably required to give effect to the provisions hereof.

8. The Assignor and Vendor that the Contracts between them shall terminate on the date specified in the Construction Contract to be entered into by the Assignor and the Assignee.

9. This Agreement shall enure to the benefit of and be binding upon parties hereto and their respective administrators, trustees, receivers, successors, and assigns.

10. This Agreement may be executed in counterpart, no one copy of which need be executed by all of the parties hereto. When copies have been executed by each of the parties hereto, all copies together shall constitute one agreement and shall be a valid and binding contract among the parties hereto as of the date first written above.

11. It is agreed that the contract value of the Supply Contracts as of the date hereof $_____ owing to the Vendor under the Supply Contracts.

IN WITNESS WHEREOF the parties have hereto affixed their hands and seals the ____ day of _____ 2021.

The Corporate Seal of:

The Corporation of the Town of Greater Napanee Seal
Assignor

Was hereunto affixed in the presence of:

Authorized Signing Office Title

Authorized Signing Office Title

The Corporate Seal of

Seal
Assignee

Was hereunto affixed in the presence of:

Authorized Signing Office Title

Authorized Signing Office Title

The Corporate Seal of

Seal
Vendor

Was hereunto affixed in the presence of:

Authorized Signing Office Title

Authorized Signing Office Title

GENERAL TERMS AND CONDITIONS FOR PRESELECTED EQUIPMENT

Table of Contents

Terms and Conditions

Covering Proposals for Supplying, Delivering and Commissioning Preselected Equipment

GT 1.0 DEFINITIONS

The following definitions shall apply in these Request for Proposal documents and in all other documents related thereto:

.1 "Engineer" means the engineering firm named in the Form of Quotation or such other person, firm or corporation as the Owner may appoint.

.2 "Delivery Period" means the period commencing on the date of shop drawing approval to the Supplier by the engineer and ending on the date when delivery to the site of the works of the equipment covered by the said order has been completed.

.3 "Equipment Supplier" or "Bidder" means a person, firm or corporation who proposes to submit, or who has submitted, a quotation for the supply of the equipment, or a part thereof, referred to herein.

.4 "General Contract" means the contract entered into or to be entered into between the Owner and a contractor providing for the construction of the works into which the equipment referred to in these documents is to be incorporated.

.5 "General Contractor" means the contractor referred to in the preceding definition hereof.

.6 "Owner" means the Corporation of the municipality for which the work is to be carried out as identified in the Form of Quotation attached hereto.

.7 "Purchaser" means the person, firm or corporation, which will place or has placed an order for the equipment, or a part thereof, referred to herein and may be the general contractor, an authorized sub-contractor of the general contractor or the Owner.

.8 "Supplier" means the equipment supplier who has been selected by the Engineer and the Owner to supply the equipment, or a part thereof, referred to herein and who has received an order therefor from the purchaser.

GT 2.0 PURPOSE AND PROCEDURE

.1 Quotations will be examined in order to select equipment for inclusion in a general contract for the construction of the proposed works. The selected equipment will be shown in the working drawings, specified in the specifications, and listed in the Form of Tender of the general contract in the SCHEDULE OF PRE-SELECTED EQUIPMENT.

.2 At a later date, tenderers for the general contract will obtain quotations independently from the selected suppliers, will enter the quoted prices and related

delivery periods in the SCHEDULE OF PRE-SELECTED EQUIPMENT in the Form of Tender, and will tender on the basis of the selected equipment being furnished without option to substitute other equipment therefor.

.3 Quotations submitted by the selected equipment suppliers to tenderers should be in writing.

.4 The specification in the general contract will include the words “or approved equal” after the naming of each item of preselected equipment. This does not mean that the contractor may propose a substitute or equivalent in such cases but is to provide for the case where the Engineer, because of exceptional circumstances (such as it being found that the selected equipment is no longer on the market or does not comply with the specification), has to make a change at a later date.

.5 Following the execution of the general contract and the issuance of the Engineer's written order to commence work, the general contractor or an authorized sub-contractor will place an order with the selected equipment supplier for the required equipment. The purchaser will arrange the time and place of delivery with the Supplier.

.6 In some cases, in order to obtain an earlier delivery date, the Owner may issue a purchase order for the required equipment to the selected equipment supplier before the general contract has been executed with provision in the said order that, immediately after the issuance of the Engineer's order to commence work to the general contractor, the Owner's order will be superseded and replaced by a similar order from the general contractor or an authorized sub-contractor who will then be responsible for arranging delivery with and paying the Supplier.

.7 If the order for the selected equipment is placed by a sub-contractor, and if the sub-contractor is required to be bonded by the terms of the general contract, then the Supplier shall be entitled to receive from the said sub-contractor or the general contractor, on written request to the general contractor, a photocopy of the executed Labour and Materials Payment Bond furnished by the said sub-contractor to the general contractor.

.8 Unless specifically stated otherwise in the specification or in the Form of Quotation, the purchaser shall carry out or arrange for the installation of the equipment.

GT 3.0 SUBMISSION OF QUOTATIONS

.1 Quotations in duplicate, accompanied by the completed Form of Quotation in the required form, will be received by the Owner until a stated time and date, all as directed in the Invitation to Quote letter.

GT 4.0 PRICES

.1 The prices quoted in the Form of Quotation shall hold firm for acceptance, after the date set for closing of quotations, for a period of validity as stated in the Form of Quotation. Provided that a written order for the equipment is placed by the

Owner, its general contractor or authorized sub-contractor, within the period of validity of the quotation, there shall be no adjustment in the price of the equipment (except as provided for hereunder with respect to imported equipment or in accordance with such amendments, if any, as may be agreed upon between the Engineer and the equipment supplier).

.2 The firm price(s) shall include all applicable excise taxes, duty, foreign exchange, royalties and patent or license fees, and shall be f.o.b. job site. (See also requirements of Clause 16 “Receiving and Storage”.)

.3 Prices quoted shall be Harmonized Sales Tax EXCLUDED. All other applicable taxes will be included in the Supplier’s quotation. The applicable rate shall be applied to the manufactured cost of the equipment and shall be shown on the Form of Quotation.

.4 Notwithstanding that it may be known at the time of submission of a quotation that increased or decreased duty and/or foreign exchange will become chargeable on the equipment or any part thereof in the near future, only duty chargeable and/or foreign exchange applicable on the closing date for receipt of quotations shall be included by the equipment supplier in his quoted prices. Any increase or decrease in the duty and/or foreign exchange applicable to the said equipment or any part thereof from the said closing date to the date of entry into Canada of the said equipment, shall result in a corresponding increase or decrease in the price charged by the Supplier save that no change in price shall be made if the net amount of increase or decrease is less than $500.00. Any increase or decrease in price pursuant to the foregoing shall be debited or credited, as the case may be, to the Owner through the purchaser.

.5 If a quotation or any part thereof is based upon the supplying of imported equipment, the equipment supplier shall state in the appropriate space in the Form of Quotation the name of each country of origin, the description and value of the equipment to be obtained from each such country, and each applicable rate of import duty and foreign exchange at the date of submission of the quotation.

.6 The selected equipment supplier shall notify the purchaser and the Engineer promptly of relevant changes in rates of import duty and foreign exchange.

.7 If, in the opinion of the Engineer, the net increase in price as a result of any change in the rate of import duty or foreign exchange will be such as to affect the relative standing of the preselected equipment in relation to equipment offered by other equipment suppliers, the Engineer may, in his discretion and provided that a written order has not already been placed for the said preselected equipment, reject the preselected equipment and direct that other equipment shall be ordered instead.

.8 The bidder shall submit his quotation on the Form of Quotation without any connection, comparison of figures with, or knowledge of, any other corporation, firm or person making a quotation for similar equipment for this project, and his quotation shall be in all respects fair and without collusion or fraud.

GT 5.0 PATENT AND LICENSES

.1 Each bidder shall allow in his quotation for the inclusion of all applicable patent or license fees relating to the equipment or process upon which he is quoting.

.2 It shall be the full responsibility of the Supplier to save the Owner, the Engineer, and the Contractor harmless from damages or costs which may arise from any patent infringements and resultant litigation.

GT 6.0 ACCEPTANCE OR REJECTION OF QUOTATIONS

.1 The Engineer may reject any or all quotations and may waive formalities at its discretion without stating reasons therefor, and the lowest or any quotation will not necessarily be accepted (but see following Clause hereof for normal notification procedure).

.2 Where more than one item is called for, the prices shall be shown separately, and the Engineer reserves the right to select one or more items from a quotation to the best overall advantage of the Owner.

GT 7.0 NOTIFYING RESULTS OF PRESELECTION

.1 When the selection of equipment has been made, each of the equipment suppliers who submitted a valid quotation will be sent a letter notifying the bidder of the outcome of the preselection.

GT 8.0 INFORMATION WITH QUOTATION

.1 Without limiting more specific requirements contained in the specification for equipment, the equipment supplier shall include with his quotation: descriptive literature, adequate engineering data, power requirements, efficiencies, and outline drawings showing principal dimensions and weights of the equipment offered. The quotation as submitted shall be essentially complete so as to permit the Engineer to make a full analysis of the equipment offered without the need for additional information.

GT 9.0 CONTRACT DOCUMENTS

.1 The intent of the Contract Documents is to include the design, labour, Goods and Special Services necessary for the performance of the Goods by the Supplier in accordance with these documents. It is not intended, however, that the Supplier shall supply products or perform work not consistent with, not covered, or not properly inferable from the Contract Documents.

.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

.3 Words and abbreviations which have well known technical or trade meaning are used in the Contract Documents in accordance with such recognized meanings.

.4 References in the Contract Documents to the singular shall be considered to include the plural as the context requires.

.5 If there is a conflict within the Contract Documents the order of priority of documents, from highest to lowest, shall be:

.1 Written Amendments;
.2 Change Orders;
.3 Work Change Directive;
.4 Consultant's or Buyer's written interpretations and clarifications;
.5 Addenda;
.6 the written executed agreement between the Buyer and Bidder shall govern over all schedules or other documents forming part of the contract;
.7 the Supplemental Conditions shall govern over the General Conditions;
.8 the General Conditions shall govern over Specifications;
.9 Specifications of a later date shall govern over Specifications of an earlier date;
.10 Specifications shall govern over Drawings;
.11 Drawings of a later date shall govern over Drawings of an earlier date;
.12 Figured dimensions shown on a Drawing shall govern over scaled or implied dimensions on the same Drawing;
.13 Drawings shall govern over the Bid Submission.
.14 Bid.

.6 The Owner and the Supplier acknowledge and agree that the Supplier is an independent contractor and neither the Supplier, nor any officer, servant or agent of the Supplier, shall be deemed to be an employee, agent, representative or servant of the Owner.

.7 The Contract shall constitute the entire agreement between the Owner and the Supplier. There are no representations, warranties, covenants, or agreements other than those contained in the Contract.

.8 Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws and Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws and Regulations in effect at the time of opening of, except as may be otherwise specifically stated in the Contract Documents.

.9 Clarifications and interpretations of, or notifications of minor variations and deviations in, the Contract Documents, will be issued by Consultant or Owner.

.10 No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Supplier or Consultant or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to Owner or Consultant, or any of

their consultants, agents, or employees any duty or authority to supervise or direct the performance of Supplier's obligations or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

.11 Compliance with Laws and Permits. All permits and licenses which are required to construct, install and/or operate Owner's facility or equipment, to use the Equipment, or to manage and dispose of any wastes and residues resulting from Owner's use of the Equipment, shall be obtained and maintained by Owner at Owner's sole expense. Owner is responsible for compliance with all laws and regulations applicable to the storage, use, handling, installation, maintenance, removal, registration, and labelling of all Equipment after delivery of the Equipment, as well as for the proper management and disposal of all wastes and residues.

GT 10.0 EXECUTION OF CONTRACT

.1 The Supplier shall execute the Contract in the manner stipulated by the Owner and return the Contract within ten (10) Calendar Days of receipt of the Contract, to the Owner.

.2 If the Supplier does not execute and return the Contract, the Supplier may be deemed by the Owner to have abandoned the Contract, whereupon the acceptance of the Bid by the Owner shall be null and void, and the Owner shall be entitled to all rights and remedies available to it at law.

GT 11.0 AUTHORITY OF THE ENGINEER

.1 The Engineer will be the Owner's representative throughout the duration of the Contract and shall have authority to act on behalf of the Owner to the extent expressly provided for in the Contract.

.2 The Engineer will interpret or clarify the Contract or any part thereof which appears indefinite, not clear, or contradictory to the Supplier.

.3 The Engineer may examine or inspect the Work or any part thereof and determine whether the Work meets the requirements of the Contract. The Engineer may reject the Work or any part thereof which does not meet the requirements of the Contract.

GT 12.0 MANUALS, PARTS LISTS

.1 The quoted prices shall allow for the provision of all instruction manuals, parts lists, erection drawings, etc., covering the installation, lubrication, maintenance, and operation of the equipment. These shall be distributed as directed in the Equipment Specification but, if no such direction is given, they shall not be sent with the equipment but shall be delivered to the purchaser as soon as possible after the receipt of an order for the equipment. The number of copies required shall be as stated in the Form of Quotation.

GT 13.0 DELIVERY

.1 The equipment supplier shall quote a delivery period for each item of equipment for which he submits a quotation. If for any reason the equipment supplier is not able to quote a firm delivery period when he submits his initial quotation, he shall state “estimated” against his period quoted. In that event, however, the equipment supplier shall (if preselected) quote a firm delivery period when quoting during the period of tendering for the general contract.

.2 The quoted delivery period shall allow for:

.1 the time required by the purchaser's official order to reach the supplier by mail, and

.2 a three-week period for the Engineer to review and comment on the Supplier's shop drawings for the equipment to be supplied.

.3 The Supplier will be entitled to an extension of his quoted delivery period on account of:

.1 The Engineer taking more than three (3) weeks to review and return to the Supplier the Supplier's shop drawings, provided that the excess time involved was not due to the said drawings containing errors or omissions or not complying with the requirements of the specifications.

.2 Delay attributable to Acts of God or other matters which were not the fault of the Supplier and over which he had no control, provided that the Supplier or manufacturer took all possible action to reduce delays and notified the Engineer promptly of the occurrence of such delays.

.4 Delivery of anchor bolts and parts to be embedded which are required in advance of the delivery of equipment shall be made when required by the purchaser.

GT 14.0 INSPECTION AT FACTORY

.1 The Engineer may, before or after preselection of equipment has been made, inspect or have its authorized representative inspect the manufacturing, assembling and testing facilities at an equipment supplier's factory or at the factory of a proposed sub-supplier of an equipment supplier, to satisfy himself of the capability and facilities of the equipment supplier or sub-supplier to manufacture and test the required equipment.

.2 The Engineer may inspect or have its authorized Inspector inspect the equipment or the process of manufacture or testing of the equipment at the Supplier's factory or at the factory of a sub-supplier of the Supplier at any reasonable time. The Engineer or the Inspector may notify the Supplier or sub-supplier at any time of unsatisfactory materials, workmanship, or processes.

.3 The equipment supplier, Supplier, or sub-supplier as the case may be, shall provide every reasonable facility, access, and co-operation to assist the Engineer, or its Inspector in carrying out inspection or testing at the factory or plant.

.4 No inspection or testing carried out or not carried out by the Engineer, or its Inspector shall relieve the Supplier of his responsibility for supplying equipment in accordance with the specifications, these General Terms and Conditions and good engineering practice.

GT 15.0 TESTING

.1 Where witnessed testing at the factory is specified, the Supplier is to give the purchaser reasonable written notice, 2 – 3 weeks (with copies to the Engineer) of the date when the equipment will be ready for such testing. Equipment is not to be delivered to the site until such testing has been completed satisfactorily as specified.

.2 Where certified factory testing of the equipment or any component part thereof is specified, the Supplier shall furnish copies of the required certified test reports, showing that the equipment complies with the specification, to the purchaser, and the Engineer before the equipment is delivered to the site.

GT 16.0 RECEIVING AND STORAGE

.1 The equipment and appurtenances shall be delivered to the site of the work in a condition satisfactory to the Engineer and any omissions, discrepancies, or damage evident on delivery shall be made good by the Supplier.

.2 The purchaser's representative at the job site shall sign the carrier's pro bill to indicate receipt of the required number of crates, packages, etc. and shall note thereon any apparent shortages of or visible damage to such crates, packages, etc. The Supplier shall furnish to the purchaser lists showing the contents of the said crates, packages, etc. Such lists shall be furnished sufficiently early so that copies will be available at the job site when delivery of the said equipment and appurtenances is made. Within fourteen (14) days after the date of delivery to the job site, the purchaser shall notify the Supplier in writing of shortages or damage in the equipment delivered.

.3 The purchaser will be responsible for storing the equipment, appurtenances, and materials and for protection against weather, loss, damage, or theft. The Supplier shall be responsible for providing the purchaser with full instructions in writing of all precautions to be observed in connection with the storing and protection of the equipment. A copy of all such instructions shall be passed to the Engineer.

GT 17.0 SHOP DRAWINGS

.1 On receipt of a purchase order, the Supplier shall submit, consistent with the time indicated by the Supplier in the Form of Quotation, all required drawings of the equipment for review. The number of prints required of each drawing shall be as stated in the Form of Quotation.

.2 Unless otherwise specifically stated in the specifications or in the order, the above-mentioned drawings (whether for review or reviewed by the Engineer) shall be sent to the Engineer.

.3 Neither the purchaser, the Owner nor the Engineer will accept responsibility for the cost of changes necessary if any equipment is fabricated without prior review of shop drawings as provided for above.

.4 No review of shop drawings by the Engineer shall relieve the Supplier of responsibility for supplying equipment which complies with the specifications, the functional requirements and good engineering practice.

GT 18.0 SERVICES REQUIRED AT SITE

The services required to be provided by the Supplier at the site of the works will be as described in one of the three (3) categories set out below. Which category applies to a particular item of equipment will be specified in the Form of Quotation. The bidder shall allow for the applicable category of service in the total price quoted for the particular item of equipment.

.1 No Field Service Required.

This category covers equipment which is to be installed by the general contractor or his sub-contractor and which, in the opinion of the Engineer, requires no normal service from the Supplier during or after the installation.

.2 Commissioning of Installation.

This category covers equipment which is to be installed by the general contractor or his sub-contractor but, before the equipment is operated, the general contractor shall direct the Supplier to commission the equipment. The Supplier shall provide the services of a factory-trained technical representative, for the minimum period given in the Form of Quotation, to commission the said equipment. The technical representative shall provide the services stated in the relevant specification and shall operate and/or demonstrate the equipment to the satisfaction of the Engineer. The Supplier shall furnish to the Engineer a letter or certificate stating that his qualified representative has found the installation to be to his satisfaction.

.3 Installation of Equipment by Supplier.

This category covers equipment which is specified as to be installed by the Supplier using his own forces. The bidder shall include in his quoted price the cost of all normal services such as installing in place, interconnections between components, connections of main and auxiliary services. Any services which are not included in the quoted price, but which are required for the operation of the equipment shall be clearly stated by the bidder in his quotation. The Supplier shall furnish to the Engineer a letter or certificate stating that his forces have completed the installation to the Supplier's satisfaction.

If the Form of Quotation specifies that the Supplier shall, in addition to installing the equipment using his own forces, commission the equipment, the provisions of category .2 above, except for the reference to installation by the general contractor or his sub-contractor, shall apply in addition.

NOTE: If, notwithstanding that it is specified in the Form of Quotation that the Supplier shall commission the equipment, the purchaser operates the equipment before the Supplier has commissioned it, the purchaser shall be responsible for any damage caused to the equipment by such premature operation.

GT 19.0 LATE DELIVERY

.1 Unless specifically stated in the Form of Quotation, a per diem liquidated damages rate payable by the Supplier to the purchaser for late delivery of the equipment ordered beyond the quoted delivery period is not stipulated herein.

.2 The Owner and the Engineer do not guarantee to the general contractor that preselected equipment will be delivered within the quoted delivery period and accept no responsibility for additional costs which may be incurred by the general contractor or any sub-contractor as a result of late delivery of any item of equipment.

.3 The Owner and Engineer accept no responsibility for any claim made by the purchaser against the Supplier on account of actual damages or additional costs incurred, or allegedly incurred, by the purchaser on account of late delivery by the Supplier of any item of equipment. Any dispute between the Supplier and the purchaser with respect to any such claim shall be settled by the Supplier and the purchaser.

GT 20.0 PAYMENT

.1 Payment to the Supplier shall be by the purchaser who may be the general contractor or an authorized sub-contractor. The equipment supplier shall submit his quotation on the basis of being paid as follows:

.1 80% of total price (excluding allowance for supervision of installation, field testing and commissioning) due within thirty (30) days after the next monthly measurement date for the general contract following delivery of the equipment, complete and in good condition, to the site of the works.

.2 A further 15% of the above-mentioned price plus the full allowance, if any, for supervision of installation and field testing due after satisfactory completion of installation and field testing and the furnishing by the Supplier to the purchaser of all operation and maintenance instructions and parts lists for the equipment and a letter stating that the Supplier's qualified representative has tested the equipment supplied and has found it, to the best of his knowledge, to be satisfactorily installed, in proper working order,

and operating in accordance with the specifications (unless such testing was not required by the Form of Quotation or the specifications). If the completion of installation and field testing is delayed through no fault of the Supplier beyond four (4) months after the date of delivery of the equipment to the site, 10% shall become payable to the Supplier. The remaining 5% shall be payable after satisfactory completion of installation and field testing and the furnishing by the supplier to the purchaser of all operation and maintenance instructions and parts lists for the equipment.

.3 The remaining 5% of the above-mentioned price shall be due on completion of a period of twelve (12) months after the date when the equipment was put into regular operation at the date of substantial performance of the general contract (as established by the Engineer), provided that the Supplier has fulfilled his guarantee to the purchaser.

GT 21.0 GUARANTEE AND WARRANTY

.1 The Supplier guarantees and warrants that all equipment covered by or supplied pursuant to his quotation shall:

.1 comply with the specifications for the said equipment;

.2 be free from defects in design, manufacture, workmanship, or materials;

.3 perform efficiently and without unwanted interruption for a period of twenty-four (24) months after the date when the equipment was put into regular operation at substantial performance of the general contract, which date shall be established by the Engineer.

.4 have any breakage, damage, defects or deterioration (other than those due to the negligence of parties other than the Supplier or to the imposition on the equipment of extraordinary working conditions or to normal wear and tear) in the said equipment that occur or are detected and are reported to the Supplier within the guarantee/warranty period referred to in (c) above made good promptly by the Supplier at his entire expense including the expense of all necessary labour, supervision, travelling, replacement parts and transportation. (To assist the Supplier in having work carried out on installed equipment or in removing or replacing installed equipment or parts thereof, the Owner will take all reasonable steps to provide the Supplier with ready access to such equipment.)

.2 The equipment supplier expressly warrants and guarantees to the Owner that, in the event of the equipment or a part thereof offered by the equipment supplier in his quotation being selected by the Engineer and the general contractor being required to furnish the said equipment or part thereof under the general contract, such equipment or such part thereof when supplied pursuant to a purchase order of the general contractor or a bonded sub-contractor under the general contractor,

shall be deemed to have been supplied upon the terms of the quotation documents issued by the Engineer, and the said quotation with such amendments, if any, as may be agreed upon in writing by the equipment supplier and the Engineer before the issuance of the said purchase order.

.3 The equipment supplier agrees that all rights and remedies available to the general contractor or sub-contractor, as the case may be, as purchaser of the equipment under the said purchase order shall be assignable to and enforceable by the Owner, subject to the assumption by the Owner of any balance of monies due and remaining unpaid on the said purchase order.

GT 22.0 EXTRA SITE VISITS

.1 If, after the Supplier has furnished the letter required by GT 20.1.2 hereof, the Supplier is requested by the purchaser or the Engineer to send a representative to the job site to investigate or rectify a suspected fault in the equipment furnished by the Supplier, and if it is found that the said equipment or Supplier is not at fault, the Supplier shall be entitled to be reimbursed for all reasonable costs and expenses incurred by him in sending his representative to the job site.

GT 23.0 ALTERNATIVE PROPOSALS

.1 Bidders may submit alternative proposals to the specifications, but such proposals shall provide sufficient information (including a list of all points of non-compliance with the specifications) to permit an accurate analysis of the alternative, and should preferably be in addition to a quotation in accordance with the specification and conditions. Whether any such alternative proposal shall be considered as equivalent to proposals complying with the specifications shall be decided by the Engineer.

GT 24.0 FORM OF QUOTATIONS

.1 Each bidder must submit to the Town with their proposal a Form of Quotation in the exact form bound herein, properly completed and signed by an authorized signing officer under the company seal.

.2 Quotations which do not include this Form of Quotation properly completed will not be considered further.

.3 The bidder shall complete all parts of the Form of Quotation:

.1 The items quoted shall be as requested. (Alternatives and special arrangements are subject to agreement with the Town.)

.2 Delivery requirements shall be as per clause GT 13.0.

.3 Validity period shall be as requested. (Prices not meeting validity requirements may not be considered.)

.4 Breakdown on imported portions of the equipment should not be given if it is less than 10% of the total price.

.5 Rate of Import Duty shall be as at the date of submission of the quotation.

.6 Rate of Exchange shall be as at the date of submission of the quotation.

GT 25.0 COMPARISON OF QUOTATIONS

.1 In comparing the various quotations, due weight will be given to the details, characteristics, sizes of the individual components, weights of units, quality of materials, space required, and guaranteed delivery dates for the equipment that each bidder proposes to supply as indicated by the drawings and data submitted with his quotation, together with the bidder's experience in the particular class of equipment with due consideration given to the submitted reference and geographic location of said references. Convenience and cost of installation, operation and maintenance will also be considered, as well as the bidder's locality of maintenance technicians and parts.

.2 The availability of spare parts and service for the equipment offered will be considered in comparing the various quotations and alternatives.

GT 26.0 INTERPRETATION OF QUOTATION DOCUMENTS

.1 Should any bidder find discrepancies in or omissions from the specifications or any of the other quotation documents, or should there exist any doubt as to the meaning of, or lack of certainty as to, the scope of the work, the bidder may submit a written request to the Engineer for the interpretation thereof. The request must be received at least three days prior to the date set for the closing of quotations.

.2 Any correction to or interpretation of the quotation documents will be made by an addendum duly issued, and a copy mailed, emailed, faxed or delivered to each person or company who has taken out a set of the quotation documents.

.3 Any addenda issued during the time of quoting shall be taken into account in preparing the quotation and, in closing the quotation, they shall become a part thereof.

.4 The purchaser will not be responsible for any verbal instructions or interpretations.

GT 27.0 ABILITY AND EXPERIENCE OF BIDDER

.1 It is the intention not to select equipment from any bidder who does not furnish satisfactory evidence that he has ability and experience in this class of work.

.2 Quotations will be accepted only from equipment manufacturers or their authorized agents.

.3 The bidder shall furnish satisfactory evidence that he has ability and experience in this class of work, and that he has sufficient plant to complete it in the time stated in the quotation.

.4 The bidder shall provide a list of installations of his equipment utilized in the water/sewage treatment field of similar size to that specified herein, and the

names and addresses of particular purchasers who may give information regarding the performance of such equipment to date. A long list of installations may not be sufficient if they are not up to date, lack responsive reference personnel and/or are not relevant to the current project.

GT 28.0 INSURANCE

.1 The Supplier shall be responsible for any loss of or damage to the equipment, or any part thereof, required to be supplied under the general contract up to the time when the said equipment has been delivered to the job site and has been received, and shall insure the said equipment in the full amount of the quotation price against loss or damage from any cause up to the said time. The Owner may require the Supplier to furnish evidence satisfactory to the Owner that such insurance has been provided.

END OF SECTION

APPENDIX B – RFP PARTICULARS

A. THE DELIVERABLES

The purpose of this RFP Document is to preselect major equipment and systems required for the Napanee WPCP Upgrades located at 310 Water St., Napanee, Ontario. This document provides the proposal requirements for the following, individual, systems which will be preselected through this RFP process.

The following is a general but not necessarily complete description of the works to be supplied for this RFP. There are five separate systems on which suppliers may bid, individual systems technical specifications documenting the mandatory technical requirements are provided in Appendix C as part of the submissions forms:

System #01 – Fine Screening and Compactor

This proposal involves the design, supply and commissioning of the preliminary treatment equipment that will be used to treat raw sanitary sewage prior to biological treatment at the WPCP. The equipment system required includes: two (2) fine screens and dewatering screw conveyor(s) (one or two screw conveyors as design requires for transporting screening material to screening bin). The fine screens will function in a duty - standby configuration (i.e. both screens are to be sized for the peak design flow).

System #02 - Vortex Grit Removal and Grit Classifier

This proposal involves the design, supply and commissioning of the preliminary treatment equipment that will be used to treat raw sanitary sewage prior to biological treatment. The equipment associated with this system includes vortex grit removal units and a grit classifier.

System #03 – Mechanical Waste Activated Sludge (WAS) Thickeners

This proposal involves the design, supply, and commissioning of two prefabricated secondary treatment waste activated and chemical sludge Thickeners to condition, thicken and convey wasted sludge in preparation for further treatment.

System # 04 – Tertiary Filtration System

This proposal involves the design, supply, and commissioning of a tertiary filtration system to ensure effluent compliance.

System #05 – Ultraviolet Disinfection System

This proposal involves the design, supply, and commissioning of a new, ultraviolet disinfection system treating effluent from the secondary clarifiers.

B. MATERIAL DISCLOSURES

1. The RFP submissions will be examined and evaluated in order to select equipment for inclusion in a general contract for the construction of the Napanee WPCP Expansion “proposed works”. The pre-selected equipment will be shown in the working drawings,

specified in the specifications, and listed in the Form of Tender of the general construction contract in the *Schedule of Pre-Selected Equipment*.

2. At a later date, tenderers for the general construction contract will obtain quotations independently from the pre-selected suppliers, will enter the quoted prices and related delivery periods in the *Schedule of Pre-Selected Equipment* in the General Contract Form of Tender, and will tender on the basis of the selected equipment being furnished without option to substitute other equipment therefor.

3. Quotations submitted by the preselected equipment suppliers to the general construction contract tenderers should be in writing.

4. The specification in the general contract will include the words “or approved equal” after the naming of each item of preselected equipment. This does not mean that the contractor may propose a substitute or equivalent in such cases but is to provide for the case where the Engineer, because of exceptional circumstances (such as it being found that the selected equipment is no longer on the market or no longer complies with the specification or other extenuating circumstance), has to make a change at a later date.

5. Following the execution of the general contract and the issuance of the Engineer's written order to commence work, the general contractor or an authorized sub-contractor will place an order with the selected equipment supplier for the required equipment. The purchaser will arrange the time and place of delivery with the Supplier.

6. In some cases, in order to obtain an earlier delivery date, the Owner may issue a purchase order for the required equipment to the selected equipment supplier before the general contract has been executed with provision in the said order that, immediately after the issuance of the Engineer's order to commence work to the general contractor, the Owner's order will be superseded and replaced by a similar order from the general contractor or an authorized sub-contractor who will then be responsible for arranging delivery with and paying the Supplier.

7. If the order for the selected equipment is placed by a sub-contractor, and if the sub-contractor is required to be bonded by the terms of the general contract, then the Supplier shall be entitled to receive from the said sub-contractor or the general contractor, on written request to the general contractor, a photocopy of the executed Labour and Materials Payment Bond furnished by the said sub-contractor to the general contractor.

8. It is the intent of the Owner to issue a Purchase Order for the value identified in the Form of Submission for the supply of Shop Drawings from the selected Supplier. The remainder of this Contract shall be novated to a successful General Contractor via the construction tender.

9. The Owner will assign the remainder of the Pre-Selection of the Equipment Contract to a General Contractor when such General Contractor has been selected. The selected Supplier for this Contract will be required to join in and execute an assignment and novation agreement in the form set out in Appendix B Section H: Novation Agreement as

soon as the construction contract between the Owner and the General Contractor has been signed.

10. The Construction Contract will contain a novation agreement in the same form as contained herein.

11. The price and payment terms of this Contract will be included in the specifications and pricing for the General Construction Contract.

C. MANDATORY SUBMISSION REQUIREMENTS

1. Submission Form (Appendix C)

Each proposal must include all of the components of the Submission Form (Appendix C) for each system for which the supplier is submitting a proposal. The submission forms consist of the following items:

- General Proponent Information
- Form of Proposal including the:
    - Financial Details
    - Technical Details

All Submission Forms must be completed in full and signed by an authorized representative of the proponent.

2. Pricing

Each proposal must include pricing information as documented in the Financial Details section of each system that complies with the instructions set out below in Section G of this Appendix B.

3. Other Mandatory Submission Requirements [N/A]

D. MANDATORY TECHNICAL REQUIREMENTS

The mandatory technical requirements are provided in the specification documents specific to each of the systems. The specification documents are provided in Appendix D. It must be noted that there are five (5) systems, each system contains the specifications from the process mechanical and electrical requirements for that specific system. Additionally, there are two specification sections:

- 25 05 03 Programmable Controls for Package Systems
- 26 05 01 Electrical Requirements for Package Systems

Each of these specifications apply to all of the systems. Submissions that do not address the requirements of these technical requirements will be evaluated accordingly.

E. PRE-CONDITIONS OF AWARD [N/A]

F. EVALUATION CRITERIA

The following sets out the categories, weightings, and descriptions of the rated criteria of the RFP. Proponents who do not meet a minimum threshold score for a category will not proceed to the next stage of the evaluation process.

Non-Price Rated Criteria Category	Weighting (Points)	Minimum Threshold
Experience and Qualifications	15 Points	
Equipment Technical Specifications	20 Points	
Operation and Maintenance	15 Points	
References	15 Points	
Non-Price Rated Criteria Sub-Total	**65 Points**	55 Points Min. Threshold
Pricing (see Section G below)	**35 Points**	N/A
Total Points	100 Points	N/A

Suggested Proposal Content for Non-Price Criteria

i. Experience and Qualifications

Each proponent should provide the following in its proposal:

(a) a brief description of the proponent;

(b) a description of its knowledge, skills and experience relevant to the Deliverables; and

(c) ability to deliver the equipment in the timelines set out in the proposal (i.e. manufacturing capacity).

ii. Equipment Technical Specifications

Each proponent must detail the equipment proposed on the basis of the technical specifications provided in Appendix D.

iii. Operations, Maintenance and Service

Each proponent shall provide the operation and maintenance requirements for all components of their equipment being proposed for the project. The proponent will provide the maintenance cost breakout for all components as well as the life cycle cost for all components.

iv. References

The proponent shall provide a listing of installations, capacities, dates and up-to-date contact information in order to facilitate the evaluation of the long-term operation of the equipment. References shall be provided for current (5 years) installations

G. PRICE EVALUATION METHOD

Pricing is worth 35 points of the total score.

Pricing will be scored based on a relative pricing formula using the values provided in the financial details portion of the proposals submission form. Each proponent will receive a percentage of the total possible points allocated to price, which will be calculated in accordance with the following formula:

$$lowest\ price \div proponent's\ price\ \times\ weighting = proponent's\ pricing\ points$$

Instructions on How to Provide Pricing

(a) Proponents should submit their financial proposal information by completing the attached financial details form and including it in their proposals.

(b) Rates must be provided in Canadian funds, inclusive of all applicable duties and taxes except for HST, which should be excluded from the submission.

(c) Unless otherwise indicated in the requested pricing information, values quoted by the proponent must be all-inclusive and must include all labour and material costs, all travel and carriage/import costs, excise taxes, all insurance costs, all costs of delivery, all costs of installation and set-up, including any pre-delivery inspection charges, and all other overhead, including any fees or other charges required by law.

(d) The proponent will identify their proposal cost for the equipment, shop drawing preparation and site services for installation inspection prior to start-up, start-up and commissioning based on the Category 2 level of service as described in Section 18.0 of the General Terms and Conditions (Appendix A).

[END OF SECTION]

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 Napanee WPCP, Town of Greater Napanee. He/she further acknowledges that the seller's proposed product, equipment, materials, and services fully meet or exceed those as specified in the Town'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 Town, become a legally binding and essential portion of the final contract agreement between the successful Proponent and the Town following execution of the contract agreement.

The following information must be completed to ensure tender acceptance.

*ADDENDA No. _____ to _____ INCLUSIVE WERE CAREFULLY EXAMINED.

DATED THIS _____DAY OF _____, 2020.

PROPONENT'S COMPANY NAME:_____

ADDRESS: _____

_____

CITY/ PROVINCE: _____ POSTAL CODE: _____

PHONE NO.: _____ FAX NO.: _____

EMAIL ADDRESS: _____

WEBSITE: _____

CONTACT NAME (please print): _____

TITLE (please print): _____ PHONE NO.: _____

AUTHORIZED SIGNATURE: _____

HST REGISTRATION NO: _____

WSIB COVERAGE: YES NO

* 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 Town and the proponent unless and until the Town 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 Town 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:

_____

_____

_____

_____

_____

_____

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 Town 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 Town to the advisers retained by the Town to advise or assist with the RFP process, including with respect to the evaluation of this proposal.

_____
Signature of Proponent Representative

_____
Name of Proponent Representative

_____
Title of Proponent Representative

_____
Date

I have the authority to bind the proponent.

B. System #1 Submission Forms – Fine Screens and Compactor

PART 1 FORM OF PROPOSAL

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

BY: _____

_____

_____

TO: The Corporation of the Town of Greater Napanee

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

FOR:

Pre-Selection of System #1: Supply, delivery and commissioning of the Fine Screens, Screening Conveyor and Screening Compactor for the Napanee WPCP, Town of Greater Napanee.

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.

