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END OF SECTION

SUMMARY OF WORK

1. GENERAL

1.1 Description

- .1 The Work in this Supply Contract comprises of the supply of stainless steel gates complete with all electrical and control appurtenances. Work also includes start-up, commissioning, training, performance testing and O&M manuals.
- .2 The Work includes, but is not limited to the following elements:
 - .1 Supply and delivery of:
 - .1 Three (3) actuated stainless steel slide gates complete with all actuators and appurtenances;
 - .2 Three (3) actuated stainless steel weir gates complete with all actuators and appurtenances.
 - .2 Installation assistance, start-up, training, commissioning, performance testing and operations and maintenance (O&M) manuals and complete with Shop Drawings; and
 - .3 Spare parts and special tools required for maintenance.
- .3 Equipment to be installed under a separate contract, with installation guidance from the gates Supplier.
- .4 Coordinate delivery, storage requirements, installation, training, start-up and commissioning with the Construction Contractor.
- .5 All products or materials that are deemed no longer supported or the product is no longer produced at the expiration of the warranty period, shall not be acceptable and will be replaced with the subsequent product. The City shall be notified of these products prior to delivery.

1.2 Definitions

- .1 Supplier: The entity supplying the goods described in Section 1.1.2 and considered the Contractor as defined in the City of Winnipeg General Conditions for Supply of Goods.

1.3 Work Sequence

- .1 Coordinate progress Schedule with the City and Contract Administrator during construction to minimize disruption and maintain disinfection.
- .2 Proposed stages include:
 - .1 Award of Contract.
 - .2 Review and approval of Shop Drawings.
 - .3 Review and approval of O&M manual and training content.

SUMMARY OF WORK

- .4 Delivery to Site.
- .5 Installation assistance.
- .6 Start-up, commissioning, and training.

1.4 Work Coordination

- .1 Coordinate Work with the General Contractor in regard to equipment delivery, storage, installation, start-up, commissioning and training.

1.5 City of Winnipeg Personnel Occupancy

- .1 The City personnel will work around the Site during the entire construction period for the execution of normal operations.
- .2 Co-operate with the City personnel in scheduling operations to minimize conflict and maintain UV disinfection in the system at all times.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

SUBMITTALS

1. GENERAL

1.1 Description

- .1 Submit to the Contract Administrator the submittals required by individual Specification Sections for review. Submit promptly and in an orderly sequence according to the Schedule of Submittals to not cause a delay in Work. Failure to submit in the scheduled time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Provide a copy of all the Specification Sections in the Tender package with any applicable addenda with each paragraph check-marked to indicate Specification compliance or cross-marked to indicate non-compliance. Requested deviations and clarifications from the specified requirements shall be provided with the Shop Drawings.
- .3 Do not proceed with Work affected by the submittal until reviewed by the Contract Administrator.
- .4 Present Shop Drawings, product data, and samples in SI Metric units. Dual units are acceptable.
 - .1 Where items or information is not produced in SI Metric units, convert units to SI Metric.
- .5 Review submittals prior to submission to the Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with the requirements of Work and Contract Documents.
- .6 The review by the Contract Administrator is for the sole purpose of ascertaining conformance with the general concept. It does not provide 'approval' of the detail design inherent in Shop Drawings (which remains with the Supplier), nor does it relieve the Supplier of responsibility for errors or omissions in Shop Drawings or for meeting all requirements of the construction and Contract Documents.
- .7 Verify that field measurements and affected adjacent Work are coordinated.
- .8 The Supplier shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of submittals. The Supplier shall direct specific attention in writing on resubmitted submittals to revisions other than the corrections requested by the Contract Administrator on the previous submission.
- .9 After the Contract Administrator's review and return of copies, distribute copies to sub-trades as appropriate.

1.2 Submittals Procedures

- .1 Details regarding submittals can be found in the individual Specification Sections.
- .2 Direct submittals to the Contract Administrator.
- .3 Hardcopy Submittals: Submit hard copies only where specifically required under individual Specifications Sections.

SUBMITTALS

- .4 Electronic Submittals: Submittals made in electronic format shall be as follows:
 - .1 Each submittal shall be an electronic file in a searchable Adobe Acrobat Portable Document Format (PDF), and native files (e.g., Word, Excel, AutoCAD, etc.). Use the 2010 version or newer.
 - .2 Electronic files that contain more than ten (10) pages in PDF format shall contain internal book marking from index page to major sections of the document.
 - .3 PDF files shall be set to open "Bookmarks and Page" view.
 - .4 Add general information to each PDF file, including title, subject, author, and keywords.
 - .5 PDF files shall be set up to print legibly at 215.9 mm by 279.4 mm, 279.4 mm by 431.8 mm or ISO A1 (594 mm by 841 mm). No other paper sizes will be accepted.
 - .6 Submit new electronic files for each resubmittal.
 - .7 Include copy of transmittal of Contractor's submittal.
 - .8 Contract Administrator will reject submittals that are not accompanied by an electronic copy.
 - .9 Provide authorization for Contract Administrator to reproduce and distribute each file as many times as necessary for Project documentation.
- .5 Transmittal of Submittal:
 - .1 Stamp each submittal with a uniform approval stamp before submitting to the Contract Administrator.
 - .1 Stamp to include project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with Contract.
 - .2 Contract Administrator will not review submittals that do not bear Supplier's approval stamp and will return them without action.
 - .3 Contract Administrator will not review submittals received directly from a Subcontractor and will return them without action.
 - .4 Complete, sign, and transmit with each submittal package, one (1) transmittal of Contractor's submittal form.
 - .2 Identify each submittal with the following:
 - .1 Numbering and tracking system:
 - .1 Sequentially number each submittal.
 - .2 Resubmission of submittal shall have original number with sequential alphabetic suffix.

SUBMITTALS

- .2 Specification Section and paragraph to which submittal applies.
- .3 Project title and City Tender number.
- .4 Date of transmittal.
- .5 Name of Contractor.
- .3 Include Contractor's written response to each of Contract Administrator's review comments with resubmission of submittals stamped "Exceptions Noted, Resubmit".
- .6 Format:
 - .1 Do not base Shop Drawings on reproductions of Contract Documents.
 - .2 Package submittal information by individual Specification Section. Do not combine different Specification Sections together in submittal package, unless otherwise directed in Specification.
 - .3 Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract.
 - .4 Index with labeled tab dividers in orderly manner.
- .7 Timeliness:
 - .1 Schedule and submit submittals in accordance with schedule of submittals and requirements of individual Specification Sections.
 - .2 Submit Shop Drawings and samples a minimum of two (2) months ahead of the scheduled delivery date for associated equipment and material and in an orderly sequence so as to cause no delay in the Work.
- .8 Processing Time:
 - .1 Time for review shall commence on Contract Administrator's receipt of submittal.
 - .2 Contract Administrator will act upon Supplier's submittal and transmit response to Contractor no later than ten (10) Business Days after receipt, unless otherwise specified.
 - .3 Supplier shall make all submittal corrections and resubmit to the Contract Administrator within ten (10) Business Days after receipt of mark-ups.
 - .4 Resubmittals will be subject to the same review time.
 - .5 The review time required will not alleviate the Supplier of his responsibility to deliver the completed Work within the required time frame and schedule. Planning for submittal reviews and the risk to the delivery schedule remains the Supplier's sole responsibility.
- .9 Resubmittals:
 - .1 Clearly identify each correction or change made and include revision date.

SUBMITTALS

- .2 No adjustment of the schedule outlined in the Supplemental Conditions or Contract Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmittals.
- .10 Incomplete Submittals:
 - .1 The Contract Administrator will return the entire submittal for the Supplier's revision if preliminary review deems it incomplete.
 - .2 Incomplete Shop Drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.
 - .3 When any of the following are missing, the submittal will be deemed incomplete:
 - .1 Contractor's review stamp completed and signed.
 - .2 Transmittal of Contractor's submittal form completed and signed.
 - .3 Insufficient number of copies.
 - .4 All requested information is not provided.
 - .5 Submittals missing Professional Engineer's seal and signature, where it is required.
 - .4 The submittal will be deemed incomplete if unusual high number of errors are identified on the submittal, making it difficult to proceed with the review.
- .11 Submittals not required by Contract:
 - .1 Will not be reviewed and will be returned stamped "RECEIVED FOR INFORMATION".
 - .2 Contract Administrator will keep one (1) copy of all Shop Drawings and Product Data.

1.3 Shop Drawings and Product Data

- .1 The term "Shop Drawing" as defined in the City's General Conditions for Construction (Revision 2020-01-31) means all drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor, Subcontractor, Manufacturer, Supplier, or distributor and which illustrate some portion of the Work.
- .2 All equipment to be installed at the Site shall require Shop Drawings, which shall be submitted to the Contract Administrator.
- .3 Sales bulletins and other general publications are not acceptable as submittals for review except where necessary to provide supplemental technical data.
- .4 Adjustments made on Shop Drawings by the Contract Administrator shall not change the Contract Price.
- .5 All Shop Drawings shall include details as follows:
 - .1 General arrangement drawings, outline dimensions and weights.

SUBMITTALS

- .2 Locations and weights for lifting spots.
 - .3 Anchoring method and dimensioned foundation template.
 - .4 Dimensioned cable entry locations.
 - .5 Dimensioned cable termination and pothead height.
 - .6 Electrical and instrumentation diagrams.
 - .7 Complete bill of materials listing the scope of supply.
 - .8 Identified internal and external component layout on assembly drawing.
 - .9 Insulating liquid type and materials.
 - .10 Insulating liquid capacity.
 - .11 Clearly identify direction of flow.
 - .12 Provide data on pressure-relief valves, oil sampling valves (drain, tap, sample), pressure/vacuum gauge, pressure/vacuum regulation, level gauge, liquid temperature indicator, and separable connectors.
 - .13 Nameplate data, including equipment certification.
- .6 Provide recommended spare parts and prices.
 - .7 Provide estimated losses at no load, 50% load and full load in either Watts per hour (preferred), or BTUs per hour.
 - .1 Placement and installation of all equipment shall be subject to the approval of the City.
 - .8 Electrical and instrumentation and control system Shop Drawings shall include additional details as follows:
 - .1 Elevation layouts, bill of materials (BOM), fuse charts, schematics, interconnections, point-to-point wiring diagrams, loop wiring diagrams, motor control diagrams, single line diagram, 3-line diagram, and CSA/cUL panel plates in addition to the other wiring and detail requirements of the Contract.
 - .1 Panel plates shall be included in submissions, to be permanently affixed on the front exterior door of the enclosure. They shall contain all information required under CSA C22.1 and C22.2. At a bare minimum the short circuit current rating (SCCR) of panel plates shall be equal to the MCC or Panelboard from which they are fed.
 - .2 Wiring diagrams shall mark conductor identification, field terminals, changes, etc.
 - .3 Detailed listing of all nameplates.
 - .4 Identification in accordance with the Drawings.

SUBMITTALS

- .5 Network architecture showing all components of the network supplied by the Supplier. Tables showing data maps for communications with Plant PLC. Tables showing data map for communications with Plant HMI. Control schematics with plant PCS interconnect details. Interconnection diagrams shall show all electrical and network connections between equipment, panel, terminal junction.
- .2 Instrument Loop Diagrams (ILDs) – detailed drawings showing typical interconnections for the specified instrumentation and control devices. The Contractor is to reproduce an ILD for each device and record all relevant notes and installation-specific information on each sheet. Update the ILDs as necessary and fill in all terminal and wiring number from relevant Shop Drawings as they become available.
 - .1 Loop wiring diagrams shall follow ISA 5.4 for standard drawing layout, symbols, and wiring depictions.
- .3 Motor Control Schematics (MCS) – when these are included, they are detailed drawings showing typical interconnections of motor control equipment. The Contractor shall reproduce a MCS for each motor and record all relevant notes and installation-specific information on each sheet. Update the MCS as necessary and fill in all terminal and wiring numbers from relevant Shop Drawings as they become available.
- .4 Equipment descriptive data and detailed information for the system hardware and software (i.e., cutsheets or product literature). Failure to provide product literature or cutsheets with drawing submissions is grounds for marking the submission “Revise and Resubmit” without review.
 - .1 Highlight only relevant information for the products provided. The intent of the literature is a technical review of the products suitability, technical ratings and limitations, and the installation/application. Sales literature, or custom-made sheets, or sales declarations shall not be included. Only manufacturer issued technical literature shall be accepted.
 - .2 Where products have configurable part numbers, the part number options shall be broken down and either circled in red or highlighted in yellow.
 - .3 All cutsheets and product literature shall be provided showing CSA or cUL markings either circled in red or highlighted in yellow.
 - .4 Where hazardous location products are required, they shall be submitted with their CSA or cUL certificates, and CSA or cUL required wiring diagrams for hazardous installations. The control system wiring diagrams shall capture these requirements, provide intrinsically safe barriers and methods as required by NFPA 820, and provide notes for the electrical installer.
- .9 Notify the Contract Administrator in writing of any deviations in Shop Drawings from the requirements of the Contract.
 - .1 Contract Administrator will not assume the responsibility for searching out deviations in the Contractor’s drawings.
- .10 The Supplier shall examine all Shop Drawings prior to submission to the Contract Administrator to ensure that all necessary requirements have been determined and verified and that each Shop Drawing has been checked and coordinated with the requirements of the

SUBMITTALS

Work and the Contract. Examination of each Shop Drawing shall be indicated by stamp, date, and signature of a responsible person of the Subcontractor for supplied items and of the Supplier for fabricated items. Shop Drawings not stamped, signed, and dated will be returned without being reviewed and stamped "REVISE AND RESUBMIT". Ensure that the following are verified:

- .1 Field measurements.
 - .2 Field construction criteria.
 - .3 Catalogue numbers and similar data.
- .11 Submittals shall be in one (1) of the following formats:
- .1 Submit three (3) copies of white prints and three (3) copies of all fixture cuts and brochures.
 - .2 Submit one (1) electronic searchable PDF copy.
- .12 Shop Drawings will be returned to the Supplier with one (1) of the following notations:
- .1 When stamped "REVIEWED" or "NO EXCEPTIONS TAKEN", distribute additional copies as required for execution of the Work.
 - .2 When stamped "REVIEWED AS MODIFIED" or "MAKE NOTED CORRECTIONS", ensure that all copies for use are modified and distributed, same as specified for "REVIEWED".
 - .3 When stamped "REVISE AND RESUBMIT", make the necessary revisions, as indicated, consistent with the Contract and submit again for review.
 - .4 When stamped "NOT REVIEWED" or "REJECTED", submit other Shop Drawings, brochures, etc., for review consistent with the Contract.
 - .5 Only Shop Drawings bearing "REVIEWED", "NO EXCEPTIONS TAKEN", "MAKE NOTED CORRECTIONS", or "REVIEWED AS MODIFIED" shall be used on the Work unless otherwise authorized by the Contract Administrator.
- .13 After submittals are stamped "REVIEWED", "NO EXCEPTIONS TAKEN", "MAKE NOTED CORRECTIONS" or "REVIEWED AS MODIFIED", no further revisions are permitted unless re-submitted to the Contract Administrator for further review.
- .14 Make changes in Shop Drawings, which the Contract Administrator shall require, consistent with Contract. When re-submitting, notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.
- .15 The mark-up and comments on submittals and O&M package shall be incorporated within two (2) months of receipt from the Contract Administrator regardless of the status of the returned submittal. Supplier shall submit long-term storage requirements for equipment that is received by the Construction Contractor and stored prior to installation.

