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## SUBMITTALS

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### 1. GENERAL

#### 1.1 Contractor's Specifications and Contractor's Drawings

- .1 Contractor's drawings are to clearly indicate materials, weights, dimensions, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work. Where articles or equipment attach or connect to other articles or equipment, clearly indicate that all such attachments and connections have been properly coordinated, regardless of the trade under which the adjacent articles or equipment will be supplied and installed.
- .2 The Contractor shall examine all Contractor's specifications and Contractor's drawings prior to submission to the Contract Administrator to ensure that all necessary requirements have been determined and verified and that each Contractor's specifications and Contractor's drawing has been checked and coordinated with the requirements of the Work and the Contract Documents. Examination of each Contractor's specifications and Contractor's drawing shall be indicated by stamp, date and signature of a responsible person of the Subcontractor for supplied items and of the Contractor for fabricated items. Contractor's specifications and Contractor's drawings not stamped, signed and dated will be returned without being reviewed.
- .3 Contractor's specifications and Contractor's drawings submitted to the Contract Administrator to be in full colour pdf electronic format. Documents to be pdf'd to the size expected to be printed. Submittals will be accepted via email or through a share file transfer, Contractor to coordinate with Contract Administrator on preferred method. All aspects of Contractor's specifications and Contractor's drawings to be clearly legible and full colour, minimum of 200dpi (dots per inch) will be accepted.
- .4 Contractor's specifications and Contractor's drawing review by the Contract Administrator is solely to ascertain conformance with the general design concept. Responsibility for approval of detail design inherent in Contractor's specifications and Contractor's drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.
- .5 Review by the Contract Administrator shall not relieve the Contractor of his responsibility for errors or omissions in Contractor's specifications and Contractor's drawings or for proper completion of the Work in accordance with the Contract Documents.
- .6 Responsibility for verification and correlation of field dimensions, fabrication processes, techniques of construction, installation, and coordination of all parts of the Work rests with the Contractor.
- .7 Contractor's specifications and Contractor's drawings will be returned to the Contractor with one of the following notations:
  - .1 When stamped "REVIEWED - NO COMMENT" no additional or revised copies of the Contractor's specifications and Contractor's drawings are required to be submitted to the Contract Administrator regarding the execution of the Works.
  - .2 When stamped "REVIEWED - AS NOTED", Contractor is to ensure that all copies for use are modified and distributed.

## **SUBMITTALS**

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- .3 When stamped “REVIEWED - REVISE AND RESUBMIT”, make the necessary revisions, as indicated, consistent with the Contract Documents and submit again for review.
- .4 When stamped “REVIEW BY CONSULTANT NOT REQUIRED”, no further revisions are required.
- .8 After submittals are stamped "REVIEWED - NO COMMENT", “REVIEW BY CONSULTANT NOT REQUIRED”, “REVIEWED - AS NOTED”, no further revisions are permitted unless re-submitted to the Contract Administrator for further review.
- .9 Only Contractor’s specifications and Contractor’s drawings bearing "REVIEWED - NO COMMENT", “REVIEW BY CONSULTANT NOT REQUIRED”, “REVIEWED - AS NOTED”, shall be used on the Works unless otherwise authorized by the Contract Administrator.
- .10 Any adjustments made on Contractor’s specifications and Contractor’s drawings by the Contract Administrator are not intended to change the Contract Price. If it is deemed that such adjustments affect the Contract Price, clearly state as such in writing prior to proceeding with fabrication and installation of Work.
- .11 Make changes in Contractor’s specifications and Contractor’s drawings, which the Contract Administrator may require, consistent with Contract Documents. When re-submitting, notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.
- .12 Contractor’s specifications and Contractor’s drawings shall be signed and sealed by a qualified Professional Engineer, registered in the Province of Manitoba. Calculations shall be submitted for review, if requested, and sealed by a qualified Professional Engineer.

### **1.2 Photographs and Publicity**

- .1 No photographs of the Site or of any portion of the Work will be permitted without prior approval of the Contract Administrator.
- .2 No press or publicity releases will be permitted without prior approval of the Contract Administrator.

### **1.3 Procedures**

- .1 The Contractor shall, if required by the Contract Administrator, submit for the review of the Contract Administrator method statements which describe in detail, supplement with Drawings where necessary, the methods to be adopted for executing any portion of Work.

**END OF SECTION**

## TEMPORARY FACILITIES

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### 1. FIELD OFFICES AND SHEDS

#### 1.1 Contractor's Office

- .1 Accommodation for the Contractor's office, plant, tools, equipment, and materials (including fuel) shall be the responsibility of the Contractor.
- .2 Provide adequate first aid facilities as recommended by the Ministry of Labour and Worker's Compensation regulations.