_____ _____

Name of Supplier Witness (Name & Signature)

_____

Signature of Authorized Officer

_____ _____

Date Company Seal

1.1 FINANCIAL DETAILS

1. Supply and delivery of the Fine Screens, Screening Conveyor and Screening Compactor and the associated equipment complete as specified. 1a. Fine Screens 1b. Screening Conveyor 1c. Screening Washer/Compactor – Single Unit 1d. Screening Washer/Compactor – Two units, one per screen	 $ $ $ $
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 Fine Screen Systems.	$
Total Quoted Price (1+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment (after approved shop drawings)	Weeks
Discount offered by Supplier for Screening Equipment, if Town commits to purchasing both Screening and Grit Removal.	$
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.2 TECHNICAL DETAILS

.1 Fine Screens Description

Parameter	**Description**
Manufacturer of Screens	
Make of Screens	
Model of Screens	
# of Screens	
Screen Type (bar, perforated, step, etc.)	
Screening Opening Size	_____ mm
Installation Angle	
Effective Flow Rate	_____ m^3/d to _____ m^3/d
Required Channel Dimensions	Width _____ mm Total Depth _____ mm Water Level @ ADF _____ mm Water Level @ PF _____ mm
Headloss	@ Peak Flow & Clean Screen _____ mm @ Peak Flow & 50% Obstructed _____ mm @ Peak Flow & 70% Obstructed _____ mm

.2 Fine Screen components included:

Component	**Description/Material**
Structural Frame • Frame Thickness • Front Cover Thickness • Back Housing Thickness	 _____ mm _____ mm _____ mm

Component	**Description/Material**
• Discharge Chute Thickness • Type of Pivot	_____ mm _____
Screening Removal Mechanism • Quantity of Elements • Element Thickness	 _____ _____ mm
Chain Driving System • Chain Type • Breaking Load	 _____ _____ KN
Wash Water System • Wash Water Flow Rate • Min. Water Pressure • Connection Size	 _____ L/s _____ KPa _____ mm
Drive Unit • Main Power Supply • Element Drive Motor • Bruch Drive Motor • Motor Enclosure Type • Motor Service Factor • Reducer Service Factor	 _____ V _____ Phase _____ Hz _____ KW _____ KW _____ _____ _____
Materials of Construction • Structural Frame • Housing Sheets • Discharge Chute • Elements • Chain Links • Bushings • Chain Pins • Sprockets • Element Slides	 _____ _____ _____ _____ _____ _____ _____ _____ _____

Component	**Description/Material**
• Bottom Revolving Element Guide • Spray Wash Manifold • Spray Nozzles	_____ _____ _____
Describe Screens (including inclination and special features)	
Describe the Screen Drive System	
Describe Cleaning Operation	

.3 Screening Conveyor Description

Parameter	**Description**
Manufacturer of Screening Conveyor	
Make of Screening Conveyor	
Model of Screening Conveyor	
# of Screening Conveyors	
# of Inlets per Conveyor	
# of Outlets per Conveyor	
Wet Screening Maximum Unit Capacity	_____ m^3/hr
Type of Screw	Shaftless or Shafted (Circle one)
Conveyor Length	_____ mm

Parameter	**Description**
Transport Mode	Push or Pull (Circle one)
Dimensions • Overall Length • Conveyor Length • Conveyor Diameter • Screw External Diameter	 _____ mm (including motor) _____ mm _____ mm _____ mm
Drive Units • Motor Power • Motor • Motor Classification • Motor Service Factor Min. • Reducer Service Factor Min.	 _____ V _____ Phase _____ Hz _____ KW _____ _____ _____
Materials of Construction • Structural Components • Spiral Screw • Drive Shaft • Wear Liner • Fasteners & Hardware	 _____ _____ _____ _____ _____

.4 Screening Washer Compactor Description

Parameter	**Description**
Manufacturer of Screening Washer Compactor	
Make of Screening Washer / Compactor	
Model of Screening Washer / Compactor	
# of Screening Washer Compactors	
Wet Screening Maximum Unit Capacity	_____ m^3/hr
Solids Reduction	_____ % (by Volume)

Parameter	**Description**
	_____ % (by Weight)
Output Dryness	_____ %
Organics Removal	_____ %
Drive Units • Motor Power • Motor • Motor Classification • Motor Service Factor Min. • Reducer Service Factor Min.	 _____ V _____ Phase _____ Hz _____ KW _____ _____ _____
Dimensions • Inlet Length • Conveyor Diameter • Installation Angle • Discharge Angle • Discharge Height • Spiral Screw External Diameter • Perforation Size • Drain Diameter	 _____ mm _____ mm _____ degrees _____ degrees _____ mm _____ mm _____ mm _____ mm
Wash Water System • Wash Water Flow Rate • Min. Water Pressure • Connection Size	 _____ L/s _____ KPa _____ mm
Material of Construction • Structural Components • Screw Flights • Screw Shaft • Roller Bearing Housing	 _____ _____ _____ _____

Parameter	**Description**
• Screw Housing	_____
• Collecting Trough	_____
• Spray Wash Manifold	_____
• Spray Nozzles	_____
• Fasteners & Hardware	_____

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

.2 Provide weight of screens and screening conveyor/washer/compactor. Yes / No (circle one)

.3 Proposed drive locations, drive weight and supporting information has been provided. Yes / No (circle one)

.4 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)

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

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

.7 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)

.8 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

C. System #2 Submission Forms – Vortex Grit Removal and Classifier

PART 1 FORM OF PROPOSAL

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

BY: _____

_____

_____

TO: The Corporation of the Town of Greater Napanee

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 Napanee WPCP, Town of Greater Napanee.

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.

_____ _____

Name of Supplier Witness (Name & Signature)

_____

Signature of Authorized Officer

_____ _____

Date Company Seal

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 – Single Unit	$
1b. Vortex Grit Unit – Two Units	$
1c. Grit Pumps	$
1d. Grit Classifier	$
1e. Vortex Grit PLC Control Panel	$
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 (1b+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
Discount offered by Supplier for Grit Removal System, if Town commits to purchasing both Screening and Grit Removal.	$
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.2 TECHNICAL DETAILS

.1 Vortex Grit System Description

Parameter	Description
Manufacturer of Vortex Grit Unit	
Make of Vortex Grit Unit	
Model of Vortex Grit Unit	
# of Vortex Grit Units	
Manufacturer of Grit Classifier	
Make of Grit Classifier	
Model of Grit Classifier	
# of Grit Classifier(s)	
Manufacturer of Grit Pump	
Make of Grit Pump	
Model of Grit Pump	
# of Grit Pumps	
Effective Flow Rate	_____ m^3/d to _____ m^3/d
Required Channel Dimensions	Influent Width _____ mm Influent Total Depth _____ mm Influent Water Level @ ADF _____ mm Influent Water Level @ PF _____ mm Effluent Width _____ mm Effluent Total Depth _____ mm Effluent Water Level @ ADF _____ mm Effluent Water Level @ PF _____ mm
Vortex Grit Removal Unit Removal Efficiency	_____ % of grit greater than 140 mesh, references and testing data required.

Parameter	**Description**
Grit Classifier Unit Design	
Inflow Grit Slurry Rate	_____ l/s to _____ l/s
% reduction	_____% reduction by Volume / Mass (circle)
Maximum Daily Grit Load	_____ m^3/d at average reduction of _____% 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

D. System #3 Submission Forms – Mechanical Waste Activated Sludge Thickener

PART 1 FORM OF QUOTATION

(See Clause 21 in General Terms and Conditions for Instructions)

BY: _____

_____

_____

TO: The Corporation of the Town of Greater Napanee

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

FOR:

Pre-Selection of System #3: Supply, delivery and commissioning of the Waste Activated Sludge Thickener for the Napanee WPCP, Town of Greater Napanee.

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.

_____ _____

Name of Supplier Witness (Name & Signature)

_____

Signature of Authorized Officer

_____ _____

Date Company Seal

1.1 FINANCIAL DETIALS

1. Supply and delivery of the Waste Activate Sludge Thickeners and the associated equipment complete as specified. 1a. Sludge Thickener	$
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 RDT Systems.	$
Total Quoted Price (1+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.2 TECHNICAL DETAILS

.1 Sludge Thickener Description

Parameter	**Description**
Manufacturer of Thickener	
Make of Thickener	
Model of Thickener	
# of Thickeners	
Dimension of Flocculation Tank • Diameter • Height • Effective Volume	 _____ m _____ m _____ m^3
Dimensions of Thickener • Length • Width • Height	 _____ m _____ m _____ m
Effective Range of Operation • Total Solids • Concentration • Volumetric Sludge Loading	 _____ kg/d to _____ kg/d _____ mg/L TS to _____ mg/L TS _____ m^3/hr to _____ m^3/hr
Performance at Maximum Feed Rate	Solids Feed Rate at maximum feed rate: _____ kg/hr at 1% TS (dry weight basis) or _____ kg/hr at 0.7% TS (dry weight basis).
Performance at Minimum Feed Rate	Solids Feed Rate at maximum feed rate: _____ kg/hr at 1% TS (dry weight basis) or _____ kg/hr at 0.7% TS (dry weight basis).
Minimum Solids Capture Rate	_____ %
Maximum active polymer dosage rate	_____ kg/ton feed solids (dry basis)
Thickened Sludge Solids Concentration	Minimum _____% on a dry-weight basis at the specified hydraulic and solids loading rates.
Materials of Construction • Structural Frame • Flocculation Tank • Rotary System	 _____ _____ _____

Parameter	**Description**
• Sprockets • Element Slides • Spray Wash Manifold • Spray Nozzles • Enclosure • TWAS Hopper	_____ _____ _____ _____ _____ _____
Describe the drive system for the Unit	
Thickened Sludge Pumping • Pump Type & # of pumps • Pump Manufacturer • Model • Capacity • Hopper Size • Control Description • Instrumentation • Enclosure • TWAS Hopper Mat'l	 _____ _____ _____ _____ _____ _____ _____ _____ _____

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

.2 Provide weight of RDT (dry and wet). Yes / No (circle one)

.3 Proposed drive locations, drive weight and supporting information has been provided. Yes / No (circle one)

.4 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)

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

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

.7 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)

.8 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

E. System #4 Submission Forms – Tertiary Filtration System

PART 1 FORM OF QUOTATION

(See Clause 21 in General Terms and Conditions for Instructions)

BY: _____

_____

_____

TO: The Corporation of the Town of Greater Napanee

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

FOR:

Pre-Selection of System #4: Supply, delivery and commissioning of the Tertiary Filtration System for the Napanee WPCP, Town of Greater Napanee.

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.

_____ _____

Name of Supplier Witness (Name & Signature)

_____

Signature of Authorized Officer

_____ _____

Date Company Seal

1.1 FINANCIAL DETIALS

1. Supply and delivery of the Tertiary Filters and the associated equipment complete as specified. 1a. Tertiary Filters	$
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 Tertiary Filter Systems.	$
Total Quoted Price (1+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.2 TECHNICAL DETAILS

.1 Tertiary Filtration Description

Parameter	Description
Manufacturer of Tertiary System	
Make of Tertiary System	
Model of Tertiary System	
# of Tertiary System(s)	
Overall Dimension of System • Length of each unit • Width of each unit • Height of each unit	 _____ m _____ m _____ m
Surface Area • Footprint for a single filter • Total filter surface area per unit	 _____ m^2 _____ m^2
Vendor to confirm if disk filter requires upstream chemical addition and flocculation with Polymer to achieve effluent standards (Yes or No). If Yes, include recommended dosing and flocculation tank sizing.	
Design Range • Average Design Flow per unit • Maximum Design Flow per unit • Average Solids Loading Rate • Max Solids Loading Rate • Average Hydraulic Loading Rate • Max Hydraulic Loading rate	 _____ m^3/d _____ m^3/d _____ $kg/m^2/d$ _____ $kg/m^2/d$ _____ $m^3/m^2/hr$ _____ $m^3/m^2/hr$
Maximum Design Headloss across entire unit	_____ m
Required Influent Pipe Size	_____ mm
Required Effluent Pipe Size	_____ mm

Parameter	**Description**
Electrical Requirements per Unit (kW) including pumps and valves	_____ kW
Filter Media • Material • Nominal Pore Size • Guaranteed Non-Prorated Media Replacement Warranty • Replacement Requirements • Sealing Components • Chemical Cleaning System • Spare Parts	 _____ _____ µm _____ years ATTACH INFORMATION ATTACH INFORMATION ATTACH INFORMATION ATTACH INFORMATION
Backwash Pumps • Pump Type • # of pumps • Pump Manufacturer • Model • Type of Drive (VFD or Constant) • Capacity at Rated Head • Rated Total Head • Operating Head Range • Max. Pump Operating Speed • Approximate min. pump operating speed as percentage of maximum • Minimum pump efficiency at rated head • Motor Nameplate Rating • NPSH required at rated capacity • Pump suction flange size • Pump discharge flange size • Maximum solids handling size	 _____ _____ _____ _____ _____ _____ L/s _____ m _____ m _____ rpm _____ % _____ % _____ kW _____ m _____ mm _____ mm _____ mm
Control Panels	

Parameter	**Description**
• Number of Local Control Panels provided (minimum of one per filter)	_____
Location of Manufacturing • Tertiary Filters • Control Panels	_____ _____

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

.2 Provide weight of Tertiary Filters (dry and wet). Yes / No (circle one)

.3 Proposed drive locations, drive weight and supporting information has been provided. Yes / No (circle one)

.4 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)

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

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

.7 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)

.8 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 at least one reference with one full year of operation with effluent TP < 0.1 mg/L, this reference may be in operation less than five (5) years as required. 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

F. System #5 Submission Forms - Ultraviolet Disinfection

PART 1 FORM OF QUOTATION

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

BY: _____

_____

_____

TO: The Corporation of the Town of Greater Napanee

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

FOR:

Pre-Selection of System #5: Supply, delivery and commissioning of the Ultraviolet Disinfection System for the Napanee WPCP, Town of Greater Napanee.

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.

_____ _____

Name of Supplier Witness (Name & Signature)

_____

Signature of Authorized Officer

_____ _____

Date Company Seal

1.1 FINANCIAL DETAILS – CONFIGURATION #1 (FULL REDUNDNACY – TWO (2) CHANNELS)

1. Supply and delivery of the UV Disinfection System and the associated equipment complete as specified. 1a. UV Disinfection Systems – Configuration #1	$
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 UV Disinfection Systems.	$
Total Quoted Price (1a+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.2 FINANCIAL DETAILS – CONFIGURATION #2 (TWO UNITS @ 75% PIF – TWO (2) CHANNELS)

4. Supply and delivery of the UV Disinfection System and the associated equipment complete as specified. 1a. UV Disinfection Systems – Configuration #2	$
5. Preparation and delivery of Shop Drawings.	$
6. 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 UV Disinfection Systems.	$
Total Quoted Price (1+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.3 FINANCIAL DETAILS – CONFIGURATION #3 (TWO UNITS @ 75% PIF, SINGLE CHANNEL)

7. Supply and delivery of the UV Disinfection System and the associated equipment complete as specified. 1a. UV Disinfection Systems – Configuration #3	$
8. Preparation and delivery of Shop Drawings.	$
9. 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 UV Disinfection Systems.	$
Total Quoted Price (1+2+3)	$
Per diem rate for additional field work not included in the above	$/Day
Total Price Valid For	240 Days
Delivery of Shop Drawings	Weeks
Delivery of Equipment for Each Phase (after approved shop drawings)	Weeks
*Amount of Currency Exchange USD/CAD	$
*Additional Amount of Duty Paid (if applicable)	$
Percent of Imported Components (if greater than 10%)	%

*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.

1.4 PROPOSAL DETAILS

.1 UV Disinfection System Description

Parameter		Description
Configuration #1 Two Channels / 100% Redundancy	Manufacturer of UV system	
	UV Reactor Model:	
	Total Number of UV Reactors (Duty + Standby)	
	Number of Modules per Reactor	
	Number of Lamps per Module	
	Total Number of Lamps	
	Effective Range of Flow Rates	_____ L/s to_____ L/s
	Required Channel Dimensions • Width of Channels • Total Depth of Channels • Side Water Level Depth in Channel	 _____ mm _____ mm _____ mm
Configuration #2 Two Channels / 75% IPF Each	Manufacturer of UV system	
	UV Reactor Model:	
	Total Number of UV Reactors (Duty + Standby)	
	Number of Modules per Reactor	
	Number of Lamps per Module	
	Total Number of Lamps	
	Effective Range of Flow Rates	_____ L/s to_____ L/s
	Required Channel Dimensions • Width of Channels • Total Depth of Channels • Side Water Level Depth in Channel	 _____ mm _____ mm _____ mm

Parameter		**Description**
Configuration #3 One Channel / 75% IPF Each	Manufacturer of UV system	
	UV Reactor Model:	
	Total Number of UV Reactors (Duty + Standby)	
	Number of Modules per Reactor	
	Number of Lamps per Module	
	Total Number of Lamps	
	Effective Range of Flow Rates	_____ L/s to_____ L/s
	Required Channel Dimensions • Width of Channel • Total Depth of Channel • Side Water Level Depth in Channel	 _____ mm _____ mm _____ mm
Confirm Maximum UV Delivered Dose at design peak flow		_____ $\mu Ws/cm^2$
Minimum Guaranteed Lamp Operating Life		_____ hours
Minimum Guaranteed Ballast Life		_____ years
Minimum Quartz Sleeve Life		_____ years
Cost for Replacement Parts: • Lamps • Ballasts • Quartz Sleeves		 $_____ ea $_____ ea $_____ ea
Provide Description of Water Level Controls		
Provide Description of Cleaning System, Cleaning System Options		
Provide Electrical Power Requirements and Equipment Description		

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

.2 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)

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

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

.5 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)

.6 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

APPENDIX D – EQUIPMENT SPECIFICATIONS

EQUIPMENT SPECIFICATIONS

25 05 03	Programmable Controls for Packaged Systems
26 05 01	Electrical Requirements for Packaged Systems
46 43 00	Fine Screens and Compactor
46 53 00	Vortex Grit Removal and Classifier
46 63 00	Mechanical Sludge Thickener
46 73 00	Tertiary Filtration System
46 83 00	Ultraviolet Disinfection System

25 05 03 Programmable Controls for Packaged Systems

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 General Requirements for the Packaged System Programmable Controls including Programmable Logic Controllers (PLC), Electronic Operator Interfaces (HMI), network and communication components and wiring, computers and related accessories, software and programming features, components (products), design, and performance.

1.2 REFERENCES

.1 Institute of Electrical and Electronics Engineers (IEEE):

.1 IEEE 802.1 – Standard for Local and Metropolitan Area Networks.

.2 IEEE 802.3 – Ethernet.

.2 International Society of Automation (ISA):

.1 ISA S5.1 – Instrumentation Symbols and Identification.

.2 ISA S5.3 – Graphic Symbols for Distributed Control/Shared Display Instrumentation, logic, and Computer Systems.

.3 ISA S5.5 – Graphic Symbols for Process Displays

.3 Telecommunications Industry Association (TIA):

.1 TIA 568 – Commercial Building Telecommunications Cabling.

.2 TIA 968-A – Technical Requirements for Connection of Terminal Equipment to the Telephone Network.

1.3 SYSTEM DESCRIPTION

.1 Presented information provides general system overview, process location, and performance. Packaged System Supplier shall provide supervision and labour for the detailed design, technology, testing, procurement, fabrication, delivery, installation of all equipment and material required for a complete programmable control system, start-up, and commissioning as specified under equipment Specification Sections.

1.4 PROCESS SUBMITTALS

.1 Comply with front end Shop Drawing section.

.2 Packaged system process control narrative (refer to PART 3 for details). Submit documents in electronic format. Provide Adobe Acrobat Reader files (PDF type with commenting allowed) unless specified otherwise.

1.5 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: Indicate and submit maintenance data for incorporation into Operations and Maintenance Manuals.

.2 Program Code: Provide editable and compiled, electronic versions of program code (PLC, HMI, etc.) on USB, for owner backup purposes. State restrictions and grant irrevocable, royalty-free license.

.3 Programming and Configuration Records:

.1 Programming, integration, and configuration records.

.2 "Executive Summary" type guide on how to use control system. The guide shall be as short as possible (not more than four (4) to eight (8) pages in length) and include:

.1 How to get around.
.2 How to monitor system.
.3 How to control system.
.4 Event management (alarm, warnings, statuses).

.3 Documentation of programming at completion of the Work as specified.

.4 Information on used data structures, data organization, control system details, final I/O list including network points, data mapping, naming/tagging conventions, development, and configuration, etc.

.5 Printouts of operator interface screen graphics layouts: colour conventions, graphics and symbols interpretation, screen navigation, function overview.

.6 Events recording (alarm, warnings, statuses), storage, retrieval, and organization.

.7 Trending and data logging, storage retrieval, and organization.

.8 System security.

.9 System startup and shutdown.

.10 All manuals shall be provided in printed and electronic, editable version.

.4 Networks Data: Complete configurations of hubs, routers, switches, etc. Provide hardcopy documentation and software data files of the configuration for each piece of network equipment and application software used in the configuration. Include configuration addresses (MAC), TCP/IP addresses and names, passwords, switch settings and parameters.

1.6 QUALITY ASSURANCE

.1 Include prerequisites, standards, limitations, and criteria which established an overall level of quality for products and workmanship under this Section.

.2 Perform work of this Section in accordance with good engineering practice.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Allen-Bradley CompactLogix equipment (PLC) is the owner's standard for package systems. No alternatives will be allowed.

.2 Each system shall be capable of completely independent operation from other systems and have sufficient capacity and I/O for control and interface with all standard and optional features and equipment provided with the listed system.

2.2 PROGRAMMABLE CONTROL DEVICES

.1 PLC:

.1 Processor: Allen-Bradley, Bulletin 1769, CompactLogix platform. CompactLogix 5370 L3 Controller, 2 Mbyte, Dual Ethernet, and 1GB SD Card.

.2 Allen-Bradley Bulletin 1769, I/O series:

.1 Discrete (I/O) cards, 120 VAC/24 VDC, (10 percent spare, minimum two (2) points).

.2 Analog (4-20 mA, T/C, RTD) cards, (10 percent spare, minimum one (1) point).

.3 Network I/O cards (DeviceNet, ControlNet, when applicable).

.4 Bulletin 1769: Power supply.

.2 HMI: Allen-Bradley, Bulletin 2711, PanelView Plus 7 Performance series colour display (minimum 12") with touch screen option, and Ethernet/IP communication.

.3 Special cards (industrial networks (Modbus, Profibus, etc.), programmable module, etc., when applicable):

.1 ProSoft Technology, MVI69 series

.2 Allen-Bradley certified Encompass partner.

.4 Accessories: Allen-Bradley, Bulletin 1492, I/O ready cables (factory wired card RTB; cable with free connectors).

2.3 SOFTWARE

.1 Supply of PLC and HMI programming software is not part of the Contract. CONTRACTOR must have own copies of programming software.

2.4 ETHERNET DEVICES

.1 Industrial Type Managed Ethernet Switch:

.1 Number of downlink ports to suite packaged system plus two (2) spare (minimum four (4)), RJ-45 Ethernet ports, 10/100 Base-TX complaint, and one (1) uplink RJ-45 Ethernet port, 10/100 Base-TX complaint.

.2 Communication status and diagnostic LEDs support applicable IEEE 802.1 and 802.3 standards, auto-sensing full or half duplex operation, auto rate conversion 10 or 100 Base-TX operation, auto crossing, MAC addresses supported (automatic learning, aging, and migration).

.3 Industrial type enclosure, DIN rail mounted, 24 VDC power supply, operating temperature between 0- and 45-degrees C.

.4 As manufactured by Hirschman, Phoenix Contact, Sixnet, or approved equal.

2.5 ETHERNET PATCH PANELS

.1 Industrial Type Patch Panel: 3xRJ-45 Ethernet ports, 10/100 Base-TX compliant, cut-through wire connection with connection clamps, DIN rail mounted. As manufactured by Phoenix Contract, VS-PP-R-3XRJ45/5-SC.

2.6 ETHERNET CABLES

.1 Copper Media, Patch Cable:

.1 Industrial Ethernet Cable – 100 Base-TX, Category 5e, four (4) twisted pairs (standard colour-coding), No 24 AWG solid copper conductors, rip cord, shielded, blue industrial grade PVC outer jacket, FT-4 rating. RJ-45 compatible and complying with TIA-968. As manufactured by Belden 11700A.

.2 Connectors CAT 5e RJ-45 clear connectors, eight (8) position shielded, 50ug old micro, one-piece design (no bars or liners) for use with solid network wiring. Compatible with Category 5e standards and complying with TIA-568. Complete with cable boot/clip protector.

2.7 INDUSTRIAL NETWORKS

.1 Cable, connectors, terminations, etc. certified for use with selected network.

2.8 FACTORY ACCEPTANCE TEST

.1 Perform Factory Acceptance Test (FAT) prior to shipment of assemblies and software.

PART 3 EXECUTION

3.1 APPLICATION

.1 Control Narrative:

.1 Control narrative shall provide details related to the packaged system operation. Written description shall include instrumentation and control system including list of functions monitored, controlled, and alarmed.

.2 Prepare narratives in Microsoft Word file format. When indicated, provide documents in editable file format for incorporation into plant manual. Otherwise provide Adobe Reader files (PDF type with commenting allowed).

.3 Proposed process narrative (provided within packaged system specification) describes the overall control philosophy from a process treatment point of view and includes basic process and control requirements.

.4 Process narrative outlines general rules for programming of logic controller(s), HMI and SCADA systems. The intention of the process control narrative is to provide the Packaged System Supplier with information on the control and monitoring of the process equipment and other plant systems that are directly or indirectly associated with treatment systems. It should be used as an aid in developing the control strategy and integration into plant operation.

.5 Process narrative shall be treated as a “work-in-process”, where all future mark-ups and modifications including “as-constructed” documentation work shall be completed by Packaged System Supplier based on actual implementation.

.6 Provide control narratives for all systems and sub-systems under the project at completion of work as specified. Each subsystem shall be listed as a separate section associated with control panel.

.2 Programmable Control System:

.1 This section outlines general rules for programming of logic controllers, HMI, and similar systems. The following information shall be used as an aid in developing the control strategy and integration of the packaged system into the operation of the complete Waste Water Treatment Plant.

.2 Packaged System Vendor shall provide supervision, labour for the design, detailed execution, procurement, configuration, testing, delivery and installation of software required for a complete package system.

.3 Overall control system programming of the packaged system is the CONTRACTOR's responsibility. The software (control logic) shall perform setup, shutdown, and monitoring of the complete packaged system in accordance with manufacturer's experience and incorporating control provisions specified herein.

.4 System Integrator shall provide details on SCADA integration. CONTRACT ADMINISTRATOR reserves rights to review and modify control concept. The final SCADA interface, control system details, I/O list, data exchange and mapping, naming/tagging conventions, etc. shall be reviewed and established prior to the system manufacturing and programming work. CONTRACTOR shall allow for such modifications including custom configuration of the control system to meet system standards.

.5 Packaged system shall operate automatically. It is anticipated that the system will operate on a regular basis. The facility SCADA and supervisory controllers will exchange control and operation signals with the packaged system. It is anticipated that most of the control and monitoring signals will be exchanged through the Ethernet/IP network and/or the hardwired connections.

.6 Software, Personal Safety, and Equipment Protection:

.1 Software shall have features supervising and controlling shutdown (i.e, cooling, dynamic braking vs. coast to stop), when packaged system is equipped with safety devices (E-stop buttons, safety pull ropes, light curtains, access door limit switches, etc.) and process limits controllers (high/low/out of range/limit/etc. temperature, pressure, flow, torque, vibration, analytical parameter, etc.).

.2 Safety devices and process limits controllers shall be independently wired to the control system, so precise shutdown conditions can be initiated and recorded.

.3 Software shall not restart packaged system automatically after alarm condition cleared, until manually reset by the operator.

.7 The control system shall allow for the operation in the following modes:

.1 Auto: Complete system, unattended operation, one button start and stop of the system through the electronic operator interface (HMI), hardwired and/or network remote signal including control of ancillary systems.

.2 Manual: Independent start, stop, and adjustment of the system through the electronic operator interface (HMI).

.3 Maintenance: Individual operation of packaged system components; start, stop, and adjustment as required through the designated operator interface (intended only for maintenance and servicing, and not operation).

.4 Note: The control logic shall allow for bumpless transfer between Auto and Manual modes including "seamless" adjustment of the machine process related operating parameters (i.e., pump speed to flow control and vice versa).

.8 The control system shall monitor the packaged system and provide following operational statuses:

.1 Ready Identifies that system is powered up and ready to operate (no alarms or warnings) in Auto mode (“readiness” of all subsystems).
.2 Not Ready: If the packaged system or ancillary systems are not available in Auto mode, and identify components creating this condition.
.3 Startup: During starting sequence (when such a sequence takes place).
.4 Running: When control system finished start-up sequence and packaged system operates as intended.
.5 Shutdown: During shutdown sequence (when such a sequence takes place).
.6 Stop: When control system finished shutdown sequence.
.7 Other typical to specific packaged system.
.8 The program shall monitor system operation, automatically adjust operating parameters, and issue critical alarms (shutdown), alarm, warnings, and shutdown system when required.

.9 Packaged System Control: The software (control logic) shall preform standard operating control functions (start-up, shutdown, etc.) and monitoring of the complete system with manufacture’s experience including the following functions:

.1 Auto start-up sequence.
.2 Operation in Auto mode with variable process parameters.
.3 Auto shutdown sequence.
.4 Operation in Manual mode (from operator interface).

.10 Packaged System Malfunction: The software (control logic) shall monitor equipment operating conditions and automatically respond to conditions endangering personnel, and/or potentially leading to the equipment failure and damage.

.1 The detailed malfunction and shutdown scenarios shall be based on manufacturer’s experiences for the offered packaged system by manufacturer’s top of the line alarm management system.
.2 Divide alarm conditions into different levels (i.e., shutdowns or critical alarms, alarms, warnings). Organize and provided fully detailed, utilizing available date, easy to troubleshoot alarm system.
.3 Software shall have capabilities for modification of some alarm “trip” setpoints (however, system shall not allow modification of alarm below absolute safety minimum/maximum). Alarm setpoints shall be user configurable when applicable based on manufacturer’s typical implementation.

.11 Ancillary Systems Control (i.e., feed system, disposal system, chemical addition, cleaning system, etc.). Provide control and monitoring for ancillary equipment as listed under Specification Sections.

.3 HMI:

.1 Machine HMI shall provide packaged system overview and utilize ISA graphic symbols and other simple graphics to depict the devices and their relative location with regards to process layout.

.2 Graphics shall include static and animated types of graphics objects. The static type shall provide information on the process layout. The animated type shall indicate the equipment status using position, visibility, colour, text or value.

.3 Alarms and warnings shall be displayed on the electronic operator interface date and time stamped (yyyy-mm-dd hh:mm), recorded by alarm type, occurrence, and correction. The alarms and warnings shall remain on the screen listing last 30 alarms, date and time stamped, complete with text description.

.4 Provide complete monitoring and control of packaged system and information on auxiliary system.

.5 System Integrator will provide final details including colour conventions for programming of HMI based on system standards and plant overall requirements.

.6 Electronic operator interface interacting with programmable logic controller system shall provide:

.1 Overview and menu driven screen access.
.2 Graphics presenting packaged system and ancillary systems.
.3 System and devices control, control setpoint, and statuses.
.4 Current alarm list (screen).
.5 Alarm and configuration setpoints screens.
.6 Help – general control overview, how to operate packaged system.
.7 Data recording, trending, historical alarms list.
.8 Password access.
.9 Other required by packaged system.

3.2 INTERFACE WITH OTHER WORK

.1 Packaged system controls may interface (control, monitor, etc.) other auxiliary system or installations. Refer to Specification Sections for interface details. Incorporate listed features.

.2 Packaged system controls will interface with overall plant SCADA system. Contractor shall coordinate with Systems Integrator to complete the work to the satisfaction of the Contract Administrator.

3.3 MANUFACTURER'S FIELD SERVICE

.1 Provide trained qualified technical personnel to perform the service herein specified. Packaged System Supplier shall specify personnel, number of visits, and time at the site that is required to complete the work.

.2 Make any necessary changes and adjustments to the software.

3.4 SITE ACCEPTANCE TEST

.1 Perform Site Acceptance Test (SAT) of assemblies and software in accordance with approved submittal plan and witnessed by CONTRACT ADMINISTRATOR.

END OF SECTION

26 05 01 Electrical Requirements for Packaged Systems

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 General requirements for packaged system electrical control system features, components (products), design, and performance.

1.2 REFERECENCES

.1 American National Standards Institute (ANS): ANSI Z535.4 – Product Safety Signs and Labels.

.2 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE): ASHREA Load Calculation Manual

.3 Canadian Standards Association (CSA):

.1 CSA C22.1 – Canadian Electrical Code, Part I – Safety Standards for Electrical Installations.

.2 CSA C22.2 – Canadian Electrical Code, Part II – Safety Standards for Electrical Equipment.

.3 CSA C22.2 No. 286 – Canadian Electrical Code, Part II – Industrial Control Panels and Assemblies.

.4 CSA CAN3 C235 – Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.5 CSA Z432 – Safeguarding of Machinery.

.6 CSA Z462 – Workplace Electrical Safety.

.4 Electrical and Electronic Manufacturers' Association of Canada (EEMAC).

.5 Electrical Safety Authority (ESA): ESA Safety Bulletins.

.6 International Electrotechnical Commission (IEC):

.1 IEC 60617 – Graphical Symbols for Diagrams

.2 IEC 60204-1 – Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements

.7 Institute of Electrical and Electronics Engineers (IEEE):

.1 IEEE 1584 – Guide for performing Arc Flash Hazard Calculations.

.2 IEEE C62.41 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.8 National Electrical Manufacturer's Association (NEMA):

.1 NEMA MG 1 – Motors and Generators.

.2 NEMA ICS 1 – Industrial Control and Systems: General Requirements

.9 Occupational Health and Safety Act (OHSA).

.10 Ontario Electrical Safety Code (OESC).

1.3 DEFINITIONS

.1 Wherever used in the Contract, the terms listed below shall have the meanings indicated which are applicable to both the singular and plural thereof.

.1 Packaged System Vendor: “Package System Vendor” means CONTRACTOR having contract with the owner to furnish materials and equipment as packaged system to be incorporated in the Work.

.2 Packaged System: “Packaged System” means plant or process equipment provided as a complete system, or group of related components and equipment organized as a unit for defined purpose, designed and constructed by Packaged System Vendor to be incorporated in the Work.

1.4 SYSTEM DESCRIPTION

.1 Information presented in the Contract Documents provides general system overview, process location, and performance. Packaged System Vendor shall provide supervision and labour for the detailed design, sizing, technology, testing, regulatory approvals and certifications, procurement, fabrication, delivery, installation of all equipment and material required for a complete electrical and control system, and start-up and commissioning as specified under equipment Specification Sections.

1.5 PROGRESS SUBMITTALS

.1 Shop Drawings (refer to PART 3 for details): Submit in electronic format. Provide Adobe Acrobat Reader files (PDF type with commenting allowed) unless specified otherwise.

.1 Indicate front view elevation, floor plan, configuration of compartments and layouts with dimensions shown.

.2 Indicated panel(s) assembly details including interior and panel face component placement, wire ducts, terminal blocks, dimensions, weights, and finishes. Indicate preferred wiring method (top or bottom) and areas designated for panel openings for raceway connections.

.3 Power schematics: Detailed wiring diagrams (one-line or three-line) indicating all power distribution, wiring connections, and power equipment ratings.

.4 Control Schematics:

.1 Detailed and complete wiring diagrams indicating all wiring between panel devices, terminals and panel wiring terminal blocks; inter-device and inter-panel wiring connections.

.2 Loop/field wiring diagrams identifying field wiring from panel terminal blocks to field device/sensor terminal blocks.

.3 PLC and I/O layouts.

.4 Network and communication schematics.

.5 Custom assemblies’ details (connections with pneumatic, hydraulic, lubrication, etc. systems).

.5 Wiring diagrams and control schematics.

.6 Nameplate legends.

.7 Locations of electrical motors, electrical equipment, junction boxes, control and instrumentation located outside panel(s).

.8 Power and control cable, wiring, and raceway schedule.

.2 Product Data:

.1 Bill of Materials (BOM), description and engineering datasheets, diagrams, or Drawings for each component. List catalog numbers, options, and accessories furnished. Include:

.1 Electrical Characteristics: Electrical ratings (size), service type, voltage, current, withstand ratings, connection requirements, etc.

.2 Mechanical characteristics including dimensions enclosure type, materials, mounting arrangement, clearance requirements, size, and location of connections.

.3 Motor Data: Manufacturer, type, voltage and number of phases, HP rating (or kW), full load amps (FLA), RPM, frame, and enclosure rating.

.4 Setup and operating instructions.

.2 Data based on advertising or sales literature is not acceptable.

.3 Submit detailed product data, manuals, or certifications for review, when required, to evaluation submittal and requested by CONTRACT ADMINISTRATOR.

.3 Design Data:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, application conditions and limitations of use, and other technical data that describes the product.

.2 Control/process narrative, operational sequence.

.3 Electrical power demand at specified rate (100 percent, 75 percent, 50 percent, 25 percent, or operational minimum, and standby).

.4 System overview schematic, sequence diagram(s) or detailed process control narrative with implementation details.

.5 Provide uninterruptible power supply sizing calculations.

.4 Test Reports: Factory Acceptance Test (FAT) report; include test results and calibration sheets.

.5 Manufacturer's Instructions:

.1 Product transportation, storage, protection, and handling data.

.2 Detailed installation requirements including field wiring requirements.

.6 Manufacturer's Filed Reports: Site Acceptance Test (SAT) report; include test results and final calibration sheets.

.7 Provide Packaged System Risk Assessment report in accordance with CSA Z432. Classify equipment hazards category. List safeguarding features (mechanical, electrical, controls) and operational safety measures.

1.6 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: Indicate and submit maintenance data for incorporation into Operations and Maintenance Manuals

.1 Identification: Provide operating manuals, manufacturer's instructions, and control descriptions. Provide data including tag, type, manufacturer's name, complete model number, and components list.