SUBMITTALS

- .16 Supplier shall provide a list of maintenance requirements for uninstalled equipment to be performed and documented by the Construction Contractor. The list shall be submitted one (1) month prior to the delivery of the equipment.
- .17 Construction Contractor shall submit records of the maintenance schedules to the Contract Administrator on a monthly basis.

1.4 Description of Construction Methods

- .1 The Supplier shall, if required by the Contract Administrator, submit for the review of the Contract Administrator method statements which describe in detail, supplemented with Drawings where necessary, the methods to be adopted for executing any portion of Work.
- .2 These statements shall also include details of constructional plan and labour to be employed. Acceptance by the Contract Administrator shall not relieve the Supplier of any of his responsibilities, nor shall reasonable refusal to approve entitles the Supplier to extra payment or an extension of time.
- .3 Other Considerations:
 - .1 Fabrication, erection, installation, and commissioning may require modifications to equipment and systems to conform to the design intent. Revise pertinent Shop Drawings and resubmit.

1.5 Requests for Information

- .1 In the event that the Contractor or any Subcontractor involved in the Work, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation by the Contract Administrator, the Supplier shall submit a Request for Information (RFI) Form in writing to the Contract Administrator.
- .2 Submission Procedure:
 - .1 Submit RFI's to the Contract Administrator on the "Request for Information" form appended to this Specification Section. The Contract Administrator shall not respond to a RFI except as submitted on this form.
 - .2 Number RFI's consecutively in one sequence in order submitted, in a numbering system established by the Contract Administrator.
 - .3 Submit one (1) distinct subject per RFI request. The unrelated items shall not be combined on one (1) form.
 - .4 Where RFI form does not have sufficient space, attach additional sheets as required.
 - .5 Submit with RFI form all necessary supporting documentation.
- .3 In the RFI, the Supplier shall clearly and concisely provide:
 - .1 The issue for which clarification or interpretation is sought and why a response is needed from the Contract Administrator; and

SUBMITTALS

- .2 An interpretation or understanding of the requirement along with reasons why such an understanding was reached.
- .4 The Contract Administrator will review all RFIs to determine whether they are valid RFIs. If it is determined that the document is not a valid RFI, it will be returned to the Contractor not having been reviewed with an explanation why it was deemed not valid.
- .5 An RFI response shall be issued within ten (10) Business Days of receipt of the request from the Supplier unless the Contract Administrator determines that a longer time is necessary to provide an adequate response. When the RFI submission is received by the Contract Administrator before noon, the review period commences on that Business Day. When the RFI submission is received by the Contract Administrator after noon, the review period commences on the subsequent Business Day.
- .6 If, at any time, the Contractor submits a large number of RFI's or the Contract Administrator considers the RFI to be of such complexity that the Contract Administrator cannot process the RFI's within ten (10) Business Days, the Contract Administrator shall confer with the Contractor within five (5) Business Days of receipt of such RFI's and the Contract Administrator and the Supplier will jointly prepare an estimate of the time necessary for processing the RFI as well as an order of priority among the RFI's submitted. The Contractor shall accommodate such necessary time at no impact to the schedule and at no additional cost to the Contract.
- .7 If the Supplier submits a RFI on an activity with ten (10) Business Days or less of available time to the impacted activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Contractor Administrator to respond to the request provided that the Contract Administrator responds within the ten (10) Business Days set forth above.
- .8 An RFI response from the Contract Administrator will not change any requirement of the Contract. In the event the Supplier believes that the RFI response from the Contract Administrator will cause a change to the requirements of the Contract, the Supplier shall within ten (10) Business Days give written notice to the Contract Administrator stating that the Contractor believes the RFI response will result in a change to the Contract and the Supplier intends to submit a change request. Failure to give such written notice of ten (10) Business Days shall waive the Supplier's right to seek additional time or cost under the requirements of the Contract.

1.6 Closeout Submittals

- .1 Refer to Section 01 78 00 - Closeout Submittals.

1.7 Miscellaneous Submittals

- .1 Prepare and submit required Contract Documents.
- .2 Copies: Submit one (1) electronic copy to Contract Administrator. Method of electronic submission shall be coordinated with Contract Administrator after execution of the Contract.
 - .1 Submit hard copies for paint samples and other submittals where specifically required under individual Specifications Sections.

SUBMITTALS

- .3 The Contract Administrator will review submittals for general conformance with design concept and intent, and general compliance with Contract.
- .4 The Contract Administrator's review does not relieve Supplier from compliance with requirements of Contract nor from errors in submittals or Supplier's design.
- .5 The Construction Contractor shall be responsible for confirmation of dimensions at Site; fabrication processes; means, methods, techniques, sequences, and procedures of construction; coordination of Work of all trades; and performance of Work in safe and satisfactory manner and in accordance with Specification Sections 01 65 00 and 01 91 31.
- .6 At the Contract Administrator's option, the Contract Administrator's review comments and review stamp will be placed either directly on submitted copies of submittals or on separate submittal review comment form.
- .7 Where Work is to be designed by the Supplier, comply with applicable codes and furnish submittals signed and sealed by a Professional Engineer licensed in the Province of Manitoba, as required by Specifications. If requested, calculations shall be submitted for review. Calculations shall be signed and sealed by a Professional Engineer registered in the Province of Manitoba.

1.8 Supplements

- .1 The supplements listed below, following "End of Section", are part of this Specification:
 - .1 Request for Information (RFI), RFI No.0.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

SUBMITTALS

For details and instructions on how to complete this document, click the [¶] icon under the Home tab to display the hidden text.

RFI Title: _____ **RFI No.:** 0

Date RFI initiated: _____ **Date Response Requested by:** _____

Date Response Issued: _____

Project Name: _____

Submitted To:

Contract Administrator (CA): _____ **Consultant Ref. No.** _____

Company/Dept.: _____ **Tender No.** _____

Requested By:	For CA Use
Name: _____	City File No.: _____
Title: _____	Project ID: _____
Company: _____	Project Record Index No.: _____
Email: _____	Purchase Order No.: _____

Request/Question: (to be completed by Contractor)

Answer/Response: (to be completed by Contract Administrator)

Attachment(s):

SUBMITTALS

Distribution (to be completed by Contract Administrator)

- Contract Administrator
- Contractor
- City Project Manager
- Other:

[Click here to enter text.](#)

COMMON PRODUCT REQUIREMENTS

1. GENERAL

1.1 Standards

- .1 Within the text of each Specification Section, references are made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in the Specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, the Contract Administrator reserves the right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing shall be borne by the City in event of conformance with Construction Contract Documents or by the Construction Contractor in event of non-conformance.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids.

1.2 Quality Assurance

- .1 Products, materials, equipment and articles incorporated in the Work shall be new, not damaged or defective, and of the best quality for the purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, shall be rejected, regardless of previous inspections. Inspection shall not relieve responsibility but is a precaution against oversight or error. Supplier shall remove and replace defective products at his own expense and shall be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to the quality or fitness of products, decision rests strictly with the Contract Administrator based upon the requirements of the Construction Contract Documents.
- .4 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item.
- .5 Permanent labels, trademarks and nameplates on products shall not be acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- .6 The Construction Contractor shall be responsible for development of a quality plan to ensure all tasks are performed to the necessary requirements and Supplier specifications. The supplier shall provide requirements to the Construction Contractor.

1.3 Availability

- .1 Immediately upon the City exercising its option to purchase, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, immediately notify Contract Administrator of such, in order that

COMMON PRODUCT REQUIREMENTS

substitutions or other remedial action shall be authorized in ample time to prevent delay in performance of Work.

- .2 In event of failure to notify Contract Administrator at commencement of Work and should it subsequently appear to the Contract Administrator that Work may be delayed for such reason, Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling and Protection

- .1 The Supplier shall provide the Construction Contractor with full instructions in writing of all preservation requirements, procedures and precautions for long-term storage and protection of the equipment. A copy of all instructions shall be provided to the Contract Administrator.
- .2 The Construction Contractor shall be responsible for storage of the equipment, appurtenances, and materials and for protection against weather, loss, damage, or theft until equipment installation.
- .3 The storage location shall be inspected and approved by the Contract Administrator and/or the City.
- .4 The Construction Contractor shall:
 - .1 Handle and store products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with Supplier's instructions.
 - .2 Store packaged or bundled products in original and undamaged condition with Manufacturer's seal and labels intact. Items shall not be removed from packaging or bundling until provided to the Construction Contractor.
 - .3 Store products subject to damage from weather in above zero weatherproof enclosures.
 - .4 Store materials on flat, solid supports and keep clear of ground. Slope to shed moisture.
 - .5 Remove and replace damaged products at own expense and to the satisfaction of the Contract Administrator.
 - .6 Touch-up damaged factory finished surfaces to Contract Administrator's satisfaction. Use touch-up materials to match original. Do not paint over nameplates.
- .5 The Construction Contractor shall adhere to Supplier's long-term storage and maintenance instructions.
- .6 Preservation requirements and procedures as per Supplier's recommendation shall be followed and documented by the Construction Contractor. Construction Contractor shall keep records of the maintenance schedules (lubrication, coatings, etc.) frequently and submit the records to the Contract Administrator on a monthly basis.

1.5 Transportation

- .1 Pay costs of transportation of products required in performance of Work. Goods shall be delivered freight on board, all duties and taxes paid, to Winnipeg, MB.

COMMON PRODUCT REQUIREMENTS

- .2 The Construction Contractor shall be responsible for receiving, off-loading, and placing into storage all equipment at the Site.

1.6 Supplier's Instructions

- .1 Unless otherwise indicated in the Specifications, the Construction Contractor shall install or erect products in accordance with the Supplier's instructions.

1.7 Quality of Work

- .1 Ensure Quality of Work is of the highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Contract Administrator if required Work is such as to make it impractical to produce required results.
- .2 The Supplier and Contractor shall not employ anyone unskilled in their required duties for Work. The Contract Administrator reserves the right to require dismissal from Site for workers deemed incompetent or careless.
- .3 Decisions as to the standard or fitness of Quality of Work in cases of dispute rest solely with the Contract Administrator, whose decision is final.

1.8 Location of Fixtures

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform the Contract Administrator of conflicting installation. Install as directed.

1.9 Fastenings

- .1 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wooden, or any other organic material, plugs are not acceptable.
- .2 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .3 Fastenings which cause spalling or cracking of material to which anchorage is made shall not be acceptable.
- .4 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .5 Use heavy hexagon heads, semi-finished unless otherwise specified. Use 304 stainless steel unless specified otherwise.
- .6 Bolts may not project more than one diameter beyond nuts.
- .7 Prevent electrolytic action between dissimilar metals and materials.
- .8 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

COMMON PRODUCT REQUIREMENTS

2. **PRODUCTS (NOT USED)**
3. **EXECUTION (NOT USED)**

END OF SECTION

EQUIPMENT INSTALLATION

1. GENERAL

1.1 Description

- .1 This Section describes requirements for all equipment supplied under this Contract relating to factory inspections, equipment delivery, equipment installation training, equipment installation, commissioning, and equipment process testing.
- .2 At least thirty (30) days prior to commencing equipment operation and the Demonstration and Running Test, the Supplier shall assist the Construction Contractor to prepare and submit a detailed start-up plan to indicate the schedule and sequence of equipment installation checks and tests required for the Contract Administrator's review and inputs. No testing Work shall commence until this plan has been discussed and reviewed by all parties involved and accepted by the Contract Administrator.

1.2 Definitions

- .1 Supplier's Representative: A Supplier's Representative is a trained person empowered by the Supplier to provide:
 - .1 Witnessing of delivery.
 - .2 Installation instruction.
 - .3 Assistance in pre-start up checks and testing.
 - .4 Training to the City's staff.