#### 1.2 Laydown and Storage

- .1 Designated areas shall be used for storage of flammable and combustible liquids and gases, which shall be properly equipped for grounding and bonding when refueling vehicles and equipment. Spills shall be contained as required by Provincial Regulations.
- .2 Pressurized dry chemical fire extinguishers of suitable capacity or equally effective extinguishers as per National Fire Protection Association (NFPA) 10 shall be provided where:
  - .1 Flammable liquids are stored or handled.
  - .2 Temporary oil or gas fire equipment is used.
  - .3 Welding or flame cutting is performed.

#### 1.3 Contractor's Trailers

- .1 The Contractor shall provide construction power at 120/240 V, 1 phase, and 600 V, 3 phase to the service points designated at the Work Site and to the Contractor's.
- .2 The Contractor shall, at its own cost, supply, install, maintain, and move extensions to the above services as required during the Construction Period, subject to CSA Standard C22.1 latest edition and Manitoba Hydro Standards and approval.

#### 1.4 Toilets and Washrooms

- .1 Washroom facilities are not available at the North End Water Pollution Control Centre for the Contractor's use.
- .2 The Contractor shall supply and maintain all necessary toilets and washrooms for its employees engaged in the Work. These toilets and washrooms shall comply with the requirements of The Public Health Act, R.S.M. 1987, c. P210, including sewage holding facilities and water storage. Sewage connections are not available.

#### 1.5 Disposal of Waste Materials

- .1 When working anywhere within the Works the Contractor shall at the end of each working day remove his rubbish and leave the Site in a clean and tidy state, to the satisfaction of the Contract Administrator.

## TEMPORARY FACILITIES

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### 1.6 Parking

- .1 Parking shall be arranged so that it does not disrupt the plant's operation and access for the City's operations and maintenance staff.

### 1.7 Contractor's Site Storage for Equipment and Materials

- .1 The Contractor shall provide and maintain in a clean and orderly condition an adequately sized storage facility on-site, which will provide weather protected storage for all the tools, equipment, and materials necessary for the undertaking and completion of the Work.
- .2 The storage facility shall be located where directed by the Contract Administrator.
- .3 The responsibility for the security of the Site storage and the condition of all the equipment and materials therein shall rest solely with the Contractor.

## 2. UTILITIES

### 2.1 Water Supply

- .1 The City shall supply water used for construction purposes. The Contractor shall be responsible for conveying the water (hook-ups, pipes, maintenance, etc.) to the construction Site from the City source.
- .2 The Contractor shall, at its own cost, supply, install, maintain, and move extensions to water services as required during the Construction Period, subject to the City's approval.

### 2.2 Heating and Hoarding

- .1 The Contractor shall provide all temporary heating required during Construction Period.
- .2 The Contractor shall pay for all costs in maintaining and providing temporary heat.

### 2.3 Power and Light

- .1 The Contractor shall provide temporary power and light for own use. Install in accordance with regulations of governing authorities.
- .2 The Contractor shall provide and pay for all temporary power required during Construction for temporary lighting and the operations, including power required.

### 2.4 Use of Permanent Water Supply, Heat, Power Light, and Telephone

- .1 The Contractor shall not make use of permanent water supply, heat, power, lighting, or telephone inside the NEWPCC without obtaining permission from the Contract Administrator or the City.

## TEMPORARY FACILITIES

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### **3. BARRIERS**

#### **3.1 Guard Rails and Barricades**

- .1 Provide guard railings and barricades, around all openings, open shafts, open stairwells. Construct as recommended by local governing authorities.

### **4. CONSTRUCTION AIDS**

#### **4.1 Scaffolding**

- .1 Provide and maintain adequate scaffolding as required. Scaffolding is to be rigid, secure, and constructed to ensure adequate safety for workers. Erect without damage to the building or finishes.

#### **4.2 Explosive Actuated Fastening Tools**

- .1 Provide for the use of explosive actuated fastening tools when required. When using, conform to the requirements of CSA Z166 - "Explosive Actuated Fastening Tools" and local governing authorities.

### **5. ROADS**

#### **5.1 Temporary Vehicular and Pedestrian Access**

- .1 Maintain existing vehicular accesses at all times during Construction.

### **6. PROTECTION OF WORK AND PROPERTY**

#### **6.1 Fire Protection**

- .1 Provide and maintain adequate temporary fire protection equipment during performance of the Work as required by insurance companies having jurisdiction.