.2 Data necessary for maintenance of equipment. In addition to requirements specified elsewhere, the manuals shall include control system troubleshooting instructions.

.3 Manufacturer's recommended list of spare parts.

.4 Furnish special inspection certificates and approvals, when applicable.

.2 Drawings: Complete "as constructed" set of Drawings consisting of all Drawings as specified under Shop Drawings. Include all field modifications and changes. Provide Drawings in printed and electronic format. Provide Adobe Reader files (PDF type with commenting allowed) unless specified otherwise.

.3 Final Risk Assessment report.

1.7 QUALITY ASSURANCE

.1 Include prerequisites, standards, limitations, and criteria which established an overall level of quality for products and workmanship under this Section.

.2 Perform work of this Section in accordance with good engineering practice.

1.8 REGULATORY REQUIREMENTS

.1 Electrical and control system must comply with the requirements of current edition of applicable electrical safety regulations of the Authority Having Jurisdiction (AHJ).

.2 Equipment and material to be CSA, ULC, or cUL certified. Refer to www.esasafe.com electrical product safety for complete list of recognized certification marks. Where there is no alternative to supplying equipment that is not certified, obtain special approval from the ESA.

.3 Products must meet CSA standards. Permanently attached CSA labels shall be attached to each assembly and all equipment supplied. Manufacturers and approval labels must be accessible and legible after equipment is installed.

1.9 DELIVERY, STORAGE, AND HANDLING

.1 Protect system components and mountings against damage during transportation

1.10 SPARE PARTS

.1 Furnish for each supplied panel the following spare parts:

.1 Two fuses of each type and ratings used in control circuitry.

.2 Three fuses of each type and ratings used in 3-phase power circuitry (i.e. motor / starter / controller protection, etc.).

.3 Two pilot light lenses and two bulbs of each colour used.

.4 Two control relays of each type and rating used in control circuitry.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 General: Supply, testing, and performance of all supplied equipment shall conform to all standards referred to herein.

.2 Use new materials and equipment unless otherwise specified. Refurbished materials are not considered new. Provide material and equipment of minimum specified design and quality. Conform to published ratings and for which replacement parts are readily available. Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified. All control and electrical components shall be standard stock items with seven (7)-day parts or until replacement available in Canada.

.3 Listed manufacturers and models are used for reference purposes to establish acceptance standards and establish minimum functional requirements for control device. Provide products of exact manufacturer, if explicitly shown and described in the other Sections of the Contract for specific application.

.4 Unless specified otherwise, separate Control/Power Panel must be provided for each system (if more than one system provided). All power, control devices, and software for a given system to be contained independently within its associated Control/Power Panel.

.5 Power equipment and components shall include required distribution equipment and transformers to supply adequate power to the system electrical devices.

.6 System must be equipped with own lockable, master disconnecting means with system overcurrent protection (breaker or fused disconnect; no exceptions). Master disconnecting means shall be flange mounted and located on the front of the panel.

.1 Disconnecting means requiring the alignment of a device, such as a rod, between itself and a panel door-mounted handle are not acceptable.

.2 The panel door shall contain only one disconnecting device, the master disconnecting means. Disconnecting means for individual motor starters / controllers shall not be installed on the panel door.

.7 Provide local safety disconnect switches.

2.2 ELECTRICAL SYSTEMS

.1 Electrical power equipment and devices shall be rated 600 VAC nominal system voltage (575 VAC motors nameplate rating). The system will be provided with a single point 600 VAC, 60 Hz, three (3)-phase, three-wire plus ground wire power feeder. Design to allow for voltage variations in accordance with CAN3 C235. If any other voltage level is required for system operation, it must be provided by the system's own, internal to the system, suitably sized transformer, power supply, and distribution components.

.2 Control power (120 VAC, 60 Hz, single (1)-phase, grounded/24 VDC) shall be provided by the manufacturer supplied, internal step-down transformers and solid-state power supplies. The preferred control voltage is 120 VAC; voltages higher then 120 VAC are not acceptable for utilization in control systems (unless specifically required for a proprietary controller).

2.3 OPERATING CONDITIONS

.1 Products, Basic Requirements – Altitude: 1,000 m without de-rating, ambient temperature 0 – 40 degrees C, 0 to 95 percent humidity.

.2 Outdoor Installation: The equipment shall be designed to handle temperature and humidity range for weather data and conditions as published by ASHRAE Load Calculation Manual. Environmental protection (heaters, air conditioning and ventilation) are required to allow product operation at ambient temperatures from minus 40 to 40 degrees C, 0 to 95 percent humidity.

.3 Hazardous Location: Regulatory and environmental protection to meet area classification and actual operating conditions.

2.4 ENCLOSURES

.1 Provide suitable control/power panel(s) in accordance with system application. The enclosure shall house all power equipment and control system components.

.1 120V and below control devices and wiring (PLC, network switches, I/O terminal blocks, control relays, etc.) shall be physically separated within a control/power panel from any motor control devices.

.2 Enclosures: Free standing, No. 16 or 14 gauge steel, seams continuously welded, smooth finish, no holes or knockouts, body flange, door and body stiffeners, door gasket, grounding stud on the door, gray (or manufacturer's standard colour) polyester powder finish surface. As manufactured by Hoffman, Rittal, or approved equal. Enclosures shall be:

.1 Type NEMA 12 for Control/Power Panels for indoor dry locations.

.2 Type NEMA 4 or 4X (corrosive environment), for indoor wet locations, below grade locations, field mounted hardware, junction boxes, control/power connection panels.

.3 Type (NEMA) 7 for hazardous locations.

.3 Control panels must have three-point type latch system with pad lockable door handle, white inside panel, thermoplastic data pocket. Panels with door clamps are not considered equal.

.4 Thermal Management Louvers and Vents (including filters changeable from outside, cooling fans (forced air cooling), filters changeable from outside, heaters and thermostats, breathers, and drains:

.1 Standard (drain for water, breather with cap for air) or universal (drain/breather for water/air) design with labyrinth design, stainless steel, ½-inch size. As manufactured by Appleton ECDB or approved equal.

.2 Enclosure high and/or low temperature switches.

.5 Accessories: Electrical or mechanical safety door interlocks preventing access to the power cabinets (power panels only) with power on, LED light with door mounted or stand-alone switch; DIN rail mounted, 120 VAC receptacle, folding shelf (450mm by 450mm) mounted inside of the panel for a laptop computer, data pockets, fasteners, seals and mounting hardware, touch-up spray paint.

.6 Wiring Management Products: Panel wiring duct, PVC rigid vinyl, slotted type including cover; door spiral flexible wraps; separators, retainers, inserts, corner and joining strips, duct mounting clips, rivets, etc.

2.5 POWER DISTRIBUTION

.1 Main Circuit Breaker: 100 percent rated, minimum 35 kA RMS at 600 VAC interrupting capacity rating including electronic, adjustable trip unit to coordinate with upstream protection devices protecting the entire system. Provide LSI protection for 200 A to 800 A rated systems. As manufactured by Cutler-Hammer molded case circuit breaker or approved equal. Flange-mounted and lockable handle on front of panel.

.2 Fused Disconnects: Allowed only if specifically required for protection, or in lieu of the breaker if mandatory for protection of solid-state equipment, or to obtain required short

circuit interrupting rating if such a breaker is not available. Provide fuses as required. 60 A and smaller fuses shall be housed in finger safe fuse holders. As manufactured by Ferraz Shawmut Ultrasafe series or approved equal. Flange-mounted and lockable handle on front of panel.

.3 Pressure/Mechanical Type Wire Lug Connectors: Copper current carrying parts, copper alloy, sized to fit copper conductors as required for the system.

.4 Power Blocks: As manufactured by Allen-Bradley, Bulletin 1492 or approved equal.

.5 Provide suitably sized grounding bus, bare copper, equipped with necessary lugs for accepting grounding conductors from motors and system components.

.6 Twist-on wire connectors (e.g., T&B Marrettes) are not acceptable as wiring connectors.

2.6 LOW VOLTAGE CONTROLLERS

.1 Provide electromechanical low voltage controllers (across-the-line or reduced voltage starters) suitable for application.

.2 Controllers shall have hardwired, standard control wiring for operation in manual mode and provisions for operation in automatic mode.

.3 Circuit Breakers for Motors: Thermal magnetic, motor protector type, with integral thermal and instantaneous magnetic trip in each pole; required for each motor.

.4 Circuit Breakers for Other Equipment: Thermal magnetic, with integral thermal and instantaneous magnetic trip in each pole; required for each system component.

.5 Magnetic Controllers: AC general purpose Class A magnetic controller for induction motors rated in horsepower or heating loads in kW where indicated.

.6 Motor Full Voltage (non-reversing, reversing, two-speed) Starters: Motor circuit protector type circuit breaker with starter sized in horsepower and overload protective device. Power sensitive or submersible equipment shall be protected with electronic overload including phase loss, jam/stall, selectable trip class, and ground fault (submersible) protection.

.1 Starters to be NEMA rated. Minimum starter NEMA Size 1, rated for continuous horsepower rating of motor.

.7 Reduced Voltage Solid State Starters: Motor circuit protector type circuit breaker with solid state soft starter with build bypass contactor and integrated electronic overload protection, internal control wiring. The solid-state starter shall bring motor up to speed in current or torque limiting mode (adjustable zero (0) to thirty (30) seconds) and, after that, automatically switch to bypass contactor for normal operation. Front accessible configuration switches, fault indication.

.8 Capacitor Contactor Units: Circuit breaker to protect system with contactor sized for connected capacitor. Control circuitry allowing for time delayed closure of the contactor after remote request.

.9 Manufacturers:

.1 Allen-Bradley.

.2 Cutler-Hammer.

.3 Square D.

.4 Siemens.

2.7 VARIABLE SPEED CONTROLLERS

.1 Provide solid-state variable speed controllers (variable frequency drives, VFD) for applications with adjustable output control requirements.

.2 Protection: Circuit breaker or fused disconnect switch with “semiconductor” fast acting fuses (Gould Shawmut Amp-trap or equal); output short circuit protection rated for 25 kA at 600 VAC, sized as recommended by VFD manufacturer.

.3 Variable Speed Controllers: Convert input power to adjustable frequency and voltage for controlling the speed of three (3)-phase squirrel cage induction motor for variable or constant torque application; pulse width modulated (PSM) inverter type with microprocessor-based controls.

.1 Input: 600 VAC (plus or minus 10 percent), three (3)-phase; 60 Hz (plus or minus 3 percent); selectable carrier frequency (2, 4, 8 kHz min), rating based on 4 kHz; displacement power factor: lagging, 0.95 to 1.0 across speed range, efficiency: 95 percent at full load; power Ride-Thru: 15 ms at full load, logic control Ride-Thru: 500 ms min.

.1 Input reactor (minimum 5 percent) or filter to minimize harmonic distortion.

.2 Output: 0 to motor rated voltage VAC, three (3)-phase; frequency range: 0 to 300 Hz minimum: intermittent overload capability: 110 percent for forty (40) seconds, 150 percent for three (3) seconds, speed regulation: 0.1 percent; flying start feature.

.1 dV/dT transient filter to prevent reflecting wave phenomenon.

.3 Speed compensated motor overload and solid-state drive and motor protection (undervoltage, phase loss, drive over temperature, ground fault).

.4 Selectable motor control and stop modes (ramp, cast, etc.); independent, adjustable acceleration/deceleration time zero (0) to nine hundred (900) seconds.

.4 Control: Device for drive manual and auto operation; control circuit can be implemented through the electronic operator interface or hardwired circuitry with ‘Speed Potentiometer’ in manual mode.

.1 Electronic operator interface with backlit digital display and membrane keypad, non-volatile memory, for drive programming (menu driven setup, limit and control setting), control (start/stop/speed), and monitoring (display of measured and operating values, diagnostics and alarms, faults data). Preferably door mounted, unless not required for packaged system operation.

.2 Analog Signals:

.1 Reference signal: 4-20 mA isolated analog input, 0-750Ω minimum load programmable to speed or frequency;

.2 Feedback signal: 4-20 mA isolated analog output, 0-750Ω minimum load, programmable to represent speed and where indicated motor current.

.3 Remote Speed Regulation Accuracy: 0.5 percent.

.3 Digital I/O Signals: Running, In-Auto and Fault dry output contacts, start/stop/enable inputs.

.4 Control wiring to meet system requirements; 120 VAC/24 VDC control circuitry; automatic reset after power failure.

.5 Environmental: Cooling fans and louvers with filters.

.6 Enclosure: Free Standing NEMA 12

.7 Manufacturers (alphabetical order):

.1 ABB

.2 Allen-Bradley: PowerFlex

.3 Schneider Electric: Altivar

2.8 MOTORS

.1 Suitable for application (driving pumps, fans, mixers, blowers, compressors, gears, conveyors, or other loads) and connected across-the-line or controlled through variable speed controller. Capacity sufficient to operate the driven load without overloading.

.2 Build in accordance with:

.1 CSA C22.2 No. 100, Motors and Generators, No. 145, Motors and Generators for use in hazardous locations.

.2 EEMAC M1-7, Motors and Generators.

.3 NEMA Standard MG1.

.4 The specific application requirements for the system.

.3 Induction Motors:

.1 Squirrel cage induction type, with a service factor of 1.15 at 40 degrees C ambient, Class F insulation, Design B torque characteristics, premium efficiency.

.2 Larger than ½ hp shall be rated for 575 VAC, three (3)-phase, 60 Hz service unless otherwise specified.

.3 TEFC enclosure, suitable for moist and corrosive environment, adequately sized, gasketed, NEMA Type 4/4X terminal boxes complete with threaded hub for conduit entry and ground connection. Explosion-proof TEXP enclosure rated for hazardous locations.

.4 Sealed ball bearing type on motors less than 50 hp. Heavy-duty, grease lubricated, ball or roller type, designed and selected to meet the specific application requirements on larger motors. Basic rating life (ABMA L10) of 100,000 hours.

.4 Inverter Duty Motors: Specifically designed to meet NEMA MG1, Part 31 requirements. The “oversized”, “heavy duty” or similarly labelled motors are not considered equal and are not acceptable. The motor shall be matched to the equipment with not less then 10:1 speed range.

.5 Accessories, based on application:

.1 Winding over-temperature protection (mandatory over 50 hp).

.2 Anti-condensation heaters.

.3 Moisture / leak and high temperature detection for all submersible motors.

.4 Suitable protection relays where required for application and warranty coverage.

.6 Manufacturers:

.1 Baldor.

.2 General Electric.

.3 TECO-Westinghouse.

.4 WEG

.5 SEW Euro Drive

.6 Siemens

.7 ABB

2.9 STANDARD CONTROL DEVICES

.1 Control Transformers:

.1 Single (1)-phase, dry type, copper wound, primary and secondary fusing; voltage, ratio, and power rating as indicated; minimum size 100 VA.

.2 Manufacturer: Allen-Bradley Bulletin 1497 or approved equal.

.2 Supplementary Protectors (Miniature Circuit Breakers):

.1 DIN rail mounted, thermal magnetic type, “finger safe” design, voltage rating 250 VAC, 10 kA short circuit rating, 0.2 to 16 A amperage rating, size, number of poles as required.

.2 Manufacturer: Allen-Bradley, 1492-CB2 or approved equal.

.3 Control Circuit Fuses:

.1 DIN rail mounted, “finger safe” design fuse holders; voltage ratings: 300 VAC, 100 kA short circuit rating, 0.5 to 30 A amperage rating, size, number of poles as required.

.2 Manufacturer: Allen-Bradley, 1492-CB2 or approved equal.

.4 24 VDC Power Supply:

.1 DIN rail mounted, switched (solid-state regulated) power supplies with the electronic protection, sized to provide at least 25 percent extra power capacity. Provide dedicated power supply for loop powered analog instrumentation.

.2 Manufacturer: Allen-Bradley, Bulletin 1606 or approved equal.

.5 Control Relays:

.1 DIN rail mounted, type (general, interposing, and isolation), number of poles, contact ratings and coil voltage as required; silver alloy SPDT contacts, electrically held, coil rated for continuous duty; minimum contacts ratings of 5 A at 120 VAC, 3 A at 24 VDC.

.6 Timers:

.1 DIN rail mounted, timing function and time adjustment to suit application, Form C contacts, coil rated for continuous duty, solid-state device, dial type.

.2 Manufacturer: Allen-Bradley Bulletin 700-HR or approved equal.

.7 Terminal Blocks: DIN rail mounted, finger safe, modular, single stack, screw type, 6 mm (1/4 inch), rated 300 VAC with the current rating equal to the maximum current rating of the conductors but not less than 10 A, including mounting rails or channels for connection to field device wiring. Refer to Part 3 for application details. Note: terminal strips (euro style, barrier terminals, double row, etc.), spring-clamp and fast connection (cut through insulation) terminal block types are not accepted.

.1 Feed through type.

.2 Isolating (switch) type.

.3 Fusible type (1 inch by 1 ¼ inch fuse).

.4 Grounding terminal blocks

.5 Special: Thermocouple, RTD, surge suppressor, plug-in, etc.

.6 Hardware: DIN rails, barriers, end anchors, stand-offs, markings, and accessories.

.7 Shorting bars to be used for jumping. (Wire jumpers are not acceptable).

.8 Wire Management Products: PVC ducts, separators, retainers, inserts, and accessories.

.9 Accessories: Fasteners, seals, and mounting hardware.

.10 Manufacturers:

.1 Allen Bradley.

.2 Cooper Bussman.

.3 Carlo Gavazzi.

.4 Cutler-Hammer.

.5 Entrelec.

.6 Omron.

.7 Phoenix Contact.

.8 Panduit.

.9 Potter & Brumfield.

.10 Siemens.

.11 Square D.

.12 Ssac.

.13 Wieland.

.14 Weidmuller.

2.10 SAFETY CONTROL DEVICES

.1 Safety control devices in accordance with manufacturer's best practices.

.2 Emergency stop buttons, pull ropes, light curtains, access door limit switches, etc.

.3 Provide process limits controllers, instrumentation, or devices (high/low/out of range/limit/etc., temperature, pressure, flow, torque, vibration, analytical parameter, etc.) to be integrated into system to protect personnel and equipment.

2.11 SPECIAL COMPONENTS

.1 Current Loop Isolator: Device shall take on 4-20 mA analog process input signal and deliver one completely isolated 4-20 mA analog signal output; accuracy-0.1 percent, linearity-0.1 percent of span; 750 Ω minimum. Load, DIN rail mounted, 24 VDC power supply, 10 to 40 degrees C ambient temperature; as manufactured by Entrelec, GUW2, or equal.

.2 Analog Signal Splitter: Device shall take on 4-20 mA analog process input signal and deliver two completely isolated 4-20 mA analog signal outputs; accuracy-0.1 percent,

linearity-0.1 percent of span; input 100 Ω, output 0-750 Ω minimum. Load, DIN rail mounted, 24 VDC power supply, minus 10 to 40 degrees C ambient temperature; as manufactured by Moore Industries, Model ECT-DIN, or equal.

.3 Intrinsically Safe Barrier: Single or multi-channel isolating interface unit, DIN rail mounted installed in the safe area to isolate signals located in the hazardous area rated Class I, Division 1, Group D. Output(s): single or multi-channel, SPST or SPDT type, relay output contacts rated minimum 1 A at 120 VAC/24 VDC; as manufactured by MTL, P+F, and Stahl.

2.12 ELECTRONIC CONTROL DEVICES

.1 Loop Controller: Microprocessor based PID loop type controller with display of process (PV) and setpoint (SP) values, keypad, auto and manual selection, limit and control settings, universal analog input (4-20 mA, T/C, RTD), universal output (proportional 4-20 mA, relay), signal replication, limit alarm relays, non-volatile memory, range and span adjustment; NEMA Type 4/4X door mounted, 120 VAC/24 VDC power supply; as manufactured by Fuji, Honeywell, Omron, and Yokogawa.

2.13 STANDARD OPERATOR INTERFACE DEVICES

.1 Function suitable for application, rated for location and area classification. Operators and indicator lights colour coding according to IEC 60204-1.

.2 Pilot Lights:

.1 Heavy duty, oil-tight type with back mounted screw terminals; NEMA Type 4/4X (or NEMA Type 7/9 for hazardous locations) style, round 30.5 mm full face, single lamp, 24 VDC or 120 VAC transformer type, push to test function with LED type bulb.

.2 Manufacturer: Allen-Bradley, Bulletin 800T/800H or approved equal.

.3 Pushbuttons and Control Switches.

.1 Heavy-duty, oil-tight type with multi-element stackable contact blocks with side wired screw terminals; two, three, or four position maintained or momentary rotary operators; contact arrangements and configurations; NEMA Type 4/4X (or NEMA Type 7 or 9 for hazardous locations) style, 30.5 mm full-face.

.2 Manufacturer: Allen-Bradley, Bulletin 800T/800H or approved equal.

.4 Accessories: Operation/status/function identification escutcheon plates for every operator; protective boots.

.5 Operator Control Stations: Rated for location intended, indoor or outdoor installations as required, heavy duty, oil tight, surface mounted, number of holes (for round, 30.5 mm operator interface devices) as required.

.1 Interior:

.1 Dry Locations: NEMA Type 12, metal enclosure.

.2 Wet Locations: NEMA Type 4X, stainless steel, metal enclosure.

.2 Exterior Locations: NEMA Type 4X, metal enclosure.

.3 Corrosive Locations: Non-metallic, NEMA Type 4X composite type (fibreglass, ABS or polycarbonate) when specifically identified and required.

.4 Hazardous Locations: NEMA Type 7 or 9 to match area classification.

.6 Manufactured by (in alphabetical order):

.1 Allen Bradley.

.2 Cutler-Hammer.

.3 Siemens

.4 Schneider Electric.

2.14 ELECTRONIC OPERATOR DEVICES

.1 Digital Indicators: 120 VAC or 24 VDC power, accept analog (thermocouple, RTD, counter, frequency, special) input signal, provide minimum 3.5 digit display scalable via front-mounted pushbuttons to indicate process variable in engineering units. Accuracy to be 0.1 percent of scale digit; 0 to 500 Ω minimum load, door flush mounted, 0 to 40 degrees C ambient temperature, including description of indicated parameter, tag range and units. As manufactured by Omron, Precision Digital, and Metermaster.

2.15 AUDIO-VISUAL SIGNALING DEVICES

.1 Alarm Horns: Surface mounted:

.1 Sound Rating: 100 dB at 3 m, power and control voltage as required.

.2 Manufacturing: Federal Signal, Model 350.

.2 Alarm Strobe Lights: Surface mounted, flashing (strobe), colour, power, and control voltage as required. As manufactured by Federal Signal, Model 371ST.

.3 Accessories: Manufacturing mounting hardware.

2.16 UNINTERRUPTIBLE POWER SUPPLY

.1 Uninterruptible Power Supply: Single or modular type, transfer unit (UPS), main battery and additional batteries, true, double conversion, online design, input 120 VAC plus or minus 20 percent, output 120 VAC, automatic voltage regulation and battery management, lightning and surge protection, overload indicator, replace battery indicator, user replaceable, hot swap sealed batteries, as manufactured by Powerware, APC or approved alternative.

.2 UPS Bypass Contactor: 4 power poles – 2 N.O., 2 N.C., with screw terminals, and 1 N.C. aux. contact for alarm to PLC.

.1 Standard of acceptance: Allen Bradley Bulletin 100-C, or approved equivalent.

2.17 PANEL WIRING

.1 All wiring shall have copper conductors with thermosetting type insulation. 600 V insulation for all circuits up to 120 VAC; RW90 or RWU90, 1,000 V insulation for 600 V circuits.

.2 Panel Power Wiring: Stranded copper conductors, minimum No. 12 AWG, with chemically cross-linked thermosetting polyethylene (XLPE) insulation, type RW90.

.3 Panel Control Wiring:

.1 Discrete (I/O) Signals and Control Circuitry: Minimum nineteen (19) stranded copper conductors, minimum No. 16 AWG, type REW, CL1251, or approved equivalent.

.2 Analog 4-20 mA (I/O) Signals and Circuit: Individually jacketed shielded twisted pair conductors, No. 18 AWG, PVC insulated, PVC jacketed. Mylar foil shielded instrument cable, including tinned copper drain wire. Maximum unshielded cable exposure shall be 50 mm, to permit connection to device terminals and neat terminations of the drain wire. Analog signal cable to be Belden 9318 shielded two (2)-conductor cable or approved equal.

.3 Special signals (thermocouple, RTD, etc.) to suit application.

.4 Pre-manufactured I/O ready cables (factory wired I/O module terminal block wired with multi-conductor cable assembly with free connections for connection to standard terminal blocks).

.4 Wire Management Products: PVC ducts (slotted type), separators, retainers, inserts, and accessories.

.5 Colour Coding:

.1 Black: Line or load conductors, 150 VAC and above.

.2 Red: AC control circuits, 150 V and below (internally sourced).

.3 Blue: DC control circuits, 150 V and below.

.4 Orange: Control circuits or wiring which may remain energized when the main disconnecting means is in off position.

.5 White: Neutral.

.6 Green (with or without yellow stripe): Grounding conductors.

2.18 SKID WIRING

.1 Power Wiring: Stranded copper conductors, minimum No. 12 AWG.

.1 Insulator Conductors: Stranded soft copper conductors, size as indicated of chemically cross-linked thermosetting polyethylene (XLPE) insulation. RW90, 600 V insulation for all circuits up to 120 VAC; RW90 or RWU90, 1,000 V insulation for 600 V circuits.

.2 Stranded Bare Copper: Class B stranded soft copper conductor, size as indicated or in accordance with CSA C22.1.

.2 Control Wiring: Match panel wiring.

.3 Raceways:

.1 Raceways shall match EEMAC Type 4X ratings to allow for equipment washing.

.2 Rigid metal or aluminum conduit as required for the corrosive environment and classified locations, to protect from mechanical damage.

.3 Liquid tight flexible metal conduit less than 0.9 m (3 feet) for connection to motors and vibrating equipment, electric and solenoid valves, electrical control devices, sensors, and instruments.

2.19 IDENTIFICATION

.1 Cable, Wire Markers: Wire identification on both ends, white background with black lettering, sleeve type heat-shrinkable plastic tags (or similar to provide firm fit on the conductor insulation), machine printed.

.2 Terminal Blocks: Each terminal to be clearly marked with factory pre-marked number and/or letter tag identifiers.

.3 Internal Components: Each internal panel-mounted device shall be fitted with a permanent nameplate (lamacoid or equal) at the device, with the device identification imprinted. Fuses and breakers shall have the size indicated on the nameplate.

.4 Panel Identification: Lamacoid nameplates in accordance with System Identification.

.5 Arc Flash Warning Labels, all control panel, enclosure, junction box, etc. in accordance with ANSI Z535.4.

.1 Colour coded labels, orange “Warning” or red “Danger” heading with descriptive text: “Arc Flash and Electrical Shock Hazard Present. Appropriate Electrical PPE required”, hazard category, Arc flash hazard boundary limits, incident energy level at <distance> m in cal/cm^2 units, shock hazard exposure (limited, restricted, prohibited approach boundaries), PPE equipment – list fire resistant clothing, hoods, boots and gloves class, indicate energy levels.

.2 For systems that do no require arc flash assessment, attach labels stating (example): “Less than 50 volts. No Arc Flash Hazard. No Shock Hazard Boundary. No Electrical PPE Required.”

2.20 PROGRAMMABALE CONTROL DEVICES AND ELECTRONIC OPERATOR INTERFACE

.1 Refer to Section 25 05 03 for information on Programmable Logic Controllers (PLC), Electronic Operator Interfaces (HMI), network and communication components and wiring, computers and related accessories, software, and programming.

2.21 FACTORY ACCEPTANCE TEST (FAT)

.1 Perform FAT prior to shipment of assemblies. CONTRACT ADMINISTRATOR reserves right to attend FAT. If FAT testing is specifically listed under equipment specification, inform CONTRACT ADMINISTRATOR in writing three (3) weeks prior to performing factory tests.

.2 Provide test equipment (digital meter(s), signal reader/generator and temporary wiring, etc.). Provide laptop and programming software to verify readings and force PLC outputs for programmable control systems. Provide basic testing program if required to check signals.

.3 Test:

.1 Confirm that control panel, operator interface devices, I/O, and all other panel components are required quality and category, verify signal types, voltage, quantities, labelling, and wiring as identified on control schematics.

.2 Perform continuity checks on all wiring. Confirm logical operation of control devices (relays, I/O check, etc.), individually and in functional groups.

.3 Simulating field wiring: Discrete signals shall be verified with input switch simulation and output test load connections at the terminal blocks. Analog signals (including RTD, thermocouple, and special) shall be verified for range and polarity using adjustable signal simulator generator/reader connected to the terminal blocks.

.4 Verify configuration, settings, and setups. Ensure that controller, control components are working properly.

.4 Rectify deficiencies, conduct troubleshooting, and otherwise take corrective action of the installed systems. The tests will be repeated if significant deficiencies are discovered during tests.

.5 Verification of the system shall be deemed complete, when all features, functions, and information required for complete control system have been checked, corrected, and documented, including all Drawings

.6 Document all testing and calibration on record sheets recording the results and dates of all tests required and performed. All test results and calibration data sheets shall be compiled as a Factory Test Report. Copies shall be retained for reference during field commissioning.

PART 3 EXECUTION

3.1 APPLICATION

.1 Drawing Standards:

.1 Prepare electrical and control drawings in AutoCAD or similar program that can export files into AutoCAD (DWG or DXF) file format. Provide drawings in editable file format and in graphic form to the client's standard, when specified. Otherwise provide Adobe Reader files (PDF type with commenting allowed).

.2 Control drawings shall utilize North American graphic symbols (EEMAC E14-3, NEMA ICS 1) and follow standard left to right logic. Control drawings utilizing International symbols (IEC 617) and top to bottom logic may be allowed only upon CONTRACT ADMINISTRATOR approval.

.3 Drawings shall be done in 11 by 17-inch format.

.4 Line reference numbers in sequential order shall be used on all Drawings.

.5 Wire numbers shall follow in general line numbers. The I/O wiring from PLC card to the control panel terminal block shall follow standard controller addressing. The wiring from control panel terminal blocks to the connected device shall follow process tag number.

.6 Where colour coded or multi-conductor cable/wires are used, the colour code shall be listed and used as supplement to the identification.

.7 Electrical and control components presented on the Shop Drawings shall be tagged, identified, and referenced by function as listed under the BOM.

.8 Drawings shall include pertinent data like voltage, current, and power data. Indicate on the Drawings hardware configuration, operational ranges, and setup details.

.9 PLC I/O Drawings: Maximum of two (2) I/O cards per page. Empty rack slots and/or future available spaces shall be incorporated into drawing set and numbering system. Provide blank drawing listing spare slot complete with rack and slot number.

.10 Control Relay Type Logic Drawings: Indicate hardware configuration, control, sequencing, status, and alarm logic.

.11 Terminal numbers or pin numbers shall be shown on the Shop Drawings and clearly identified for each subassembly or component. Where the internal wiring

diagrams of subassemblies are furnished on separate sheets, they shall be clearly identified and referenced.

.12 Process limit contacts shall be shown turned off with their function and control settings indicated on the Drawings.

.13 Control panel layout(s) shall provide panel assembly details including interior and panel face component placement, wireways, terminal blocks including dimensions. The Shop Drawings shall include complete and detailed BOM including manufacturer's name, full model and catalog number. Include layouts of all control/marshalling panels and junction boxes with terminal blocks.

.14 Control schematics, panel and field wiring diagrams shall identify all control system components and devices. The Shop Drawings shall include complete hardwired schematics, elementary, and field wiring diagrams for all control panels and related elements, loop diagrams for all system loops, inter-connection devices and inter-panel wiring connections, wiring diagrams, communication, and network schematics.

.15 A cross referencing system shall be used in conjunction with devices, so the associated devices/contacts may be readily located on the diagrams.

.2 Packaged System Control Narrative: Control Narrative shall provide details related to the packaged system operations. Written description shall include instrumentation and control system including list of functions monitored, controlled, and alarmed.

.3 Electrical and Control System Design:

.1 Packaged System Vendor shall provide supervision, labour for the design, detailed execution, procurement, fabrication, delivery and installation of equipment and material required for a complete packaged system.

.2 Provide materials and perform work in accordance with the latest named published editions of codes and standards.

.3 Power to all components of the packaged system including associated devices (i.e., instrumentation) to be provided through the Control/Power Panel.

.4 If control components and power electrical components (starters, contactors, variable frequency drives, etc.) share the same panel, the power circuitry and components must be isolated and separated from control devices (PLC, control relays, etc.) and circuits using metal barriers, dividers, etc. and occupy separate section (space) of the panel including separate, independently operated access door (in the case of two or three door floor standing enclosure). Provide electrical or mechanical safety door interlocks preventing access to the power cabinets (power panels only) with power on.

.5 Power (600 VAC including 208 VAC, 120 VAC if used for motor power) wiring must be grouped on separate power blocks, physically isolated, and run separately from any control wiring.

.6 Devices and components over 750 VAC must have dedicated compartment with separate access door.

.7 Packaged control system shall be provided with emergency shutdown and safety system in accordance with manufacturer's experience and CSA Z432. Safety devices must be provided whenever there is a potential for operator to come into contact with operating machinery. Incorporate safety devices (E-stop buttons, safety pull ropes, light curtains, access door limit switches, etc.) and process limits controllers (high/low/out of range/limit/etc. temperature, pressure, flow, torque,

vibration, analytical parameter, etc.) into the control system. All devices shall be independently wired to the control system, so precise alarms can be initiated.

.8 Control System:

.1 Process limits controllers (high/low/limit/etc. temperature, pressure, flow, torque, vibration, analytical parameter, etc.) shall be provided to protect equipment and maintain process conditions in accordance with manufacturer's "know-how" for state-of-the-art system.

.2 Incorporate and implement control system safety features in accordance with CSA Z432. When E-STOP pushbutton or other emergency/safety device is activated, or equipment critical alarm signal is present, the control system shall shutdown system instantaneously with exception of safety systems (i.e., cooling, dynamic braking vs. coast to stop) when applicable. The hardwired circuitry shall prevent from delivering any electric power to the equipment. The unit shall not restart automatically after alarm condition is cleared, until manually reset by the operator.

.3 When process limit signals (high/low/out of range/limit/etc. temperature, pressure, flow, torque, vibration, analytical parameter, etc.) are present, program logic shall shutdown system in sequence. The unit shall not restart automatically after alarm condition is cleared, until manually reset by the operator.

.9 Thermal Management: Provide environmental protections. Provide thermal management if temperature inside the enclosure during normal operation will exceed 40 degrees C (at 25 degrees C ambient). Install louvers and vents with filters changeable from outside in enclosures with electronic operator interfaces, transformers, or power supplies over 350 W, and where convection cooling is sufficient. Provide forced air-cooled fans with filters changeable from outside in enclosures with drive(s), transformer over 750 W, power equipment, etc. sized appropriately to maintain no more than 40 degrees C inside enclosure (at 25 degrees C ambient). Install and wire panel high temperature alarm and over temperature shutdown protection. Install panel heaters and thermostats in all outdoor enclosures, and wet locations where required to maintain moisture control. Assume minus 40 degrees C ambient for outdoor locations Install drains and breathers in all outdoor enclosures (other than Type 4X).

.10 Enclosures to be provided with data pocket. Free standing enclosures to be provided with large data pocket and LED light with door mounted or stand-alone switch.

.11 Enclosures with programmable control systems to be equipped with:

.1 Programming receptacle – on exterior of door (120 VAC, individually fused at not more than 5 A).

.2 LED light (control panel section only).

.3 Folding shelf (450 mm by 450 mm) mounted inside of panel for a laptop computer.

.4 Network receptacle – on exterior of door.

.5 Data pocket.

.12 Uninterruptible Power Supply (UPS):

.1 Provide power UPS for systems when required for personnel, critical process, or equipment safety. Size UPS system to perform one safe shutdown.

.2 Provide UPS for systems with programmable controllers (one pre control panel). Size UPS to provide power to programmable logic controller, electronic operator interface, and Ethernet switch for twenty (20) minutes. Report power fail alarm.

.13 Provide signal splitters for recorders and analog loops where, there are more than two (2) devices in the loop.

.4 Component Installation:

.1 Install components, control devices, etc. in accordance with manufacturer's instructions. Mount equipment to ensure adequate clearance between door mounted and back panel mounted components with the panel door closed.

.2 Detailed panel layouts are to be provided with dimensions indicated. Final device placement is the responsibility of CONTRACTOR and should be based on the guidelines provided by the equipment manufacturer.

.3 Arrange low voltage controllers, drives, control devices, and components to provide proper ventilation and cooling throughout the entire enclosure. The variable frequency drives shall be mounted not less than 150 mm from any other device for proper heat dissipation.

.4 Arrange internally mounted equipment for ease of access and removal when necessary.

.5 Fastening controller assemblies to the panel back panels shall be by means of appropriately sized drilled and tapped screw holes. Machine screws only with lock washers are to be used; self-tapping hardware is not acceptable.

.6 Provide panel with a minimum of 15 percent blank spare panel space for future modifications.

.7 Components and terminal block rails shall be located square to the back panel. Door mounted instruments shall align horizontally and vertically on edges or centerlines as indicated. Arrange operator interface devices into logical groups.

.5 Wiring:

.1 All wiring shall be installed continuous from terminal to terminal. No splices will be allowed.

.2 All wires terminated to terminal blocks shall have crimped ferrule lugs.

.3 Neatly form, tie wrap, and frequently supported wiring. Wire looms shall be secure and wire forming shall provide enough length to ensure that there will be no mechanical tension on wire terminations.

.4 Flexible wiring harnesses with approved terminating connectors at both sides shall be provided for any hinged panel or door-mounted equipment and each shall have 20 percent spare capacity.

.5 Wires installed at terminal blocks shall be at right angles to the terminal, shall have a neat loop, and have adequate spare length to reach up to four terminal blocks either side of the termination point.