1.3 Expertise and Responsibility

- .1 The Contract Administrator recognizes the expertise of the Supplier.
- .2 Should the Contract Administrator issue an Addendum, Field Order, Change Order, or Instruction to change the Work which would, in the opinion of the Supplier, compromise the success or safety of the Work, then it shall be incumbent on the Supplier to notify in writing the Contract Administrator to this effect within two (2) days.

1.4 Inspection at Factory

- .1 The City or the Contract Administrator may, before or after selection of equipment has been made, inspect or have an authorized representative inspect the manufacturing, assembling, and testing facilities at the Supplier's or Subcontractor equipment factory, to satisfy themselves of the capability of the Supplier or Subcontractor equipment to supply the specified equipment.
- .2 The City and/or the Contract Administrator may inspect or have an authorized inspector inspect the equipment factory or the process of manufacture or testing of the equipment at the Supplier's or Subcontractor equipment factory at any reasonable time. The City and/or the Contract Administrator or the inspector may notify the Supplier or Subcontractor at any time of unsatisfactory materials, workmanship, or processes.

EQUIPMENT INSTALLATION

- .3 The Supplier shall provide every reasonable facility, access, and cooperation to assist the City and the Contract Administrator or an authorized inspector in carrying out inspection or testing at the equipment factory or facility.
- .4 Inspection or testing carried out by the City or the Contract Administrator or an authorized inspector shall not relieve the Supplier of the responsibility for supplying equipment in accordance with the Contract and good engineering practice.

1.5 Equipment Delivery

- .1 Delivery shall be coordinated with and made to the Construction Contractor. Written acceptance of receipt, at delivery, by the Construction Contractor shall constitute "Delivery to Site" under this Contract. The shipping lists of materials shall be carefully checked by the Supplier's Representative in the presence of the Contract Administrator and the Construction Contractor. When the Construction Contractor accepts the equipment delivery, they shall certify the delivery by completing Form 100 – Certificate of Equipment Delivery, attached to this Specification.
- .2 The Supplier shall provide a schedule within fifteen (15) calendar days after notification of acceptance of Shop Drawings. No delivery to the Site of the Work shall occur until Reviewed Shop Drawings are received by the Supplier.
- .3 The schedule shall allow for:
 - .1 Two (2) weeks for the Contract Administrator to review and comment on the Supplier's Shop Drawings for the equipment to be supplied. Additional time for Shop Drawings corrections and resubmittals shall be accommodated in the schedule.
- .4 The Supplier shall be entitled to an extension of the quoted delivery period on account of:
 - .1 Delay attributable to Acts of God or other matters, which were not the fault of the Supplier and over which it had no control, provided that the Supplier took all possible action to reduce delays and notified the City promptly of the occurrence of such delays.
- .5 Ten (10) days before delivery, notice shall be given to the Contract Administrator so that arrangements for receipt and for inspection can be made. The shipping lists of materials shall be carefully checked by the Supplier in the presence of the Contract Administrator and the Construction Contractor.
- .6 The Supplier shall clearly mark each item to be shipped and identify and reference it to the packing lists and to bills of materials on the Shop Drawings. The lists will be used by the Supplier, the Construction Contractor, and the Contract Administrator to check the contents of each delivery. No shipments shall be off-loaded until itemized packing lists have been received by the parties mentioned herein.
- .7 The Supplier shall adequately pack and crate each component to provide protection during transport, handling, and storage. Equipment suitable for outside storage will be stored to the satisfaction of the Supplier and the Contract Administrator. The Supplier shall identify each component with durable labels or tags securely attached to each piece of equipment, crate, or container. All crates shall be clearly labelled with 5 cm red font as "Indoor Storage" or "Outdoor Storage" on a minimum of four (4) faces of the crate.
- .8 The Supplier shall protect polished and machined metal surfaces from corrosion and damage during shipment and storage and shall carefully pack and crate the equipment for

EQUIPMENT INSTALLATION

- shipment. The Supplier shall protect threaded connections with threaded plugs or caps and shall protect open plain end pipes with caps.
- .9 The Supplier shall pack electrical equipment and control panels to prevent scratching, access by dirt, moisture, or dust, or damage to insulation and shall cover equipment having exposed bearings and glands to exclude foreign matter. All openings in the equipment shall be covered before shipment. Sufficient lifting hooks shall be supplied for handling all crates and boxes and heavy pieces.
 - .10 The Construction Contractor shall provide temperature controlled, humidity controlled and secure local storage in Winnipeg, MB in a location to be inspected and approved by the City, between equipment delivery and installations according to Section 01 61 00.
 - .11 The Construction Contractor may elect to store the equipment for an extended duration (i.e. six (6) months or more), to accommodate the construction schedule. The Supplier shall provide any special packaging and protective coatings, lubricants, etc., which the Supplier deems necessary to protect the equipment during the protracted storage and prior to equipment performance testing. Coordinate with the Construction Contractor.
 - .12 The Supplier shall be responsible for providing the Construction Contractor with full instructions in writing of all precautions to be observed in connection with the storing and protection of the equipment.
 - .13 The Construction Contractor shall notify the Contract Administrator of any damages and loss occurred to the stored equipment during the storage period. Any damaged crate shall be fully inspected by the City and the Supplier. The Construction Contractor shall be responsible for the repair and replacement of the damaged and lost good.
 - .14 The Construction Contractor shall be responsible for removing any protective coatings prior to installation and equipment performance testing in accordance with the Supplier's written instructions.
 - .15 The Supplier's Representative shall be at the delivery Site to witness the off-loading, moving and placement of the equipment and to examine the equipment for damage and loss, and to inspect the Construction Contractor's storage facilities for the equipment supplied for compliance with the Supplier's recommendations. The Supplier shall maintain an inventory of all equipment supplied and delivered to the Construction Contractor.
 - .16 The Construction Contractor shall be responsible for receiving, off-loading, and placing into storage all equipment at the Site and/or the off-Site storage location.

1.6 Installation Assistance

- .1 The equipment will be installed by the Construction Contractor at separate time periods so that the existing UV system can be maintained. The Supplier's Representative shall assist in each installation period. It is currently anticipated that equipment installation will be separated by several months.
- .2 Each installation period shall include installation of one (1) slide gate with one (1) weir gate at a time.
- .3 Unless otherwise specifically stated in the Specifications, the Supplier shall provide, a factory-trained Representative who, in conjunction with the Contract Administrator or their agent, shall give instructions regarding the installation of the equipment.

EQUIPMENT INSTALLATION

- .4 Before commencing installation of the equipment, the Construction Contractor shall arrange for the attendance of the Supplier's Representative who shall provide instructions in the methods, techniques, precautions, and any other information relevant to the successful installation of the equipment.
- .5 The Construction Contractor shall inform the Contract Administrator, in writing, of the attendance at the Site of any Supplier's Representative for installation training at least fourteen (14) days prior to arrival.
- .6 Before commencing the second installation period, the Supplier's Representative shall be at the storage site to inspect the stored equipment for damage and loss. The Supplier's Representative shall identify any outstanding deficiencies and shall provide a copy of the inspection report to the Contract Administrator. The deficiencies shall be rectified by the Construction Contractor and the Supplier's Representative shall re-inspect the equipment.
- .7 When the Supplier's Representative is satisfied that the Construction Contractor is aware of all installation requirements, they shall so certify by completing Form 101 – Certificate of Readiness to Install, attached to this Specification.
- .8 The completed form shall be delivered to the Contract Administrator prior to departure of the Supplier's Representative from the Site.
- .9 Installation of the equipment shall not commence until the Contract Administrator has advised that he has received the completed Form 101.
- .10 Separate copies of Form 101 shall be used for different equipment and for each installation period.

1.7 Installation

- .1 If necessary, or if so directed by the Contract Administrator during the course of installation, the Construction Contractor shall contact the Supplier's Representative to receive clarification of installation procedures, direction and any other additional information necessary to continue and complete the installation in an appropriate manner.
- .2 The Construction Contractor shall arrange for the Supplier's Representative to visit the Site to provide assistance and instruction during all of the separate installation periods, and including items such as all aspects of installation, at the Construction Contractor's cost. For clarity, the Supplier's Representative is not required to witness the entirety of the installation.
- .3 Prior to completing each period of installation, the Construction Contractor shall inform the Supplier's Representative and arrange for the attendance at the Site of the Supplier's Representative to verify successful installation.
- .4 The Supplier's Representative shall conduct a detailed inspection of the installation for each period of installation including alignment, electrical connections, workmanship and all other items as required to ensure successful operation of the equipment.
- .5 The Supplier's Representative shall identify any outstanding deficiencies in the installation.
- .6 The deficiencies shall be rectified by the Construction Contractor and the Supplier's Representative shall be required to re-inspect the installation, at the Construction Contractor's cost.

EQUIPMENT INSTALLATION

- .7 When the Supplier's Representative accepts the installation, they shall certify the installation by completing Form 102 – Certificate of Satisfactory Installation, attached to this Specification.
- .8 Separate copies of Form 102 shall be used for each gate installation.
- .9 Deliver the completed Form 102 to the Contract Administrator prior to departure of the Supplier's Representative from the Site.
- .10 Tag the equipment with a 100 mm by 200 mm card stating "EQUIPMENT CHECKED. DO NOT RUN." stencilled in large black letters. Sign and date each card.

1.8 Operation and Performance Verification

- .1 Equipment shall be subjected to a Demonstration, Running Test, and Performance Test after the installation has been verified and any identified deficiencies have been remedied.
- .2 During the Demonstration, Running Test, and Performance Test, the Construction Contractor shall operate equipment as required by Section 01 91 31 to complete the Performance Verification.
- .3 Inform the Contract Administrator at least fifteen (15) days in advance of conducting the tests and arrange for the attendance of the Supplier's Representative. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Construction Contractor and the Contract Administrator.
- .4 The Supplier's Representative shall conduct all necessary checks to the equipment and if necessary, advise the Construction Contractor of any further checking, flushing, cleaning, or other work needed prior to confirming the equipment is ready to run.
- .5 Testing shall be performed according to Section 01 91 31.

1.9 Supplements

- .1 The supplements listed below, following "End of Section", are part of this Specification:
 - .1 Form 100 – Certificate of Equipment Delivery.
 - .2 Form 101 – Certificate of Readiness to Install.
 - .3 Form 102 – Certificate of Satisfactory Installation.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

EQUIPMENT INSTALLATION

**CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100**

We certify that the equipment listed below has been received and delivered into the care of the Construction Contractor. The equipment has been found to be in satisfactory condition. No defects in the equipment were found.

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

(Authorized Signing Representative of the Construction Contractor)

Date

(Authorized Signing Representative of the Supplier)

Date

(Authorized Signing Representative of the Contract Administrator)

Date

EQUIPMENT INSTALLATION

**CERTIFICATE OF READINESS TO INSTALL
FORM 101**

I have familiarized the Construction Contractor of the specific installation requirements related to the equipment listed below and am satisfied that he understands the required procedures.

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

(Authorized Signing Representative of the Supplier)

Date

I certify that I have received satisfactory installation instructions from the equipment Supplier.

(Authorized Signing Representative of the Construction Contractor)

Date

EQUIPMENT INSTALLATION

**CERTIFICATE OF SATISFACTORY INSTALLATION
FORM 102**

I have completed my check and inspection of the installation listed below and confirm that it is satisfactory and that defects have been remedied to my satisfaction except any as noted below:

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

OUTSTANDING DEFECTS: _____

(Authorized Signing Representative of the Supplier)

Date

(Authorized Signing Representative of the Construction Contractor)

Date

(Authorized Signing Representative of the Contract Administrator)

Date

CLOSEOUT SUBMITTALS

1. GENERAL

1.1 Submittals

- .1 Submittals shall be in accordance with Section 01 33 00.
- .2 Prepare instructions and data using personnel experienced in the maintenance and operation of described products.
- .3 A copy will be returned after final inspection with the Contract Administrator's comments.
- .4 Revise the content of the documents as required prior to final submittal.
- .5 All mark-ups identified from previous reviews shall be implemented for final O&M manuals.
- .6 Four (4) weeks prior to Substantial Performance of the Work, the Construction Contractor will submit, to the Contract Administrator, six (6) final paper copies of the Operating and Maintenance (O&M) Manuals and one (1) searchable electronic copy (PDF) on USB drive in S.I. Units. Supplier shall submit the information contained herein, electronically and in a format such that the Construction Contractor can submit hard copies as specified herein.
- .7 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of the same quality and manufacture as the products provided in Work.
- .8 Furnish evidence, if requested, for type, source and quality of the products provided.

1.2 Format

- .1 Organize data as an instructional manual.
- .2 The Construction Contractor will submit the manual as follows. Binders shall be vinyl, hard covered, 3 'D' ring, loose leaf with spine and face pockets. The maximum width of each binder shall not exceed 125 mm; where there is more data than will fit in a binder of 125 mm maximum width, the number of binders shall be as required.
- .3 When multiple binders are used, correlate the data into related consistent groupings. Identify contents of each binder on the spine.
- .4 Covers shall be used to identify each binder with type or printed title "Operation and Maintenance Manual"; list date, title of project, the City, Construction Contractor and Contract Administrator, and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 The text shall be Manufacturer's printed data.
- .8 Drawings shall be provided with reinforced punched binder tab. Bind in with text, fold larger drawings to size of text pages.

CLOSEOUT SUBMITTALS

- .9 Provide 1:1 scaled CAD files in dwg format on a USB drive.
- .10 Provide one (1) electronic copy (on USB drive) of the entire manual. The electronic copy shall have a linked Table of Contents to each section and shall be word searchable.
- .11 PDF files shall be set to open "Bookmarks and Page" view and contain internal book marking from index page to major sections of document.

1.3 Contents - Each Volume

- .1 Table of Contents: provide title of project:
 - .1 Date of submission; names.
 - .2 Addresses and telephone numbers of the Contract Administrator, Contractor and Sub-Contractor with the names of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product and system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 - .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
 - .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Drawings larger than 210 mm x 300 mm (A4) shall be contained in plastic pouch. Provide a separate panel for each drawing.
 - .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating Manufacturer's instructions.
 - .6 Training: refer to Section 01 79 00.

1.4 As-Builts and Samples

- .1 Maintain one (1) record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed Shop Drawings, product data, and samples.
 - .6 Field test records.

CLOSEOUT SUBMITTALS

- .7 Inspection certificates.
- .8 Manufacturer's certificates.
- .2 Label record documents and file in accordance with Section number listings in the List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .3 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .4 Keep record documents and samples available for inspection by the Contract Administrator.

1.5 Equipment and Systems

- .1 For each item of equipment and each system:
 - .1 Include the description of the unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Provide copy of reviewed submittals.
 - .3 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 - .4 Include installed colour coded wiring diagrams.
 - .5 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.
 - .6 Maintenance Requirements: include preventative and corrective maintenance routine, procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 - .7 For any equipment requiring measurement to be taken, the baseline values of all measurements shall be provided.
 - .8 Safety Data Sheets (SDSs) for all chemicals needed in operation and maintenance.
 - .9 Provide a maintenance and lubrication schedule, and a list of lubricants and quantities required. Use the summary forms provided at the end of this Section.
 - .10 Include Manufacturer's printed O&M instructions.
 - .11 Include the sequence of operation by the controls Manufacturer.
 - .12 Provide original Manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

CLOSEOUT SUBMITTALS

.13 Provide a list of original Manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Additional requirements: as specified in individual Specification Sections.

1.6 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-Protection and Weather-Exposed Products: include the Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual Specifications Sections.

1.7 Spare Parts

.1 Provide spare parts, in quantities specified in individual Specification Sections.

.2 Provide items of the same manufacture and quality as items in the Work.

.3 Deliver to Site, place and store.

.4 Receive and catalogue items. Submit inventory using the summary form at the end of this Section. Include approved listings in O&M Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.8 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in the individual Specification Sections.

.2 Provide items of the same manufacture and quality as items in the Work.

.3 Deliver to Site, place and store.

.4 Receive and catalogue items. Submit inventory listing to the Contract Administrator. Include approved listings in the O&M Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 Special Tools

.1 Provide special tools, in quantities specified in individual Specification Section.

.2 Provide items with tags identifying their associated function and equipment.

CLOSEOUT SUBMITTALS

- .3 Deliver to Site, place and store.
- .4 Receive and catalogue items. Submit inventory listing to the Contract Administrator. Include approved listings in the O&M Manual.

1.10 Storage, Handling and Protection

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration and in accordance with the Manufacturer's preservation instruction.
- .2 Store in original and undamaged condition with Manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

1.11 Warranties and Bonds

- .1 Develop a warranty management plan to contain information relevant to Warranties. Warranty management plan to include required actions and documents to assure that the Contract Administrator receives warranties to which it is entitled.
- .2 Provide the plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .3 Submit warranty management plan to the Construction Contractor, a minimum of sixty (60) days before planned pre-warranty conference.
- .4 Submit warranty information made available during the construction phase, to the Contract Administrator for approval prior to each monthly pay estimate.
- .5 Assemble approved information for Construction Contractor and submit upon acceptance of Work. Organize the information as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing.
 - .2 List Subcontractor, Supplier, and Manufacturer, with name, address, and telephone number of responsible principals.
 - .3 Obtain warranties and bonds, executed in duplicate by Subcontractors, Suppliers, and Manufacturers, within ten (10) days after completion of the applicable item of Work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.

CLOSEOUT SUBMITTALS

- .6 Conduct a joint ten (10) month warranty inspection, measured from the time of acceptance by the Contract Administrator. The inspection shall be attended by the Contract Administrator, Contractor, and Supplier's Representative.
- .7 Include information contained in the warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of Construction Contractors, Subcontractors, Manufacturers or Suppliers involved.
 - .2 Provide a list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of Manufacturers or Suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one (1) year overall warranty of construction after Substantial Performance for all the units functioning. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of the warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent O&M Manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .3 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .8 Respond in a timely manner to oral or written notification of required construction warranty repair Work.
- .9 Written verification will follow oral instructions. Failure to respond will be cause for the City to proceed with action against the Construction Contractor.

1.12 Warranty Tags

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by the Contract Administrator.

CLOSEOUT SUBMITTALS

- .2 Attach tags with a durable plastic tie.
- .3 Leave the date of acceptance until project is accepted for occupancy.
- .4 Indicate the following information on the tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Construction Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

1.13 Supplements

- .1 The supplements listed below, following "End of Section", are part of this Specification:
 - .1 Forms: Maintenance Summary Form.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

CLOSEOUT SUBMITTALS

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. MODEL _____

4. SERIAL NUMBER _____

5. EQUIPMENT/TAG NUMBER(S) _____

6. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 45 KG) _____

7. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

8. MANUFACTURER' S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

9. MAINTENANCE REQUIREMENTS

MAINTENANCE OPERATION COMMENTS	FREQUENCY	LUBRICANT (IF APPLICABLE)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation	Refer by symbol to lubricant required.

CLOSEOUT SUBMITTALS

10. LUBRICANT LIST

REFERENCE SYMBOL	SHELL	STANDARD OIL	GULF	ARCO
List symbols used in No. 9. above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.			

11. RECOMMENDED SPARE PARTS FOR THE CITY'S INVENTORY.

PART NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST
Note: Identify parts provided by this Contract with two asterisks.				

DEMONSTRATION AND TRAINING

1. GENERAL

1.1 Description

- .1 This Section contains requirements for training City staff, by persons retained by the Contractor specifically for the purpose of proper operation and maintenance of all equipment supplied and installed under this Contract.
- .2 The Contractor will develop the overall training plans for the equipment with input from the Supplier and the City. The Supplier shall be responsible for providing qualified training instructors and field lesson plans as detailed in the Specifications and as described herein.
- .3 Arrange for Supplier’s Representatives to supply detailed classroom and hands-on training to the City’s operations personnel, maintenance personnel, and select on-call personnel on operation and maintenance of specified product (system, subsystem, and component) and as required in applicable Specifications.
 - .1 Be tailored for the specific audience in each course.
 - .2 Ensure that each course accommodates plant staff shift schedules by providing multiple sessions covering the same content if necessary.
 - .3 Arrange for and require plant staff to perform the demonstrated procedures and provide an evaluation of the Participants.
- .4 The City shall require training for at least two (2) sessions for Electrical and Instrumentation staff. See Table 1.

Table 1 : Training Requirements

Training Participant Groups	Approximate Number of Personnel	Minimum Number of Sessions	Constraints
Maintenance Personnel			
Electrical and Instrumentation Maintenance	14	2	

- .5 To facilitate scheduling of the City personnel, the City may elect to divide sessions into operation-specific topics and maintenance-specific topics as applicable, to allow operations/ on-call staff and maintenance staff to attend separately. The Contractor shall coordinate with the Contract Administrator and the City. Training to be scheduled and coordinated to not interfere with the operation and maintenance of the existing NEWPCC facility.
- .6 Training will be scheduled at least four (4) weeks in advance of the respective training sessions.
- .7 Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with the City and familiar with Operation and Maintenance manual information specified in Section 01 78 00 - Closeout Submittals.

DEMONSTRATION AND TRAINING

- .8 Training sessions shall be conducted by qualified Supplier's Representatives, with a minimum of two (2) years' experience. Supplier's Representatives shall be familiar with the specified equipment as well as with facility operation and maintenance requirements.
- .9 The Contract Administrator has the authority to determine if the training is sufficient based on the lesson plan submitted by the Contractor.
- .10 Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

1.2 Submittals

- .1 Submit the following information to the Contract Administrator thirty (30) Calendar Days prior to the first training session. The material will be returned as either "NO EXCEPTIONS TAKEN," "EXCEPTIONS NOTED" or "EXCEPTIONS NOTED - RESUBMIT".
 - .1 Lesson plan and supplemental training manuals, handouts, visual aids and other reference material required for each training session.
 - .2 Submit proposed lesson plan not less than twenty-one (21) Calendar Days prior to scheduled training and revise as necessary for acceptance.
 - .3 Lesson Plan: When training of the City personnel is specified, prepare for each required course, a lesson plan containing but not limited to the following information:
 - .1 Title and objectives.
 - .2 Recommended types of attendees (e.g., managers, engineers, operators, maintenance).
 - .3 Course description and outline of course content.
 - .4 Format (e.g., lecture, self-study, demonstration, hands-on).
 - .5 Instruction materials and equipment requirements, including supplemental training manuals, handouts, visual aids and other reference material required for each training session.
 - .6 Resumes of instructors providing the training.
 - .4 Training Schedule:
 - .1 Submit not less than twenty-one (21) Calendar Days prior to start of equipment installation and revise as necessary for acceptance.
 - .2 List specified equipment and systems that require training services and show:
 - .1 Respective Supplier.
 - .2 Estimated dates for installation completion.
 - .1 Training schedule to include:

DEMONSTRATION AND TRAINING

- .1 Course name;
 - .2 Course Lesson Plan submittal dates;
 - .3 Planned session dates and durations; and
 - .4 Planned Training Participant Groups.
- .3 Adjust schedule to ensure training of appropriate personnel as deemed necessary by the City, and to allow full participation by Supplier's Representatives. Adjust schedule for interruptions in operability of equipment.
- .4 Individual sessions shall not exceed four (4) hours. A break should be incorporated into sessions that exceed two (2) hours. Training session anticipated to exceed four (4) hours can be assigned to multiple-sessions; however, no more than one (1) – 3-hour and one (1) - 4-hour sessions (seven (7) hours total) may be delivered to the same participants in a single day. Two (2) successive 4-hour sessions may be delivered to alternating shifts of attendees in a single day (i.e., one group of attendees in the morning, and a second group of attendees in the afternoon). Training sessions requiring more than seven (7) hours may be delivered on separate days.
- .5 Classes shall not be scheduled concurrently.

1.3 Location and Training Facilities

- .1 The City shall provide the classroom training facilities.
- .2 Field training sessions shall take place at the equipment location.

1.4 Format and Content

- .1 The training program shall:
 - .1 Provide a high-level overview of maintenance requirements. Include a point-form outline of maintenance intervals consistent with the summary form in Specification Section 01 78 00.
 - .2 Ensure training covers all aspects of the unit needed by operations or maintenance staff (such as operating the system locally, operating the system remotely, reviewing alarms and actions required, operating the system during fault or upset, returning the system to normal operating condition, etc.)
 - .3 Ensure training covers all aspects of the Process Control System (PCS) including screens and graphics, screen navigation, pre-configured and custom trending, pop-up dialog boxes, alarm management, remote/local and manual/automatic operating modes, and any programmed sequences.
- .2 The training sessions shall be comprised of both classroom training and field training. As a minimum, they shall cover the following topics for each item of equipment or system:
 - .1 Classroom training shall cover:

DEMONSTRATION AND TRAINING

- .1 Familiarization.
- .2 Safety.
- .3 Operation, including reviewing alarms and required actions;
- .4 Troubleshooting;
- .5 Preventative and predictive maintenance;
- .6 Corrective maintenance;
- .7 Parts; and
- .8 Local representation.
- .2 Field Training:
 - .1 As a minimum, field equipment training for operations personnel shall include:
 - .1 Identification of equipment: location of primary element; location of instrument readout; discussion on purpose, basic operation, and information interpretation.
 - .2 Identification of instrumentation and calibration, if applicable.
 - .3 Discussion and demonstration of standard operating procedures, safe work procedure, and daily visual inspection of system operations.
 - .4 Discussion and demonstration of the preventative maintenance activities, and predictive maintenance activities where applicable.
 - .5 Discussion and demonstration of start-up and shutdown procedures.
 - .6 Demonstration of routine disassembly and assembly of equipment.
 - .7 Identification and review of safety items and demonstration of safety procedures.
 - .8 Review of Operation and Maintenance Manuals.
 - .9 Demonstration of operating parameter adjustment for optimized equipment and system operation.

1.5 Training Deliverables

- .1 Supplier shall provide all material used in the training to the City;

1.6 Training Material

- .1 The Training Material shall be provided in electronic native, editable file format.

DEMONSTRATION AND TRAINING

- .2 The Training Material shall be organized by course, with all material used and collected from Participant Groups during training systematically arranged in a consistent manner.

1.7 Training Completion Forms

- .1 Form T1, attached to this Specification, shall be signed by the trainer, the Contract Administrator, and by a City Staff representative for each City shift when classroom training has been completed. One (1) form is to be used for each item of equipment and each system for which training has been provided. Once all classroom training sessions have been completed, Form T1 is to be submitted to the Contract Administrator.
- .2 Form T2, attached to this Specification, shall be signed by the trainer, the Contract Administrator, and by a City Staff representative for each City shift when field training has been completed. One (1) form shall be used for each item of equipment and each system for which training has been provided. Once all field training sessions have been completed, Form T2 shall be submitted to the Contract Administrator.
- .3 The supply of adequate training, including completion of Forms T1 and T2 shall be a required prerequisite for handover of equipment, as appropriate to the City.