.6 Provide wire ducting sized for no more than 50 percent fill. Provide separate ducting for interior cabinet interconnection wiring and exterior field cable routing.

Allow separate ducts and avoid routing of analog signals and discrete signals, and VAC wiring.

.7 Mechanical checks shall be made to determine if there are any broke parts, wires, mechanical binding, loose screws, and proper soldered connections. Mechanical tolerances shall be checked on all units including contact grip and wires.

.8 Installation and wiring methods of electrical and control equipment shall be approved for the area classification in which that equipment is installed.

.9 Do no install electrical power, control wiring, instrumentation, or data cables in the same raceway, unless otherwise shown or specified. Use dedication raceway for each of the above listed circuits. All control wiring into and out of control panels having more than three devices, must go through rail mounted terminal strips.

.6 Bonding and Grounding:

.1 Provide suitable grounding and bonding provisions for each panel and equipment.

.2 Install grounding bus. Firmly bond panel mounted devices on or within the panels to ground. Provide supplementary bonding conductors for back panels and doors. Attach a separate bonding conductor to all devices that are not firmly fastened to the panels with screws for such devices as case mounted instruments, meters, etc.

.3 Install complete permanent, continuous grounding and bonding system. Provide all equipment grounding as required regardless of whether it has been shown on the Drawings or called for in this Section. Install grounding connections to typical equipment including in, but not necessarily limited to the following list: service equipment, transformers, duct systems, frames of motors, starters, control panels, distribution panels, steel supports, tanks, frames, etc. Bond together individual steel members and frame structures, each metallic raceway or open wireway, pipe, duct, and other metal object.

.7 Terminal Blocks:

.1 Easily accessible for attachment of field connections; each field-connecting conductor shall be served by one (1) terminal. Clearly marked with factory pre-marked number and/or letter tag identifiers; match conductor identification number where possible.

.2 Divide control signals into groups. Do not mix DC and AC terminals; provide barriers. Provide terminals for each I/O group (Digital Inputs (DI), Digital Outputs (DO), Analog Inputs (AI) and Analog Outputs (AO), special).

.3 Provide a minimum of 10 percent spare terminals for each type of terminal assembly in each panel. In addition to spare terminals, wire each spare (unused) programmable controller I/O point (discrete, analog, and special) to terminal blocks. For wiring not directly related to an I/O group, spare terminals shall be installed at the end of the terminal assembly (e.g., 24 VDC terminal rail, 120 VAC terminal rail grounding rail etc.)

.4 Wire analog signals (AI and AO) through fusible and isolation type terminal blocks.

.5 Terminate spare conductors on terminals.

.8 Identification:

.1 All items shall be clearly identified with an engraved lamacoid nameplate securely fastened in place.

.2 Place identification at each end on all wires as shown on the Drawings.

.3 All panel-mounted equipment shall be fitted with a permanent lamacoid nameplate on, or above the device, with the device identification imprinted. Fuses and breakers shall have the size indicated on the nameplate.

3.2 INTERFACE WITH OTHER WORK

.1 Packaged system power/control panel may interface (control, monitor, etc.) other system or installations. Refer to equipment Specification Section for interface details. Incorporated listed features.

.2 Perform field adjustments of main over current device in accordance with protective device coordination study (by others).

3.3 MANUFACTURER'S FIELD SERVICES

.1 Provide trained qualified technical personnel to perform the service herein specified.

.2 Make any necessary changes and adjustments to the equipment.

3.4 SITE ACCEPTANCE TEST

.1 Perform SAT in the presence of CONTRACT ADMINISTRATOR.

.2 Provide tests equipment (digital meter(s), signal reader/generator, etc.). Provide laptop and programming software to verify operation for programmable control systems.

.3 Check prior to energization:

.1 Perform field adjustments of all protective devices to place the control/power panel in the final operating condition.

.2 Verify the safety and readiness of the cables, phasing, and connections prior to energization.

.4 General Contractor (installer) shall energize packaged system feeder in presence of CONTRACTOR. CONTRACTOR shall energize panel and all electrical, instrumentation, and components, unless specifically permitted in writing for CONTRACTOR to power up packaged control system.

.5 Installation Acceptance: Verify and inspect if installation performed by others is satisfactory:

.1 Confirm that field located components are installed, verify signal types, voltage, quantities, labeling and wiring as identified on control schematics.

.2 Perform continuity checks on field wiring. Confirm logical operation of control devices (relays, I/O check, etc.), individually and in functional groups.

.3 Perform continuity checks on field wiring.

.4 Confirm logical operation of field devices, individually and in functional groups.

.6 Pre-Startup Tests:

.1 Include operation of all instruments by actuation of their controlling variable and monitoring of received signals. If the process media are not physically available or not available at required level (e.g., high pressure or temperature) provide testing means and media to simulate process conditions. Remove and reinstall sensors when required for testing.

.2 System sub-circuits and process subassemblies shall be group tested to verify control logic operation, alarm registration, sequence, and timing operations. Logic circuit operational interlocks (auto start/stop signals), protective and alarm interlock operation shall be verified. Alarm registration, latching and rest operation shall be verified for all system alarms.

.3 Operation of all field instruments and devices by actuation of their controlling variable where possible and monitoring of received signals at the control panels. Similarly, panel outputs to field drives and devices shall be verified by operation of manual mode controls at the control panels. Any equipment, which cannot be safely energized by testing of discrete panel outputs, shall be temporarily disconnected, and potential or continuity checks of the output circuits made while energized.

.4 Analog circuits shall be verified for polarity, zero, span and linearity, by operation of the field instruments and panel circuit outputs. Where simulation by varying a measured variable through its calibrated range is not practical, a test signal shall be injected (or simulated) at the field transmitter and the circuit monitored and checked at the local and/or area control panel.

.5 Analog output control signals shall be generated to test and verify proper device proportional response. Where such testing is done the actuated device shall, where possible, be isolated from the process by closing related isolating valves.

.6 Verify configuration, settings, and setups. Ensure that controller, control components are working properly. Adjust system settings to suite operational conditions.

.7 Operator devices, pushbuttons, selector switches, indicating lights and display devices must be tested and functioning according to the intended operational philosophy.

.8 Packaged control system interface with other systems and installations. Include integration with SCADA other system vendors and their respective systems.

.9 Networks and communication systems.

.7 Startup:

.1 Operate packaged system as a complete entity. Perform control system operational tests using process media. Startup operations shall be continuous until it is satisfactorily demonstrated that the packaged system is suitable for continuous on-line service.

.2 Demonstrate operation and performance of packaged system.

.8 Rectify deficiencies, conduct troubleshooting, and otherwise take corrective action of the installed systems. The tests will be repeated if significant deficiencies are discovered during tests.

.9 Verification of the system shall be deemed complete, when all features, functions and information required for complete control system have been checked, corrected, and documented including all Drawings.

.10 Document all testing and calibration on record sheets recording the results and dates of all tests required and performed. All test results and calibration data sheets shall be compiled as a Site Test Report. Copies shall be retained for the record.

END OF SECTION

46 43 00 Fine Screens and Compactor

PART 1 GENERAL

1.1 SUMMARY

.1 This specification covers the general features of design, materials, manufacture, arrangement, shipment and commissioning of a mechanically cleaned fine screen system complete with two fine screens and corresponding downstream screenings transport and treatment equipment. The equipment package also includes a control panel system that enables the manual and fully automatic operation of the complete screening, transport & treatment system.

.2 Acceptable screen types for the purpose of this proposal include a 6 mm perforated plate design & a 2 mm aperture step screen design. Spiral conveyor screens shall not be considered.

.3 Any material or equipment that is not specifically mentioned or included in this specification but is necessary to ensure a fully operational system is to be supplied with the equipment and included in the quotation. Additional features may be offered and will be considered as “value added offerings” during the evaluation. Consideration must be given to the environmental operating conditions of the Napanee location, including both the climatic environment and operating conditions.

.4 The proponent shall include a check-listed version of the present specification indicating compliance and deviation from each specification paragraph and sub-items with its preselection proposal.

.5 The fine screen system shall provide a minimum a capacity of removing of 90% of the solids 6 mm diameter (in any dimension) and larger.

1.2 DESIGN

.1 Fine Screens – Perforated Plate (or) Step Screen

.1	Quantity:	Two (2)
.2	Filter Media Aperture:	6 mm round (or) 2 mm slot
.3	Maximum Instantaneous Peak Flow:	0.49 m^3/s (1,764 m^3/hour) per screen; 100% redundancy
.4	Classification:	Class 1, Division 1, Group D
.5	Channels:	Parallel influent channels to be spaced a minimum of 600 mm apart; Channel dimensions: Manufacturer to propose optimal channel dimensions for evaluation that ensure that the proposed screen obtains a maximum

			headloss of 200mm at full peak flow @ 35% screen blockage. Manufacturer to provide substantiating calculations and/or curves.
.2	Screening Conveyor		
	.1	Quantity:	two (2)*
	.2	Inlet Feed Rate:	1.5 m^3/hr wet screenings
	.3	Minimum Conveyor Trough Diameter:	250 mm (min. diameter selected in order to ensure proper conveyance of screenings debris without bridging or plugging)
	.4	Minimum Spiral Diameter:	185 mm
	.5	Shaftless Spiral Material: Hardness and Hardox	Special micro alloy abrasion-resistant steel; 400 Brinell wearbars
	.6	Conveyor Liner Material: welded to a 2mm thick U-subliner	Hardox (400 Brinell) bar liner max. 1200 mm long sections
	.7	Material to Convey:	Wet Screenings
	.8	Conveyor Length:	Length to encompass both screen inlet zones with 90-degree side-wall chutes.
	.9	Classification:	Class 1, Division 1, Group D

*Each screening conveyor is dedicated to each screen.

.3	Screening Washer/Compactor		
	.1	Quantity:	Two (2) (One (1) per screen)
	.2	Minimum Inlet Feed Rate:	1.5 m^3/hr wet screenings
	.3	Minimum Wash Press Diameter:	250 mm
	.4	Minimum Shafted Spiral Diameter:	180 mm
	.5	Minimum Wash Inlet Length:	340 mm x 1000 mm
	.6	Shafted Spiral Material: Micro Alloy	Special Abrasion resistant
	.7	Material to Convey:	Wet Screenings
	.8	Solids Volume Reduction:	Up to 70%
	.9	Output Dryness:	Up to 60%

.10 Organics Removal — Up to 90%

.11 Classification: — Class 1, Division 1, Group D

.4 All electrical panels to have a completed arc flash analysis and be equipped with arc flash warning labels and arc flash information in accordance with CSA C22.1 – Canadian Electrical Code and CSA Standard Z462 – Workplace Electrical Safety.

.5 The Supplier shall be responsible to ensure and guarantee that all the specified equipment will be:

.1 Designed, fabricated and assembled to provide reliable and efficient operation.

.2 Equipped with CSA Approved electrical components and will comply with all Codes and Standards referred to in this Specification.

.3 Of new material which is of current manufacture and proven in the field for the duty required.

.4 Correctly described on the Form of Proposal and supporting information .

1.3 APPROVED MANUFACTURERS

.1 The equipment shall be the product of a company regularly engaged in the design, manufacture and supply of this type of equipment and whose equipment is of a design which has been in satisfactory service under similar conditions for not less than ten (10) years.

1.4 ALTERNATIVES

.1 If a bidder wishes to offer an alternative proposal, in addition to the proposal complying with this specification, each such alternative must be clearly set out and the related adjustment shall be stated for each alternative.

1.5 DOCUMENTS

.1 Read this Specification in conjunction with the following documents:

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems
.2 26 05 01 Electrical requirements for Packaged Systems

.2 RFP Documentations

.3 Submission Forms

.4 Form of Proposal

.5 All information requested on that form shall be submitted in addition to the bidder`s supporting information for the quotation to receive full consideration.

.6 General Terms and Conditions for Preselected Equipment, shall be the governing terms and conditions accepted in the Form of Proposal by the Supplier.

.2 This specification together with the above-mentioned documents and any further documents issued therewith by the Engineer comprise the proposal documents.

1.6 SYSTEM DESCRIPTION

.1 It is the intent of these Specifications to specify a complete and fully operating system that will perform its intended function(s). All devices, fittings, and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified.

.2 All drives, motors, instrumentation etc. supplied shall be designed for a Class 1, Division 1, Group D environment.

1.7 STANDARDS

.1 All equipment and materials in accordance with the latest issue of all appropriate Standards and Codes, including, but not limited to the following:

.1 AFBMA – Load Ratings and Fatigue Life for Ball Bearings

.2 AGMA – American Gear Manufacturer's Association

.3 ANSI – American National Standards Institute

.4 ASME – American Society of Mechanical Engineers

.5 ASTM – American Society for Testing and Materials

.6 CEC – Canadian Electrical Code

.7 CEMA – Canadian Electrical Manufacturers Association

.8 CSA – Canadian Standards Association

.9 CWB – Canadian Welding Bureau

.10 IEC – International Electrotechnical Commission

.11 NEC - National Electrical Code

.12 NEMA – National Electrical Manufacturer's Association

.13 NFPA – National Fire Protection Association

.14 NFPA – National Fluid Power Association

.15 OSHA – Occupational Safety and Health Administration

.16 SSPC – Steel Structures Painting Council

.17 UL (cUL) – Underwriter's Laboratories Inc.

1.8 WARRANTY AND GUARANTEE

.1 The supplier shall warranty the products and workmanship of the equipment delivered to site. The supplier shall guarantee that the system can perform under the conditions stated and provide supporting documentation of their experience.

.2 Guarantee and warranty all components of the scope of supply for the greater of either 24 months after the date when the equipment achieves satisfactory

performance, established according to the terms of the General Contractor's Contract, or until the expiry of a period of 36 months after the date of completion of delivery of such equipment to the site, whichever period terminates first.

.3 The manufacturer shall offer an optional extended warranty up to a total of 60 months after the date when the equipment achieves satisfactory performance, established according to the terms of the General Contractor's Contract.

PART 2 PRODUCTS

2.1 GENERAL

.1 Each piece of equipment specified shall be designed for continuous operation, 24 hours per day, 7 days per week.

.2 All housings, structural components, troughs, hoppers, chutes, manifolds, nozzles, valve bodies, ducts, bases, anchors, and fasteners must be a minimum of Type 316 or 316L Stainless Steel.

.3 All stainless steel main components to be treated with full submersion passivation.

.4 Each unit must be factory assembled and tested prior to delivery to site and ready for installation except for CSA Class 1, Div. 1 motors, which can be installed on site.

.5 The mechanically cleaned screens will be designed for the removal of solids and fibrous materials from municipal wastewater.

.6 Furnish all mechanical and electrical equipment and instruments as required to perform the functions specified and described within this document.

.7 All equipment is to be furnished by or through a single supplier to ensure coordination and compatibility of equipment.

.8 The equipment must be capable of mode of operation adjustments and post power failure start-up with no additional effort or intervention by the operator.

.9 Provide sufficient quantity of grease or oil of the correct grade necessary for the initial start-up, operation of the equipment and for the extent of the warranty period. Where auto-greasers are incorporated into the supply, they are to be suitable for 12-month operation without replacement.

.10 On-site power is available as follows: 600 V / 3 Phase / 60 Hz.

.11 Manufacturer shall provide screens, motors, gear reducers, solenoid valves to control wash water flow, level instrumentation elements and transmitters, screening conveyor/washer/compactor, controls, control panels, and lifting attachments, as a complete integrated package to ensure proper coordination, compatibility, and operation of the system.

2.2 FINE SCREEN REQUIREMENTS – PERFORATED PLATE SCREEN

.1 Structural Frame (Perforated Plate)

.1 The structural frame shall be designed to be of the monobloc type and be set at an angle from the horizontal as stated previously.

.1 The structural frame shall be fabricated with two lateral plates connected by means of cross braces. A bolted plate shall seal the top of the frame.

.2 The structural frame shall be supplied with central ports to access the sparge system and to allow inspection of screen elements.

.3 The screen frame shall be recessed in the channel floor, if deemed necessary to maintain optimum hydraulic capacity, and be firmly anchored to the channel at all channel operating floor levels. Anchors shall be supplied and installed by the contractor.

.4 Steel sheeting shall be used to cover the front sections of the frame located above the channel top. The removable front panels shall be latched to the screen frame. The latches must be secure, sealed, long lasting and durable to withstand years of operation. The latches shall be releasable without a tool.

.5 Steel sheeting shall be used to cover the back sections of the frame located above the channel top. The housing shall be bolted to the screen frame. The upper edge of the back section shall be fitted with a bolted rubber strip precisely fit to close the gap between the back section and the panels travelling downwards. The rubber strip shall be at an angle allowing screenings to freely fall towards the slope of the discharge chute.

.6 Screenings shall be discharged down a steeply sloped enclosed discharge chute, on the downstream side, above the top operating floor. The discharge chute housing shall also be supplied with a rotating brush access hatch.

.7 Routine service, repair or replacement of damaged parts shall be possible with the screen in the channel. All designs shall ensure that day-to-day maintenance, replacement of chains and/or elements shall be done from the operating floor level.

.8 Access panels must be designed for ease of access with provisions to ensure frame remains leak free when installed. The panels shall seal the unit and include a vent connection.

.2 Frame Pivot (Perforated Plate)

.1 The structural frame shall include a pivot system to allow rotation of the unit out of the channel for inspection and servicing. The pivot system shall be designed to withstand the total unit weight without distortion at any position.

.1 Pivot shall be lift type and shall allow raising the screen out of the channel without needing to remove component(s) below the discharge chute.

.2 Pivot system shall be capable of pivoting the unit when submerged under site hydraulic conditions and shall be designed to handle all vertical and horizontal loads.

.3 Screenings Removal Mechanism (Perforated Plate)

.1 The unit shall be fitted with perforated panels carried by two endless chains and traveling upward on the upstream side of the screen frame.

.1 The traveling elements shall be capable of stopping virtually all solids larger than the previously stated perforations size diameter, in both directions. Designs employing slotted openings instead of circular perforations shall not be allowed.

.2 Elements shall be specially formed to create ledges to lift larger solids. The design of the elements shall limit the possibility of lifting solids that are larger than the screen internal passage way. Designs employing the use of curved elements, lifters or tines to take out solids shall not be allowed. Designs which require screenings handling in order to be lifted up shall not be allowed.

.3 Element travelling speed shall be adapted to the application requirements.

.4 Elements shall be easily removable from the operating floor.

.5 The mechanical screen shall incorporate an efficient sealing design arrangement to prevent screenings from bypassing the screen panels. This is achieved by means of polyethylene sealing strips attached to the frame sides and stainless steel sealing wings mounted on the chains. Sealing wings made of material other than stainless steel shall not be allowed.

.6 Two rows of sealing brushes covered with a rubber flap across the bottom of the screen shall also be provided. Design made with single row of sealing brush shall not be allowed.

.7 The clearance between elements, as well as between element wings and lateral-sealing strips shall not exceed 2 mm.

.8 Elements shall be rigid in order to provide a high resistance to impact and eliminate issues related to torsion caused by uneven loading. The screen shall be capable of withstanding a maximum hydraulic static differential as described in equipment specifications.

.4 Chain Driving System (Perforated Plate)

.1 The unit shall incorporate two top mounted driving chain sprockets fastened to the main drive shaft. These chain wheels shall drive endless chains.

.1 The chain shall have a pitch of 200 mm and a breaking load adapted to the application. It shall be supplied with solid pins and bushings. Designs employing the use of roller chains or designs with roller chains that incorporate hollow pins as roller shafts will not be allowed. Solid/hollow riveted pins shall not be allowed.

.2 Driving chain sprockets shall be split type and have 10 teeth. Half of the teeth shall be used to drive the chain. The remaining 5 teeth

shall provide a spare driving system, thus extending the sprocket's life expectancy. Sprockets shall be mounted on a drive shaft. The drive shaft shall be straight and of sufficient size to operate without distortion.

.3 Two (2) self-aligning ball bearings, assembled in a flange mounted case shall support the main drive shaft on the sides of the chain take up assembly. A chain take up assembly shall be provided with the bearing supports and be mounted at the screen frame sides.

.4 The bottom of the unit frame shall incorporate two revolving element guides. They will move at the same speed as the elements to reduce wear to a minimum on all exposed components. Each 19 mm thick bottom guide will be carried on a stub shaft incorporating a greasable sealed "Nylatron" sleeve. Each lower stub shaft shall be bolted in place to allow easy removal. Grease lines shall run from the lower shaft to the upper most operating floor to allow easy lubrication.

.5 Guides fitted with a slide shall be located on the upstream side of the frame. Each of the two (2) chains shall also be supported on the return side, with lateral guides fitted with slides.

.5 Self-adjusting Cleaning Brush (Perforated Plate)

.1 The collected screenings shall be positively removed from the screen panels by a heavy duty, high-speed Nylon fineset self-adjusting rotating brush.

.1 The brush shall have a minimum diameter of 451 mm and have, when in operation, a surface contact ratio of 50:1 with element.

.2 The rotating brush shall be assembled on a straight solid shaft of sufficient size to operate without distortion.

.3 The brush shaft shall be mounted on a self-adjusting support assembly including a pivoting shaft with self-aligning ball bearings. These bearings shall be mounted on pillow blocks located on each side of the structural frame top plate.

.4 Lever assembly arms shall be fixed on the pivoting shaft ends. Gas springs attached to the levers shall insure a constant pressure on the perforated plate elements to provide optimum contact and cleaning.

.5 Features for minimizing or preventing wipe, floss and rag deposition and wrapping on brush or rotating components is desired.

.6 Wash Water System (Perforated Plate)

.1 The unit shall be provided with an additional cleaning apparatus. A sparge system shall be used to backwash the screen panels.

.1 The backwash shall clean the perforations and project the dislodged screenings towards the discharge chute.

.2 The sparge system shall consist of an element washing manifold equipped with a set of spray nozzles.

.3 This system shall be provided with a connection to water/effluent water at a flow and pressure as described in

equipment specifications and/or as required by the manufacturer.

.4 The following components will be supplied with each unit to control the wash water:

.1 One (1) manual ball valve
.2 One (1) electrically actuated (solenoid) NEMA-7 SS ball valve.
.3 One (1) “Y” strainer

.7 Motor & Drive Unit (Perforated Plate)

.1 The chain and brush drive shafts shall be driven by means of dedicated speed-reducing gearboxes and motors. The motors shall not be overloaded under normal operating conditions and shall be designed for heavy duty service 24 hours per day service duty.

.1 The motors shall have an external protection to meet the local environmental conditions. The motor shall also be of the normal starting torque and low starting current type.
.2 The gear reducers shall be of the parallel-helical type. It shall include anti-friction bearings with high overhang load properties, and double lip temperature oil seals riding on a precision ground shafts. Gears shall be made of hardened, heat treated forged steel as per AGMA standards. The gearing shall be oil lubricated. The gear reducers shall have an internal and external protection to meet the local environmental conditions (corro-protected).
.3 The motors shall be rated premium efficiency.

.8 Accessories (Perforated Plate)

.1 Odour Control Connection: Ø100 mm (4”)

2.3 FINE SCREEN REQUIREMENTS – STEP/BAR SCREEN

.1 Structural Frame (Step Screen)

.1 The frame assembly shall be of unified construction, forming a rigid structural assembly in order to provide a secure unit consisting of two side frames, two drive plates, fixed and mobile lamella support members, two frame support plates, and a base plate. The drive plates shall be mounted within the side frame and shall be connected to the mobile lamella support members. The frame assembly shall be designed to fit into the channel without the need for recessed channel walls or floor. The neoprene side skirts shall be attached to the front side frames with stainless steel retainers and hardware to provide sealing between the screen and the channel walls. The side frames shall extend fully from the channel invert to the top of the unit and shall be arranged to pivot out of the channel for maintenance or maintenance inspection when required. The structural frame shall be fabricated with two lateral plates

connected by means of cross braces. A bolted plate shall seal the top of the frame.

.2 Frame Pivot (Step Screen)

.1 The structural frame & supports shall include a pivot system to allow rotation of the unit out of the channel for inspection and servicing. All equipment components shall be accessible from the floor slab without the use of ladders or platforms when the screen is in pivoted position. Maintenance inspection & servicing of the screen shall not require closed space channel entry. The pivot system shall be designed to withstand the total unit weight without distortion at any position.

.1 Pivot shall be lift type and shall allow raising of the screen out of the channel without needing to remove the discharge chute or the downstream screenings transport or wash press equipment or hopper.

.2 Pivot system shall be capable of pivoting the unit when submerged under site hydraulic conditions and shall be designed to handle all vertical and horizontal loads.

.3 Screen unit shall be supplied with appropriately-located lifting lugs on its frame that enable an easy and operator-safe pivot out of the channel.

.4 Supports shall be a bolt-together design with no on-site welding required and will accept shims for height adjustment if required.

.5 Each fine step screen shall be normally positioned at a 50° inclination and shall be supported and bolted to the upper channel slab using stainless steel support pedestals provided with the screens. The screens shall be able to pivot completely out of their respective concrete channel to allow for complete access to all components from the operating floor. This lift-out capability will allow for easy maintenance access. Lifting lugs for pivoting the screen shall be located on the lower sides of the step screen unit. Screens with higher installation angles are not acceptable.

.3 Screenings Removal Mechanism (Step Screen)

.1 The fine step screen screening surface shall consist of alternating fixed and mobile lamellae steps. All required lamellas shall be attached to either the fixed or mobile lamella linkage drive support members. The lamellas shall be divided into two segments on larger models, one lower and one upper. Normally it shall be only necessary to replace the lower lamellas in exceptional circumstances only. The lamellas shall have a 2mm opening aperture width. Movable lamellas shall be provided with UHMW plastic spacers on each side to maintain the proper spacing and prevent metal-to-metal contact between the lamellas. The upper end of the fixed lamellas shall be outfitted with a stainless steel finger-type discharge. The lower portion of the mobile lamellas shall be provided with saw teeth to penetrate through fine grit and sand

during operation. All lamellas shall be manufactured from 316 or 316L stainless steel.

.2 The fine step screen lamellae (bars) shall incorporate a curved step design to improve lifting of screenings material. This curved step shall have a 1:1 ratio of height to depth in order to ensure effective screenings transport toward discharge without material roll-back. Tall, shallow steps that do not reflect the height-to-depth ratio and steps that have a hook-like design with a flat horizontal step are unacceptable. The step curve must be on the horizontal part of the step.

.3 The step screen's lamella steps shall be the same size/height across their full length and lamella steps will move in the same circular (and non-elliptical) pattern across the full length of bar screen.

.4 The step screen's lamellas will be 3 mm thk. minimum. Thinner lamellae and units that incorporate plastic lamellae are not acceptable.

.5 The fine step screen lamellas will be of a bolt-on type rather than welded in order to allow for quick and easy replacement of one or more bars, if necessary.

.6 Each fine step screen shall be equipped with rubber neoprene skirts in order to provide adequate sealing between the inside of the channel and the screen's frame—thereby ensuring that a) all raw wastewater passes through the screen passage openings and b) the linkage mechanism is protected from unscreened wastewater.

.7 The bottom step of the screen shall allow for sewage inflow and shall not be equipped with plug/spacers, end shoes, brushes, or rubber barriers. The design of the bottom step shall restrict screenings passage to 2 mm maximum throughout its entire operating cycle (moveable bar rotation) and in all operating conditions. Screens with flexible bottom lamellae, which allow larger debris to pass through the bar screen than the specified aperture, are not acceptable. Systems that require flushing systems at the base of the screen are not acceptable.

.8 Each screen shall be operated intermittently in order to capture much finer debris when a 'screenings mat' layer accumulates across the surface of the screen's bars. This operating technique shall significantly increase performance efficiency of the screens.

.4 Linkage Driving System (Step Screen)

.1 Each fine step screen shall be designed to operate without drive chains or sprockets. Its drive station shall be located above the top of the channel floor slab and shall be protected by an enclosed motor compartment.

.1 Each fine step screen shall be complete with an integrated drive assembly consisting of an electric gear motor, drive shaft, lifetime greased shaft, eccentric bearings, and home-position braking mechanism.

.2 The drive assembly shall be capable of elevating the weight of the mobile lamellas and the maximum debris load. No drive components shall be located below the maximum water level of the channel. The step screen shall be driven by an eccentric drive shaft without the use of chains, sprockets, tensioners or belts.

.3 An appropriate torque safety guard (Emotron M20) shall be provided with each screen and preinstalled within the proposed control panel to stop the motor & perform a reverse self-clearing sequence in the event that the lamella plates become jammed.

.4 The gear drive & motor of the screen shall be isolated from screenings debris and the channel by being located in its own enclosure accessible via bolted or hinged covers.

.5 Chain & cog drive systems are not acceptable.

.5 Cleaning mechanism (Step Screen)

.1 The cleaning mechanism of the step screen shall incorporate an all-stainless steel discharge finger-type assembly that avoids wrapping of stringy or other material and positively moves captured screenings from the lamella bar rack to the downstream equipment inlet without the use of brushes or scraper mechanisms. The discharge shall work without blockage or fouling by wet wipes, floss, rags or other screenings debris.

.6 Wash Water System (Step Screen)

.1 The step screen shall not require service water or spray jets for proper operation either at the lamella bar rack, the discharge or at the base of the screen. Units that require service water addition are not acceptable.

.7 Motor & Drive Unit (Step Screen)

.1 Each fine step screen linkage drive system shall be complete with an integrated drive assembly consisting of an electric gear motor, drive shaft, automatically/lifetime greased shaft, eccentric bearings, and electrical home-position braking mechanism. The step screen unit's single motor shall not be overloaded under normal operating conditions and shall be designed for heavy duty service 24 hours per day service.

.1 The motor shall have an external protection to meet the local Class 1, Div. 1, Group D explosion-proof environmental conditions. The motor shall also have external protection to meet the local environmental conditions (corro-protected).

.2 The motor shall be rated premium efficiency.

.3 The gear reducer shall be of the parallel-helical or helical bevel type. It shall include anti-friction bearings. Gears shall be made of hardened, heat treated forged steel as per AGMA standards. The gearing shall be oil lubricated. The gear reducers shall have an internal and external protection to meet the local environmental conditions (corro-protected).

.8 Accessories (Step Screen)

.1 Odour Control Connection: Ø100 mm (4”)

2.4 CONVEYORS:

.1 Spiral Screw:

.1 The screw shall be manufactured in one long section. Diameter and pitch shall be adapted to the application requirements. The minimum spiral diameter, however, shall be 185 mm.

.1 Micro Alloy (special Abrasion Resistant Steel)/ High Strength Carbon Steel. Minimum nominal Brinell Hardness shall be 380 BN. 44W structural steel spirals shall not be acceptable. Material type shall be clearly identified in the preselection proposal.

.2 The spiral flight shall be cold rolled from continuous flat bars of the specified material. Helicoidal flights or stretched flat plates shall not be acceptable.

.3 The flight thickness of the screw shall be a minimum of 20 mm. The pitch of the screw shall be equal to the screw diameter.

.4 The screw shall have a full diameter welded drive plate for the connection to the drive shaft with high tensile bolts.

.5 The screw shall be reinforced. The reinforcement shall be constituted of an insert spiral, be welded to the inner helical surface of the main spiral and have a minimum thickness of 15 mm. Torque and power design calculations shall be submitted with the preselection proposal for review.

.2 Conveyor Body:

.1 The conveyor shall be manufactured in sections flanged-bolted together.

.1 The U or Octagonal shape trough shall be made of 3 mm thick AISI 316 / 316L stainless steel material. The trough shall have a flanged-bolted end adapter plate assembly at the driving end to receive the screw conveyor geared motor and that ensures that potential liquid leaks at the drive shaft/trough end plate penetration drip to atmosphere and not into the interior gear drive mechanism. The screw conveyor drive shall support the driving end of the screw.

.1 The trough shall be fitted with an easily replaceable wear liner to support the screw. Wear liner sections shall be attached to the trough with square stainless steel bar retainers. Bolts, glues or welding are not acceptable as a liner retaining method.

.2 The trough shall be covered with bolted removable lids made of 3 mm thick flat material.

.3 The trough will incorporate a full 2-bend flange at each of its sides in order to ensure structural strength and provide adequate connection point for bolted lids: i.e. 90 degree bend at top of U-trough and a further 90 degree bend.

.4 Inlet hopper(s) shall be bolted to the trough and be easily removable. The sidewall shall be 90° from the horizontal to prevent material build-up.

.5 The conveyor shall be supported by anchored structural supports with adjustable jack screw located on each side of the trough. Anchors shall be supplied and installed by the contractor.

.3 Motor & Drive Unit:

.1 The main drive shaft shall be driven by means of a gear reducer and motor. The gear motor shall not be overloaded under normal operating conditions and shall be designed for heavy duty 24 hours per day service.

.1 The motor shall have an external protection to meet the local environmental conditions (corro-protected). The motor shall also be of the normal starting torque and low starting current type.

.2 The motors shall have an external protection to meet the local Class 1, Div. 1, Group D explosion-proof environmental conditions.

.3 The motors shall be rated premium efficiency.

.4 The gear reducer shall be of the parallel-helical or helical bevel type. It shall include anti-friction bearings. Gears shall be made of hardened, heat treated forged steel as per AGMA standards. The gearing shall be oil lubricated. The gear reducers shall have an internal and external protection to meet the local environmental conditions (corro-protected).

.2 Rotating Shaft Motion Detector (Zero Speed Switch):

.1 A motion detector, of the under-speed alarm type, for mounting on the unit shall be provided by the manufacturer. It must stop the drive when the equipment has either discontinued rotating or slowed down to a point that the unit is no longer operating efficiently.

.2 New Motion Sensor for the conveyor shall be provided/incorporated within the unit and by the manufacturer as follows.

.1 Milltronics MFA-4P motion controller supplied in a windowed polycarbonate NEMA 4X enclosure to be mounted in a non-hazardous area.

.2 Milltronics XPP-5 Class 1, Div. 1 motion probe with an integral, factory sealed 10 meter cable, suitable for use in a classified location for field mounting to the conveyor unit including sensor mounting bracket.

.4 Washer Compactor:

.1 Compactor Screw:

.1 The nominal screw diameter shall be adapted to the application requirements & manufacturer recommendations / responsibility. Minimum screw diameter, however, shall be 180 mm.

.1 Screw material shall be:

.1 Special abrasion resistant micro-allow and Hardox plate.

.2 The flight thickness of the screw shall range from 10 mm to 12.7 mm in the drainage section and end with a thickness of a minimum of 20 mm in the dewatering / compaction section. The leading face of the last flight section shall be provided with hard facing material such as Hardox with a Brinell Hardness of 400.

.3 The screw shall be welded to a shaft to eliminate the negative effects of stress and shall avoid distortion.

.4 If required, a wiper blade made of leather, polyurethane or a nylon brush shall be fastened to the periphery of each flight in the inlet drainage section via an easy-to-use bolt-on retaining assembly.

.2 Screw Housing:

.1 The screw housing shall be formed from a steel plate into a tube.

.1 The tube shall have a top opening & 90 degree side-wall inlet chute to allow screenings into the compactor.

.2 Guide elements / wear bars shall be fitted inside the compacting section to prevent the screenings from plugging the housing. Wear bars shall be made of Hardox with a Brinell of 400. Stainless steel wear bars are not acceptable.

.3 The lower section of the housing shall be provided with holes. These openings shall allow the water to drain freely and shall be designed to eliminate clogging.

.3 Collecting Trough / Outer Housing:

.1 The collecting trough / outer housing shall be made of formed steel sheet.

.1 It shall be designed to completely enclose the screw housing and shall be equipped with a minimum 75 mm drain to each side of the unit.

.2 The collecting trough shall be fitted with two lateral inspection ports on each side having dimensions of 75 mm x 500 mm for occasional maintenance purposes or shall be accessible from a top quick-release cover.

.3 Interior corners of the trough to be designed to eliminate buildup of material and for ease of cleaning.

.4 The supporting trough end plates of the compactor shall be firmly anchored to the operating floor. Anchors shall be supplied and installed by the contractor. The trough end plates shall be equipped with integrated lifting lugs.

.4 Inlet Hopper:

.1 The inlet hopper shall be made of steel sheet.

.1 It shall be bolted on the collecting trough over the screw housing top opening.

.2 The sidewall shall be inclined at 90° from the horizontal axis to prevent screenings build up on the hopper walls.

.3 Hopper must be provided with a protective bolted cover to protect operators from injury and an easily-removable inspection cover with handle. Inspection port shall include a grated protection grid for operator safety.

.5 Washing & Flushing System:

.1 The screenings washing system shall be integrated within the screw housing.

.1 The washing system shall be designed to clean the collected screenings material in the washing section. This area located prior to the dewatering / compaction section is equipped with a screenings washing system.

.2 A washing/flushing manifold with 360 degree spray nozzles shall be installed in the collecting trough on top of the screw housing dewatering / compaction section to clear any accumulation of material that may be present around the screw housing and in the collecting trough by flushing them to the drain.

.3 The following components will be supplied with each unit to control the wash water:

.1 Main washing system line

.1 One (1) full port manual ball valve in NPT(F) diameter as recommended by manufacturer.

.2 One (1) “Y” strainer in NPT(F) diameter as recommended by manufacturer.

.2 Washing Zone

.1 One (1) manual full port ball valve in NPT(F) diameter as recommended by manufacturer.

.2 One (1) electrically actuated (solenoid) Class 1, Div. 1, ANSI 316L full port valve NPT(F) diameter as recommended by manufacturer.

.3 Compaction / Drain Flushing Zone

.1 One (1) manual ball full port valve in NPT(F) diameter as recommended by manufacturer.

.2 One (1) electrically actuated (solenoid) Class 1, Div. 1, ANSI 316L full port valve NPT(F) diameter as recommended by manufacturer.

.6 Discharge / Compaction Tube:

.1 The discharge / compaction tube shall be made of standard elbows and rolled steel plate.