1.8 Supplement

- .1 Supplements listed below, following "End of Section," is a part of this Specification:
 - .1 Form T1 Certificate of Satisfactory Classroom Training.
 - .2 Form T2 Certificate of Satisfactory Field Training.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

DEMONSTRATION AND TRAINING

**CERTIFICATE OF SATISFACTORY CLASSROOM TRAINING
FORM T1**

We certify that the classroom training for the equipment listed below has been provided as per the Specifications.

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

(Trainer)

Date

(City Staff Representative)

Date

(Contract Administrator)

Date

DEMONSTRATION AND TRAINING

**CERTIFICATE OF SATISFACTORY FIELD TRAINING
FORM T2**

We certify that the field training for the equipment listed below has been provided as per the Specifications.

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

(Trainer)

Date

(City Staff Representative)

Date

(Contract Administrator)

Date

COMMISSIONING PLAN

1. GENERAL

1.1 Description

- .1 Provide a complete and fully functional system ensuring that:
 - .1 City personnel have been fully trained in aspects of installed systems as per Section 01 79 00.
 - .2 Documentation relating to installed equipment and systems has been completed as per Section 01 65 00.
- .2 The Supplier shall cooperate with Construction Contractor in all commissioning activities pertaining to the supplied equipment.
- .3 The Supplier shall cooperate with Construction Contractor to develop a Detailed Commissioning Plan and Commissioning Schedule using this Section as a Base Commissioning Plan.
- .4 Use this Section as a master planning document for Commissioning as it:
 - .1 Outlines organization, scheduling, allocation of resources, and documentation pertaining to implementation of Commissioning.
 - .2 Communicates responsibilities of team members involved in Commissioning including scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to operation, maintenance, process, and administration of Commissioning.
 - .4 Describes how the process of verification meets the design requirements of the completed Works.
 - .5 Sets out scope, standards, roles and responsibilities, expectations, deliverables and provides:
 - .1 An overview of Commissioning.
 - .2 A general description of elements that make up the Detailed Commissioning Plan.
 - .3 A process and methodology for successful Commissioning.
- .5 The Contract Administrator shall witness and certify tests and reports of results.
- .6 Commissioning activities shall be completed before issuance of Substantial Performance.

1.2 Definitions

- .1 Acceptance: for the purpose of this Specification Section, acceptance shall be defined as the formal turnover of a system to the City. This shall occur after the successful end of Commissioning of each system through a formal acknowledgement between the Contract

COMMISSIONING PLAN

- Administrator, the City, and the Contractor. Success of the Commissioning period is determined by the Contract Administrator.
- .2 Base Commissioning Plan: General Commissioning requirements within this Section to be used in the development of a Detailed Commissioning Plan.
 - .3 Commissioning: for the purpose of this Specification Section, Commissioning shall be defined as the successful completion of the Performance Test specified in this Section and Section 40 05 90.
 - .4 Commissioning Agent: Agent of the Contractor with experience in Commissioning, satisfactory to the Contract Administrator, responsible for the oversight and execution of Commissioning.
 - .5 Commissioning Report: the final Commissioning document as described in Clause 3.13.
 - .6 Commissioning Schedule: Gantt chart showing planned dates for performing all activities related to commissioning of all upgraded systems. The Commissioning Schedule is to be developed by the Contractor and submitted to the Contract Administrator for review, as described in Clause 3.1. The Supplier shall provide input as necessary.
 - .7 Demonstration: a one-hour demonstration of the successful installation and operation of the equipment.
 - .8 Detailed Commissioning Plan: Commissioning Plan developed by Contractor from the Base Commissioning Plan to be submitted and reviewed by the Contract Administrator, as described in Clause 3.2. Unless defined as "Base Commissioning Plan", all other instances of "Commissioning Plan" refer to the Detailed Commissioning Plan.
 - .9 There will need to be three (3) distinct commissioning plans in place, with one (1) for each channel. Then there need to be an additional commissioning required once all three (3) channels are brought online.
 - .10 Running Test: a test in which equipment is run continuously for a minimum of seven (7) days for each installation period. During the test period, as practicable, conditions shall be simulated which represent maximum or most severe, average, and minimum or least severe conditions. Successful completion of the Running Test is required for Form 103.
 - .11 Performance Test: a test in which the equipment is run continuously for ten (10) days after the complete UV system has been installed. During this period, as practicable, conditions shall be simulated which represent maximum or most severe, average, and minimum or least severe conditions. Successful completion of the Performance Test is required for Form 104.
 - .12 System: for the purpose of this Specification Section, a system shall be defined as the equipment, piping, controls, ancillary devices, electrical power, etc., which together perform a specific function at the facility.

1.3 Submittals

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Commissioning Schedule to be submitted and accepted by the Contract Administrator as per Clause 3.1.

COMMISSIONING PLAN

- .3 Detailed Commissioning Plan to be submitted and accepted by the Contract Administrator as per Clause 3.2.
- .4 Detailed Commissioning Plan to be refined and resubmitted as required during the construction phase as per Clause 3.3.

1.4 Composition, Roles, and Responsibilities of Commissioning Team

- .1 Commissioning Team to consist of the following members:
 - .1 Contract Administrator who is responsible for:
 - .1 Monitoring Commissioning activities.
 - .2 Witnessing and certifying reported results.
 - .3 Reviewing and approving Contractor submissions.
 - .4 Assisting in the resolution of issues resulting from all tests.
 - .5 Reviewing the final Commissioning Report.
 - .2 City personnel who are responsible for:
 - .1 Attending Commissioning activities to verify re-installed existing equipment operates as per the original sequence of operations.
 - .2 Attending Commissioning activities to verify newly installed equipment operates as intended.
 - .3 Performing necessary testing as noted in Clause 1.5.1.
 - .3 Construction Team: Contractor, Subcontractors, suppliers, and support disciplines, who are responsible for construction and/or installation in accordance with Contract Documents, including:
 - .1 Testing.
 - .2 Mechanical testing, adjusting and balancing (TAB).
 - .3 Integrating Commissioning activities into the Contractor's Project Schedule.
 - .4 Performing and documenting equipment installation as per Section 01 65 00.
 - .5 Performing and documenting start-up including installation and start-up checklists.
 - .4 Contractor's Commissioning Agent who shall be responsible for implementing specified Commissioning activities including:
 - .1 Planning and preparing checklists (installation/start-up checklists as required, product information) and test procedures.

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- .2 Determining operational training requirements.
- .3 Developing a Detailed Commissioning Plan, updating information provided in the Base Commissioning Plan.
- .4 Performing and documenting Demonstration, Running Test and Performance Test.
- .5 Preparing and updating issues logs.
- .6 Verifying, reviewing, and conducting training.
- .7 Preparing final Commissioning Report.

1.5 Extent of Commissioning

- .1 Testing of electrical panels must be completed before proceeding with Commissioning activities.
 - .1 Testing after the electrical modifications shall conform to CSA C22.2 No. 14, CSA C22.2 No. 286 and related CSA standards. CSA special inspections shall be coordinated by the Contractor after operation is confirmed.

2. PRODUCTS

2.1 Equipment

- .1 Provide sufficient instrumentation at the Supplier's expense to verify and commission the installed systems.

3. EXECUTION

3.1 Commissioning Schedule

- .1 Provide input to the Construction Contractor as they prepare a detailed Commissioning Schedule. The Construction Contractor will submit to the Contract Administrator for review and approval at the same time as the Project Schedule. Include milestones, testing, documentation, training, and Commissioning activities of components, equipment, subsystems, systems, and integrated systems.
- .2 After approval, incorporate the Commissioning Schedule into the Project Schedule.
- .3 Contractor, Contractor's Commissioning Agent, and Contract Administrator will monitor progress of Commissioning against the approved Commissioning Schedule.

3.2 Development of Commissioning Plan

- .1 This Section is to be considered a Base Commissioning Plan for the equipment, to be used by the Construction Contractor in the development of a Detailed Commissioning Plan. Provide assistance to the Construction Contractor when requested by the Construction Contractor.
- .2 The Detailed Commissioning Plan and associated Commissioning Schedule shall be approved by the Contract Administrator at least twenty (20) Business Days prior to the planned

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start of Commissioning. The plan shall comply with the requirements that have been established by the Contract Administrator.

- .3 The Detailed Commissioning Plan shall be drafted by the Contractor and reviewed by the Contract Administrator and shall incorporate the contents of the Base Commissioning Plan as specified in this Section. The Detailed Commissioning Plan shall include the following:
 - .1 Inform the Contract Administrator at least fifteen (15) Business Days in advance of conducting the tests and arrange for the attendance of the Manufacturer's Representative. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Contractor and the Contract Administrator.
 - .2 The Manufacturer's Representative shall conduct all necessary checks to the equipment and advise the Contractor of any further checking, flushing, cleaning, or other work needed prior to confirming the equipment is ready to run.
 - .3 Contingency plans in the event of a process malfunction.
 - .4 Drawings and sketches as required to illustrate the planned sequence of events.
 - .5 List and details for all temporary equipment or component (additional spool pieces, etc.) required to facilitate Commissioning.
 - .6 List of all personnel who the Contractor plans to be in attendance for Commissioning and handover with information indicating their qualifications for this Work.
- .4 The Detailed Commissioning Plan shall take into account:
 - .1 Approved Shop Drawings and product data.
 - .2 Approved changes to the Contract.
 - .3 Project Schedule.
 - .4 Contractor's, Subcontractor's, and Suppliers' requirements.
 - .5 Project construction team's and Commissioning team's requirements.
- .5 The Detailed Commissioning Plan shall include:
 - .1 Commissioning Schedule.
 - .2 Installation and start-up check lists provided by Manufacturers and Suppliers.
 - .3 Manufacturer Performance Test forms provided by Manufacturers and Suppliers.
 - .1 Forms to include testing parameters at full range of operating conditions to verify responses of equipment and systems.
- .6 Submit the completed Detailed Commissioning Plan to the Contract Administrator for review and acceptance. The Detailed Commissioning Plan shall be reviewed prior to its implementation. The Contract Administrator shall be the final arbiter.

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3.3 Refinement of Commissioning Plan

- .1 During the construction phase, the Construction Contractor will revise, refine, and update the Detailed Commissioning Plan to include approved design and construction changes. Provide input to the Construction Contractor as required.
 - .1 At each revision, indicate revision number and date.
- .2 The Construction Contractor will submit each revised Detailed Commissioning Plan to the Contract Administrator for review and acceptance.

3.4 Equipment

- .1 All process, electrical, control, and miscellaneous equipment related to the system shall be successfully installed and tested in accordance with Section 01 65 00, this Specification Section, and any specific requirements noted in other Divisions. Form 103 shall be executed for each gate.
- .2 Temporary equipment or components will be installed and tested as necessary to ensure that it functions reliably and consistently through the Commissioning period.

3.5 Controls

- .1 All controls which are the responsibility of this Contractor shall be installed and tested prior to Commissioning.
- .2 The Contract Administrator shall arrange for the simulation of the control sequences or shall allow for the operation of the system without the features included in the Work of others. Every effort shall be made to ensure that the Commissioning period provides for the full and comprehensive operation of the equipment under all anticipated normal and adverse operating conditions.
- .3 In the event that achieving adverse operating condition was deemed impractical by the City operation, the I/O signals may be manipulated to achieve the necessary reaction of the system.

3.6 Plant Utility Service

- .1 The City shall provide power and other ancillary services as necessary to operate the facility through the Commissioning period. Provision of these services shall be limited to reasonable levels.

3.7 Manpower

- .1 Supply all staff required during Commissioning as necessary to assist the City's staff in the operation of the facility.
- .2 Supply competent staff capable of maintaining, repairing, and adjusting the equipment and controls to achieve the intended design functions during the Commissioning period.

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- .3 Ensure equipment Supplier's Representatives are available as necessary to certify adjustments in equipment, to guide in setting correct operating limits, and to generally provide input as required for the appropriate operation of the equipment.

3.8 Operating Descriptions

- .1 Operating descriptions shall be prepared by the Contract Administrator for the facility systems. Other information outlining the operating requirements shall also be available from the Contract Administrator. The Supplier and the Construction Contractor will review these descriptions and shall make themselves familiar with the requirements in order that they can undertake Commissioning in an appropriate manner.
 - .1 Operating descriptions shall be considered part of documentation for systems as listed in Clause 3.13.2.

3.9 Design Parameters

- .1 Design parameters for the system shall be as defined in the Specifications and/or the operating descriptions.

3.10 Pre-Commissioning Activities

- .1 Conduct pre-start-up pressure, static, flushing, cleaning, "bumping" testing, and loop validation during construction as specified in the individual sections. This testing shall be witnessed and certified by the Contract Administrator and does not form part of Commissioning specifications. Include completed documentation with the Final Commissioning Report.
- .2 Perform prestart up inspections prior to commencing Commissioning. Utilise approved installation and start-up check lists if required. Rectify any deficiencies to the Contract Administrator's satisfaction. Include completed documentation with the Final Commissioning Report.
- .3 Pre-commissioning activities shall include, at minimum:
 - .1 Process systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 Complete pre-start-up checks and complete relevant documentation.
 - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.

3.11 Commissioning of Instrumentation and Control

- .1 Commissioning activities shall only proceed after instrumentation and control tests have been completed.
- .2 A minimum written notice of fifteen (15) Business Days shall be required prior to commencing with process commissioning activities. To qualify for process commissioning the following activities shall be completed:

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- .1 Instrument calibrations;
 - .2 Initial Control Settings and adjustments have been made;
 - .3 All field devices have been set-up;
 - .4 Forms (i.e., 100 forms) have been completed;
 - .5 PLC/SCADA IO and loop checks have been completed; and
 - .6 Proper mounting and connections have been made.
- .3 During Commissioning, demonstrate to the Contract Administrator proper calibration and correct operation of instruments and gauges.
 - .4 Commissioning of the instrumentation and control system shall include but not be limited to the following:
 - .1 Verify installation of components, wiring connections, and piping connections.
 - .2 Verify wiring continuity and pipe leak tests.
 - .3 Verify instrument calibrations and loop tests and provide a written report to the Contract Administrator.
 - .1 The report shall include record of functional checks and any adjustments required for the instruments and control equipment under operational conditions.
 - .4 Coordinate instruments and control equipment supplier's service personnel as required for complete system testing.
 - .5 Coordinate and cooperate with the City, Contract Administrator, and other contractors to commission the Control System I/O points.
 - .6 Direct plant personnel at hand-over as to final adjustment of the system for correct operation of plant as per Section 01 79 00.
 - .7 Ensure that the instrumentation and control equipment suppliers cooperate to complete the Work.
 - .8 Verify signal levels and wiring connections to all instrumentation and control equipment.

3.12 Start-Up and Commissioning of Equipment

- .1 A Supplier's Representative shall conduct all necessary checks to the equipment prior to start-up as described in Section 01 65 00.
- .2 Following the installation and calibration of the equipment, the Construction Contractor shall perform a Demonstration, Running Test, and Performance Test of the full system, which will be witnessed by the Supplier's Representative and the Contract Administrator. It will be the responsibility of the Construction Contractor to arrange the times for testing and start-up

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- activities. The Construction Contractor shall confirm that these times are acceptable to the Contract Administrator and the City.
- .3 The Construction Contractor shall supply all water, chemicals, temporary power, heating, and/or any other ancillary equipment or services required to complete the initial demonstration, running test and performance tests.
 - .1 During the Demonstration, Running Test and Performance Test, the Contractor shall operate equipment as required to meet the requirements from all Divisions of this Specification.
 - .2 Test leakage for each gate under specified seating and unseating head conditions.
 - .3 If required, the Contractor shall supply any ancillary equipment or services required to complete the Demonstration, Running Test and Performance Test.
 - .4 Should the Demonstration, Running Test and Performance Test reveal any defects, then those defects shall be documented and promptly rectified, and the testing shall be repeated to the satisfaction of the Contract Administrator. Even if this shall require repeating of all commissioning procedures from the beginning, it will be at the sole discretion of the Contract Administrator.
 - .5 Additional costs incurred by the Contractor due to repeat testing shall be borne by the Contractor.
 - .4 On successful completion of the Demonstration and Running Test, Form 103 – Certificate of Equipment Satisfactory Running Test Performance (attached to this Specification) will be signed by the Supplier's Representative, the Contractor, and the Contract Administrator. Form 103 is required for each gate, which includes its associated electrical/control modifications by extension and for each installation period.
 - .5 On successful completion of the Performance Test, Form 104 – Certificate of Equipment Satisfactory Performance Test Performance (attached to this Specification) will be signed by the Supplier's Representative, the Contractor, and the Contract Administrator. Form 104 is required for each gate, which includes its associated electrical/control modifications by extension. For clarity, Performance Test will not begin until all UV equipment is installed.
 - .6 Demonstration:
 - .1 The Contractor shall notify the Contract Administrator of their readiness to demonstrate the operation of the equipment. The Contract Administrator shall attend.
 - .2 With the assistance of the Supplier's Representative on site, the Contractor shall demonstrate that the equipment is properly installed. Alignment, piping connections, electrical connections, etc. shall be checked and if appropriate, code certifications provided.
 - .3 The equipment shall then be run for one (1) hour. Local controls shall be verified by cycling the equipment through several start-stop operations, modulating its output, or some combination. Operating parameters shall be checked to ensure that they are within the specified or Supplier's Representative's recommended limits, whichever is more stringent. This step shall be repeated for each modified system.

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- .4 Test leakage: The test must demonstrate that all gates leak no more than the design leakage criteria.
- .5 On satisfactory completion of the one (1) hour demonstration, the equipment shall be stopped, and critical parameters shall be rechecked.
- .7 Running Test:
 - .1 The Running Test shall be performed subsequent to successful Demonstration of equipment.
 - .2 Completely test each gate to verify that equipment can perform its specified function in satisfactory manner without mechanical or electrical defects, or operational difficulties.
 - .3 The equipment shall run continuously for a minimum of seven (7) days. During this period conditions shall be simulated which represent maximum (or most severe), average, and minimum (or least severe) flow conditions. These conditions shall be mutually agreed to by the Supplier's Representative, the Contractor, and the Contract Administrator on the basis of the information contained in the technical specifications, and the methods utilized to create the simulated conditions, and the time periods allotted to each.
 - .4 The Running Test shall be repeated for each piece of major equipment and each period of installation.
 - .5 The Supplier's Representative shall be on site for on-site for one (1) day during the Running Test of each gate.
 - .6 The Running Test shall be completed as follows:
 - .1 To perform the Running Test, the Contractor, with on-site supervision by the Manufacturer's Representative, shall operate all controls and other devices to ensure they are functional.
 - .2 The purpose of the Running Test shall be to demonstrate the effectiveness of all system components and control features in all modes of control.
 - .1 Local control of all devices when local controllers and/or HMI are not in service.
 - .2 Automatic shutoff and alarm for various failure modes. This shall include air monitoring, process monitoring, and shutdown sequences operating as intended for both life safety and process safety.
 - .7 At the time of the tests, make final adjustments necessary to place equipment in satisfactory working order to prepare for Start-up.
 - .8 Test equipment and accessories specified herein in accordance with Supplier's printed instructions over full operating range of equipment.
 - .9 The Contractor shall submit results of the Running Test within twenty-four (24) hours to the Contract Administrator. Final documented and summarized results shall be submitted in a format acceptable to the Contract Administrator within five (5) Business Days. Results shall include, at a minimum:

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- .1 Pass or Fail status of all tasks and commentary on the performance of each task.
 - .2 Leakage rate.
 - .10 The Contractor, with assistance from the Manufacturer's Representative, shall complete each Running Test to the satisfaction of the Contract Administrator and the City prior to commencing the Performance Test.
- .8 Performance Tests:
- .1 Following completion of the Demonstrations and Running Tests, the Contractor in cooperation with the City's operating staff shall conduct the Performance Test with on-site supervision assistance from the Supplier's Representative. The Supplier's Representative shall submit to the Contractor, the City, and the Contract Administrator a complete testing plan.
 - .2 Performance Tests shall be conducted subsequent to the Running Test.
 - .3 The Performance Test shall be completed for the gates when the entire UV system has been installed in the three (3) channels.
 - .4 To perform the Performance Test, the Contractor in cooperation with City's operating staff shall operate the complete system with on-site supervision assistance from the Manufacturer's Representative continuously for a minimum of ten (10) days.
 - .5 During the ten (10) day period, conditions shall be simulated by plant operations which represent maximum (or most severe), average, and minimum (or least severe) flow conditions. These conditions shall be mutually agreed to by the Supplier's Representative, the Contractor, and the Contract Administrator on the basis of the information contained in the technical specifications, and the methods utilized to create the simulated conditions, and the time periods allotted to each.
 - .6 The Supplier's Representative shall be on site for on-site for one (1) day during the Performance Test of each gate.
 - .7 The Contractor shall submit the initial results of each Performance Test within twenty-four (24) hours to the Contract Administrator. Final documented and summarized results shall be submitted in a format acceptable to the Contract Administrator within five (5) Business days.
 - .8 The Contract Administrator reserves the right to request additional testing at no additional cost. No equipment shall be accepted and handed over to the City prior to the satisfactory completion of the Performance Test and receipt of the test reports.
 - .9 In all cases, compliance with the requirements of this Specification shall be determined for each day of the testing period.
- .9 Should the initial Demonstrations, Running Tests or the Performance Test reveal any defects, then those defects shall be promptly rectified and the demonstration, Running Tests and/or the Performance Test shall be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Construction Contractor, or the Contract Administrator, due to

COMMISSIONING PLAN

repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Construction Contractor.

3.13 Final Commissioning Report

- .1 Construction Contractor to submit the completed Commissioning Report within a maximum of two (2) weeks of completion of Commissioning. The final Commissioning Report is to be reviewed and accepted by the Contract Administrator prior to granting Substantial Performance. The Supplier shall provide documentation as required.
- .2 Final Commissioning Report shall include:
 - .1 Start-up, pre- Commissioning activities, and documentation for systems and equipment.
 - .2 Description of Commissioning activities and documentation.
 - .3 Description of Commissioning of integrated systems and documentation.
 - .4 Completed installation checklists.
 - .5 Completed Running Test Report(s).
 - .6 Final settings of commissioned equipment.
 - .7 Training Plans.
- .3 Before the final Commissioning Report is accepted, individual reported results to be subject to verification by the Contract Administrator.

3.14 Training Plans

- .1 Refer to Section 01 79 00 - Demonstration and Training.

3.15 Supplements

- .1 The supplements listed below, following "End of Section", are part of this Specification:
 - .1 Form 103 – Certificate of Equipment Satisfactory Running Test Performance.
 - .2 Form 104 – Certificate of Equipment Satisfactory Performance Test Performance.

END OF SECTION

COMMISSIONING PLAN

**CERTIFICATE OF EQUIPMENT SATISFACTORY RUNNING TEST PERFORMANCE
FORM 103**

We certify that the equipment listed below has been operated and tested as per the Specifications and that the equipment meets its Running Test criteria. No defects in the equipment were found. The equipment is therefore classed as “conforming”.

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO: _____

**REFERENCE
SPECIFICATION:** _____

(Authorized Signing Representative of the Supplier) _____
Date

(Authorized Signing Representative of the Contractor) _____
Date

(Authorized Signing Representative of the Contract Administrator) _____
Date

Acknowledgement of Receipt of O&M Manuals.

(Authorized Signing Representative of the City) _____
Date

COMMISSIONING PLAN

**CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE TEST
PERFORMANCE
FORM 104**

We certify that the equipment listed below has been operated and tested as per the Specifications and that the equipment meets its Performance Test criteria. No defects in the equipment were found. The equipment is therefore classed as “conforming”.

PROJECT: _____

SYSTEM DESCRIPTION: _____

TAG No (s): _____

**REFERENCE
SPECIFICATION (s):** _____

(Authorized Signing Representative of the Supplier) _____
Date

(Authorized Signing Representative of the Contractor) _____
Date

(Authorized Signing Representative of the Contract Administrator) _____
Date

(Authorized Signing Representative of the City) _____
Date

STAINLESS STEEL GATES AND APPURTENANCES

1. GENERAL

1.1 Description

- .1 Provide and test fabricated stainless steel slide and weir gates and appurtenances as indicated and in compliance with Contract Documents.

1.2 References

- .1 All standards referenced in the Specifications are referring to the most recent version of the published standard.
- .2 ASTM International (ASTM):
 - .1 ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A276 - Standard Specifications for Stainless Steel Bars and Shapes.
 - .3 ASTM A666 - Annealed Or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, And Flat Bar.
 - .4 ASTM B26 - Aluminium-Alloy Sand Castings.
 - .5 ASTM B221 - Aluminium and Aluminium-Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes.
 - .6 ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
 - .7 ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
 - .8 ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - .9 ASTM D4020 - Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials.
 - .10 ASTM D6098 - Extruded and Compression Molded Shapes Made from Polycarbonate (PC).
 - .11 ASTM F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - .12 ASTM F594 - Stainless Steel Nuts.
- .3 Canadian Welding Bureau (CWB) Code.
- .4 American Water Works Association (AWWA):
 - .1 AWWA C561-12 - Fabricated Stainless Steel Slide Gates.
 - .2 ANSI/AWWA C542 - Electric Motor Actuators for Valves and Slide Gates.

STAINLESS STEEL GATES AND APPURTENANCES

.5 Canadian Standards Association (CSA):

.1 Welding Procedure Specifications.

1.3 Definitions

- .1 Slide Gate: a stainless steel gate used for lower head applications, up to 2 m. Gates require sealing along three sides.
- .2 Weir Gates: a stainless steel lifting gate with a seal on the bottom and the sides. Water flowing over the gate is measured for height and correlated with flow for measurement.
- .3 Maximum Seating Head: The maximum seating head is defined as the maximum pressure head exerted on the gate (at the centerline elevation of the gate opening) in the direction into the frame and arising from the highest differential water level which could work to seat the gate.
- .4 Maximum Unseating Head: The maximum unseating head is defined as the pressure head exerted on the gate (at the centerline elevation of the gate opening) in the direction away from the frame and arising from the maximum differential water level which could work to unseat the gate.

1.4 Submittals

- .1 Submit the following Shop Drawings in accordance with Section 01 33 00:
 - .1 Certified shop and erection drawings. Contractor shall submit electronic files of the proposed equipment in the capacity, size, and arrangement as indicated and specified.
 - .2 Design calculations confirming stress and deflection of the slide, yoke and stem. Include calculations of breakaway lift and thrust forces, clearly showing the weight of the gate, the weight of stem or cylinder rod, coefficient of friction, and seating and unseating head.
 - .3 Maximum bending stress and deflection of the slide under design head specified and indicated.
 - .4 Details of gate actuator assembly, gate assembly, stem supports, accessories.
 - .5 Complete description of all materials, material thicknesses of all components.
 - .6 Installation drawings showing the details required for installation, dimensions, clearances and anchor bolt locations.
 - .7 Shop Drawing data for accessory items.
 - .8 Certified setting plans, with tolerances, for anchor bolts.
 - .9 Operating and maintenance instructions and parts lists.
 - .10 Shop and field-testing procedures and set up.