.1 It shall be flanged and bolted at the outlet end of the compaction section. The length and inclination shall be per manufacturer recommendations and shall conform to the desired target discharge point indicated on the contract drawings.

.2 It shall be designed to avoid jamming with compacted screenings.

.7 Roller Bearing Housing:

.1 The roller bearing housing shall be totally enclosed and grease-filled. It shall include two (2) roller bearings to limit radial and axial loads from the screw.

.1 The bearing assembly shall guide and support the screw shaft to provide a minimal gap between the screw flight and the housing to ensure proper cleaning of the drainage section. It shall also limit the load on the screw housing to minimize the friction at any time during normal operation.

.2 The housing shall be isolated from the screw housing by means of oil seals. These seals shall provide efficient protection against water penetration into the bearing housing and against oil leaks. The assembly shall be designed for heavy-duty service.

.3 Other radial and axial load protection designs shall also be considered. The manufacturer shall describe the design and provide installation evidence of long-term reliable and low-maintenance service.

.8 Motor & Drive Unit:

.1 The main drive shaft shall be driven by means of a gear reducer and motor. The gear motor shall not be overloaded under normal operating conditions and shall be designed for heavy duty 24 hours per day service duty.

.1 The motor shall have an external protection to meet the local Class 1, Div. 1, Group D explosion-proof environmental conditions. The motor shall also have external protection to meet the local environmental conditions (corrosion-protected).

.2 The motor shall be rated premium efficiency.

.3 The gear reducer shall be of the parallel-helical or helical bevel type. It shall include anti-friction bearings. Gears shall be made of hardened, heat treated forged steel as per AGMA standards. The gearing shall be oil lubricated. The gear reducers shall have an internal and external protection

to meet the local environmental conditions (corro-protected).

2.5 ELECTRICAL REQUIREMENTS

.1 Incoming power available at site:

.1 Main three (3) Phase Power Feed: 600V, 3 Phase, 60 Hz.

.2 Single Phase Control Power Feed: 120V, 1 Phase, 60 Hz

.2 General:

.1 Refer to specification section 26 05 01 for additional requirements.

.2 If transformers are required to modify the 600V feed, the Supplier is to provide. Transformer(s) must meet CSA Energy Efficiency requirements with low temperature rise, minimum K-Rating of 9, a minimum amp rating of 125% of maximum amp draw and be enclosed in a minimum NEMA 3R enclosure.

.3 The Screen System Main Control Panel enclosure shall be CSA approved type epoxy-paint mild steel enclosure rated NEMA 4-12 for Non-Hazardous Area with lockable stainless steel enclosure. All internal components must be CSA and/or cUL certified.

.4 The local control HOA station enclosures shall be in cast aluminum and rated Class 1, Div. 1 for installation in the screening room adjacent to and within sight-line of the screening equipment. HOA stations to be provided by manufacturer for proper integration with the screening system main control panel. HOA stations shall include auxiliary contacts that report their status back to the screening system control panel and the facility PLC.

.5 Local Class 1, Div. 1 motor disconnect stations for installation within the screening room and within sight-line of the screening equipment to be supplied by others for proper integration with the screening system main control panel. The motor disconnects must include auxiliary contacts that report their status back to the screening system control panel and the facility PLC.

.6 Main supply breakers to screening system control panel to be supplied by others. Screening system supplier to indicate amperage rating of main supply breaker that shall be located in the MCC.

.7 The screen requires variable frequency drives

.8 All internal components shall be sealed as per latest local code and in respect of the classification environment.

.9 Protection must be provided against earth leakage (i.e. ground) faults.

.10 All electrical components must be “off-the shelf” items and available through local electrical distributors, not solely through the Supplier. Supplier to identify items which must be purchased from the Supplier to maintain the warranty.

.11 The main control panel shall be supplied in a plug-&-play arrangement and include all components for a fully functional system including starters, amperage protection and other items mandated in this specification.

.12 Equipment will be installed indoors and in the heated, dry environment of the control room.

.13 All wires and labels inside the panel must be labeled clearly and must match the details on the Control Panel drawings. Use full description where possible.

.14 Utilization of identical motors for the majority of equipment is preferred to minimize the number of motors required as spare.

2.6 CONTROL SYSTEM REQIUREMENTS

.1 Work Included:

.1 The work includes the complete supply, programming, commissioning, and operator training for a single control system/panel for the two (2) new screens, two (2) screenings transfer conveyor and two (2) wash press compactor at the subject facility. The screening system manufacturer shall furnish one (1) new remote main control panel, local HOA control stations & local motor disconnect stations for the fully automatic and manual operation of the six (6) pieces of mechanical equipment. All required components shall be included within the control panel including starters. No elements other than an appropriately-sized fused breaker shall be required at the MCC cell supplying power to the main screening system control panel. Although connected to the facility Scada system via a ‘Read’ & ‘Write’ communication protocol capability, the main screening system control panel will not depend on facility network functionality. The proposed control system shall enable a stand-alone functional system independent of facility network logic, signals or instrumentation.

.2 Refer to specifications 25 05 03 and 26 05 01 for additional requirements.

.2 Shop Drawings:

.1 The vendor shall supply detailed shop drawings for the controls system including annotated catalog cuts showing the selected model number for each proposed component, shop drawings, control schematics, loop diagrams, layout drawings, control panel layouts, control panel power distribution schematics, network diagrams, instrument list, I/O list, process control narrative, functional requirements specifications, instrument test forms, I/O module test forms, PLC system commissioning checklist, design calculations and studies.

.3 General:

The proposed main panel shall have the following minimum characteristics, components, and functionality and will provide for a fully-functioning fine screening system:

.1 The control system shall be pre-wired and pre-programmed to monitor process variables and initiate all process functions required, including closing and positioning of valves, and any other actions necessary to conduct the operation and maintenance of the complete screening, transport and screenings debris treatment system;

.2 CSA-approved NEMA 4-12 painted steel enclosure for indoor installation in an adjacent non-classified room. Minimum dimensions of the control panel enclosure shall provide for ample room for component layout and heat dissipation. Internal layout drawing of proposed control panel to be provided with preselection proposal for evaluation;

.3 NEMA 4X fused operating handle disconnect switch, main processing unit (PLC), the required input/output (I/O) cards, all cable, hardware, I/O power supplies, transformers, cooling/ventilation and any other equipment that is required to perform the control operations in automatic and manual modes.

.4 Supply all components required to eliminate any detrimental effects of supply voltage harmonic distortion, ripple, or high voltage DC spikes and to maintain satisfactory operation of the equipment (ex. surge suppression). A constant voltage transformer shall be supplied within the control panel that shall supply power to the PLC and its related equipment.

.5 One (1) Allen-Bradley / CompactLogix with Ethernet connectivity and ready for connection to the plant PLC/SCADA; complete data exchange table & HMI screen .jpg files to be provided to client by screening system manufacturer for integration with the plant SCADA;

.6 Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.7 The screening system PLC shall be capable of bi-directional communication with the plant wide SCADA control system (by Others) by means of an Ethernet/IP protocol. Process monitoring, alarm notification, and remote control shall be possible from the plant wide SCADA control system.

.8 One (1) x 12-inch color Allen Bradley model Panel View Plus 7.

.9 One (1) Managed Ethernet switch with a minimum of 5 ports;

.10 Uninterruptible Power Supply (UPS):

.1 All control panels having a PLC, I/O rack, and/or data communications equipment shall be fed power from a UPS. This includes control panels supplied with packaged systems.

.2 The UPS shall provide uninterrupted power to, at minimum, the PLC/RTU, its I/O and field instruments.

.3 The UPS shall be sized to ensure the control panel continues to perform communications, data manipulation, calculations, monitoring and process data archiving for a minimum of 20 minutes following the loss of supply power.

.4 When sizing the UPS, all critical loads shall be identified, and power calculations shall be provided. Provide additional battery cabinets to allow for load/time requirements if necessary.

.5 Install the UPS in a control panel. The UPS shall not block access to any panel mounted equipment.

.11 CSA Allen-Bradley Powerflex reversible VFDs for the two (2) fine screen brush and belt drive systems;

.12 For the conveyor & the wash press compactor: full voltage reversing 5 Hp minimum 600V/60/3 NEMA rated motor starters for the two (2) fine screens, one (1) conveyor & the one (1) wash press including electronic overload relay installed inside the control panel;

.13 Amperage protection integrated into VFDs for the screen drives and, for the soft starters, true torque detectors reporting real-time percentage of torque and preinstalled within the main screening system control panel;

.14 For the conveyor & the wash press compactor: current transformers (CT) reporting real-time amperage.

.15 For all equipment: additional thermal overload protection in addition to electronic torque / amperage protection.

.16 The panel door shall include the following minimum components/features: main disconnect switch (lockable), motor lock-out switches and thermal resets, main push button E-Stop, alarm reset push button, white power on LED, red LED pilot lights for all motors "Fault" conditions, green LED pilot lights for all motors "Forward" and "Reverse" conditions, and yellow LED pilot lights indicating the operation of the wash press compactor solenoids.

.17 Provide a minimum of 100% spare fuses with a spare fuse holder mounted inside the panel.

.18 The PLC supplier’s recommended wiring practices shall be followed for the PLC and all associated components. The supplier shall furnish and install all necessary relays, pilot devices, or other components necessary to avoid dissipation of inductive currents into the input or output circuitry.

.19 Two (2) appropriately selected Siemens Milltronics Echomax XPS (or) Endress & Hauser Prosonic S ultrasonic level sensors (Class 1, Div. 1) installed upstream/downstream of each of the two (2) fine step screens (total of 4 sensors) including corresponding transmitters installed on wall next to main control panel or inside main control panel (total of 2 transmitters); each sensor to include mounting bracket (or) stilling tubes and corresponding bolts for mounting within channel or facility’s grating (or) checker plate material.

.20 A total of two (2) high water level HWL float switches (NEMA-7) w/ mounting bracket & 10 m of factor-sealed cable; Class 1, Div. 1; one for each screen.

.21 The controls package shall include final copies of the PLC & HMI program on a USB key and a user license granted to the Owner. The vendor will also be required to provide fully documented ladder logic in print form.

.22 PLC & HMI programming shall provide the following features as part of the controls offering:

.1 Enable the adjustment of every aspect of the control narrative values for each piece of equipment for optimization that will significantly diminish electrical and wash water usage and runtimes/mechanical wear-and-tear;
.2 Reporting of all real-time equipment statuses, timer values, timer setpoints, upstream & downstream liquid levels, calculated differential values, and torque or amperage values for each piece of equipment;
.3 HMI will have password protection in order to ensure a tamper-proof interface.

.23 Heat dissipation calculations for the proposed control panel as required with the preselection proposal. Non-ventilated Panels: Design to adequately dissipate heat from equipment mounted inside panel or on panel. Alternatively furnish refrigeration cooling system for Control Panels with supply voltages greater than 120 VAC.

.24 Regular & high capacity wash press modes.

.25 Supplier of each product stating that it is a current product and that it will be supported (spare parts, software drivers, service, etc.) for a period of not less than five (5) years from the date of purchase. Submit confirmation with Shop Drawings.

.4 Anticipated Sequence Of Operation

.1 Screens

.1 Automatic Mode

.1 Screens: The proposed screens shall run in automatic mode in response to upstream and differential levels. The manufacturer shall include a complete control narrative description with the preselection proposal including rationales supporting the proposed operational philosophy for review and evaluation. This sequence description shall describe how the respective system accommodates normal and high flow conditions and any other precautionary, self-managing back-up logic sequences that make the system more reliable and/or easier to operate including high torque/amperage and jamming protection.
.2 Conveyor & Washer Compactor: The proposed transport & screenings treatment equipment shall run in automatic mode in response to material capture volumes of the screening equipment. The manufacturer shall include a complete control narrative description with the preselection

proposal including rationales supporting the proposed operational philosophy for review and evaluation. This sequence description shall describe how the respective system accommodates normal and high flow conditions and any other precautionary, self-managing back-up logic sequences that make the system more reliable and/or easier to operate including high torque/amperage and jamming protection.

.2 Manual Mode:

.1 Screens, Conveyor & Washer Compactor: The proposed screening, transport & screenings treatment equipment shall be able to be run in manual mode. Each piece of equipment shall be able to be run from a local HOA station in either forward or reverse while still being protected by thermal overload equipment located within the screening system main control panel.

2.7 LOCAL CONTROL STATIONS

.1 Fine Screens, Conveyor & Washer Compactor

.1 Each unit shall be supplied with a local control station located near and, ideally, within sight-line of the respective the unit. The following local HOA stations shall be provided as part of the proposed control system. The HOA stations shall include:

.1 “HAND / OFF / AUTO” selector switch
.2 "FORWARD / OFF / REVERSE" selector switch c/w spring loaded return from “REVERSE” to “OFF” position
.3 “EMERGENCY STOP” mushroom push button
.4 A Class 1, Div. 1-rated cast aluminum enclosure
.5 A design that includes auxiliary contact signal(s) back to the main control panel indicating On/Off status.
.6 Buttons & selectors to be 30mm dia. Class 1, Div. 1; Allen Bradley or approved alternate.

.2 When manually operated in LOCAL mode, all automatic operations of the equipment are de-activated. Manual operation of the equipment requires an operator at direct proximity of the equipment at all time.

2.8 SPARE PARTS

.1 The following spare parts and safety equipment to be supplied at each facility (Supplier to advise, if and how their spare parts list differs from the below.):

.2 For Fine Screens – Perforated Plate Type:

.1 One (1) Rotating Brush

.2 10% of the Filtering Elements for one Screen

.3 One (1) Bottom Brush

.4 One (1) set of Bottom Sprockets with stud shaft and Nylatron Sleeve

.5 One (1) complete Chain Link Set

.6 One (1) Brush Motor

.7 One (1) Screen Motor

.3 For Fine Screens – Step Screen Type:

.1 One (1) complete set of high load sleeve bushings

.2 One ((1) set of bottom stub shafts (total of 4)

.3 Six (6) deflector plate mounting kits

.4 One Hundred (100) UHMW inter-spacers

.5 One (1) Screen Motor

.4 For each Conveyor

.1 One (1) Complete Set of UHMW Wear Liners delivered in retaining cradles that maintain the U-shape of the liners while in storage.

.5 For Washer Compactor

.1 One (1) Complete Set of Screw Leathers with Hardware, One (1) Complete Set of Polyurethane Wipers w/ Hardware or One (1) Bolt-On Nylon Brush as per the proposed wash press design

.2 One (1) Complete Set of Anti-Directional Wear Bars and, if required, mounting hardware

.3 One (1) Complete Bearing Box Sealing Kit

.4 One (1) Common Conveyor/Compactor Motor

.5 Others – As recommended for use within warranty period (e.g. oil, auto greasers).

.6 Any special proprietary tools.

PART 3 EXECUTION

3.1 PROTECTION FOR SHIPPING

.1 Adequately protect all equipment for shipment to the site and during unloading and storage at the site

3.2 EQUIPMENT DELIVERY AND INSTALLATION VERIFICATION

.1 Delivery of Equipment: The Supplier shall coordinate the date of major equipment delivery close to the time the equipment will be installed. The General Contractor will be responsible for receiving, off-loading and placing into storage all equipment at the site related to this Procurement Contract.

3.3 INSTALLATION

.1 Lifting lugs: Equipment or components over 45 kg (100 pounds) in weight shall be provided with lifting lugs.

.2 Screen assemblies and equipment shall be installed in accordance with approved procedures, by the general contractor, submitted with the shop drawings and as indicated, and in strict compliance with the manufacturer's recommendations, unless otherwise approved.

.3 Inspection, testing, start-up and field adjustment shall be as indicated.

3.4 MANUFACTURER'S SERVICES

.1 Provide written instruction and information to the General Contractor for the installation of the equipment.

.2 Respond to queries during construction related to installation and commissioning of the supplied equipment.

.3 Liaise with the General Contractor to identify milestones for inspection.

.4 The equipment shall be installed under the supervision of a representative of the Supplier who shall also instruct the Owner's personnel in these matters. Provide this service priced (including all expenses) as part of the preselection proposal.

.5 The Supplier shall provide start-up reports covering installation inspection and start up activities.

.6 Manufacturer's Representative, shall be a skilled factory-trained technician, with references for a least 10 other complete installations, to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC, testing of Scada signals with the facility SCADA designer and training of the operators in starting-up and testing the equipment and systems. Present at site or classroom designated by Owner, for minimum 8 hour on-site person days listed below, travel time excluded:

.1 2 person days for installation assistance and inspection; 2 trips.

.2 5 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.

.7 After installation supervision and field testing services, the Supplier shall submit to the owners representative, a certification letter certifying that the equipment was installed per the manufacturer's recommendations.

.8 Bear all costs of any nature required because of failure of any of the units including performance.

.9 As often as it takes, re-test, adjust and generally apply technical expertise and materials to solve any performance or equipment problems or deficiencies that

may exist in the installed equipment, at no additional cost to this supply contract. Five failed attempts shall be grounds for rejection of the equipment.

.10 The Supplier shall provide operator training to all required plant personnel.

.11 Provide four (4) copies of system operations and maintenance manuals to the Engineer for each piece of equipment supplied. Manuals shall be bound in three ring, hard cover, type binders. Provide an electronic copy in PDF or MS Word format.

.12 All costs, including travel, lodging, meals and incidentals for Supplier service shall be included in the bid form.

PART 4 PRESELECTION SHOP DRAWING SUBMITTAL REQUIREMENTS

4.1 INFORMATION REQUIRED

.1 The Pre-selected supplier shall provide the following:

.1 Installation Shop Drawings including the supplier's certification and engineering seal.

.2 Installation Shop Drawings shall be provided in the 2024 or more current versions of Revit, Solidworks, or Step (.stp) file digital platforms for use during the detailed design.

.3 Installation Instructions specific to the project.

.4 Operations and Maintenance Manuals specific to the project.

.2 Distribution of supplied information:

.1 Upon notification of the of award, the successful proponent shall prepare and submit, within the time period identified in the submittal forms, the above listed documents to the owners representative for review and integration in the detailed design. The successful supplier shall provide a single technical contact person who will be available to provided detailed design recommendations.

END OF SECTION

46 53 00 Vortex Grit Removal and Classifier

PART 1 GENERAL

1.1 SUMMARY

.1 This specification covers the general features of design, materials, manufacture, arrangement, shipment and commissioning of a vortex grit removal system complete with two vortex grit removal systems, grit slurry pumps and a grit classifier.

.2 Any material or equipment that is not specifically mentioned or included in this specification but is necessary to ensure a fully operational unit is to be supplied with the equipment and included in the quotation. Additional features may be offered and will be considered as "value added offerings" during the evaluation. Consideration must be given to the environmental operating conditions of the Napanee, ON location, including both the climatic environment and operating conditions. We would like to consider both a single vortex unit and a fully redundant vortex unit operation (2 vortex units).

1.2 DESIGN

.1 The design of the vortex grit removal tanks is for installation within concrete, circular grit tanks to be contained within a heated building.

.2 The Vortex Grit Removal units are to be designed in-parallel, with full redundancy, each unit providing 100% of the following design basis:

.1	Quantity:	Two (2)
.2	Minimum Flow:	2,000 m^3/d
.3	Average Daily Flow:	11,500 m^3/d
.4	Peak Instantaneous Flow:	490 L/s
.5	Grit Characteristics:	Typical of municipal wastewater
.6	Grit Density based on SES:	1,400 kg/m^3
.7	Design for the following removal rates:	
	.1 95% grit with diameter larger than 105 micron (140 mesh)	
.8	Electrical Classification:	Class 1 Division 1, Group D

.9 Vortex Grit units incorporating mechanical scraper mechanisms are not to be provided.

.10 Tank inlet and outlet to be as shown on Contract Drawings.

.3 Grit Slurry Pumps

.1	Quantity:	Two (2) Self Priming
.2	Design Capacity:	12 – 18 L/s
.3	Material to Convey:	Grit Slurry from Vortex
.4	Classification:	Class 1 Division 1, Group D

.4 Grit Classifier and Cyclone

.1	Quantity of Grit Classifier	One (1)
.2	Quantity of Grit Cyclones:	One (1) or Two (2)

.3 Inlet Feed Rate: To match grit pump (per cyclone)
.4 Material to Convey: Grit Slurry from Vortex
.5 Design for the following removal rate:

.1 Match the Vortex removal rates identified in 1.2.2.7.
.2 The underflow grit shall, on a weighted average, contain no more than 15% by weight of unattached organic material.

.6 Classification: Class 1 Division 1, Group D

.5 All electrical panels to have a completed arc flash analysis and be equipped with arc flash warning labels and arc flash information in accordance with CSA C22.1 – Canadian Electrical Code and CSA Standard Z462 – Workplace Electrical Safety.

.6 The Supplier shall be responsible to ensure and guarantee that all the specified equipment will be:

.1 Designed, fabricated, and assembled to provide reliable and efficient operation.
.2 CSA Approved (where applicable) and comply with any Codes and Standards referred to in this Specification.
.3 Of new material which is of current manufacture and proven in the field for the duty required.
.4 Correctly described on the Form of Quotation.

1.3 APPROVED MANUFACTURERS

.1 The equipment shall be the product of a company regularly engaged in the design, manufacture and supply of this type of equipment and whose equipment is of a design which has been in satisfactory service under similar conditions for not less than five (5) years. Current references for a minimum of three (3) Ontario installations are required.

1.4 ALTERNATIVES

.1 If a bidder wishes to offer an alternative proposal, in addition to the proposal complying with this specification, each such alternative must be clearly set out and the related adjustment shall be stated for each alternative. Cost savings for combining the Vortex supply with the Fine Screening equipment will be considered.

1.5 DOCUMENTS

.1 Read this Specification in conjunction with the following documents:

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems
.2 26 05 01 Electrical requirements for Packaged Systems

.2 RFP Documentations
.3 Submission Forms
.4 Form of Proposal

.5 All information requested on that form shall be submitted in addition to the bidder`s supporting information for the quotation to receive full consideration.

.6 General Terms and Conditions for Preselected Equipment, shall be the governing terms and conditions accepted in the Form of Proposal by the Supplier.

.2 This specification together with the above-mentioned documents and any further documents issued therewith by the Engineer comprise the quotation documents.

1.6 SYSTEM DESCRIPTION

.1 It is the intent of these Specifications to specify a complete and operating system that will perform its intended function(s). All devices, fittings, and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified.

.2 All drives, motors, instrumentation etc. supplied shall be designed for a Class 1, Division I, Group D environment.

1.7 STANDARDS

.1 All equipment and materials in accordance with the latest issue of all appropriate Standards and Codes, including, but not limited to the following:

.1 AFBMA - Load Ratings and Fatigue Life for Ball Bearings
.2 AGMA – American Gear Manufacturer’s Association
.3 ANSI – American National Standards Institute
.4 ASME – American Society of Mechanical Engineers
.5 ASTM – American Society for Testing and Materials
.6 CEC – Canadian Electrical Code
.7 CEMA – Canadian Electrical Manufacturers Association
.8 CSA – Canadian Standards Association
.9 CWB – Canadian Welding Bureau
.10 HIS – Hydraulic Institute Standards
.11 IEC – International Electrotechnical Commission
.12 NEC - National Electrical Code
.13 NEMA – National Electrical Manufacturer’s Association
.14 NFPA – National Fire Protection Association
.15 NFPA – National Fluid Power Association
.16 OSHA – Occupational Safety and Health Administration
.17 SSPC – Steel Structures Painting Council
.18 UL (cUL) – Underwriter’s Laboratories Inc.

1.8 WARRANTY AND GUANRANTEE

.1 The supplier shall warranty the products and workmanship of the equipment delivered to site. The supplier shall guarantee that the system can perform under the conditions stated and provide supporting documentation of their experience.

.2 Guarantee and warranty all components of the scope of supply for the greater of either 24 months after the date when the equipment achieves satisfactory

performance, established by through the terms of the General Contractor's Contract, or until the expiry of a period of 36 months after the date of completion of delivery of such equipment to the site, whichever period terminates first.

PART 2 PRODUCTS

2.1 GENERAL

.1 Each piece of equipment specified shall be designed for continuous operation, 24 hours per day, 7 days per week.

.2 All housings, structural components, troughs, hoppers, chutes, manifolds, nozzles, valve bodies, ducts, bases, anchors, and fasteners must be Type 316L stainless steel for all welded components and 316 stainless steel for all other components. All stainless-steel main components to be treated with full submersion passivation.

.3 Each unit must be factory assembled and tested prior to delivery to site and ready for installation.

.4 Furnish all mechanical and electrical equipment and instruments as required to perform the functions specified and described within this document.

.5 All equipment is to be furnished by or through a single supplier to ensure coordination and compatibility of equipment.

.6 The equipment must be capable of mode of operation adjustments and post power failure start-up with no additional effort by the operator.

.7 Provide sufficient quantity of grease or oil of the correct grade necessary for the initial start-up, operation of the equipment and for the extend of the warranty period. Where auto-greasers are incorporated into the supply, they are to be suitable for 12-month operation without replacement.

.8 On-site power is available in 600 V / 3 Phase / 60 Hz.

.9 Manufacturer shall provide vortex grit equipment suitable for installation in concrete tanks, grit pumps, motors, gear reducers, solenoid valves to control wash water flow, level elements and transmitters, grit cyclones, grit classifier, controls, control panels, and lifting attachments, as a complete integrated package to ensure proper coordination, compatibility, and operation of the system.

2.2 VORTEX GRIT REMOVAL SYSTEMS

.1 Design

.1 Options for One (1) or Two (2) vortex grit removal tanks, in concrete, designed to remove grit from municipal wastewater are to be installed downstream of 2 - 6mm fine screens.

.2 Grit that settles in the vortex grit removal tanks will be transferred to the cyclones ahead of the grit classifier via grit slurry pumps.

.3 The grit separation/classification units shall be characterized by a dominant, strong free vortex which utilizes centrifugal and gravitational

forces and secondary boundary layer velocities for the separation, collection, and classification of grit from the inflow.

.4 Each grit tank shall contain a grit hopper for the capture of settled grit and will be equipped with a grit washing mechanism and grit extraction pipe to the grit slurry pumps.

.5 All maintenance shall be completed from the operating floor.

.6 Grit washing mechanism

.1 Each tank shall be supplied with a minimum one (1) water scour system complete with a minimum 50mm 316 full port stainless steel solenoid valve and one (1) manual 50mm 316 SS full port isolation ball valve, wye strainer, complete with flushing valve, to be supplied to the base of each vortex grit removal tank. Sizing of the scour water lines shall be per the manufacturer's requirements to achieve the performance criteria; valve sizing shall match the required line size. The flow rate for the water scour system shall be identified by the supplier in the submission, the line pressure to each tank provided external to the manufacturers supply shall be a maximum of 375 kpa (55 psi(g)). Should a higher pressure be required, it should be identified in the submittal. Pressure regulator to be provided by supplier.

.7 Each grit tank to be equipped with a manual 316 Stainless Steel isolation slide gate on both the inlet and outlet channels, supplied by others.

2.3 GRIT PUMPS:

.1 Two (2) grit slurry pumps as required to transport grit slurry from the grit tank hoppers to the grit cyclones on the grit classifier. All pumps shall be self-priming.

.2 Provide pump with the following construction:

.1 Volute

.1 Casing shall be made of gray iron No. 30 with internal volute scroll. Casing shall incorporate mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance. A fill port of 3-in/(90 mm) diameter minimum shall be supplied for ease of filling the pump casing. A casing drain of at least 1-1/4 (32 mm) in NPT shall be provided to insure complete and rapid draining. Units shall include G-R Hard Iron Impeller, Seal Plate and wear plate. Casing shall include Gray Iron 30 Suction and Discharge Spool Flanges to ANSI 150#.

.2 Impeller: Semi Open Type, Two Vane Impeller: hardened iron, dynamically balanced, double-shrouded non clogging design. The impeller shall be capable of handling solids (63.5 mm dia.), fibrous materials, heavy sludge, and other matter found in wastewater.

.3 Cover Plate: Pumps must be equipped with a lightweight removable cover plate, allowing complete access to the pump interior to permit the clearance of stoppages and to provide simple access for services and repair without disturbing suction or discharge piping. Replacement of wear plate, impeller, and seal shall be

accomplished through the removable cover plate. In consideration for safety, a pressure relief valve shall be supplied as standard equipment.

.4 Rotating Assembly: Entire rotating assembly, which includes bearings, shaft, seal and impeller, shall be removed as a unit without disturbing pump casing or piping. Means shall be provided for external adjustment of the impeller to the wear plate.

.2 Replaceable Wear Plate: “Pumps shall also be fitted with a replaceable wear plate secured to the cover plate by studs and nuts and made of G-R hardened iron.

.3 Mechanical Seal:

.1 Tandem mechanical shaft seal system consisting of two (2) independent seal assemblies. The seals shall operate in an oil reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal shall have one stationary and one rotating tungsten carbide deal. Seals shall not be ceramic/carbon.

.2 The mechanical seal shall seal pump shaft against leakage. Rotating and stationary seal faces shall be tungsten titanium carbide, cage and spring shall be stainless steel, and elastomers shall be Viton.

.3 Each seal face must be ground to produce a flatness tolerance not to exceed three light bands, as measured by on optical flat and monochromatic light. To insure steel faces are in full contact at all times, stationary seal seat shall be double floating and self-aligning during periods of shock loads that will cause deflection, vibration and axial or radial movements of the pump shaft.

.4 The Mechanical seal shall be installed within a seal housing adjacent to an oil filled reservoir in the pump pedestal, the oil serving as both lubricating and cooling media.

.4 Protection

.1 Three thermal set to open at 125 degrees Celsius embedded in the stator lead coils to monitor the temperature of each phase winding. Thermal switches used on conjunction with and supplemental to external motor overload protection.

.5 Bearings:

.1 Radial/Thrust Bearings: Open single row ball. Motor bearing shall be permanently grease lubricated. Bearings to compensate for axial and radial thrust.

.6 Cooling System

.1 Cool by surrounding environment or pumped media. The pump shall be capable of operating dry for external periods.

.7 Standard of Acceptance:

.1 Gorman Rupp T4A

.8 Drive Unit:

.1 Pump motors shall be as indicated, NEMA design B with cast iron frame with copper windings, induction type, with normal starting torque and low starting current characteristics, suitable for continuous service. The motors shall not overload at the design condition or at any head in the operating range as specified.

.2 Provide motors with 3-wire RTD PT100, one per phase complete with dedicated RTD junction box mounted on the motor for remote monitoring of motor winding temperature.

.3 Motors are to be premium efficiency.

.4 Motors will be fed from Starters (provided by others) and are to be NEMA MG1 Part 31 certified. Shop drawings are motor labels are to indicate compliance with NEMA MG1 Part 31. Inverter Duty statements will not be accepted.

.9 Drive Transmission

.1 Power to pumps transmitted via direct drive or V-belt drive assemblies (preference shall be to a direct drive arrangement). The sheave/belt combination shall provide the speed ratio needed to achieve the required pump operating conditions.

.2 Each drive assembly shall utilize V-belts as indicated providing a minimum combined safety factor of 1.5. Single belt drives or system with a safety factor of less than 1.5 are not acceptable. Computation of safety factors shall be based on performance data published by the drive manufacturer.

.3 The pump manufacturer shall submit power transmission calculations which document the following:

.1 Ratio of pump/motor speed.
.2 Pitch diameter of driver and driven sheaves.
.3 Number of belts required per drive.
.4 Theoretical horsepower transmitted per belt, based on vendor's data.
.5 Center distance between pump and motor shafts.
.6 Arc-length correction factor applied to theoretical horsepower transmitted.
.7 Service factor applied to established design horsepower.
.8 Safety factor ratio of power transmitted/brake horsepower

2.4 GRIT CLASSIFER

.1 One (1) grit classifier with two (2) hydro cyclones to separate grit from a grit slurry pumped from the vortex grit tanks.

.2 Grit classifier shall consist of a grit settling tank with depth controlled by adjustable weir, spiral, shaftless screw conveyor located above the maximum water level, sealed cover, 200mm diameter duct connection to odour control, instrumentation, and drive assembly for spiral conveyor.

.3 Grit removal from the slurry flow stream to the classifier to be by gravity and/or centrifugal force. Liquid to be decanted to the process drain system ad settled grit removed and deposited in a waste bin.

.4 Grit removal shall include grit washing to reduce volatile organic component discharge with grit to less than 15% of material by weight. Grit washing system to include 2-piece stainless steel ball isolation valve, rated, 316 SS, slow closing ASCO solenoid valve (120 V), and wye strainer complete with flushing valve.

.5 All wetted components (trough, grit settling tank, weir, discharge chute, classifier support structure, screw assembly, cover, piping, nozzles, hardware and fasteners) are to be 316L Stainless Steel. U-Shaped trough wear 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 not requiring bolts, screws, rivets or glue. Each section to be approximately 1.2m max. length. Liners to be pre-installed in the classifier.

.6 Hopper and grit conveyor channel to be fabricated from minimum 6mm plate.

.7 Provide floor-mounting plates to permit final leveling by grouting and anchoring.

.8 All enclosures to include hinged access openings, complete with quick release latches.

.9 Shaftless Spiral Screw conveyor to be double ribbon, 66% pitch, helical conveyor with a minimum outside diameter of 215mm. Pillow block or similar end bearing shall be provided with auto-lubrication device. The Spiral screw shall be constructed of an abrasion resistant micro alloy steel with a nominal 220 Brinell Hardness.

.10 Drive shall be direct-connected, TEXP, Class I, Division I, 600V, 3 phase, 60 Hz motor. Motor shall be designed for starting and continuously operating conveyor screw when 50% of through is full without overloading.

.11 Provide a NEMA 7X motion detector for the grit classifier screw conveyor to sense the rotation of the screw. Amplified shall be mounted in a Type 304 stainless steel EEMAC 7X enclosure with hinged access cover and be capable of adjusting set point over full range of 2 to 3,000 rpm within repeatability of +/- 1% of the selected range and also be capable of adjusting the time delay between 0 and 60 seconds to allow equipment to accelerate to normal operating speed on start-up. Motion detector to be non-contacting type. Probe to be TEXP explosion proof with a minimum 5 m cable length, CSA approved suitable for Class 1 Division 1 environments. Provide two (2) dry contacts rated to a minimum of 15 Amps, 125 VAC: one contact for use in the conveyor interlock control circuit within the remote starter and one for remote indication of switch status to the main controlling PLC.

.12 Spray wash system designed to wash grit prior to discharge to bin while grit classifier is operating. Spray wash system shall consist of stainless-steel spray header, nozzles, and ball valves, all components shall be constructed of 316 stainless steel. A NC 316 stainless steel EEMAC 7X solenoid valve suitable for 120V, 1 phase, 60 Hz power supply shall control the water flow rate to the wash system. Size of the spray wash line and valve shall be sized by the manufacturer to ensure compliance with the performance criteria.

.13 Provide one (1) vibration type level switch for the grit classifier to detect a high-level condition within the classifier. Output shall be DPDT dry contact output wired, failsafe configurable with a 40mm ANSI B16.5 316L Flange, ECTFE coated. Suitable for installation within a Class I, Division I area.

.14 Grit classifier shall be equipment with a cable operated safety stop switch, rated for installation within a Class I Division I area.

2.5 ELECTRICAL REQUIREMENTS

.1 Incoming power available at site:

.1 Main three (3) Phase Power Feed: 600V, 3 Phase, 60 Hz.
.2 Single Phase Control Power Feed: 120V, 1 Phase, 60 Hz

.2 General:

.1 See also specifications:

.1 26 05 01 Electrical requirements for Packaged Systems

.2 If transformers are required to modify the 600V feed, the Supplier is to provide. Transformer(s) must meet CSA Energy Efficiency requirements with low temperature rise, minimum K-Rating of 9, a minimum amp rating of 125% of maximum amp draw and be enclosed in a minimum NEMA 3R enclosure.

.3 The Vortex Grit Main Control Panel enclosure shall be CSA approved type epoxy-paint mild steel enclosure rated NEMA 4-12 for Non-Hazardous Area with lockable stainless-steel enclosure. All internal components must be CSA and/or cUL certified.

.4 The local control HOA station enclosures shall be in cast aluminum and rated Class 1, Div. 1 for installation in the grit removal room adjacent to and within sightline of the grit equipment. HOA stations to be provided by manufacturer for proper integration with the grit system main control panel. HOA stations shall include auxiliary contacts that report their status back to the grit system control panel and the facility PLC.

.5 Local Class 1, Div. 1 motor disconnect stations for installation within the grit room and within sight-line of the grit equipment to be supplied by others for proper integration with the grit system main control panel. The motor disconnects must include auxiliary contacts that report their status back to the screening system control panel and the facility PLC.

.6 Main supply breakers to grit system control panel to be supplied by others. Grit system supplier to indicate amperage rating of main supply breaker that shall be located in the MCC.

.7 All internal components shall be sealed as per latest local code and in respect of the classification environment.

.8 Protection must be provided against earth leakage (i.e. ground) faults.

.9 All electrical components must be “off-the shelf” items and available through local electrical distributors, not solely through the Supplier. Supplier to identify items which must be purchased from the Supplier to maintain the warranty.

.10 The main control panel shall be supplied in a plug-&-play arrangement and include all components for a fully functional system including starters, amperage protection and other items mandated in this specification.
.11 Equipment will be installed indoors and in the heated, dry environment of the control room.
.12 All wires and labels inside the panel must be labeled clearly and must match the details on the Control Panel drawings. Use full description where possible.
.13 Utilization of identical motors for the majority of equipment is preferred to minimize the number of motors required as spare.

2.6 CONTROL SYSTEM

.1 General

.1 See also specifications:

.1 25 05 03 Programmable Controls for Packaged Systems

.2 Work Included:

.1 The work includes the complete supply, programming, commissioning, and operator training for a single control system/panel for the two (2) vortex grit systems, grit slurry pumps, and grit classifier.
.2 The grit system manufacturer shall furnish one (1) new remote main control panel, local HOA control stations & local motor disconnect stations for the fully automatic and manual operation of the five (5) pieces of mechanical equipment. All required components shall be included within the control panel including starters. No elements other than an appropriately sized fused breaker shall be required at the MCC cell supplying power to the main grit system control panel. Although connected to the facility Scada system via a 'Read' & 'Write' communication protocol capability, the main grit system control panel will not depend on facility network functionality. The proposed control system shall enable a stand-alone functional system independent of facility network logic, signals, or instrumentation.