STAINLESS STEEL GATES AND APPURTENANCES

- .11 Certified results of gate shop testing, including shop leakage test results of each gate at the design unseating head specified and indicated.
- .12 Certified results of actuator shop testing from the actuator Manufacturer.
- .13 List of recommended special tools and spare parts other than those specified.
- .14 Recommendations for short and long-term storage.
- .15 Motor shop test results.
- .16 The latest ISO 9001 series certification or quality system plan.
- .17 Material Certification:
 - .1 Provide certification from the equipment Manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the City.
 - .2 Where materials are not specified, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated.
- .2 A copy of the contract mechanical process, structural, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this Specification Section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.
 - .1 Failure to include all drawings or a statement applicable to the equipment specified in this Section will result in submittal return without review until a complete package is submitted.
- .3 A copy of this Specification Section with addenda and all referenced Specification Sections with addenda, with each paragraph check-marked to indicate Specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
 - .1 If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
 - .2 Failure to include a copy of the marked-up Specification Sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up Specifications and justifications are submitted in a complete package.

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- .4 Stamped and sealed design data from a registered Professional Engineer in the Province of Manitoba certifying that the design and installation of slide gates meet the requirements of Applicable Law and the requirements of the Design and Construction Specifications.

1.5 Spare Parts

- .1 Comply with the requirements specified in Section 01 61 00.
 - .1 One (1) set of all special tools is required.

1.6 Quality Assurance

- .1 Gates shall be the product of one Manufacturer.
- .2 Gates shall be Manufacturer's standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.
- .3 Welding: In accordance with latest applicable American Welding Society Code, ASME Welding Code, and Canadian Standards Association Welding Procedure Specifications, or equivalent.
- .4 Shop tests as specified, including shop leakage testing of each gate at the design unseating head to confirm compliance with the leakage rate specified and indicated.
- .5 The Contractor shall obtain the gates, actuators and appurtenances from the gate Manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.
- .6 Manufacturer of gates shall have a minimum of five (5) operating installations with gates of the size specified and in the same service as specified operating for not less than five (5) years.

1.7 Delivery, Storage and Handling

- .1 Comply with the requirements specified in Section 01 61 00.
- .2 Electric actuators are to be shipped separate from the gate assembly.

2. PRODUCTS

2.1 System Description

- .1 Gate sizes and operating data are indicated in the Gate Schedule.

2.2 Manufacturers

- .1 Acceptable Manufacturers:
 - .1 RW Gate Co.
 - .2 Whipps.

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- .3 Fontaine Aquanox.
- .4 Hydro Gate.
- .5 Or approved equivalent.

2.3 Slide Gate Construction

- .1 Provide slide gates and a guide to stop flow in a channel with removable slide gate components.
- .2 Self contained, rising stem, flush bottom type with self-adjusting seals.
- .3 Gates with adjustable wedges or wedging devices are not acceptable.
- .4 Provide all structural components with 6 mm (1/4-inch) minimum thickness.
- .5 Gate assemblies shall be media blasted or passivated in accordance with ASTM A380 prior to shipment to remove all mill scale, weld splatter, discoloration, or other surface imperfections.
- .6 Assembly to consist of the following:
 - .1 Frame.
 - .2 Slide.
 - .3 Stem
 - .4 Seals.
- .7 Materials:
 - .1 Frame Assembly and Retainers: ASTM A240 Type 316L stainless steel.
 - .2 Slides and Stiffeners: ASTM A240 Type 316L stainless steel.
 - .1 6 mm (1/4-inch) minimum thickness.
 - .3 Seat, seals and facing: ASTM D4020 UHMW (Ultra-high Molecular Weight) Polyethylene.
 - .4 Invert Seal for upward acting gates only: ASTM D2000 Neoprene or EPDM.
 - .5 Stems: ASTM A276 Type 316 stainless steel.
 - .1 Minimum diameter: 38 mm (1-1/2-inch).
 - .6 Lift Nuts: ASTM B584 Bronze, UNS-C86500.
 - .7 Floorstand and Wall Brackets: ASTM A276 Type 316L stainless steel.
 - .8 Gear Operator Housing: Cast aluminum or ductile iron.

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- .9 Hardware, studs and nuts: ASTM A276 Type 316 stainless steel.
- .10 Anchor bolts: Type 316 stainless steel. Minimum diameter of 13 mm (1/2-inch).

2.4 Configuration, Components and Features

.1 General:

- .1 Design slides and frames with a safety factor of five with regard to tensile, compressive and shear strength, and with the requirement that all gates to comply with field leakage tests specified in AWWA C561 as modified herein.
- .2 Operating forces used for determining the strength of gate components (yokes, frames, slides, stems, slide nut pockets, and other load-bearing members) to be based on the sum of the guide friction force and the weight of the slide and stem without allowance for buoyancy.
- .3 Leakage is not to exceed 0.60 litre per minute per linear metre of sealing perimeter.
- .4 Each slide to be stamped or otherwise permanently indicate the pressure rating of the installed equipment.

.2 Slide:

- .1 Slide and reinforcing stiffeners welded to the slide.
 - .1 Stainless steel plate, minimum 6 mm (1/4-inch).
 - .2 Reinforcement: Provide a minimum of two horizontal stiffeners welded to the slide and two vertical stiffeners welded to outside of the horizontal stiffeners.
 - .3 Provide slide to engage the guide a minimum of 25.4 mm (1 inch) on each side and have a minimum material thickness of 16 mm (1/4 inch) where it engages the guide.
 - .1 When the width of the gate in metres (feet) times the differential head in metres (feet) acting on the invert of the gate exceeds 11.15 (120), provide a minimum thickness of 76 mm (3 inches) of slide edge engaging the guide.
 - .4 Stem connector to be constructed of two angles or plates welded to the slide. Provide a minimum of two bolts connecting the stem to the stem connector.
- .2 Deflection: Maximum of 1/720 of the span or 1.6 mm (1/16 inch) whichever is smaller, under design head specified.

.3 Seals:

- .1 Provide a self-adjusting seal system suitable for the leakage, frequent cycling and velocities specified herein and mounted such that there is no obstruction to the specified gate opening size.
- .2 Provide gates equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal to metal contact between the frame and slide.

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- .3 Extend the seat/seals to accommodate 1.50 x the slide height with the gate in the fully open or fully closed position.
 - .4 Provide all upward opening gates with a resilient flush bottom seal for sealing the invert of the gate.
 - .5 Provide all downward opening weir gates with self-adjusting UHMW seat/seals across the invert member.
 - .6 Provide all seals mechanically fastened to the frame or slide, force fit seals or seals attached with adhesive are not acceptable.
 - .7 Provide all seats and seals to be field replaceable without the need to remove grout or concrete and without the need to remove the frame from the wall or wall thimble.
 - .8 Gates using "J" or "P" seals are not acceptable.
- .4 Frames:
- .1 Provide frame assembly including guide members, invert members and yoke members constructed of formed stainless steel plate with a minimum thickness of 6 mm (1/4-inch).
 - .2 Provide gussets to support the guide members for unseating gates as required by the design head specified and indicated.
 - .1 Provide gussets extended to support the outer portion of the guide assembly and positioned to transfer the load to the anchor bolts.
 - .3 Provide frames for mounting type as indicated in the Gate Schedule.
 - .1 Wall mounted with stainless steel anchor bolts and non-shrink, non-metallic grout or EPDM gasket.
 - .4 Provide all wall mounted gates with a flanged frame. Flat frame gates are not acceptable.
 - .5 Provide all mounted frames with a minimum guide weight of 16.37 kg/metre (11 lbs/ft) and a minimum guide extension weight of 9.67 kg/metre (6.5 lbs/ft).
 - .6 Provide guide extensions constructed of C-channel shape or similar. Angles are not acceptable guide extensions.
 - .7 Frame Guides and Invert Members: Provide frames as a one-piece, fully welded assembly.
 - .1 Bolt-on yokes are acceptable when necessary to facilitate slide removal.
 - .2 Frames that require field assembly are not acceptable unless the overall frame size exceeds a size suitable for shipment on a standard flat bed truck.

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- .8 Provide the frame guides extending to accommodate the entire height of the slide when the slide is in the fully opened position on upward opening slide gates or downward opening weir gates.
 - .9 For self-contained gates, provide a yoke across the top of the frame guides with the yoke formed by two structural members fixed to the top of the guides to provide a one-piece rigid frame.
 - .1 Provide the yoke designed to allow removal of the slide.
 - .10 Provide a rigid stainless steel invert member across the bottom of the opening.
 - .1 Invert member: Flush bottom type on upward opening gates with a minimum weight as specified.
 - .11 Provide a rigid stainless steel member across the invert of the opening on downward opening weir gates.
- .5 Stems:
- .1 Provide a threaded operating stem to connect the operating mechanism to the slide.
 - .2 For rising stem gates provide the threaded portion engaging the operating nut in the manual operator or motor actuator.
 - .3 Minimum stem outside diameter of 38 mm (1-1/2 inches).
 - .4 Stem extension pipes are not acceptable.
 - .5 Provide the stem constructed of solid stainless steel bar for the entire length.
 - .6 Tensile strength: Not less than 60,000 psi for stems.
 - .7 Provide the stem threaded to allow full travel of the slide unless otherwise specified or indicated.
 - .8 L/R: Not to exceed 200.
 - .9 Provide the stem in accordance with AWWA C561, to withstand in tension the loads caused by an 18 kg (80 lb) effort on the manual crank or handwheel without exceeding 25% of the ultimate tensile strength of the stem material.
 - .10 Motor Operators: Design stems to withstand in compression 1.30 x stalled output.
 - .11 Provide the stem, in tension, designed to withstand a load caused by an 18 kg (40 pound) effort on the crank or handwheel without exceeding 1/5 of the ultimate tensile strength of the stem material.
 - .12 Provide the threaded portion of the stem machined rolled or cut full depth ACME type threads with 16 micro-inch or better finish. Stub threads are not acceptable.
 - .13 Provide stems of more than one piece joined by bronze or stainless steel couplings with the coupling bolted to the stem.

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- .14 Provide dual stems for upward opening gates wider than 1500 mm (60-inch) when the opening width is 2 x greater or more than the height of the slide. Provide dual stems for downward opening gates wider than 1220 mm (48 inch) when the opening width is 2 x greater or more than the height of the slide.
- .15 Provide stems on manually operated gates with an adjustable stop collar to prevent over closing of the gate.
- .16 For rising stem gates, provide clear plastic covers with 25 mm (1 inch) graduations. Provide vent holes to prevent condensation.

2.5 Electric Motor Actuators

- .1 Provide in accordance with Specification Section 40 23 13.

2.6 Shop Painting

- .1 Unless otherwise specified, provide MPI Premium Grade paint system.
- .2 The City will provide Colour Schedule after Contract award.
- .3 Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.
- .4 Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.7 Shop Testing

- .1 Assemble each gate and inspect for proper seating.
 - .1 Check clearance between frame and gate seating surfaces.
- .2 Fully open and close each gate in guide system to ensure gates operate freely as recommended by the gate Manufacturer.
- .3 Conduct a shop leakage test at the design unseating head on each gate to confirm leakage as specified and indicated for Field Testing.
- .4 Operate floorstands and benchstands to insure proper assembly and operation.
- .5 Repeat tests until specified results are obtained.
- .6 Correct or replace promptly all defects or defective equipment revealed by or noted during tests at no additional cost to the City.

3. EXECUTION

3.1 Installation

- .1 Install items in accordance with Specification Section 01 65 00.
- .2 Clean debris, dirt, and gravel, from inside of gates and channels before placing gates.

STAINLESS STEEL GATES AND APPURTENANCES

- .3 Install slide gates in completely assembled condition.
- .4 Erect and support slide gates in positions free from distortion and strain on appurtenances during handling and installation.
- .5 Inspect material for defects in workmanship and material.
- .6 Clean out debris and foreign material from gate opening and seats, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair gates and other equipment which do not operate easily or are otherwise defective.

3.2 Field Testing

- .1 Comply with the requirements specified in Specification Section 01 91 31 and as specified herein.
- .2 After installation of gates, and after inspection, operation, testing and adjustment have been completed by the Manufacturer's field service technician, conduct Demonstration, Running Test and Performance Test for each gate in presence of the Contract Administrator to determine its ability to operate as specified, and to operate smoothly without jamming under specified conditions.
- .3 Test all operators.
- .4 Leakage Test: Leakage not to exceed 0.6 L/min per metre (0.05 gpm per foot) of seal perimeter.
 - .1 Prepare and submit a written test plan in accordance with AWWA C561 for review and approval prior to commencing the test. Testing prior to approval is not acceptable.
 - .2 Provide a written summary of test results.
 - .3 Test leakage for each gate under specified seating and unseating head conditions.
 - .4 The test must demonstrate that all gates leak no more than the design leakage criteria.
 - .5 Leakage testing is completed once performance and testing documentation have been completed.
- .5 Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the City.
- .6 Repeat tests until specified results are obtained.
- .7 Contractor to provide all water labour, piping, testing equipment for conducting tests.
- .8 Remove and replace equipment at no additional cost to the City with equipment that will meet all requirements specified and indicated if unable to demonstrate to the satisfaction of the Contract Administrator that equipment will perform the service specified, indicated and as submitted.

STAINLESS STEEL GATES AND APPURTENANCES

3.3 Field Touch-Up Painting

- .1 After installation and testing accepted by the Contract Administrator, apply touch-up paint to all scratched, abraded and damaged shop painted surfaces. Coating type and colour shall match shop painting.

3.4 Contract Closeout

- .1 Provide in accordance with Section 01 78 00.