.3 General:

.1 The control system shall be pre-wired and pre-programmed to monitor process variables and initiate all process functions required, including closing and positioning of valves, and any other actions necessary to conduct the operation and maintenance of the two (2) grit systems and grit classifier.
.2 CSA-approved NEMA 4-12 painted steel enclosure for indoor installation in an adjacent non-classified room. Minimum dimensions of the control panel enclosure shall provide for ample room for component layout and heat dissipation. Internal layout drawing of proposed control panel to be provided with preselection proposal for evaluation;
.3 NEMA 4X fused operating handle disconnect switch, main processing unit (PLC), the required input/output (I/O) cards, all cable, hardware, I/O power supplies, transformers, cooling/ventilation and any other equipment that is required to perform the control operations in automatic and manual modes.

.4 Supply all components required to eliminate any detrimental effects of supply voltage harmonic distortion, ripple, or high voltage DC spikes and to maintain satisfactory operation of the equipment (ex. surge suppression). A constant voltage transformer shall be supplied within the control panel that shall supply power to the PLC and its related equipment.

.5 One (1) Allen-Bradley Micrologix PLC (Model 1400) / CompactLogix Model TBD with Ethernet connectivity and ready for connection to the plant PLC/Scada; complete data exchange table & HMI screen Jpegs to be provided to client by screening system manufacturer;

.6 Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.7 The grit system PLC shall be capable of bi-directional communication with the plant wide SCADA control system (by Others) by means of an Ethernet/IP protocol. Process monitoring, alarm notification, and remote control shall be possible from the plant wide SCADA control system

.8 One (1) x 12-inch color Allen Bradley model Panel View Plus 7;

.9 One (1) Ethernet switch with a minimum of 5 ports; unmanaged;

.10 Uninterruptible Power Supply (UPS):

.1 All control panels having a PLC, I/O rack, and/or data communications equipment shall be fed power from a UPS. This includes control panels supplied with packaged systems.

.2 The UPS shall provide uninterrupted power to, at minimum, the PLC/RTU, its I/O and field instruments.

.3 The UPS shall be sized to ensure the control panel continues to perform communications, data manipulation, calculations, monitoring and process data archiving for a minimum of 20 minutes following the loss of supply power.

.4 When sizing the UPS, all critical loads shall be identified, and power calculations shall be provided. Provide additional battery cabinets to allow for load/time requirements if necessary.

.5 Install the UPS in a control panel. The UPS shall not block access to any panel mounted equipment.

.11 The PLC Supplier's recommended wiring practices shall be followed for the PLC and all associated components. The Supplier shall furnish and install all necessary relays, pilot devices, or other components necessary to avoid dissipation of inductive currents into the input or output circuitry.

.12 Resistor-capacitor networks shall be provided for each relay that interfaces with the PLC. The PLC shall be sized to provide at least 25 percent spare program memory. Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.13 Provide a minimum of 100% spare fuses with a spare fuse holder mounted inside the panel.

.14 The vendor will be required to provide fully documented ladder logic along with the actual PLC program (not the PLC programming software) on DVD.

.15 Supplier must provide the most recent versions of the PLC program following successful commissioning.

.16 Provide a written confirmation from the Supplier of each product stating that it is a current product and that it will be supported (spare parts, software

drivers, service, etc.) for a period of not less than Five (5) years from the date of purchase. Submit confirmation with Shop Drawings.

.17 The Control Panel shall display the following controls:

.1 Power disconnect switch (one per motor)
.2 E-stop push-button (one per motor)
.3 Water scour indicating light (one per tank)
.4 AUTO/MANUAL selector switch
.5 START/STOP push button for grit pumps (Remote Manual Mode)
.6 START/STOP/REVERSE push bottom for grit classifier (Remote Manual Mode)
.7 OPEN/CLOSE push button for spray wash water (one per tank) (Remote Manual Mode)
.8 General alarm RESET push button
.9 Operator Interface Terminal shall display

.1 General alarms
.2 Grit pump status: Running/Stopped/Fault/Enable
.3 Grit classifier status: Running/Reverse/Stopped/Fault/Enable and no-motion alarm
.4 Wash Water Solenoid Valve Status: Open/Closed
.5 Cycle time remaining and time remaining to next cycle

.4 Anticipated Sequence of Operation

.1 Vortex Grit Removal:

.1 Automatic Mode

.1 The paddles run continuously in the duty grit removal unit. The paddles in the standby unit are initiated manually by the operators.

.2 Cleaning Sequence

.1 The duration and frequency of the grit removal cycle will be adjustable in the provided control panel. Default settings will be to run for 20 minutes, 6 times per day.
.2 When grit is to be removed, the water scour, grit pumps and grit classifier will be initiated.

.5 Conveyors & Washer Compactors

.1 Supplier must provide the recommended Control Philosophy & Required Operating Parameters for programming in SCADA by Others:
.2 Controls Philosophy must include:

.1 Operation in Automatic Mode;
.2 Operation in Manual Mode;
.3 Required Thermal Protection;
.4 Required Jamming Protection;
.5 Alarm Monitoring requirements; and
.6 Any other details that are important for Operation & Maintenance.

2.7 LOCAL CONTROL STATIONS

.1 Grit Removal Units and Grit Classifier

.1 Each unit shall be supplied with a local control station located near the unit. Local Control Stations shall be suitable for installation within a Class I Division I area. The following components shall be assembled and pre-wired to identified terminal blocks.

.1 “HAND / OFF / AUTO” selector switch
.2 "FORWARD / OFF / REVERSE" selector switch c/w spring loaded return from “REVERSE” to “OFF” position
.3 “EMERGENCY STOP” Push button, pad-lockable

.2 When manually operated in LOCAL mode, all automatic operations of the equipment are de-activated. Manual operation of the equipment requires an operator at direct proximity of the equipment at all time.

2.8 SPARE PARTS

.1 The following spare parts and safety equipment to be supplied at each facility (Supplier to advise, if and how their spare parts list differs from the below.):

.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.

PART 3 EXECUTION

3.1 DELIVERY STORAGE AND HANDLING

A. All equipment shall be shipped completely assembled where possible. Large fabricated assemblies shall be shipped in sub-assemblies as large as practical from the point of view of moving them into and about the structures, and piece-marked to facilitate field erection.

B. The Supplier shall co-operate with the General Contractor in the matter of packaging, time of delivery and shipping.

C. The equipment and appurtenances shall be delivered to the Site of the work in a condition satisfactory to the Owner and any omissions, discrepancies, or damage evident on delivery shall be made good by the Supplier.

D. The General Contractor at the Site shall unload the Supplier’s equipment, sign the carrier's pro bill to indicate receipt of the required number of crates, packages, note any apparent shortages of or visible damage to such crates and packages and shall assume care and custody of the equipment. The Supplier shall furnish to the Contractor, lists showing the contents of the crates and packages available at the job site when delivery of the equipment and appurtenances is made. Within seven

(7) days after the date of delivery to the job site, the Contractor will notify the Supplier in writing of shortages or damage in the equipment delivered.

E. The Supplier shall supply the services of a competent, factory-trained technical representative to site during major equipment deliveries to ensure proper receiving, handling, storage, and completeness of shipped components.

3.2 EQUIPMENT DELIVERY AND INSTALLATION VERIFICATION

.1 Delivery of Equipment: The Supplier shall coordinate the date of major equipment delivery close to the time the equipment will be installed. The General Contractor will be responsible for receiving, off-loading, and placing into storage all equipment at the site related to this Procurement Contract.

3.3 INSTALLATION

.1 Lifting lugs: Equipment or components over 45 kg (100 pounds) in weight shall be provided with lifting lugs.

.2 Equipment shall be installed in accordance with approved procedures, by the general contractor, submitted with the shop drawings and as indicated, and in strict compliance with the manufacturer's recommendations, unless otherwise approved.

.3 Inspection, testing, start-up, and field adjustment shall be as indicated.

3.4 MANUFACTURER'S SERVICES

.1 Provide written instruction and information to the General Contractor for the installation of the equipment.

.2 Respond to queries during construction related to installation and commissioning of the supplied equipment.

.3 Liaise with the General Contractor to identify milestones for inspection.

.4 The equipment shall be installed under the supervision of a representative of the Supplier who shall also instruct the Owner's personnel in these matters. Provide this service priced (including all expenses) as part of this Contract as noted below.

.5 Provide a site visit comprising a minimum of 48 man-hours on site for each installation, scheduled by the General Contractor, at a time acceptable to the Owner, for a skilled factory-trained technician to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC and training of the operators in starting-up and testing the equipment and systems.

.6 The Supplier shall provide start-up reports covering installation inspection and start up activities.

.7 Manufacturer's Representative, shall be a skilled factory-trained technician, with references for a least 10 other complete installations, to make final adjustments, undertake performance testing assistance, conduct commissioning of the

equipment, programming of the PLC, testing of Scada signals with the facility SCADA designer and training of the operators in starting-up and testing the equipment and systems. Present at site or classroom designated by Owner, for minimum 8 hour on-site person days listed below, travel time excluded:

.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.

.8 After installation supervision and field-testing services, the Supplier shall submit to the owners representative, a certification letter certifying that the equipment was installed per the manufacturer's recommendations.

.9 Bear all costs of any nature required because of failure of any of the units including performance.

.10 As often as it takes, re-test, adjust and generally apply technical expertise and materials to solve any performance or equipment problems or deficiencies that may exist in the installed equipment, at no additional cost to this supply contract. Five failed attempts shall be grounds for rejection of the equipment.

.11 The Supplier shall provide operator training to all required plant personnel.

.12 Provide four (4) copies of system operations and maintenance manuals to the Engineer for each piece of equipment supplied. Manuals shall be bound in three ring, hard cover, type binders. Provide an electronic copy in PDF or MS Word format.

.13 All costs, including travel, lodging, meals, and incidentals for Supplier service shall be included in the bid form.

PART 4 PRESELECTION SUBMITTAL REQUIREMENTS

4.1 INFORMATION REQUIRED

.1 The Pre-selected supplier shall provide the following:

.1 Installation Shop Drawings including the supplier's certification and engineering seal.
.2 Installation Shop Drawings shall be provided in the 2022 or more current versions of Revit, Solidworks, or Step (.stp) file digital platforms for use during the detailed design.
.3 Installation Instructions specific to the project.
.4 Operations and Maintenance Manuals specific to the project.

.2 Distribution of supplied information:

.1 Upon notification of the of award, the successful proponent shall submit the above listed documents to the Engineer for review and integration in the

detailed design. The successful supplier shall provide a single technical contact person who will be available to provided detailed design recommendations.

END OF SECTION

46 63 00 Mechanical WAS Thickener

PART 1 GENERAL

1.1 SUMMARY

.1 This specification covers the general features of design, materials, manufacture, arrangement, shipment and commissioning of a two (2) rotary drum thickeners, including floc development tanks, auxiliary equipment, control panels and appurtenances to be used to thicken Waste Activated Sludge (WAS) prior to aerobic digestion.

.2 Any material or equipment that is not specifically mentioned or included in this specification but is necessary to ensure a fully operational unit is to be supplied with the equipment and included in the quotation. Additional features may be offered and will be considered as "value added offerings" during the evaluation.

1.2 PERFORMANCE REQUIREMENTS

.1 Each Waste Activated Sludge Thickener shall be capable of optimum performance for the following process conditions:

.1	Number of Units:	Two (2) units , fully redundant operation
.2	Operation Configuration	One (1) Duty / One (1) Standby
.3	WAS Feed Rate	2.0 – 8.0 L/s
.4	Supply Solids Concentration	0.5 – 1.5% MLSS
.5	Supply Solids Temperature	6 to 25 °C
.6	Supply Solids pH	5.5 to 8.0
.7	Discharge Solids Concentration	5.5 – 8.5% TS
.8	Mass Loading to Thickeners:	

.1 Daily Loading: 1,000 – 3,100 kg/d (dry solids)

.2 Operation: Intermittently and Continuously (24/7), supplier will assume the daily loading requirements to be met during an 8 hour/day operating period at the peak loading.

.9 Maximum liquid/emulsion polymer usage (100% active): 10 kg/dry MT solids

.2 All electrical panels to have a completed arc flash analysis and be equipped with arc flash warning labels and arc flash information in accordance with CSA C22.1 – Canadian Electrical Code and CSA Standard Z462 – Workplace Electrical Safety.

.3 Sludge thickener controls are to integrate with and control ancillary equipment required for the thickening operation, including but not limited to the thickener, polymer system, waste activated sludge feed pumps, washing system, filtrate discharge and thickened sludge pumping. This integration shall be accomplished through data communications on standard Ethernet between the thickener PLC and the main plant PLC/SCADA system.

.4 The Supplier shall be responsible to ensure and guarantee that all the specified equipment will be:

.1 Designed, fabricated, and assembled to provide reliable and efficient operation.
.2 CSA Approved (where applicable) and comply with any Codes and Standards referred to in this Specification.
.3 Of new material which is of current manufacture and proven in the field for the duty required.
.4 Correctly described on the Form of Quotation.

1.3 APPROVED MANUFACTURERS

.1 The equipment shall be the product of a company regularly engaged in the design, manufacture and supply of this type of equipment and whose equipment is of a design which has been in satisfactory service under similar conditions for not less than five (5) years.

1.4 ALTERNATIVES

.1 If a bidder wishes to offer an alternative proposal, in addition to the proposal complying with this specification, each such alternative must be clearly set out and the related adjustment shall be stated for each alternative.

1.5 DOCUMENTS

.1 Read this Specification in conjunction with the following documents:

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems
.2 26 05 01 Electrical requirements for Packaged Systems

.2 RFP Documentations
.3 Submission Forms
.4 Form of Proposal
.5 All information requested on that form shall be submitted in addition to the bidder`s supporting information for the quotation to receive full consideration.
.6 General Terms and Conditions for Preselected Equipment, shall be the governing terms and conditions accepted in the Form of Proposal by the Supplier.

.2 This specification together with the above-mentioned documents and any further documents issued therewith by the Engineer comprise the quotation documents.

1.6 SYSTEM DESCRIPTION

.1 It is the intent of these Specifications to specify a complete and operating system that will perform its intended function(s). All devices, fittings, and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified.

.2 All drives, motors, instrumentation etc. supplied shall be designed for a Unclassified environments.

1.7 STANDARDS

.1 All equipment and materials in accordance with the latest issue of all appropriate Standards and Codes, including, but not limited to the following:

.1 AFBMA - Load Ratings and Fatigue Life for Ball Bearings
.2 AGMA – American Gear Manufacturer's Association
.3 ANSI – American National Standards Institute
.4 ASME – American Society of Mechanical Engineers
.5 ASTM – American Society for Testing and Materials
.6 CEC – Canadian Electrical Code
.7 CEMA – Canadian Electrical Manufacturers Association
.8 CSA – Canadian Standards Association
.9 CWB – Canadian Welding Bureau
.10 IEC – International Electrotechnical Commission
.11 NEC - National Electrical Code
.12 NEMA – National Electrical Manufacturer's Association
.13 NFPA – National Fire Protection Association
.14 NFPA – National Fluid Power Association
.15 OSHA – Occupational Safety and Health Administration
.16 SSPC – Steel Structures Painting Council
.17 UL (cUL) – Underwriter's Laboratories Inc.

1.8 WARRANTY AND QUANRANTEE

.1 The supplier shall warranty the products and workmanship of the equipment delivered to site. The supplier shall guarantee that the system can perform under the conditions stated and provide supporting documentation of their experience.

.2 Guarantee and warranty all components of the scope of supply for the greater of either 24 months after the date when the equipment achieves satisfactory performance, established by through the terms of the General Contractor's Contract, or until the expiry of a period of 36 months after the date of completion of delivery of such equipment to the site, whichever period terminates first.

PART 2 PRODUCTS

2.1 GENERAL

.1 Provide two (2) rotary drum, inclined plate or similar thickening units, complete with floc development tanks, drive impellers, rotary drums with filtration media, supporting frames, spray deflection coverings, spray wash header, return water collection tanks, hoppers, sludge conditioning system, control panels, and auxiliary equipment and appurtenances.

.2 Each piece of equipment specified shall be designed for continuous operation, 24 hours per day, 7 days per week.

.3 All housings, structural components, floc development tank, return water collection tank, driven impeller and shaft, filtration media, internal drum components and piping, hoppers, chutes, manifolds, nozzles, valve bodies, ducts, bases, covers, anchors, and fasteners must be a minimum of Type 316 or 316L Stainless Steel.

.4 All stainless-steel main components to be treated with full submersion passivation.

.5 Each unit must be factory assembled and tested prior to delivery to site and ready for installation.

.6 Furnish all mechanical and electrical equipment and instruments as required to perform the functions specified and described within this document.

.7 All equipment is to be furnished by or through a single supplier to ensure coordination and compatibility of equipment.

.8 The equipment must be capable of mode of operation adjustments and post power failure start-up with no additional effort by the operator.

.9 Provide sufficient quantity of grease or oil of the correct grade necessary for the initial start-up, operation of the equipment and for the extend of the warranty period. Where auto-greasers are incorporated into the supply, they are to be suitable for 12-month operation without replacement.

.10 On-site power is available in 600 V / 3 Phase / 60 Hz.

2.2 EQUIPMENT REQUIREMENTS

.1 Structural Frame

.1 All thickening equipment shall be provided on a single equipment skid designed to accommodate all operating and static loads without deflection, deformation, or vibration, which will in any manner degrade performance of the equipment. At a minimum, the flocculation tank, drum, frame, and covers must all be mounted on a single skid designed for even distribution of all loads. Lifting lugs shall be provided, allowing for movement of entire assembled unit.

.2 The skid shall be fabricated or welded and bolted Galvanized Steel or Type 316 L stainless steel members.

.3 Equipment base and support frame:

.1 Provide fabricated base to support the complete assembly. Design frame to adequately support all loads with no vibration when operating at maximum rated drum speed and throughput.

.2 Fabricate in sections as required for shipping and installation and provide bolted connections. Alternatively, provide separate bases for major equipment.

.3 Supply all necessary spring type vibration isolators (if needed) to permit bolting of the base directly to the operating floor. Provide isolators with built-in leveling bolts and resilient shocks as per isolator manufacturer recommendations.

.4 Provide data on required anchor bolts complete with installation instructions.
.5 Provide frame with four removable lifting eyes to facilitate handling.
.6 Assume that the service platform for the RDT type equipment shall be located a minimum 1.0 m above the finished floor upon which it is mounted to allow for the discharge hopper (included in the supply) to be connected to the TWAS progressive cavity discharge pump (NIC) which will be installed on the finished floor and connected to the outlet of the TWAS hopper.

.2 Flocculation Tank

.1 The flocculation tank shall be equipped with a 6-inch flanged pipe stub inlet near the bottom of the tank and an outlet to a discharge flume assembly or distribution box.
.2 The driven impeller of the flocculation system shall be composed of a shaft and a double vertical flat blade on either side of the shaft with a nylon steady
bearing centrally located on the bottom of the tank.
.3 Flocculation tank shall be connected to the thickening section in such a way
that foul air will flow with the sludge to the hopper for removal.
.4 Flocculation tank shall have a stainless-steel cover with a hinged opening that is easily opened for inspection of the flocculation process.

.3 Rotary System

.1 The rotary system shall be composed of filter screen on the drum support structure that rotates horizontally around a center feed assembly. The filter screen shall consist of stainless-steel woven-wire mesh or wedge wire selected on the basis of porosity or percent openness, the opening size, and the wire diameter used in the weaving process. The wire mesh or wedge wire selections shall be made on the basis of maximizing flow consistent with the requirements for high-quality filtrate.

.1 Filter Screen Minimum Percent Open Area: 25 percent.

.2 The woven-wire mesh or wedge wire filter screen shall be easily changed from the drum support structure with simple tools.
.3 The rotary system shall be equipped with flights and/or roll bars, split augers,
ports, closures, and deflectors to influence shear, water release, and drainage rate independent of flow.
.4 The rotary system drive shall be fitted with a zero-motion detector. If movement of the rotary system is not sensed, the zero-motion detector shall relay an alarm. The zero-motion detector shall be calibrated to operate between the minimum and maximum recommended speeds for the rotary system

.4 Drum Wash System shall be designed to boost or reduce pressure if necessary and provide a continuous flow of plant service non-potable water to the spray header designed to keep the thickening drum orifices clear of solids:

.1 Water Supply System:

.1 Pressure Reducing Valve:

.1 If necessary, design and supply for Contractor-installation, a pressure reducing valve and 40 mesh strainer system for each thickener.

.2 Pressure reducing valve shall be capable of reducing maximum plant service NPW pressure to required pressure.

.3 Strainer shall be oversized to accommodate the flow equivalent to twice the normally required wash water flow. Strainer shall be easy to remove for inspection and maintenance cleaning.

.2 Wash water has the following characteristics:

.1 Wash water: Plant service non-potable water is available at a reliable minimum pressure of 100 psig, although it can fluctuate to a maximum pressure of 120 psig.

.2 Solids Content: Up to 50 milligrams per liter (mg/L) of suspended solids.

.3 Chlorine Residual: Up to 3 mg/L of total chlorine residual.

.3 Spray Header:

.1 A self-cleaning washing header shall be oriented in a horizontal position the length of the rotary system to maintain positive cleaning with each revolution of the rotary system, forcing the washed off solids to return to the mass of solids tumbling inside the rotary element. The washing header shall be mounted with U-bolts permitting the adjustment of the angle of impact of the water, from tangential to square, relative to the rotary system.

.2 Provide a 50mm 2-way solenoid valve to be connected just upstream of the was water connection to the spray water header. The solenoid valve shall comply with the requirements below:

.1 Minimum NEMA Type 4 enclosure

.2 120 VAC operation

.3 Minimum Class F coil insulation

.4 Furnish with manual/bypass operator

.4 Nozzles: Replaceable, designed with a built-in hand wheel operated stainless steel brush to provide cleaning action without disassembly; handwheel to extend to outside of thickener so brush can be operated without interruption of the thickener operation.

.5 Nozzle spacing shall be such that the sprays from adjacent nozzles overlap one another at the drum surface.

.6 Spray header shall be fitted with an Ashcroft stainless steel pressure gauge, liquid filled type 1008S with a 8mm NPT back connection, 75mm dial dual scaled at 0/160 psi.

.7 Washing system shall include an adjustable flow or pressure switch that shall relay an alarm if the solenoid valve on the spray water system fails and wash water can no longer be supplied to the washing header.

.8 Spray piping and nozzles: Braced and of sufficient pressure rating to with stand pressure caused by sudden valve closure.

.5 Shower Deflection Enclosure

.1 The rotary element shall be covered on the outside with shower deflection covers designed to contain any fugitive spray and minimize mist emissions. The panels shall overlap and shall be fastened to the framing members of the rotary element. The panels shall be limited in dimension and fastened to the framing members by wing nuts to facilitate removal.

.2 Provide a 200mm odour control duct connection to the enclosure.

.6 TWAS Discharge Hopper

.1 Thickener manufacturer shall provide one fully removable TWAS hopper for each thickener.

.1 Provide the thickened sludge hopper to convey thickened sludge from the rotary drum thickener discharge to the TWAS pump suction.

.2 The structural design of the hopper, its connections to the rotary drum thickener, and its supports shall be designed in accordance with the requirements for structural steel and the load combinations provided herein.

.3 The hopper shall be supported off of the platform steel framing shown on the plans. Under no circumstances shall the weight of the hopper and its contents be transferred to the pump below.

.4 Hopper shall consist of two sections that are bolted together such that top portion of the hopper can be disconnected from the bottom portion of the hopper and the drum, and removed while the bottom portion remains in place and supported from the platform steel framing. Design of the hopper and thickener skid shall allow removal of the thickener skid over the bottom portion of the hopper once the top portion of the hopper is removed and skid is elevated a maximum of 150mm.

.1 Manufacturer shall provide a Type 316 stainless steel plate with lifting eyes sized to cover the opening of bottom portion of the hopper upon removal of the top portion. Manufacturer shall provide support brackets in bottom portion of hopper upon which plate shall rest.

.5 Construct the hopper of Type 316 stainless-steel plates welded and braced as required for rigidity.

.6 The hopper shall be fitted with doors to allow easy access for thickened sludge inspection and sampling.

.7 Provide each portion (top and bottom) of the thickened sludge hopper with two 75mm diameter welded lifting rings fabricated from 50mm thick (minimum) stainless-steel bars.

.8 All materials used for fabrication shall conform to the structural and miscellaneous standards of the American Institute of Steel Construction.

.9 Provide hopper with both the interior and exterior surfaces of the hopper smooth, free from sharp edges, burrs, and projections, and with all welds ground smooth and all edges and corners rounded.

.2 Hopper Requirements

.1 The hopper shall have a minimum volume of 750 L to adequately convey the thickened sludge without bridging or overflowing and arranged to convey the peak material production rate from the thickener and shall extend down as a rectangular chute to a flanged rectangular flexible coupling that will be connected to the TWAS pump suction flange.

.1 Rectangular Flexible Coupling: thickener manufacturer to provide flanged rectangular flexible coupling with Neoprene rubber and Type 316 stainless steel hardware.

.2 Sludge Hopper Bottom Flange: Coordinate with rectangular flexible coupling manufacturer and pump manufacturer.

.2 The minimum incline angle of the sloped section of the hopper is 50 degrees from the horizontal.

.3 Do not allow any part of the hopper to come in contact with the rotary
drum thickener drives or to interfere with the normal operation of the unit.

.4 Provide a 100mm diameter flanged connection on rectangular chute as shown on the Drawings for draining the hopper to the filtrate sump when the TWAS pump is not operating.

.3 One (1) appropriately selected Siemens Milltronics Echomax XPS (or) Endress & Hauser Prosonic S ultrasonic level sensors (Class 1, Div. 2) installed for level measurement in each sludge hopper including corresponding transmitters installed on proximate to the thickener; each sensor to include mounting bracket (or) stilling tubes and corresponding bolts for mounting to the hopper.

.1 Thickener manufacturer shall provide a 100mm diameter flanged connection on rectangular chute as shown on the Drawings for mounting of the hydrostatic level sensor.

.4 Float level switches (NEMA-7) for high-high level condition in sludge hopper shall be provided by the supplier.

.1 Thickener manufacturer shall provide a Type 316 stainless steel bracket to accommodate float level switch mounting.

.5 Thickener manufacturer shall provide flanged Type 316 stainless steel 150mm odour control nozzle on hopper to allow withdrawal of foul air from entire thickener, including flocculation tank. Manufacturer shall provide Type 316 stainless steel support brackets for 6-inch foul air duct along outside of hopper. Locations on hopper where odor control nozzle and support brackets are located shall be reinforced.

.7 In-Line Non-Clog Venturi Mixing Valve, Polymer Injection Ring, and Manifold (Sludge Conditioning System):

.1 Each thickener shall be provided with a sludge conditioning system designed to efficiently mix polymer with the sludge and to adequately
condition the sludge for optimum thickening. Each sludge conditioning system shall include an in-line non-clog venturi mixing valve, polymer injection ring, and manifold that shall be supplied by the rotary drum thickener manufacturer and installed by the Contractor.

.2 The sludge conditioning system shall be mounted upstream of the thickener and shall consist of an in-line venturi mixer with a variable orifice, polymer injection ring, and polymer solution distribution manifold. The thickener manufacturer shall be required to provide to the Engineer a proper layout for the system.

.3 Flocculation time shall be adjustable by the displacement of grooved pipe sections (spools) with the sludge conditioning system at a minimum of three locations in the sludge feed piping. The sludge conditioning system supplied by the thickener manufacturer will be installed at one of the three locations. Pipe spools of proper size shall be supplied by the Contractor and will occupy the remaining two locations.

.4 The sludge conditioning system shall meet the following mechanical specifications:

.1 In-Line Venturi Mixer:

.1 The in-line mixer shall have a flanged Type 316 stainless-steel housing, an adjustable orifice connected to an externally mounted lever and counterweight, and a removable side plate for inspection and cleaning. Flanges shall be ASME/ANSI B16.1 Class 125 flanges.

.2 The open throat area shall be approximately 29 square cm or greater, as required for specified hydraulic capacity, fully adjustable downward, and shall open automatically to prevent clogging.

.3 The position of the counterweight on the externally mounted orifice plate lever shall be fully adjustable, within a 180-degree arc, to allow for adjustment of the mixing energy, regardless of the mounting angle, while the unit is in operation.

.2 Polymer Injection Ring:

.1 The injection ring shall have four injection points evenly distributed 90 degrees apart along its circumference for injecting polymer into the sludge flow.

.3 Manifold Block:

.1 The manifold distribution block shall divide the single polymer
solution feed line into four separate flows for connection to the polymer injection ring.

.4 Performance Requirements:

.1 Polymer solution and sludge mixed in less than 1.0 second at rated hydraulic capacity.
.2 Mixing energy independently adjustable during operation.

.5 Sludge Conditioning System Testing:

.1 Each sludge conditioning system shall be hydrostatically tested by the manufacturer at the factory. Certified test results indicating that each system has passed the specified test parameters shall be submitted for approval. No sludge conditioning system shall be shipped or installed until this testing has been completed and test results have been approved by the Engineer.
.2 Each system shall be tested as specified below:

.1 The testing medium shall be water. Under no circumstances is air to be used as the test medium.
.2 Each system shall be tested at the test pressure 0F 1.5 x the operating pressure for the sludge feed piping.
.3 The test duration shall be 2 hours. A passing test is one where there is no visible leakage and no decrease on the initial test pressure.
.4 A sludge conditioning system that fails the pressure test shall be either repaired or replaced at no additional cost to the Owner. Repaired systems shall be retested. Replacement systems shall be tested using this procedure.

.8 Drive Units:

.1 The following drive units shall be supplied for each rotary drum thickener:
a. Main Unit Drum Drive:

.1 3.75 kW (maximum), 1,800 revolutions per minute, TEFC, 600-volt, 3-phase, 60-Hertz alternating current, premium high-efficiency motor with 1.0 service factor.
.2 The controller shall be a variable frequency drive (VFD) mounted in the thickener vendor control panel.

.2 Flocculation Tank Drive:

.1 0.75 kW (maximum), 1,800 revolutions per minute, TEFC, 600-volt, 3-phase, 60-Hertz alternating current, premium high-efficiency motor with 1.0 service factor.

.2 The controller shall be a variable frequency drive (VFD) mounted in the thickener vendor control manel.

2.3 ELECTRICAL REQUIREMENTS

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems
.2 26 05 01 Electrical requirements for Packaged Systems

.2 Incoming power available at site:

.1 Main three (3) Phase Power Feed: 600V, 3 Phase, 60 Hz.
.2 Single Phase Control Power Feed: 120V, 1 Phase, 60 Hz

.3 General:

.1 Refer to specification section 26 05 01 for additional requirements.
.2 If transformers are required to modify the 600V feed, the Supplier is to provide the power requirements. The transformer shall be provided by others.
.3 The Thickener System Main Control Panel enclosure shall be CSA approved type 316/316L Stainless steel and rated NEMA 4X for Non-Hazardous Area with lockable stainless-steel door-on-door style enclosure. The control panel must incorporate an inside hinged panel to separate the high voltage equipment (e.g. 600VAC) from the operator interface and controls. All internal components must be CSA and/or cUL certified.
.4 The Local Control Station enclosures shall be non-corrode and rated NEMA4X for installation in Non-Hazardous areas.
.5 All local disconnect switches or breakers to be supplied by others per latest local code.
.6 All internal components shall be sealed as per latest local code from the environment.
.7 Protection must be provided against earth leakage (i.e. ground) faults.
.8 All electrical components must be, as practical, “off-the shelf” items and available through local electrical distributors, not solely through the Supplier. Supplier to identify items which must be purchased from the Supplier to maintain the warranty.
.9 Equipment will be installed indoors.
.10 All wires and labels inside the panel must be labeled clearly and must match the details on the Control Panel drawings. Use full description where possible.
.11 Utilization of identical motors for the majority of equipment is preferred to minimize the number of motors required as spare.

2.4 CONTROL SYSTEM

.1 Work Included:

.1 The work includes the complete supply, programming, commissioning, and operator training for a single control system/panel for the two (2) new waste activated sludge thickeners.

.2 Shop Drawings:

.1 The vendor shall supply detailed shop drawings for the controls system including catalog cuts, shop drawings, control schematics, loop diagrams, layout drawings, control panel layouts, control panel power distribution schematics, network diagrams, instrument list, I/O list, process control narrative, functional requirements specifications, instrument test forms, I/O module test forms, PLC system commissioning checklist, design calculations and studies.

.3 General:

.1 Refer to specification 25 05 03 and 26 05 01 for additional requirements.
.2 The unit operation will be integrated into a plant wide control system (SCADA) and HMI (Human Machine Interface).
.3 The control system shall be pre-wired and pre-programmed to monitor process variables and initiate all process functions required, including closing and positioning of valves, and any other actions necessary to conduct the operation and maintenance of the two (2) thickeners.
.4 The control panel will be installed indoors, with exact location to be determined on-site and approved by Buyer/Consultant.

.1 The Main Control Panel enclosure shall be CSA approved type 316/316L Stainless steel and rated NEMA 4X for Non-Hazardous Area with lockable stainless-steel door-on-door style enclosure. The control panel must incorporate an inside hinged swing panel(s) to separate the high voltage equipment (ex. 600VAC) from the operator interface and controls.
.2 Non-ventilated Panels: Design to adequately dissipate heat from equipment mounted inside panel or on panel. Alternatively furnish refrigeration cooling system for Control Panels with supply voltages greater than 120 VAC.
.3 Furnish a solid metal barrier or Lexan plexiglass shield, to separate 600VAC (ex. VFD) from 120VAC (ex. PLC) components.

.5 One (1) Allen-Bradley CompactLogix Model TBD with Ethernet connectivity and ready for connection to the plant PLC/Scada; complete data exchange table & HMI screen Jpegs to be provided to client by RDT system manufacturer;
.6 The PLC shall be capable of bi-directional communication with the plant wide SCADA control system (by Others) by means of an Ethernet/ IP. Process monitoring, alarm notification, and remote control shall be possible from the plant wide SCADA control system.
.7 Supply a complete control panel, including the swing panel mounted main fusible type disconnect switched sized for the application c/w NEMA 4X operating handle and interlock, the main processing unit (PLC), the required input/output (I/O) cards, all cable, hardware, I/O power supplies,

and any other equipment that is required to perform the control operations in automatic and manual modes.

.8 Operator devices shall be a minimum of 22 mm diameter, type NEMA 4X:

.1 General: Power ON (white light), General E-Stop (mushroom button), General fault (red light), Alarms Reset (black push-button).

.2 Equipment Status: Motor Run (Red light), Motor Off (Green light) Motor Fault (Yellow light).

.3 Auxiliary Equipment Status: Valve Open (Red), Valve Closed (Green)

.4 Equipment manual controls: Auto / Manual (selector switch), Motor On / Off (selector switch).

.9 Supply all components required to eliminate any detrimental effects of supply voltage harmonic distortion, ripple, or high voltage DC spikes and to maintain satisfactory operation of the equipment (ex. surge suppression). A constant voltage transformer shall be supplied within the control panel that shall supply power to the PLC and its related equipment.

.10 Uninterruptible Power Supply (UPS):

.1 All control panels having a PLC, I/O rack, and/or data communications equipment shall be fed power from a UPS. This includes control panels supplied with packaged systems.

.2 The UPS shall provide uninterrupted power to, at minimum, the PLC/RTU, its I/O and field instruments.

.3 The UPS shall be sized to ensure the control panel continues to perform communications, data manipulation, calculations, monitoring and process data archiving for a minimum of 20 minutes following the loss of supply power.

.4 When sizing the UPS, all critical loads shall be identified and power calculations shall be provided. Provide additional battery cabinets to allow for load/time requirements if necessary.

.5 Where possible, install the UPS in a control panel. The UPS shall not block access to any panel mounted equipment.

.6 Enclose any unit not mounted in a control panel within a vented enclosure with a NEMA rating suitable for its mounting location.

.11 The PLC Supplier’s recommended wiring practices shall be followed for the PLC and all associated components. The Supplier shall furnish and install all necessary relays, pilot devices, or other components necessary to avoid dissipation of inductive currents into the input or output circuitry.

.12 Resistor-capacitor networks shall be provided for each relay that interfaces with the PLC. The PLC shall be sized to provide at least 25 percent spare program memory. Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.13 Provide a minimum of 100% spare fuses with a spare fuse holder mounted inside the panel.

.14 The vendor will be required to provide fully documented ladder logic along with the actual PLC program (not the PLC programming software) on DVD.

.15 Supplier must provide the most recent versions of the PLC program following successful commissioning.

.16 Provide a written confirmation from the Supplier of each product stating that it is a current product and that it will be supported (spare parts, software drivers, service, etc.) for a period of not less than Five (5) years from the date of purchase. Submit confirmation with Shop Drawings.

.4 The RDTs shall be controlled as follows:

.1 When the HAND/OFF/AUTO selector switch at the RDT is in HAND, the drum drive, flocculator drive, and wash-water solenoid valve can be controlled by the individual START/STOP and OPEN/CLOSE pushbuttons for each component. The drum and flocculator drive speeds can be controlled with their respective potentiometers.

.2 Upon activation of any EMERGENCY STOP cord, all components of the RDT shall stop and close.

.3 When the HAND/OFF/AUTO is in AUTO, the RDT shall be controlled by the plant PLC.