END OF SECTION

STAINLESS STEEL GATES AND APPURTENANCES - GATE SCHEDULE

#	Area	Commodity	Tag	Type	Channel Width (m)	Invert (relative to the floor) (m)	Slide Height (m)	Seating Head (m)	Unseating Head (m)	Side Mounting*	Bottom Mounting*	Self Contained/ Non Self Contained	Stem	Electric Actuator	Motor Enclosure Type	Notes
1	UV Facility	Secondary Effluent	XV-U11011	Slide Gate	2.44	0.9	1.7	0.85	0.85	CS	CWF	Self Contained	Rising	Yes	NEMA 4X	Upward Opening
2	UV Facility	Secondary Effluent	XV-U12011	Slide Gate	2.44	0.9	1.7	0.85	0.85	CS	CWF	Self Contained	Rising	Yes	NEMA 4X	Upward Opening
3	UV Facility	Secondary Effluent	XV-U13011	Slide Gate	2.44	0.9	1.7	0.85	0.85	CS	CWF	Self Contained	Rising	Yes	NEMA 4X	Upward Opening
4	UV Facility	Secondary Effluent	XV-U11014	Weir Gate	2.44	0	2.7	Minimal	1.25	CWF	CWF	Self Contained	Rising	Yes	NEMA 4X	Downward Opening
5	UV Facility	Secondary Effluent	XV-U12014	Weir Gate	2.44	0	2.7	Minimal	1.25	CWF	CWF	Self Contained	Rising	Yes	NEMA 4X	Downward Opening
6	UV Facility	Secondary Effluent	XV-U13014	Weir Gate	2.44	0	2.7	Minimal	1.25	CWF	CWF	Self Contained	Rising	Yes	NEMA 4X	Downward Opening

* CWF = Concrete wall face mounted
 EF= Embedded Frame
 CS = channel side mounted
 CB = channel bottom mounted
 FW=Face of wall mounted

ELECTRIC MOTOR ACTUATORS AND APPURTENANCES

1. GENERAL

1.1 Description

- .1 Supply, installation and testing of electric powered actuators and accessories for controlled devices such as slide and weir gates.
- .2 Sizing and selection of modulating control valve and actuator components.
- .3 Coordinate with the gate supplier to size and match powered actuators to controlled devices.
- .4 Electric powered actuators are standardized by the City via RFP 331-2014. Manufacturer is Rotork, series is IQ3. No substitutes will be accepted.

1.2 References

- .1 All standards referenced in the Specifications are referring to the most recent version of the published standard.
- .2 American Water Works Association (AWWA):
 - .1 ANSI/AWWA C542 - Electric Motor Actuators for Valves and Slide Gates.
- .3 Canadian Standards Association (CSA):
 - .1 Welding Procedure Specifications.
- .4 International Standards Organization (ISO):
 - .1 5210, Industrial Valves – Multi Turn Actuator Attachment.
 - .2 5211, Industrial Valves – Part Turn Actuator Attachment.
- .5 National Electrical Manufacturers Association (NEMA).
- .6 Underwriters Laboratory (UL):
 - .1 1709, UL Standard for Safety, Rapid Rise Fire Tests of Protection Materials for Structural Steel.

1.3 Submittals

- .1 Submit the following in accordance with Section 01 33 00:
 - .1 Shop Drawings for complete actuator assemblies and accessories prior to delivery. Submittals to include.
 - .2 Product data sheets for each make and model.
 - .3 Complete catalog information, descriptive literature, specifications, identification of materials of construction, and cross-sectional details.

ELECTRIC MOTOR ACTUATORS AND APPURTENANCES

- .4 Submit the following data complete, grouped together, and separated by divider, for each set of valves with the same combination of features and accessories:
 - .1 Dimensional outline drawing showing gate body, trim, actuator, and accessories.
 - .2 Identification of materials of construction, cross-sectional views and details; for valves, components, and accessories.
 - .3 Power and control wiring diagrams, including terminals and numbers.
 - .4 Complete motor nameplate data.
 - .5 Sizing calculations for open-close, and modulating gates.
 - .6 List of Configuration Parameters: Include the following for each piece of equipment and/or component which contains adjustable or programmable settings:
 - .1 List of switchable settings, or programmable settings complete with:
 - .1 Switch/parameter tag No. or I.D. or address.
 - .2 Range of possible settings.
 - .3 Factory default setting.
 - .4 Blank column for recording final field setting.
 - .2 Description of each adjustable parameter complete with description of each allowable value.
- .2 Submit a completed ISA S20.50 Instrument Specification Sheet for each device.

1.4 Service Conditions

- .1 Provide electrical enclosures rated for the area classification.
- .2 Coordinate with designer for process and design conditions.

1.5 Shipment, Protection and Storage

- .1 Ship and store equipment in accordance with Specification Section 01 61 00.

1.6 Delivery and Storage

- .1 Provide delivery and storage in accordance with Specification Section 01 65 00.
- .2 Deliver actuators to site using loading methods which will not damage casings or coatings.
- .3 Clearly tag all actuators, stating size, type, coatings and mating parts.
- .4 When stored on-site, use storage methods recommended by the Manufacturer to prevent damage, undue stresses and protection from adverse weather conditions.

ELECTRIC MOTOR ACTUATORS AND APPURTENANCES

2. PRODUCTS

2.1 General

- .1 Provide new material only.
- .2 Provide all actuator mounting hardware and accessories mounted on the device prior to shipment.
- .3 Provide actuators of NEMA 4X construction or better, suitable for use in an industrial environment. Provide hazardous area approvals where required for classified areas.
- .4 Size actuators for drip-tight shutoff and breakaway at full valve pressure rating, unless otherwise specified.
- .5 Tag the control devices, accessories and actuators to indicate operating characteristics. Tag the actuator inlet and outlet ports for electric services. Electric actuators must be CSA or cUL approved.

2.2 Actuator Types

- .1 Electric Motor Actuators - Three Phase:
 - .1 General:
 - .1 Controls integral with the actuator and fully equipped as specified in AWWA 542.
 - .2 Stem protection for rising stem gates.
 - .3 Actuator ambient temperature range -40°C to 70°C and up to 100% relative humidity.
 - .4 Design that allows gear case to be opened for inspection or disassembly without releasing stem thrust or taking valve out of service.
 - .5 Equipped with side-mounted handwheel for manual operation. Include automatic clutch to positively disengage handwheel when drive motor control is energized.
 - .6 Design handwheel operator such that failure of motorized gearing will not prevent hand operation of valve.
 - .7 Circuitry which ensures motor turns in correct direction irrespective of supply polarity connected to power terminal; valve and operator to suffer no damage due to incorrect power connection.
 - .8 Instantaneous reversal protection whereby automatic time delay circuit limits current surges when actuator is signaled to instantaneously reverse direction.
 - .9 Anti-hammer protection whereby electronic torque limitation switches off actuator when preset load is reached due to obstruction or end of travel.

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- .10 Bi-metal thermostat embodied in motor control transformer windings to prevent overheating due to extensive use.
 - .11 Jammed valve motor protection whereby logic circuit protects motor from overheating by de-energizing motor if valve does not move after developing maximum torque.
 - .12 Opto-isolators incorporated to interface with remote control inputs to protect logic circuits from high voltage transients appearing at actuator terminals.
 - .13 Actuator shall include diagnostic module which will store and enable download of historical actuator data to permit analysis of changes in actuator or gate performance. Retrieval of this information must be demonstrated in the field.
- .2 Actuator Operation:
- .1 Suitable for full 90-degree rotation.
 - .2 Manual override handwheel.
- .3 Non-Intrusive Electronics:
- .1 Local controls, diagnostics, and calibration, including limit and torque switch settings, shall be accomplished non-intrusively. Electronic valve position display with capability to show continuous torque output. If applicable, provide two hand-held configuration units for every ten (10) actuators provided, two (2) minimum.
- .4 Open-Close Service Inlet Gates:
- .1 Capable of 60 starts per hour.
 - .2 Size with a minimum of 1.5 safety factor based on the maximum unseating and seating torque of the gate at its AWWA pressure classification. Safety factor shall be demonstrated and documented in Shop Drawings submittals and at time of commissioning under real service conditions using actuator software and torque display on actuator. Motor stall torque not to exceed capacity of gate.
 - .3 Controls and Indicators:
 - .1 LOCAL-OFF-REMOTE selector switch, padlockable in each position.
 - .2 Integral OPEN-STOP-CLOSE momentary pushbuttons with seal-in circuits to control valve in LOCAL position.
 - .3 Remote OPEN-STOP-CLOSE momentary control dry contact inputs in REMOTE position. Integral seal-in circuits for remote OPEN and CLOSE commands.
 - .4 Auxiliary contact that closes in REMOTE position.
 - .5 OPEN and CLOSED indicating lights.

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- .6 Form "A" dry contact for:
 - .1 OPEN status.
 - .2 CLOSED status.
- .7 Integral reversing motor starter with built-in overload protection. Control transformer for 120-volt or 24-volt control voltage.
- .8 Gate shall remain in last position on loss of operator power.
- .5 Modulating Service Outlet Weir Gates:
 - .1 Actuators shall employ AWWA compliant, S4-50% duty class motors with a rated minimum 900 starts per hour capability.
 - .2 Gate's actuation speeds shall be between 255 mm (10 inch) and 356 mm (14 inch) per minute
 - .3 Gate's maximum design rate of change of flow shall be limited to 25% of the Peak Design Flow/Channel per minute, or alternatively, flow shall be ramped up (zero to peak) or down (peak to zero) in no less than 4 minutes.
 - .4 Actuators shall employ AWWA compliant, Class B, solid-state Thyristor based switchgear capable of at least 5,000,000 modulating steps before overhaul; electromechanical type actuators and controls are not permitted.
 - .5 Actuators to be sized with minimum 2.0 safety factor based on maximum unseating and seating torque of gate at its AWWA pressure classification. Safety factor shall be demonstrated and documented at time of commissioning under real service conditions using actuator software. Motor stall torque not to exceed torque capacity of gate.
 - .6 Feedback potentiometer and integral electronic positioner/comparator circuit to maintain valve position.
 - .7 Controls and Indicators:
 - .1 LOCAL-OFF-REMOTE selector switch, padlockable in each position.
 - .2 Integral OPEN-STOP-CLOSE momentary pushbuttons with seal-in circuits to control valve in LOCAL position.
 - .3 Auxiliary contact that closes in REMOTE position.
 - .4 OPEN and CLOSED indicating lights.
 - .5 Remote OPEN-STOP-CLOSE momentary control dry contact inputs in REMOTE position. Integral seal-in circuits for remote OPEN and CLOSE commands.
 - .6 Form "A" dry contacts for:

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- .1 OPEN status.
- .2 CLOSED status.
- .3 Gate FAULT status.
- .8 Gate shall remain in last position on loss of operator power.
- .9 Duty cycle limit timer and adjustable band width, to prevent actuator hunting.
- .10 Gate position output converter controlled by a modulating analog signal with feedback signal in proportion to gate position, through a 4-20 mA signal.
- .6 Actuator Power Supply:
 - .1 600 VAC, three-phase, 60 Hz unless indicated otherwise.
 - .2 Control power transformer, 24-volt or 120-volt secondary.
- .7 Enclosure:
 - .1 Unless indicated otherwise, provide enclosure as defined in NEMA 4X.
 - .2 Contain 120-volt space heaters, or electrical compartment shall be non-breathing to prevent condensation.
- .8 Limit Switches:
 - .1 Single-pole, double-throw (SPDT) type, field adjustable, with contacts rated for 5 amps at 120 volts ac.
 - .2 Each valve actuator to have minimum of two transfer contacts at end position, one for valve fully OPEN and one for valve fully CLOSED.
 - .3 Housed in actuator control enclosure.

2.3 Product Standardization:

- .1 This product was standardized by the City via RFP 331-2014.
- .2 Manufacturer and Series:
 - .1 Rotork; IQ3.
- .3 No alternates or substitutes will be accepted.
- .4 All requests for purchase or quotation shall reference RFP 331-2014 to receive standardized pricing that the City has negotiated with the vendor.

2.4 Spare Parts

- .1 Provide one (1) spare actuator for each type and size.

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- .2 Provide a list of all spare parts which would be expected to be required under normal conditions for a period of five (5) years. At the Contract Administrator's request, provide a price for these parts.

3. EXECUTION

3.1 Installation

- .1 Provide installation assistance to the Construction Contractor in accordance with Section 01 65 00.

3.2 Start-Up and Commissioning

- .1 Provide testing and commissioning in accordance with Section 01 91 31.
- .2 Factory test each actuator assembly prior to shipment.
- .3 Automatic valves to be tested in conjunction with control system testing. Set all opening and closing speeds, limit switches, as required or recommended by the Contract Administrator.
- .4 Field setup and commissioning of the actuators shall be performed by Rotork under the standardization agreement (RFP 331-2014) for the following:
 - .1 The first actuator of each type installed on Site; and
 - .2 A minimum of two (2) actuators additional of each type, or 5% of the actuators of that type, whichever is greater.
 - .3 Coordinate with Rotork as required to understand the limitations of Rotork's field setup and commissioning services and provide all remaining services to provide a complete commissioning and start-up.
 - .4 Field setup and commissioning of the remaining actuators may be performed by Rotork, or by a representative of the gate manufacturer.
- .5 Rotork's presence to setup and commission the actuator in no way limits the Supplier's responsibility for setup and commissioning.
- .6 It is the responsibility of the Construction Contractor to ensure that the installation of the actuator is complete and that the gate is ready to commission, as per Rotork's documented pre-commissioning checklist.

3.3 Training

- .1 Provide the services of a qualified technical Supplier's Representative for personnel training as specified in Specification Section 01 79 00.

END OF SECTION