.5 Remote monitoring and control:

.1 Provide dry relay contact outputs for the following:

.1 System Auto.
.2 System Failed.
.3 Emergency Stop.
.4 System Running.
.5 Flocculator Failed.
.6 Flocculator Running.
.7 Drum Running.
.8 Drum Failed.
.9 Low Spray Water Pressure or Flow.
.10 Zero-motion.

.2 Accept 120VAC discrete inputs for the following:

.1 Flocculator Run
.2 Drum Run

.3 Provide 4-20mA outputs for the following:

.1 Flocculator Speed
.2 Drum Speed
.3 Polymer Feed Rate

.4 Provide 4-20mA inputs for the following:

.1 Flocculator Speed Setpoint
.2 Drum Speed Setpoint

2.5 SPARE PARTS

.1 The following spare parts and safety equipment to be supplied at each facility (Supplier to advise, if and how their spare parts list differs from the below.):

.1 One (1) set of trunnion wheels per rotary drum thickener
.2 One (1) drive sprocket per rotary drum thickener

.3 One (1) driven sprocket per rotary drum thickener
.4 One (1) idler sprocket per rotary drum thickener
.5 One (1) drive chain per rotary drum thickener
.6 One (1) spare drum drive, including all associated couplings, gear reducers, and other components required for a fully functioning drive
.7 One (1) spare flocculation tank mixer drive, including all associated couplings, gear reducers, and other components required for a fully functioning drive.
.8 As recommended for use within warranty period (eg oil, auto greasers).
.9 Any special proprietary tools.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. All equipment shall be shipped completely assembled where possible. Large fabricated assemblies shall be shipped in sub-assemblies as large as practical from the point of view of moving them into and about the structures, and piece-marked to facilitate field erection.

B. The Supplier shall co-operate with the General Contractor in the matter of packaging, time of delivery and shipping.

C. The equipment and appurtenances shall be delivered to the Site of the work in a condition satisfactory to the Owner and any omissions, discrepancies, or damage evident on delivery shall be made good by the Supplier.

D. The General Contractor at the Site shall unload the Supplier's equipment, sign the carrier's pro bill to indicate receipt of the required number of crates, packages, note any apparent shortages of or visible damage to such crates and packages and shall assume care and custody of the equipment. The Supplier shall furnish to the Contractor, lists showing the contents of the crates and packages available at the job site when delivery of the equipment and appurtenances is made. Within seven (7) days after the date of delivery to the job site, the Contractor will notify the Supplier in writing of shortages or damage in the equipment delivered.

E. The Supplier shall supply the services of a competent, factory-trained technical representative to site during major equipment deliveries to ensure proper receiving, handling, storage, and completeness of shipped components.

3.2 EQUIPMENT DELIVERY AND INSTALLATION VERIFICATION

.1 Delivery of Equipment: The Supplier shall coordinate the date of major equipment delivery close to the time the equipment will be installed. The General Contractor will be responsible for receiving, off-loading, and placing into storage all equipment at the site related to this Procurement Contract.

3.3 INSTALLATION

.1 Lifting lugs: Equipment or components over 45 kg (100 pounds) in weight shall be provided with lifting lugs.

.2 Thickener assemblies and equipment shall be installed in accordance with approved procedures, by the general contractor, submitted with the shop drawings and as indicated, and in strict compliance with the manufacturer's recommendations, unless otherwise approved.

.3 Inspection, testing, start-up, and field adjustment shall be as indicated.

3.4 MANUFACTURER'S SERVICES

.1 Provide written instruction and information to the General Contractor for the installation of the equipment.

.2 Respond to queries during construction related to installation and commissioning of the supplied equipment.

.3 Liaise with the General Contractor to identify milestones for inspection.

.4 The equipment shall be installed under the supervision of a representative of the Supplier who shall also instruct the Owner's personnel in these matters. Provide this service priced (including all expenses) as part of this Contract as noted below.

.5 Provide a site visit comprising a minimum of 48 man-hours on site for each installation, scheduled by the General Contractor, at a time acceptable to the Owner, for a skilled factory-trained technician to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC and training of the operators in starting-up and testing the equipment and systems.

.6 The Supplier shall provide start-up reports covering installation inspection and start up activities.

.7 Manufacturer's Representative, shall be a skilled factory-trained technician, with references for a least 10 other complete installations, to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC, testing of Scada signals with the facility SCADA designer and training of the operators in starting-up and testing the equipment and systems. Present at site or classroom designated by Owner, for minimum 8-hour on-site person days listed below, travel time excluded:

.1 2 person days for installation assistance and inspection; 2 trips.
.2 2 person days for functional and performance testing, training, and completion of Manufacturer's Certificate of Proper Installation; 1 trips.
.3 1 person days for pre-start-up classroom or site training: 1 trips.

.8 After installation supervision and field-testing services, the Supplier shall submit to the owner's representative, a certification letter certifying that the equipment was installed per the manufacturer's recommendations.

.9 Bear all costs of any nature required because of failure of any of the units including performance.

.10 As often as it takes, re-test, adjust and generally apply technical expertise and materials to solve any performance or equipment problems or deficiencies that may exist in the installed equipment, at no additional cost to this supply contract. Five failed attempts shall be grounds for rejection of the equipment.

.11 The Supplier shall provide operator training to all required plant personnel.

.12 Provide four (4) copies of system operations and maintenance manuals to the Engineer for each piece of equipment supplied. Manuals shall be bound in three ring, hard cover, type binders. Provide an electronic copy in PDF or MS Word format.

.13 All costs, including travel, lodging, meals, and incidentals for Supplier service shall be included in the bid form.

PART 4 PRESELECTION SUBMITTAL REQUIREMENTS

4.1 INFORMATION REQUIRED

.1 The Pre-selected supplier shall provide the following:

.1 Installation Shop Drawings including the supplier's certification and engineering seal.
.2 Installation Shop Drawings shall be provided in the 2024 or more current versions of Revit, Solidworks, or Step (.stp) file digital platforms for use during the detailed design.
.3 Installation Instructions specific to the project.
.4 Operations and Maintenance Manuals specific to the project.

.2 Distribution of supplied information:

.1 Upon notification of the of award, the successful proponent shall prepare and submit, within the time period identified in the submittal forms, the above listed documents to the owner's representative for review and integration in the detailed design. The successful supplier shall provide a single technical contact person who will be available to provided detailed design recommendations.

END OF SECTION

46 73 00 Tertiary Filtration System

PART 1 GENERAL

1.1 GENERAL

.1 This specification covers the general features of design, materials, manufacture, arrangement, shipment and commissioning of tertiary disk filters, complete with electric drive motors, associated appurtenances, accessories and control panels. The work includes the design, supply, delivery/supervision of installation, on-site testing, commissioning and training for the specified equipment. The units will be installed at the Napanee Water Pollution Control Plant.

.2 It is the intent of these Specifications to specify a complete and operating system that will perform its intended function(s). All devices, fittings, material, equipment and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified, and is to be supplied with the equipment and included in the quotation. Additional features may be offered and will be considered as “value added offerings” during the evaluation.

.3 All drives, motors, instrumentation etc. supplied shall be designed for unclassified environments.

.4 Equipment provided under this section shall be fabricated, assembled, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the Manufacturer unless exceptions are noted by the Engineer.

.5 Disk Filters shall be supplied in coated carbon or stainless steel tanks supplied by the manufacturer.

.6 Each disk filter shall include all components for a fully functioning system including support structures, media, seals, wheels, trunions, bearings, influent distribution plates (as required), backwashing and filtrate collection system, tank covers (as applicable), local control panels, etc.. In all cases, backwashing shall be provided through a consolidated backwash system with pumps sized and provided by the disk filter vendor. The following equipment will be provided by others:

.1 Influent/effluent piping/valving

.2 Piping and valves from the consolidated backwash pumping facility to a common single connection point at each disk filter backwash control valve. All backwash systems, piping and valves internal or external from the filter to the common point of coupling will be provided by the vendor.\

.3 Interconnecting piping between parallel units backwash water collection, drainage, etc.

.4 Interconnecting wiring and conduits from the vendor supplied control panels and the field installed equipment.

1.2 PERFORMANCE REQUIREMENTS

.1 Each Tertiary Filter shall be capable of optimum performance for the following process conditions:

.1	Number of Units:		Three (3) units, firm capacity operation
.2	Operation Configuration		Two (2) Duty / One (1) Standby
.3	Design Flow		
	.1	Average Daily Flow	11,500 m^3/d
	.2	Peak Instantaneous Flow	42,336 m^3/d
.4	Filter Influent		
	.1	Total Suspended Solids	25 mg/L
	.2	Total Phosphorus	0.8 mg/L
.5	Filter Effluent		
	.1	Total Suspended Solids	10 mg/L
	.2	Total Phosphorus	0.1 mg/L

.2 All electrical panels to have a completed arc flash analysis and be equipped with arc flash warning labels and arc flash information in accordance with CSA C22.1 – Canadian Electrical Code and CSA Standard Z462 – Workplace Electrical Safety.

.3 Tertiary treatment controls are to integrate with and control ancillary equipment required for the treatment operation, including but not limited to the flocculation tank mixer (as required), polymer system (if required), washing system, filtrate discharge and backwash pumping. This integration shall be accomplished through data communications on standard Ethernet between the filter PLC and the main plant PLC/SCADA system.

.4 The Supplier shall be responsible to ensure and guarantee that all the specified equipment will be:

.1 Designed, fabricated, and assembled to provide reliable and efficient operation.

.2 CSA Approved (where applicable) and comply with any Codes and Standards referred to in this Specification.

.3 Of new material which is of current manufacture and proven in the field for the duty required.

.4 Correctly described on the Form of Quotation.

1.3 APPROVED MANUFACTURERS

.1 The equipment shall be the product of a company regularly engaged in the design, manufacture and supply of this type of equipment and whose equipment is of a design which has been in satisfactory service under similar conditions for not less than five (5) years.

1.4 ALTERNATIVES

.1 If a bidder wishes to offer an alternative proposal, in addition to the proposal complying with this specification, each such alternative must be clearly set out and the related adjustment shall be stated for each alternative.

1.5 DOCUMENTS

.1 Read this Specification in conjunction with the following documents:

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems
.2 26 05 01 Electrical requirements for Packaged Systems

.2 RFP Documentations

.3 Submission Forms

.4 Form of Proposal

.5 All information requested on that form shall be submitted in addition to the bidder`s supporting information for the quotation to receive full consideration.

.6 General Terms and Conditions for Preselected Equipment, shall be the governing terms and conditions accepted in the Form of Proposal by the Supplier.

.2 This specification together with the above-mentioned documents and any further documents issued therewith by the Engineer comprise the quotation documents.

1.6 STANDARDS

.1 All equipment and materials in accordance with the latest issue of all appropriate Standards and Codes, including, but not limited to the following:

.1 AFBMA - Load Ratings and Fatigue Life for Ball Bearings

.2 AGMA – American Gear Manufacturer’s Association

.3 ANSI – American National Standards Institute

.4 ASME – American Society of Mechanical Engineers

.5 ASTM – American Society for Testing and Materials

.6 CEC – Canadian Electrical Code

.7 CEMA – Canadian Electrical Manufacturers Association

.8 CSA – Canadian Standards Association

.9 CWB – Canadian Welding Bureau

.10 IEC – International Electrotechnical Commission

.11 NEC - National Electrical Code

.12 NEMA – National Electrical Manufacturer’s Association

.13 NFPA – National Fire Protection Association

.14 NFPA – National Fluid Power Association

.15 OSHA – Occupational Safety and Health Administration

.16 SSPC – Steel Structures Painting Council

.17 UL (cUL) – Underwriter's Laboratories Inc.

1.7 SUBMITTALS

.1 Installation Shop Drawings stamped by a Professional Engineer licensed to practice in the Province of Ontario.

.2 Installation Shop Drawings shall be provided in digital platforms that can be imported into Revit or Solidworks for use during the detailed design.

.3 Complete assembly and installation drawings, together with wiring diagrams, detailed specifications, and data covering materials used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted in accordance with Division 01 Specifications.

.4 Electrical connection diagrams and schematics identifying all items requiring electrical control or power for operation of the equipment shall be submitted for review. Submittals shall verify each applicable feature in this specification.

.5 The data and specifications for each unit shall include, but shall not be limited to, the following:

.1 Catalogue cuts or equipment data sheets showing Equipment Supplier's complete descriptive information and product literature, Equipment make and model, materials of construction.

.2 Dimensioned drawings for each Filter unit and accessories (General Arrangement Drawings), showing plans, elevation and appropriate cross sections of the complete Disk Filter unit, including recommended location of local control panels, any lifting locations and type, materials of construction, overall weights, weights of largest components requiring removal for maintenance, clearance required around unit for maintenance access.

.3 Installation Instructions specific to the project.

.4 Drawings indicating all structural connections, clearances to structures and indicate loads transferred through connections.

.5 Process Control Narrative for the proposed control system, which shall detail operation mode, control strategy, default parameter setting and alarms. Operating description for the local control panel covering all logic and sequences of operation.

.6 Electrical requirements and all electrical and mechanical components, including catalogue data on ancillary electrical components including limit switches.

.7 Data indicating range and required setting of indicators, instruments, timers and other related devices.

.8 Submit Equipment Testing and Commissioning Plan, and Operating and Maintenance Manual, specific to the project, including the recommended procedures for off-loading, handling and storage of equipment until installed, lubrication, trouble-shooting guide, and safety issues.

.6 Distribution of supplied information:

.1 Upon notification of the award, the successful proponent shall prepare and submit, within the time period identified in the submittal forms, the above listed documents to the owner's representative for review and integration in the detailed design. The successful supplier shall provide a single technical contact person who will be available to provided detailed design recommendations.

PART 2 PRODUCTS

2.1 GENERAL

.1 Provide three (3) tertiary treatment systems (two (2) duty / one (1) standby), complete with drive impellers, media, supporting frames, spray deflection coverings (as required), spray wash header (as required), backwash suction manifolds (as required), return water collection tanks, hoppers, influent conditioning system, control panels, and auxiliary equipment and appurtenances.

.2 As the filter media accumulates solids, the level in the filter will rise and initiate a backwash sequence at high level. The tertiary filter remains on-line and continues to filter secondary effluent throughout the backwash sequence.

.3 Notwithstanding the specified design conditions, the equipment manufacturer is to optimize the unit operation.

.4 Each piece of equipment specified shall be designed for continuous operation, 24 hours per day, 7 days per week.

.5 All housings, structural components, return water collection tank, driven impeller and shaft, filtration media, piping, manifolds, nozzles, valve bodies, ducts, bases, covers, anchors, and fasteners must be a minimum of Type 316 or 316L Stainless Steel.

.6 All stainless-steel main components to be treated with full submersion passivation.

.7 Each unit must be factory assembled and tested prior to delivery to site and ready for installation.

.8 Furnish all mechanical and electrical equipment and instruments as required to perform the functions specified and described within this document.

.9 All equipment is to be furnished by or through a single supplier to ensure coordination and compatibility of equipment.

.10 The equipment must be capable of mode of operation adjustments and post power failure start-up with no additional effort by the operator.

.11 Provide sufficient quantity of grease or oil of the correct grade necessary for the initial start-up, operation of the equipment and for the extend of the warranty period. Where auto-greasers are incorporated into the supply, they are to be suitable for 12-month operation without replacement.

.12 On-site power is available in 600 V / 3 Phase / 60 Hz.

2.2 EQUIPMENT REQUIREMENTS

.1 Filter Tank/Basin

.1 Filter tanks shall be carbon coated or stainless steel, supplied by the manufacturer.

.2 Structural Frame (as applicable)

.1 All filter equipment shall be provided on a single equipment skid designed to accommodate all operating and static loads without deflection, deformation, or vibration, which will in any manner degrade performance of the equipment. At a minimum, the filter tank, and covers (as required) must all be mounted on a single skid designed for even distribution of all loads. Lifting lugs shall be provided, allowing for movement of entire assembled unit.

.2 The skid shall be fabricated or welded and bolted Type 316 L stainless steel members.

.3 Equipment base and support frame:

.1 Provide fabricated base to support the complete assembly. Design frame to adequately support all loads with no vibration when operating at maximum rated speed and throughput.

.2 Fabricate in sections as required for shipping and installation and provide bolted connections. Alternatively, provide separate bases for major equipment.

.3 Supply all necessary spring type vibration isolators (if needed) to permit bolting of the base directly to the operating floor. Provide isolators with built-in leveling bolts and resilient shocks as per isolator manufacturer recommendations.

.4 Provide data on required anchor bolts complete with installation instructions.

.5 Provide frame with four removable lifting eyes to facilitate handling.

.6 Assume that the service platform for the filter equipment shall be located 1.5 m above the finished floor for access and observation of the operation.

.3 Filter Disk Assembly

.1 Each disk assembly shall be comprised of several individual segments.

.2 Filter disk assemblies shall be constructed such that each segment is easily removable from the center tube or axle assembly, without special tools, to

allow for removal and replacement of the disk segment at the point of installation.

.3 If applicable, there shall be shoulder seals at the edges of each disk and the wall of the filtrate zone. These seals shall be made of industrial grade EPDM rubber for long life.

.4 Filter area calculations and loading rates shall be based on the submerged filter area.

.4 Centre Assembly

.1 Centre Tube Assembly (If applicable)

.1 The center tube assembly shall be watertight, one piece, structural welded, minimum 5 mm (3/16”) thick 304 stainless steel fabricated piece that is open at one end to allow the influent or effluent to enter and has openings to the filter discs.

.2 It also shall consist of 304 stainless steel driven sprocket, wheel assemblies, disk segment rods, disk frame

.3 All fasteners shall be 316 stainless steel.

.2 Centre Axle Assembly (If applicable)

.1 The center axle on which the disks are mounted shall be made of AISI 316 stainless steel.

.2 The axle assembly, including the disks, is to be designed so it can be removed from the tank. All internal hardware is to be AISI 316 stainless steel.

.5 Drive Assembly

.1 Each filter shall include an adjustable drive assembly with a gearbox, drive sprocket, drive chain or belt to rotate the centre tube or axle assembly.

.2 The motor shall be standard efficiency TEFC rated for 600V, 3 phase, 60Hz operation.

.6 Backwash Assembly

.1 The backwash assembly shall be either suction based or pressure based. Filtered effluent water shall be used for backwashing.

.2 Backwashing will be through one or two dedicated backwash pump(s) per filter. The filter vendor shall size the backwash pumps. . Pressure based systems shall allow for 20% additional pressure beyond that required at the filter to allow for distribution losses. Suction based pumping systems shall allow for an additional 12 m of discharge head.

.3 Backwash pump control (start-stop, speed if applicable, etc.) is to be provided by the vendor Local Control Panel.

.4 Provide suction valves, discharge valves and check valves for each backwash pump. Valves will be supplied with electric actuators if required to automate the backwash system; otherwise manual actuators are sufficient.

.5 All suction and discharge piping between the backwash pumps and the single point of coupling at each filter will be by others. Engineer will be responsibile for sizing the piping and working with the Disk Filter supplier to develop a preferred layout and confirm pump sizing.

.6 Provide a minimum of one pressure gauge for the suction and discharge of each pump and single magnetic flow meter for the discharge header to measure backwash flows. Provide any additional instrumentation and/or controls for a fully functioning and integrated filter backwashing system.

.7 Suction based backwash system:

.1 Provide actuated valves to control backwashing as required.
.2 Provide one actuated filter drain valve.
.3 As the amount of solids on the disk surface increases, the static pressure required to pass water through the disk increases. This results in an increased water level within the filter tank and increased differential pressure on the disk. Provide a pressure gauge at each filter backwash assembly for monitoring
.4 Solids are backwashed from the disk surface by liquid suction through 304 stainless steel backwash shoes. 304 or 316 SS springs shall be used to maintain the proper tensioning of the backwash shoe against the media surface.

.8 Pressure based backwash system:

.1 Provide actuated valves to control backwashing at each filter as required.
.2 Provide one actuated filter drain valve.
.3 The backwash system shall be comprised of 304 stainless steel backwash spray headers installed between the discs. Each backwash header shall have spray nozzles for each disc side.
.4 The spray nozzle shall be of flat pattern to deliver high pressure.
.5 Provide inlet strainer(s) on each filter complete with differential pressure gauges to protect spray nozzles from plugging.

.7 Filter Valves

.1 Filter valves shall be either plug valves or ball valves. Butterfly valves shall not be acceptable for this application.

.8 Influent Weir Box (if applicable)

.1 Each filter shall include a 304 stainless steel influent weir box for flow distribution. The weir box shall be mounted to the filter basin interior using 304 stainless steel wedge anchors and hardware.

.9 Integral Influent Weirs (if applicable)

.1 Each filter shall include an integral influent weir that is part of the tank weldment. The weir shall be constructed of the same material as the filter tank.

.10 Chemical Cleaning System (as applicable)

.1 The filter assembly shall be provided with any internal equipment that may be required for intermittent media chemical maintenance cleaning. Provide assistance to engineer in providing recommendations for the sizing and design requirements for any recommended chemical cleaning systems.

.2 The disks and other submerged components shall be chlorine resistant, so that chlorine cleaning can be performed, if required, to prevent the growth of swarms or other microorganisms.

2.3 ELECTRICAL REQUIREMENTS

.1 Related Specifications

.1 25 05 03 Programmable Controls for Packaged Systems

.2 26 05 01 Electrical requirements for Packaged Systems

.2 Incoming power available at site:

.1 Main three (3) Phase Power Feed: 600V, 3 Phase, 60 Hz.

.2 Single Phase Control Power Feed: 120V, 1 Phase, 60 Hz

.3 General:

.1 Refer to specification section 26 05 01 for additional requirements.

.2 If transformers are required to modify the 600V feed, the Supplier is to provide the power requirements. The transformer shall be provided by others.

.3 The Tertiary Filter System Main Control Panel enclosure shall be CSA approved type 316/316L Stainless steel and rated NEMA 4X for Non-Hazardous Area with lockable stainless-steel door-on-door style enclosure. The control panel must incorporate an inside hinged panel to separate the high voltage equipment (e.g. 600VAC) from the operator interface and controls. All internal components must be CSA and/or cUL certified.

.4 The Local Control Station enclosures shall be non-corrode and rated NEMA4X for installation in Non-Hazardous areas.

.5 All local disconnect switches or breakers to be supplied by others per latest local code.

.6 All internal components shall be sealed as per latest local code from the environment.

.7 Protection must be provided against earth leakage (i.e. ground) faults.

.8 All electrical components must be, as practical, “off-the shelf” items and available through local electrical distributors, not solely through the Supplier. Supplier to identify items which must be purchased from the Supplier to maintain the warranty.

.9 Equipment will be installed indoors.

.10 All wires and labels inside the panel must be labeled clearly and must match the details on the Control Panel drawings. Use full description where possible.

.11 Utilization of identical motors for the majority of equipment is preferred to minimize the number of motors required as spare.

2.4 INSTRUMENTATION AND CONTROL SYSTEM

.1 Instrumentation

.1 Provide all instrumentation to allow for a fully functioning and integrated disk filter system and consolidated backwash pumping facility. At a minimum the following instruments shall be provided:

.1 Each filter shall be equipped with an ultrasonic level transmitter or pressure transducer type level transmitter to provide real-time continuous filter level data to the Local Control Panel. If the transmitter is used as the primary element for filter backwash control, a secondary back-up system for backwash control using float or capacitance probe shall be provided.

.2 Backwash level sensor (as applicable): Each filter shall be equipped with an adjustable water level sensor.

.3 Bypass level sensor: Each filter unit will be supplied with a by-pass (high) level sensor. The by-pass level sensor will be mounted in such a way as to ensure that the device indicates when the water reaches a height above the backwash level sensor and has entered a by-pass scenario. When the by-pass level sensor is activated, it will activate a relay inside the control cabinet and a pilot light on the front of the control panel will illuminate. The pilot light will be labeled "Filter By-Pass". The by-pass level relay will have a spare set of normally open dry contacts available for monitoring.

.4 Provide suction and discharge pressure gauges for each backwash pump. Vendor to select ranges suitable for the anticipated pressures and/or vacuum conditions.

.2 Control System

.1 Each filter shall be provided with a local control panel housing all electrical starters and distribution equipment with a single 575V power supply and a PLC based control panel complete with HMI. It is acceptable to provide one (1) consolidated power and control panel per filter provided the 600V equipment is isolated by an internal divider and cover; while the control section is accessed. Control panels shall be in accordance with Section 25 05 03.

.2 The panels shall allow for local, manual and fully automatic control for operation of the disk filter. Panels shall be furnished fully assembled, wired

and pre-programmed in a NEMA rated and UL/CSA certified control enclosure. All conduit/wiring between the panel and field instruments/equipment shall be by others.

.3 Shop Drawings:

.1 The vendor shall supply detailed shop drawings for the controls system including catalog cuts, shop drawings, control schematics, loop diagrams, layout drawings, control panel layouts, control panel power distribution schematics, network diagrams, instrument list, I/O list, process control narrative, functional requirements specifications, instrument test forms, I/O module test forms, PLC system commissioning checklist, design calculations and studies.

.4 General:

.1 Refer to specification 25 05 03 and 26 05 01 for additional requirements.

.2 The unit operation will be integrated into a plant wide control system (SCADA) and HMI (Human Machine Interface).

.3 The control system shall be pre-wired and pre-programmed to monitor process variables and initiate all process functions required, including closing and positioning of valves, and any other actions necessary to conduct the operation and maintenance of the three (3) filters.

.4 The control panel will be installed indoors, with exact location to be determined on-site and approved by Buyer/Consultant.

.1 The Main Control Panel enclosure shall be CSA approved type 316/316L Stainless steel and rated NEMA 4X for Non-Hazardous Area with lockable stainless-steel door-on-door style enclosure. The control panel must incorporate an inside hinged swing panel(s) to separate the high voltage equipment (ex. 600VAC) from the operator interface and controls.

.2 Non-ventilated Panels: Design to adequately dissipate heat from equipment mounted inside panel or on panel. Alternatively furnish refrigeration cooling system for Control Panels with supply voltages greater than 120 VAC.

.3 Furnish a solid metal barrier or Lexan plexiglass shield, to separate 600VAC (ex. VFD) from 120VAC (ex. PLC) components.

.5 One (1) Allen-Bradley CompactLogix PLC with Ethernet connectivity and ready for connection to the plant PLC/Scada; complete data exchange table & HMI screen Jpegs to be provided to client by Tertiary Filter system manufacturer;

.6 The PLC shall be capable of bi-directional communication with the plant wide SCADA control system (by Others) by means of an Ethernet/ IP. Process monitoring, alarm notification, and remote control shall be possible from the plant wide SCADA control system.

.7 Supply a complete control panel, including the swing panel mounted main fusible type disconnect switched sized for the application c/w NEMA 4X

operating handle and interlock, the main processing unit (PLC), the required input/output (I/O) cards, all cable, hardware, I/O power supplies, and any other equipment that is required to perform the control operations in automatic and manual modes.

.8 Operator devices shall be a minimum of 22 mm diameter, type NEMA 4X:

.1 General: Power ON (white light), General E-Stop (mushroom button), General fault (red light), Alarms Reset (black push-button).
.2 Equipment Status: Motor Run (Red light), Motor Off (Green light) Motor Fault (Yellow light).
.3 Auxiliary Equipment Status: Valve Open (Red), Valve Closed (Green)
.4 Equipment manual controls: Auto / Manual (selector switch), Motor On / Off (selector switch).

.9 Supply all components required to eliminate any detrimental effects of supply voltage harmonic distortion, ripple, or high voltage DC spikes and to maintain satisfactory operation of the equipment (ex. surge suppression). A constant voltage transformer shall be supplied within the control panel that shall supply power to the PLC and its related equipment.

.10 Uninterruptible Power Supply (UPS):

.1 All control panels having a PLC, I/O rack, and/or data communications equipment shall be fed power from a UPS. This includes control panels supplied with packaged systems.
.2 The UPS shall provide uninterrupted power to, at minimum, the PLC/RTU, its I/O and field instruments.
.3 The UPS shall be sized to ensure the control panel continues to perform communications, data manipulation, calculations, monitoring and process data archiving for a minimum of 20 minutes following the loss of supply power.
.4 When sizing the UPS, all critical loads shall be identified and power calculations shall be provided. Provide additional battery cabinets to allow for load/time requirements if necessary.
.5 Where possible, install the UPS in a control panel. The UPS shall not block access to any panel mounted equipment.
.6 Enclose any unit not mounted in a control panel within a vented enclosure with a NEMA rating suitable for its mounting location.

.11 The PLC Supplier’s recommended wiring practices shall be followed for the PLC and all associated components. The Supplier shall furnish and install all necessary relays, pilot devices, or other components necessary to avoid dissipation of inductive currents into the input or output circuitry.

.12 Resistor-capacitor networks shall be provided for each relay that interfaces with the PLC. The PLC shall be sized to provide at least 25 percent spare program memory. Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.13 Provide a minimum of 100% spare fuses with a spare fuse holder mounted inside the panel.

.14 The vendor will be required to provide fully documented ladder logic along with the actual PLC program (not the PLC programming software) on DVD.

.15 Supplier must provide the most recent versions of the PLC program following successful commissioning.

.16 Provide a written confirmation from the Supplier of each product stating that it is a current product and that it will be supported (spare parts, software drivers, service, etc.) for a period of not less than Five (5) years from the date of purchase. Submit confirmation with Shop Drawings.

.5 The tertiary filters shall be controlled as follows:

.1 When the HAND/OFF/AUTO selector switch at the Tertiary Filter is in HAND, the media drive, and wash-water solenoid valve can be controlled by the individual START/STOP and OPEN/CLOSE pushbuttons for each component. The media drive speeds can be controlled with their respective potentiometers.

.2 Upon activation of any EMERGENCY STOP cord, all components of the Tertiary Filter System shall stop and close.

.3 When the HAND/OFF/AUTO is in AUTO, the Tertiary Filter shall be controlled by the plant PLC.

.6 Remote monitoring and control:

.1 Provide dry relay contact outputs for the following:

.1 System Auto.
.2 System Failed.
.3 Emergency Stop.
.4 System Running.
.5 Media Drive Running.
.6 Media Drive Failed.
.7 Low Spray Water Pressure or Flow.
.8 Zero-motion.

.2 Accept 120VAC discrete inputs for the following:

.1 Media Drive Run

.3 Provide 4-20mA outputs for the following:

.1 Media Drive Speed
.2 Polymer Feed Rate

.4 Provide 4-20mA inputs for the following:

.1 Media Drive Speed Setpoint

2.5 SPARE PARTS

.1 The following spare parts and safety equipment to be supplied at each facility (Supplier to advise, if and how their spare parts list differs from the below.):

.1 Replacement media for one complete filter including all media backing support assemblies, seals, fastening hardware for direct bolt-in to a unit.

.2 One (1) replacement drive sprocket/cog and chain/belt

.3 One complete set of all bearings and/or trunnion wheels for a single filter

.4 Complete set of replacement backwash shoe assemblies or backwash nozzles for a complete filter

.5 Complete set of internal seals for one filter as required

.6 One (1) complete drive motor and gearbox for each type of motor/gearbox included on a single filter.

.7 One (1) set of any special tools required for maintenance

.2 Spare parts shall be suitably packaged in separate individual boxes/crates with labels indicating the contents of each package. Spare parts shall be delivered to the Owner as directed. Spare parts shall be shipped in separate packages from the installed components. If any of the above spare parts or supplies are used during the testing process, they must be replaced by the Manufacturer at no cost to the Owner.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

.1 All equipment shall be shipped completely assembled where possible. Large fabricated assemblies shall be shipped in sub-assemblies as large as practical from the point of view of moving them into and about the structures, and piece-marked to facilitate field erection.

.2 The Supplier shall co-operate with the General Contractor in the matter of packaging, time of delivery and shipping.

.3 The equipment and appurtenances shall be delivered to the Site of the work in a condition satisfactory to the Owner and any omissions, discrepancies, or damage evident on delivery shall be made good by the Supplier.

.4 The General Contractor at the Site shall unload the Supplier’s equipment, sign the carrier's pro bill to indicate receipt of the required number of crates, packages, note any apparent shortages of or visible damage to such crates and packages and shall assume care and custody of the equipment. The Supplier shall furnish to the Contractor, lists showing the contents of the crates and packages available at the job site when delivery of the equipment and appurtenances is made. Within seven (7) days after the date of delivery to the job site, the Contractor will notify the Supplier in writing of shortages or damage in the equipment delivered.

.5 The Supplier shall supply the services of a competent, factory-trained technical representative to site during major equipment deliveries to ensure proper receiving, handling, storage, and completeness of shipped components.

3.2 EQUIPMENT DELIVERY AND INSTALLATION VERIFICATION

.1 Delivery of Equipment: The Supplier shall coordinate the date of major equipment delivery close to the time the equipment will be installed. The

General Contractor will be responsible for receiving, off-loading, and placing into storage all equipment at the site related to this Procurement Contract.

3.3 INSTALLATION

.1 Lifting lugs: Equipment or components over 45 kg (100 pounds) in weight shall be provided with lifting lugs.

.2 Filter assemblies and equipment shall be installed in accordance with approved procedures, by the general contractor, submitted with the shop drawings and as indicated, and in strict compliance with the manufacturer's recommendations, unless otherwise approved.

.3 Inspection, testing, start-up, and field adjustment shall be as indicated.

3.4 MANUFACTURER'S SERVICES

.1 Provide written instruction and information to the General Contractor for the installation of the equipment.

.2 Respond to queries during construction related to installation and commissioning of the supplied equipment.

.3 Liaise with the General Contractor to identify milestones for inspection.

.4 The equipment shall be installed under the supervision of a representative of the Supplier who shall also instruct the Owner's personnel in these matters. Provide this service priced (including all expenses) as part of this Contract as noted below.

.5 Manufacturer's Field Representative, shall be a skilled factory-trained technician, with references for a least 10 other complete installations.

.6 All costs, including travel, lodging, meals, and incidentals for Supplier service shall be included in the bid form.

3.5 FIELD QUALITY CONTROL

.1 Installation Check. The Manufacturer shall provide the services of a qualified field representative according to the quality control section to assist during installation of the equipment by the General Construction Contractor. As a minimum, the Manufacturer's field representative shall be made available as follows:

.1 Installation assistance (2 trip) 2 days (per trip)

.2 Startup assistance (3 trips) 1 day (per trip)

.2 In conjunction with startup, after installation of the filters and after all accessories are in operable condition, a field mechanical test shall be performed by the General Construction Contractor under the supervision of the Manufacturer in the presence of the Engineer.

.3 Each filter shall be submitted to complete normal start, normal stop, and emergency stop cycles. Each filter shall then be submitted to an 8 hour running test. At the beginning and end of the test and at periodic intervals between, all thermometers, pressure gauges, and flow indicators shall be observed and recorded. All safety devices shall be checked for satisfactory operation.

.4 The no-load amperage of the motor shall be checked and recorded. The start timer and acceleration time to running speed shall be checked and adjusted, if necessary.

.5 Any malfunctions appearing during the tests shall be corrected and additional testing performed, as directed by the Engineer, to assure that the defective or maladjusted equipment will perform satisfactorily after adjustment.

.6 In conjunction with start-up, after the field mechanical test, the Manufacturer shall make the equipment available to assist with start-up activities related to auxiliary equipment, including backwash pumps and other related equipment. The start-up of this auxiliary equipment requires the Disk Filters to be on-line. The Manufacturer's field representative shall operate the equipment throughout this period.

.7 Field Evaluation Tests. A field evaluation test shall be run on each filter after the installation is complete and the filters are operating properly as determined by the representative of the Manufacturer. The field evaluation test shall be broken down into two tasks, preliminary field tests and performance tests. The field evaluation test shall be conducted by a capable representative of the Manufacturer and accepted by the Engineer. The Owner's operating personnel shall assist the Manufacturer's representative in the performance test. A designated representative of the Owner and/or the Engineer shall observe the performance test. As a minimum, the Manufacturer's field representative shall be made available as follows for the initial tests:

.1 Field Evaluation testing (3 trips) 4 days (per trip), 8 hours per day (excluding travel time)

.8 Preliminary Field Tests. Preliminary field tests shall be conducted using the filter under the design conditions specified. Preliminary field tests shall consist of a series of runs to confirm the solid loading rate to meet the design conditions.

.9 Performance Tests. Performance tests shall be conducted to demonstrate the equipment's ability to consistently perform at the design conditions specified. Each filter shall be operated under design operating conditions. Separate tests shall be conducted on each filter. The Manufacturer's representative shall adjust filter operation at the start of each run and shall make no further adjustments during each test run, unless specifically authorized by Engineer. The performance test shall include the following two conditions:

.1 Forty eight (48) consecutive hour period at Average Daily Flow with secondary effluent

.2 Twenty (24) hour period at Peak Flow conditions with secondary effluent

Due to flow constraints, the vendor shall allow for three separate performance tests to cover all filters (i.e., only 1/3 of the filters will be performance tested at a time).

.10 Test Protocol. The actual plant flow at the time of the testing will be available to achieve each of the test conditions. If not, flow through the filter will be calculated using the water level over the effluent weir.

.1 The filters to be tested will be set up the week before testing begins and must be operated for a sufficient period in advance of the start of testing at 8 am on the first day.

.2 The Supplier shall furnish all labour, materials, equipment, lab services, instrumentation, and any other equipment and services necessary for conducting the field performance testing.

.3 The influent flow and influent and effluent sampling data shall be collected and presented by the Manufacturer in a report. The data shall be presented to clearly verify performance compliance. At a minimum, the report must include records of the following parameters for each day of testing:

.1 Daily flow total
.2 Influent/Effluent TSS composite sample concentration
.3 Influent/Effluent total phosphorus (TP), Soluble phoshorus
.4 Backwash rates

.11 The test results will be used to prove compliance with the performance requirements prior to acceptance of the equipment and to evaluate cost adjustments on the equipment if necessary. Consistent compliance with design conditions shall be defined as the average of sample values meeting or exceeding the specified design conditions.

.12 The Engineer's initial observation of tests over a maximum of four working days shall be at the Owner's expense. All costs of subsequent visits by the Engineer to witness or observe additional tests necessary because of failure of the initial tests or inability to conduct the initial tests will be deducted from monies due the Manufacturer. Engineer's costs for observation of additional tests are not expected to exceed $1,500 ($CAN) per day including expenses.

.13 Essentially, steady state operation shall be maintained throughout the test.

.14 Samples will be collected as directed by Engineer, and analyses performed at no cost to Owner by an independent testing laboratory acceptable to Owner. The Manufacturer may collect parallel samples for analyses by others. Engineer shall initial all data sheets.

.15 Should the equipment not achieve consistent compliance during the performance tests, or fail to achieve the required discharge TSS and TP concentrations, then the Manufacturer shall modify the equipment and repeat the performance tests. Costs of modifying equipment, reducing or furnishing additional equipment, or subsequent retesting shall be borne by the Manufacturer. Should the equipment fail to meet any of the design requirements, the equipment shall be rejected and shall be replaced by the General Construction Contractor with acceptable equipment at the Manufacturer’s expense. Equipment replacement shall include all costs of removal of failed equipment, installation of new equipment, and all retesting required to prove compliance with the performance requirements.

.16 Engineer shall be sole judge of conformance with performance testing requirements.

.17 Field Evaluation Report. The Manufacturer shall submit a written report within 10 days after completion of the tests presenting the results of the field evaluation

tests. The report shall include all laboratory analysis reports and recorded data and observations as specified. Six (6) copies of the report shall be submitted to the Engineer within 30 days after completion of the specified tests. The report shall include all data collected during field testing, including, but not limited to, the following:

.1 Results of preliminary test runs

.2 Data from performance testing to demonstrate consistent achievement of design conditions for the Disk Filter:

.1 Influent flow
.2 Loading rate
.3 Influent/Effluent TSS concentrations
.4 Influent/Effluent Particle size distribution (PSD)
.5 Backwash ratio

.1 Filtration rate
.2 Backwash flowrate
.3 Length of filtration period
.4 Length of backwash cycle

.6 Transmittance at UV system

.18 After installation supervision and field-testing services, the Supplier shall submit to the owner's representative, a certification letter certifying that the equipment was installed per the manufacturer's recommendations.

.19 Balance. All rotating parts shall be accurately machined and shall be in as nearly perfect rotational balance as practicable.

3.6 TRAINING

.1 Training shall be provided on the complete start-up, shutdown, operation and maintenance procedures and troubleshooting of the filter and all ancillary equipment and as indicated in the training section. As a minimum, the Manufacturer's field representative shall be made available for operator training as follows:

.1 Training (2 trips) 1 day (per trip), 8 hours per day (excluding travel time)

3.7 WARRANTY

.1 Each filter shall be new and shall carry the full Manufacturer's warranty on parts, service, and performance. Warranty shall begin at substantial completion. The warranty shall include replacement of all defective equipment and shall extend two (2) years beyond substantial completion.

.2 Allow for a minimum of two visits to inspect and clean the filters. These visits are in addition to any other required warranty visits.

.3 Corrective Work. Any location where corrosion is evident shall be considered a failure of the material or the protection system. Before starting corrective work, the Manufacturer shall submit to the Engineer for review an analysis of the cause of the failure and details of the proposed corrective work. The Manufacturer shall

make repairs acceptable to the Engineer at all points where failures are observed within the Warranty Period.

.4 Inspection. Each filter shall be inspected at the end of the warranty period by representatives of the Owner, the Engineer, and the Manufacturer to identify any failures that may have occurred. The Manufacturer shall establish the date of each inspection and shall notify the Owner at least 30 days in advance. The scheduled inspection shall not relieve the Manufacturer from the obligation to perform corrective work whenever needed.

.5 The Manufacturer shall prepare and deliver to the Owner an inspection report covering each inspection, indicating the number and type of failures observed, material and part where materials have failed, the percentage of the surface area where corrosion protection system failure has occurred, and the names of the persons making the inspection. Color photographs illustrating each type of failure shall be included in the report.

END OF SECTION

46 83 00 Ultraviolet Disinfection System

PART 1 GENERAL

1.1 SUMMARY

.1 This specification covers the general features of design, materials, manufacture, arrangement, shipment and commissioning of an open channel gravity flow ultraviolet (UV) disinfection equipment, including all control equipment and accessories to provide a complete operating system.

.2 Any material or equipment that is not specifically mentioned or included in this specification but is necessary to ensure a fully operational unit is to be supplied with the equipment and included in the quotation. Additional features may be offered and will be considered as "value added offerings" during the evaluation.

1.2 DESIGN

.1 UV Disinfection Equipment

.1 Configuration #1

.1	Quantity:	Two (2) Units
.2	Operation Configuration	One (1) Duty / One (1) Standby in a two-channel configuration, each unit to provide full treatment and hydraulic redundancy (100% + 100%).

.2 Configuration #2

.1	Quantity:	Two (2)
.2	Operation Configuration	One (1) Duty / One (1) Standby in a two-channel configuration, each unit to provide 75% treatment of PIF.

.3 Configuration #3

.1	Quantity:	Two (2)
.2	Operation Configuration	One (1) Duty / One (1) Standby in a one-channel configuration, each unit to provide 75% treatment of PIF.

.4 Design Flow

.1	Minimum Daily Flow	2,000 m^3/d
.2	Average Daily Flow	11,500 m^3/d
.3	Peak Day Flow	30,600 m^3/d
.4	Peak Instantaneous Flow	490 L/s

.5 UV Transmissivity (UVT) at 253.7 nm
Over full Range of Flows 55%
.6 Total Suspended Solids (TSS) 25 mg/L
.7 UV Safety Factors for design:

.1 UV Lamp Aging Factor 0.8 or lower
.2 Quartz Sleeve Fouling Factor 0.92 or lower

.8 UV Dosage 30 mJ/cm^2, the basis for evaluating the dose delivered by the UV disinfection system shall be the manufacturer's MS-2 Bioassay results as determined by independent third-party reactor validation testing.

.2 All electrical panels to have a completed arc flash analysis and be equipped with arc flash warning labels and arc flash information in accordance with CSA C22.1 – Canadian Electrical Code and CSA Standard Z462 – Workplace Electrical Safety.

.3 The Supplier shall be responsible to ensure and guarantee that all the specified equipment will be:

.1 Designed, fabricated, and assembled to provide reliable and efficient operation.
.2 CSA Approved (where applicable) and comply with any Codes and Standards referred to in this Specification.
.3 Of new material which is of current manufacture and proven in the field for the duty required.
.4 Correctly described on the Form of Quotation.

1.3 APPROVED MANUFACTURERS

.1 The equipment shall be the product of a company regularly engaged in the design, manufacture and supply of this type of equipment and whose equipment is of a design which has been in satisfactory service under similar conditions for not less than five (5) years.

1.4 ALTERNATIVES

.1 If a bidder wishes to offer an alternative proposal, in addition to the proposal complying with this specification, each such alternative must be clearly set out and the related adjustment shall be stated for each alternative.

1.5 DOCUMENTS

.1 Read this Specification in conjunction with the following documents:

.1 Systems Description
.2 Form of Quotation (completed by the Supplier)
.3 All information requested on that form shall be submitted in addition to the bidder`s supporting information, for the quotation to receive full consideration.

.4 General Terms and Conditions for Preselected Equipment shall be the governing terms and conditions accepted in the Form of Quotation by the Supplier.

.2 This specification together with the above-mentioned documents and any further documents issued therewith by the Engineer comprise the quotation documents.

1.6 SYSTEM DESCRIPTION

.1 It is the intent of these Specifications to specify a complete and operating system that will perform its intended function(s). All devices, fittings, and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified.

.2 All drives, motors, instrumentation etc. supplied shall be designed for an unclassified area.

1.7 STANDARDS

.1 All equipment and materials in accordance with the latest issue of all appropriate Standards and Codes, including, but not limited to the following:

.1 AFBMA - Load Ratings and Fatigue Life for Ball Bearings
.2 AGMA – American Gear Manufacturer's Association
.3 ANSI – American National Standards Institute
.4 ASME – American Society of Mechanical Engineers
.5 ASTM – American Society for Testing and Materials
.6 CEC – Canadian Electrical Code
.7 CEMA – Canadian Electrical Manufacturers Association
.8 CSA – Canadian Standards Association
.9 CWB – Canadian Welding Bureau
.10 IEC – International Electrotechnical Commission
.11 NEC - National Electrical Code
.12 NEMA – National Electrical Manufacturer's Association
.13 NFPA – National Fire Protection Association
.14 NFPA – National Fluid Power Association
.15 OSHA – Occupational Safety and Health Administration
.16 SSPC – Steel Structures Painting Council
.17 UL (cUL) – Underwriter's Laboratories Inc.
.18 USEPA – United States Environmental Protection Agency

1.8 WARRANTY AND QUANRANTEE

.1 The supplier shall warranty the products and workmanship of the equipment delivered to site. The supplier shall guarantee that the system can perform under the conditions stated and provide supporting documentation of their experience.

.2 Guarantee and warranty all components of the scope of supply for the greater of either 24 months after the date when the equipment achieves satisfactory performance, established by through the terms of the General Contractor's Contract, or until the expiry of a period of 36 months after the date of completion of delivery of such equipment to the site, whichever period terminates first.

PART 2 PRODUCTS

2.1 GENERAL

.1 Provide two (2) UV disinfection systems (one (1) duty / one (1) standby), complete with controls and accessories as shown and as specified for the various configurations. Provide equipment suitable for open channel, gravity flow installation including, but not limited to, the following components, and appurtenances necessary for the interconnection of components, in the quantities required:

.1 UV lamp module with support rack and bracket
.2 UV system instrumentation, controls, and power distribution
.3 Wireway and interconnecting cables
.4 Water level control device
.5 UV intensity monitoring system
.6 Elapse time meter
.7 Automatic cleaning system
.8 Spare parts

.2 Each piece of equipment specified shall be designed for continuous operation, 24 hours per day, 7 days per week.

.3 All metallic parts shall be constructed of 304 stainless steel or better to suit service conditions.

.4 The UV sleeves shall be Type 214 clear fused quartz.

.5 All wiring exposed to UV light shall be Teflon coated.

.6 All other material exposed to UV light shall be Type 304 or 316 stainless steel, Type 214 quartz or Teflon or other suitable UV resistant material unaffected by prolonged exposure over the component service life.

.7 All stainless-steel components to be treated with full submersion passivation.

.8 Each unit must be factory assembled and tested prior to delivery to site and ready for installation.

.9 Furnish all mechanical and electrical equipment and instruments as required to perform the functions specified and described within this document.

.10 All equipment is to be furnished by or through a single supplier to ensure coordination and compatibility of equipment.

.11 The equipment must be capable of mode of operation adjustments and post power failure start-up with no additional effort by the operator.

.12 On-site power is available in 600 V / 3 Phase / 60 Hz.

2.2 PERFORMANCE REQUIREMENTS

.1 The ultraviolet disinfection system will produce an effluent conforming to the following discharge permit: 200 Fecal Coliform/100 ml, based on a 30 day Geometric Mean. Grab samples will be taken in accordance with the Microbiology

Sampling Techniques found in Standard Methods for the Examination of Water and Wastewater, 19th Ed.

.2 Provide a UV disinfection system complete with UV Banks, System Control Center, Power Distribution Center(s), Support Racks(s) and Level Controller(s) as shown on the contract drawings and as herein specified.

.3 The UV system will be designed to deliver a minimum UV dose of 30 mJ/cm^2 MS2 at peak flow, in effluent with a UV Transmission of 55 % at end of lamp life (EOLL) after reductions for quartz sleeve fouling. The basis for evaluating the UV dose delivered by the UV system will be the independent third party bioassay, without exception. Bioassay validation methodology to follow protocols described in NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (May 2003) and/or applicable sections of the US EPA Design Manual – Municipal Wastewater Disinfection (EPA/625/1-86/021).

.4 The UV Dose will be adjusted using an end of lamp life factor of 0.5 to compensate for lamp output reduction over the time period corresponding to the manufacturer's lamp warranty. The use of a higher lamp aging factor will be considered only upon review and approval of independent third party verified data that has been collected and analysed in accordance with protocols described in NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (May 2003).

.5 The UV Dose will be adjusted using a quartz sleeve fouling factor of 0.8 when sizing the UV system in order to compensate for attenuation of the minimum dose due to sleeve fouling during operation. The use of a higher quartz sleeve fouling factor will be considered only upon review and approval of independently verified data that has been collected and analysed in accordance with protocols described in NWRI Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse (May 2003).

.6 Independent 3rd Party Validation for use of higher factors (lamp aging and sleeve fouling) must be submitted as part of the proposal.

.7 The system will be able to continue providing disinfection while replacing UV lamps, quartz sleeves, ballasts and while cleaning the UV lamp sleeves.

.8 The system will be designed for complete indoor installation.

2.3 EQUIPMENT REQUIREMENTS

.1 UV Lamp Modules

.1 Module shall consist of lamps with each lamp placed in an individual sleeve. Module shall be capable of being withdrawn as a unit and replaced without interrupting operation of any other module, shall be self-supporting in the channel, and shall be capable of supporting a weight of 90 kg.

.2 Horizontal lamp module shall have lamps in sleeves sealed and supported in a NEMA 6P stainless steel frame. Electrical wires which carry power to the lamps and ballasts shall be completely enclosed in the frame and shall be isolated from the wastewater. The frame shall be capable of protecting lamps and sleeves from foreign material or debris within the channel.

.3 Vertically oriented module shall have lamps installed in a weatherproof, watertight enclosure. Sleeve shall be fitted to the enclosure using compression fitting and neoprene gasket. Wiring shall have numbered terminal strips which correspond to the numbering in the main power panel. Lamp enclosure shall be fitted with a waterproof wiring connector to allow the enclosure to be disconnected and removed from the channel. Lamp connection shall be above the waterline or shall be waterproof. Safety interlock switch shall turn off power to the lamps when module enclosure covers are opened. A Class B, ground fault circuit interrupter shall be provided for each enclosure to turn off power if water enters the enclosure. Lamps shall be arranged so that they can be replaced without disassembling or removing lamp module.

.4 System shall allow for complete system shutdown or by-pass. System shall allow continuous disinfection while replacing lamps, sleeves, and ballasts; and while cleaning the lamp sleeves.

.5 Systems with shall be provided with a mechanical lifting device for the removal of the modules.

.2 UV Lamps

.1 Lamps shall be low-pressure mercury vapour type of the hot-cathode preheated design to promote longevity in which the coiled filamentary cathodes are heated by the arc current. The filament shall be a clamped design and shall withstand shock and vibration. Lamps that are not amalgam or that are based on driving a low pressure lamp at amperages greater than 500 milliamps will not be allowed.

.2 Lamp shall have the following characteristics:

.1 90 percent of UV radiation shall be within the wavelengths of 233.7 to 273.7 nm.

.2 Produce a minimum UV intensity of 190 microwatts per square cm at a distance of 1 meter.

.3 Maximum power input of 65 watts (not including ballast losses).

.4 Have a minimum arc length of 1475 mm.

.5 Rated to produce zero levels of ozone.

.6 Have a minimum UV output of 26.7 watts at 100 hours.

.3 Lamp base shall be metal and ceramic, resistant to UV light and ozone. Lamp tube shall be capable of transmitting 90 percent of the radiation produced therein.

.4 Changing lamps shall not require removal of the sleeve from the lamp module frame. Lamp ballast shall be capable of being replaced by plant operating personnel.

.5 System shall use lamps available from at least 2 currently active lamp manufacturers without modifications to the system.

.6 Electrical connections will be at one end of the lamp and have four pins, dielectrically tested for 2,000 Vrms. Lamps that do not have 4 pins will be considered instant start. To be considered as an alternate, instant start lamp systems will supply replacement spare lamps equal to 50% of the total number of lamps in the system.

.7 Lamps will be operated by electronic ballasts with variable output settings.

.3 UV Lamp Sleeve

.1 Sleeve shall be clear fused quartz circular tubing. Sleeve shall be rated for transmittance of 89 percent or more and sleeve shall not be subject to solarization over its life. The nominal wall thickness shall be between 0.8 and 2.09 mm.

.2 One end of each sleeve shall be closed, and the other end sealed by a lamp end seal and compressed O-ring. The closed end of the sleeve shall be held in place by means of a retaining O-ring. The sleeve shall not come in contact with any steel in the frame.

.4 Lamp End Seal and Lamp Holder

.1 The open end of the lamp sleeve shall be sealed by means of a stainless-steel nut which compresses an external sleeve O-ring seal. The sleeve nut shall have a surface which allows a positive hand grip for tightening and shall not require any tools for removal.

.2 The lamp holder shall be held in place in such a way as to isolate and seal the lamp from the module frame and other lamps in the module. Should a lamp sleeve fracture, the seal shall prevent moisture from entering the module frame and the electrical connections to other lamps in the module. The lamp holder shall incorporate UV resistant materials which prevent lamp sleeve from touching steel.

.5 UV Lamp Module Support Rack

.1 Rack shall be stainless steel construction and shall not allow UV light to radiate above the channel when the lamp modules are energized and fully immersed in the effluent.

.6 Lamp Array Configuration

.1 Horizontal: Horizontal lamp configuration shall be a uniform array with lamps parallel to each other and to the flow. Lamps shall be evenly spaced in horizontal and vertical rows with centerline spacings equal in both directions. The single array pattern shall be continuous and symmetrical throughout each reactor.

.2 Vertical: Vertical lamp configuration shall be a staggered uniform array with lamps parallel to each other, but perpendicular to the flow. Lamps shall be evenly spaced with alternating rows offset by one-half the uniform centerline spacing.

.7 Water Level Control

.1 A level control device shall be placed at the discharge end of each channel. Level control device shall maintain constant channel water level within tolerances required to keep lamps submerged and shall prevent excessive water layer over the top lamps.

.2 A water level sensor shall be situated within the channel to provide an alarm indication and/or automatic system shutdown should the water level drop below the uppermost part of the top row of horizontal lamps. Alarm contacts for remote annunciation shall also be provided.

2.4 ELECTRICAL REQUIREMENTS

.1 Incoming power available at site:

.1 Main three (3) Phase Power Feed: 600V, 3 Phase, 60 Hz.
.2 Single Phase Control Power Feed: 120V, 1 Phase, 60 Hz

.2 General:

.1 Refer to specification section 26 05 01 for additional requirements.
.2 If transformers are required to modify the 600V feed, the Supplier is to provide the power requirements. The transformer shall be provided by others, refer to section 26 05 01. Transformer(s) must meet CSA Energy Efficiency requirements with low temperature rise, minimum K-Rating of 9, a minimum amp rating of 125% of maximum amp draw and be enclosed in a minimum NEMA 3R enclosure.
.3 Control and monitoring components and power supply shall be housed in NEMA enclosures. Internal components shall be sealed from the environment. System electronics to be used in an interior environment shall be housed in enclosures conforming to NEMA 250 Type 12. System electronics to be used in an exterior and corrosive environment, as defined in NEMA 250, shall be housed in enclosures conforming to NEMA 250, Type 4X.
.4 All local disconnect switches or breakers to be supplied by others per latest local code.
.5 All internal components shall be sealed as per latest local code from the environment.
.6 Protection must be provided against earth leakage (i.e. ground) faults.
.7 All electrical components must be, as practical, “off-the shelf” items and available through local electrical distributors, not solely through the Supplier. Supplier to identify items which must be purchased from the Supplier to maintain the warranty.
.8 Equipment will be installed indoors.
.9 All wires and labels inside the panel must be labeled clearly and must match the details on the Control Panel drawings. Use full description where possible.
.10 Utilization of identical motors for the majority of equipment is preferred to minimize the number of motors required as spare.

.3 Parameters

.1 The system shall be divided into the proper number of parallel electrical subsystems for the peak design flow.
.2 Each electrical subsystem shall be powered from a distribution center and shall include ground fault circuit detection, circuit protection, modules, and interconnecting cables.
.3 One power panel shall be supplied for each module and shall be prewired by the manufacturer, except for the final connection of the individual modules to the power panel.
.4 Ground fault detection shall be standard with the UV equipment manufacturer.

.5 Sufficient cooling shall be provided to ballasts. Magnetic ballasts shall have a minimum allowable air flow per ballast of 0.014 m^3/s.

.6 Wiring and electrical connections shall be protected against moisture to prevent electrical shorts or failure. Electrical installation and materials shall conform to NFPA 70. The unit shall be completely wired requiring only an external connection for a single external power supply and remote control.

.7 Controls and designations shall conform to NEMA ICS 1

.4 Interconnect Cables

.1 Multiconductor unshielded cable shall be suitable for indoor installation.

.2 Insulation shall be thermoplastic rubber with operating range of -60 to 125 degrees Celsius with low temperature flexibility and flame retardants.

.3 The UV stabilized jacketing shall be resistant to oils, chemicals, fuels, solvents, and to mechanical abuse and abrasion.

.4 Cable shall be supplied by the equipment manufacturer and shall be of sufficient length and number for a complete system.

.5 Cable shall be of a modular repairable type and shall allow for field replacement and repair of its components by plant operators.

.5 Connectors and Receptors

.1 Connector shall be waterproof Type S.O. cable for in-line connection. The design shall allow fast and easy positive coupling and uncoupling. Connector shall be mounted out of possible flood-prone environments. Connector shall be of a “snap-on” design having no threads and shall allow for visual confirmation that the connection is locked in place,

.6 Ballasts

.1 Ballast shall conform to ANSI C82.4; shall be coordinated to the ballast supplies; shall be rated for 120 or 600 volts; and shall have a power factor of not less than 90 percent at a crest factor of 2.0 or less, and a voltage range of not less than plus or minus 10 percent. Ballast shall be suitable for operating at -15 degrees Celsius and above. Magnetic ballast shall be located and/or enclosed in an environment not susceptible to the effects of heat, cold and moisture. Ballast shall be of a modular design allowing for quick disconnect and replacement by operators.

.7 Cableway

.1 If required by the equipment manufacturer, cable shall be installed in weatherproof and submersible cableway. The cableway shall be stainless steel, 1.98 mm thick. Cableway shall be gasketed and completely watertight under a submerged condition.

2.5 CLEANING SYSTEM

.1 Provide cleaning equipment and cleaning solutions. Cleaning system shall be a permanent in-channel installation for cleaning individual lamp sleeves or entire lamp modules.

.2 Hydraulic System Center (HSC):

.1 One (1) HSC will be supplied to house all components required to operate the automatic cleaning system.
.2 Enclosure material of construction will be Type 304 Stainless Steel - Type 4X (IP66).
.3 The HSC will contain a hydraulic pump complete with integral 4-way valve and fluid.

.3 Cleaning System:

.1 An automatic cleaning system will be provided to clean the quartz sleeves using both mechanical and chemical methods. Wiping sequence will be automatically initiated with capability for manual override.
.2 The cleaning system will be fully operational while UV lamps and modules are submerged in the effluent channel and energized.
.3 Cleaning cycle intervals to be field adjustable.
.4 Remote Manual and Remote Auto cleaning control options will be provided.
.5 The cleaning system will be provided with the required solutions necessary for initial equipment testing and for equipment start-up.

.4 To be considered as an alternate, systems that use only mechanical wiping must have the ability to periodically be cleaned out of channel using a chemical bath. Out of channel cleaning will include lifting slings, removable banks, cleaning tanks, agitation system and air compressors, as required. The UV manufacturer will be responsible for supplying all equipment including any equipment not specifically listed required to perform out of channel chemical cleaning. Contactor will be responsible for installation.

2.6 CONTROL SYSTEM

.1 Work Included:

.1 The work includes the complete supply, programming, commissioning, and operator training for a single control system/panel for the UV disinfection system.
.2 Refer to specifications 25 05 03 and 26 05 01 for additional requirements.

.2 Shop Drawings:

.1 The vendor shall supply detailed shop drawings for the controls system including catalog cuts, shop drawings, control schematics, loop diagrams, layout drawings, control panel layouts, control panel power distribution schematics, network diagrams, instrument list, I/O list, process control narrative, functional requirements specifications, instrument test forms, I/O module test forms, PLC system commissioning checklist, design calculations and studies.

.3 General:

The proposed main panel shall have the following minimum characteristics, components, and functionality and will provide for a fully-functioning UV disinfection system:

.1 The unit operation will be integrated into a plant wide control system (SCADA) and HMI (Human Machine Interface).

.2 The control system shall be pre-wired and pre-programmed to monitor process variables and initiate all process functions required, including closing and positioning of valves, and any other actions necessary to conduct the operation and maintenance of the disinfection system.

.3 The control panel will be installed indoors, with exact location to be determined on-site and approved by Buyer/Consultant.

.1 The Main Control Panel enclosure shall be CSA approved type 316/316L Stainless steel and rated NEMA 4X for Non-Hazardous Area with lockable stainless-steel door-on-door style enclosure. The control panel must incorporate an inside hinged swing panel(s) to separate the high voltage equipment (ex. 600VAC) from the operator interface and controls.

.2 Non-ventilated Panels: Design to adequately dissipate heat from equipment mounted inside panel or on panel. Alternatively furnish refrigeration cooling system for Control Panels with supply voltages greater than 120 VAC.

.3 Furnish a solid metal barrier or Lexan plexiglass shield, to separate 600VAC (ex. VFD) from 120VAC (ex. PLC) components.

.4 The control panel PLC shall be Allen Bradley CompactLogix communicating over Ethernet/IP with the plant wide SCADA Control System (CompactLogix 5370 L3 Controller, Minimum version 1769-L30ER with the latest possible firmware).

.5 The PLC shall be capable of bi-directional communication with the plant wide SCADA control system (by Others) by means of an Ethernet/ IP. Process monitoring, alarm notification, and remote control shall be possible from the plant wide SCADA control system.

.6 Supply a complete control panel, including the swing panel mounted main fusable type disconnect switched sized for the application c/w NEMA 4X operating handle and interlock, the main processing unit (PLC), the required input/output (I/O) cards, all cable, hardware, I/O power supplies, and any other equipment that is required to perform the control operations in automatic and manual modes.

.7 Operator devices shall be a minimum of 22 mm diameter, type NEMA 4X:

.1 General: Power ON (white light), General E-Stop (mushroom button), General fault (red light), Alarms Reset (black push-button).

.2 Equipment Status: Motor Run (Red light), Motor Off (Green light) Motor Fault (Yellow light).

.3 Auxiliary Equipment Status: Valve Open (Red), Valve Closed (Green)

.4 Equipment manual controls: Auto / Manual (selector switch), Motor On / Off (selector switch).

.8 Supply all components required to eliminate any detrimental effects of supply voltage harmonic distortion, ripple, or high voltage DC spikes and to maintain satisfactory operation of the equipment (ex. surge

suppression). A constant voltage transformer shall be supplied within the control panel that shall supply power to the PLC and its related equipment.

.9 Uninterruptible Power Supply (UPS):

.1 All control panels having a PLC, I/O rack, and/or data communications equipment shall be fed power from a UPS. This includes control panels supplied with packaged systems.

.2 The UPS shall provide uninterrupted power to, at minimum, the PLC/RTU, its I/O and field instruments.

.3 The UPS shall be sized to ensure the control panel continues to perform communications, data manipulation, calculations, monitoring and process data archiving for a minimum of 20 minutes following the loss of supply power.

.4 When sizing the UPS, all critical loads shall be identified and power calculations shall be provided. Provide additional battery cabinets to allow for load/time requirements if necessary.

.5 Where possible, install the UPS in a control panel. The UPS shall not block access to any panel mounted equipment.

.6 Enclose any unit not mounted in a control panel within a vented enclosure with a NEMA rating suitable for its mounting location.

.10 The PLC Supplier's recommended wiring practices shall be followed for the PLC and all associated components. The Supplier shall furnish and install all necessary relays, pilot devices, or other components necessary to avoid dissipation of inductive currents into the input or output circuitry.

.11 Resistor-capacitor networks shall be provided for each relay that interfaces with the PLC. The PLC shall be sized to provide at least 25 percent spare program memory. Provide a minimum of 20 percent spare Input and Output modules and of corresponding I/O rack space.

.12 Provide a minimum of 100% spare fuses with a spare fuse holder mounted inside the panel.

.13 The vendor will be required to provide fully documented ladder logic along with the actual PLC program (not the PLC programming software) on DVD.

.14 Supplier must provide the most recent versions of the PLC program following successful commissioning.

.15 Provide a written confirmation from the Supplier of each product stating that it is a current product and that it will be supported (spare parts, software drivers, service, etc.) for a period of not less than Five (5) years from the date of purchase. Submit confirmation with Shop Drawings.

.4 The UV Disinfection System shall be controlled as follows:

.1 Equipment shall be of the fully automatic program control type and shall be capable of receiving standard 4-20 mA control signals from the plant effluent flowmeter. Control of 2 or more banks of modules shall be accomplished by turning lamp banks on and off in proportion to flow variations. Controls shall continuously adjust the UV intensity automatically in proportion to wastewater flow. Controls shall require no manual attention other than adjustment of the required UV intensity.

.5 Lamp Status Indicators

.1 Indicators shall indicate the status whether ON/OFF of each lamp in the module being powered.

.2 Indicators shall indicate the status "POWER ON", only, in each module.

.3 The lamp monitoring system shall indicate the geometric location of each individual lamp and operating status of each lamp by means of a neon lamp or alpha-numeric data display (LED or LCD). Upon lamp failure, the corresponding lamp shall be illuminated and contact closure shall occur for remote alarm annunciation. Contact closure for remote annunciation shall be provided to indicate lamp module failure due to ground fault interruption.

.6 UV Intensity Detection System

.1 A submersible UV sensor shall continuously sense the UV intensity produced in each bank of lamp modules. The sensor shall measure only the germicidal portion of the light emitted by the lamps within the channel between 254.5 and 255.0 nm. The UV intensity shall be displayed on the intensity meter. Each UV intensity probe shall be located at a point of minimum expected intensity within the lamp array. The probe shall mount to any lamp in the array and shall be clip-on and self-aligning to assure the proper spacing from the tube without necessity of hand tools. The probe shall be factory calibrated with verification in the field prior to startup. The UV equipment manufacturer shall provide justification for the sensor location.

.2 One (1) UV intensity meter shall be provided per bank of lamp modules. The meter shall indicate safe intensity, low intensity, and unsafe intensity by means of color codes on the meter face or have a 0 to 100 percent scale. The UV intensity meter shall be clearly labeled and located on the remote-control panel.

.3 A nonresettable elapsed time meter shall be provided per bank of lamp modules. The meter shall record hours of UV bank operation from 0 to 99,999 hours.

.4 One hand/off/auto switch shall be provided for each UV bank and for each automatic slide gate shown and specified.

.5 Alarms shall be time delayed to prevent nuisance alarms.

.7 Remote monitoring and control:

.1 Provide dry relay contacts for minor alarms which will indicate that maintenance attention is required. Minor alarms include:

.1 Low warning UV intensity
.2 Individual lamp failure

.2 Provide dry relay contacts for major alarms which will indicate an extreme condition in which the disinfection performance may be jeopardized. Major alarms shall include:

.1 Low UV intensity
.2 Lamp failure of 2 or more adjacent lamps
.3 Multiple lamp failure
.4 Module failure

2.7 SPARE PARTS

.1 The following spare parts and safety equipment to be supplied at each facility (Supplier to advise, if and how their spare parts list differs from the below.):

.1 One (1) complete assembled lamp module
.2 10% of the total number of system lamps
.3 5% of the total number of system ballasts
.4 10% of the total number of system lamp sleeves
.5 Ten (10) sets of lamp end seals
.6 Ten (10) sets of lamp socket connectors
.7 Provide one (1) portable UV module maintenance rack, constructed of 304 stainless steel
.8 One (1) 20 L pail of food grade grease
.9 Two (2) sets of spare fuses for each size of fuse provided within the system
.10 One (1) 20 L pail of hydraulic fluid
.11 Two (2) personnel safety shields which block out UV wavelengths between 200 and 400 nm
.12 Provide two (2) sets of rubber gloves
.13 Provide one (1) UV warning label
.14 Any special proprietary tools.

PART 3 EXECUTION

3.1 DELIVERY, SHIPPING AND HANDLING

A. All equipment shall be shipped completely assembled where possible. Large fabricated assemblies shall be shipped in sub-assemblies as large as practical from the point of view of moving them into and about the structures, and piece-marked to facilitate field erection.

B. The Supplier shall co-operate with the General Contractor in the matter of packaging, time of delivery and shipping.

C. The equipment and appurtenances shall be delivered to the Site of the work in a condition satisfactory to the Owner and any omissions, discrepancies, or damage evident on delivery shall be made good by the Supplier.

D. The General Contractor at the Site shall unload the Supplier’s equipment, sign the carrier's pro bill to indicate receipt of the required number of crates, packages, note any apparent shortages of or visible damage to such crates and packages and shall assume care and custody of the equipment. The Supplier shall furnish to the Contractor, lists showing the contents of the crates and packages available at the job site when delivery of the equipment and appurtenances is made. Within seven (7) days after the date of delivery to the job site, the Contractor will notify the Supplier in writing of shortages or damage in the equipment delivered.

E. The Supplier shall supply the services of a competent, factory-trained technical representative to site during major equipment deliveries to ensure proper receiving, handling, storage, and completeness of shipped components.

3.2 EQUIPMENT DELIVERY AND INSTALLATION VERIFICATION

.1 Delivery of Equipment: The Supplier shall coordinate the date of major equipment delivery close to the time the equipment will be installed. The General Contractor will be responsible for receiving, off-loading, and placing into storage all equipment at the site related to this Procurement Contract.

3.3 INSTALLATION

.1 Lifting lugs: Equipment or components over 45 kg (100 pounds) in weight shall be provided with lifting lugs.

.2 UV disinfection equipment shall be installed in accordance with approved procedures, by the general contractor, submitted with the shop drawings and as indicated, and in strict compliance with the manufacturer's recommendations, unless otherwise approved.

.3 Inspection, testing, start-up, and field adjustment shall be as indicated.

3.4 PERFORMANCE TESTING

.1 After completion of specified plant operating period and when each unit is operating to satisfaction of Engineer, conduct tests necessary to demonstrate to Engineer that each UV unit meets specified guarantees and other requirements of contract documents.

.2 Measure each performance parameter as specified, BOD5, suspended solids, and other tests necessary by UV manufacturer for both influent and effluent of UV system.

.3 Equipment supplier is responsible to collect and analyze samples.

.4 Provide testing procedures and methodology minimum three (3) weeks prior to performance testing for review by Engineer.

.5 Failure to follow these procedures resulting in poor data and repeat of performance test is at no additional cost to Owner.

.6 Mutually acceptable outside independent laboratory to complete laboratory tests on samples.

.7 Acceptance testing based on five (5) trouble free, consecutive days of operation on each UV unit. Provide competent supervisor during acceptance test periods to supervise operation of each UV unit.

.8 If test demonstrates that any unit fails to meet stated guarantees, modify, adjust, re-build or perform necessary work so that unit performs as specified. Repeat acceptance test and perform testing to demonstrate that guarantees are met.

.9 When acceptance tests have to be repeated, provide labour, materials, and supervision for work required so that each unit meets guarantees at no extra cost to Owner.

3.5 MANUFACTURER’S SERVICES

.1 Provide written instruction and information to the General Contractor for the installation of the equipment.

.2 Respond to queries during construction related to installation and commissioning of the supplied equipment.

.3 Liaise with the General Contractor to identify milestones for inspection.

.4 The equipment shall be installed under the supervision of a representative of the Supplier who shall also instruct the Owner's personnel in these matters. Provide this service priced (including all expenses) as part of this Contract as noted below.

.5 Provide a site visit comprising a minimum of 48 man-hours on site for each installation, scheduled by the General Contractor, at a time acceptable to the Owner, for a skilled factory-trained technician to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC and training of the operators in starting-up and testing the equipment and systems.

.6 The Supplier shall provide start-up reports covering installation inspection and start up activities.

.7 Manufacturer's Representative, shall be a skilled factory-trained technician, with references for a least 10 other complete installation, to make final adjustments, undertake performance testing assistance, conduct commissioning of the equipment, programming of the PLC and training of the operators in starting-up and testing the equipment and systems. Present at site or classroom designated by Owner, for minimum 8 hour on-site person days listed below, travel time excluded:

.1 2 person days for installation assistance and inspection; 2 trips.
.2 5 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.

.8 After installation supervision and field-testing services, the Supplier shall submit to the owners representative, a certification letter certifying that the equipment was installed per the manufacturer's recommendations.

.9 Bear all costs of any nature required because of failure of any of the units including performance.

.10 As often as it takes, re-test, adjust and generally apply technical expertise and materials to solve any performance or equipment problems or deficiencies that may exist in the installed equipment, at no additional cost to this supply contract. Five failed attempts shall be grounds for rejection of the equipment.

.11 The Supplier shall provide operator training to all required plant personnel.

.12 Provide four (4) copies of system operations and maintenance manuals to the Engineer for each piece of equipment supplied. Manuals shall be bound in three ring, hard cover, type binders. Provide an electronic copy in PDF or MS Word format.

.13 All costs, including travel, lodging, meals, and incidentals for Supplier service shall be included in the bid form.

PART 4 PRESELECTION SUBMITTAL REQUIREMENTS

4.1 INFORMATION REQUIRED

.1 The Pre-selected supplier shall provide the following:

.1 Installation Shop Drawings including the supplier's certification and engineering seal.
.2 Installation Shop Drawings shall be provided in the 2024 or more current versions of Revit, Solidworks, or Step (.stp) file digital platforms for use during the detailed design.
.3 Installation Instructions specific to the project.
.4 Operations and Maintenance Manuals specific to the project.

.2 Distribution of supplied information:

.1 Upon notification of the of award, the successful proponent shall submit the above listed documents to the Engineer for review and integration in the detailed design. The successful supplier shall provide a single technical contact person who will be available to provided detailed design recommendations.

END OF SECTION