#### **6.2 Protection of Building Finishes and Equipment**

- .1 The Contractor shall protect existing mechanical and electrical equipment from damage.
- .2 Maintain and protect existing services in operation during the course of the Work. Repair services damaged at no cost to the City.
- .3 If service interruptions are necessary, such interruptions shall be made only at times approved by the City.
- .4 Advise the Contract Administrator of any necessary service relocations not identified by the Contract documents.

## **TEMPORARY FACILITIES**

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### **7. ACCESS TO SITE AND BUILDING**

#### **7.1 Site**

- .1 Access to the Site will be available from the existing roadways.
- .2 It will be the Contractor's responsibility to check that these accesses are in suitable condition before any plant, equipment or materials are dispatched to Site.
- .3 Access on the Site is restricted by existing buried and surface utilities and structures. Contractor to confirm location of all potential obstructions and to review routing of construction vehicles with the Contract Administrator.
- .4 The Contractor is to maintain access at all times for City personnel or the Contract Administrator.
- .5 The Contractor shall be required to submit to the Contract Administrator the names of all persons the Contractor wishes to have on the Site. The Contract Administrator may reject anyone without explanation.

### **8. ACCESS TO WORK**

- .1 Normal working hours for City staff working inside the building shall be the period between 7:30 a.m. and 4:00 p.m., Monday to Friday, except holidays.
- .2 The Contract Administrator shall be informed at least 24 hours in advance where the Contractor intends to carry out Work outside Normal Working Hours and no such Work shall be done without the Contract Administrator's approval.

### **9. SECURITY**

#### **9.1 Site Lighting**

- .1 Provide and pay for temporary Site lighting as required for non-daylight times.

### **10. ENVIRONMENTAL CONTROLS**

#### **10.1 Noise Control**

- .1 Abide by all local ordinances. Adjust hours of operation accordingly.

#### **10.2 Dust Control**

- .1 Initiate dust control measures to minimize dust generation.

**END OF SECTION**

## **EQUIPMENT INSTALLATION**

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### **1. GENERAL**

#### **1.1 Intent**

- .1 This Section describes general requirements for all equipment supplied under the Contract. The Contractor shall be responsible for the supply, installation, testing, operation, and performance verification of the specified equipment.

#### **1.2 Definitions**

- .1 **Manufacturer:** the Manufacturer is the person, partnership, or corporation responsible for the manufacture and fabrication of equipment provided to the Contractor for the completion of the Work.
- .2 **Manufacturer's Representative:** the manufacturer's Representative is a trained serviceman empowered by the Manufacturer to provide installation, testing, and commissioning assistance to the Contractor in his performance of these functions.

#### **1.3 Expertise and Responsibility**

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

### **2. PRODUCTS (NOT USED)**

### **3. EXECUTION**

#### **3.1 Equipment Delivery**

- .1 The equipment shall be delivered to the City of Winnipeg North End Water Pollution Control Centre.
- .2 A duly executed "Certificate of Equipment Delivery" (Form 100) shall be completed. Any damage identified during the inspection shall be repaired as per the Manufacturer's recommendations by the Contractor at no cost to the City. Any severe damage will be grounds for rejection of the equipment. The severely damaged equipment will be replaced at no cost to the City.
- .3 The Contractor shall be responsible for receiving, off-loading, and placing into storage all equipment at the Site.
- .4 The Contractor shall ensure that he is fully informed of precautions to be taken in the unloading of equipment and its subsequent storage.

#### **3.2 Installation Assistance**

- .1 Before commencing installation of equipment, the Contractor shall arrange for the attendance of the Manufacturer's Representative to provide instructions in the methods,

## **EQUIPMENT INSTALLATION**

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techniques, precautions, and any other information relevant to the successful installation of the equipment.

- .2 When the Manufacturer's Representative is satisfied that the Contractor is aware of all installation requirements, he shall so certify by completing Form 101 attached to this Specification.

### **3.3 Installation**

- .1 The Contractor shall install all equipment. If necessary, or if so directed by the Contract Administrator during the course of installation, the Contractor shall contact the manufacturer to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in an appropriate manner.
- .2 If it is found necessary, or if so directed by the Contract Administrator, the Contractor shall arrange for the Manufacturer's Representative to visit the Site to provide assistance during installation, all at no cost to the City.
- .3 Prior to completing installation, the Contractor shall inform the Manufacturer and arrange for the attendance at the Site of the Manufacturer's Representative to verify successful installation.
- .4 The Manufacturer's Representative shall conduct a detailed inspection of the installation including alignment, electrical connections, belt tensions, rotation direction, running clearances, lubrication, workmanship, and all other items as required to ensure successful operation of the equipment.
- .5 The Manufacturer's Representative shall identify any outstanding deficiencies in the installation.
- .6 The deficiencies shall be rectified by the Contractor and the Manufacturer's Representative will be required to re-inspect the installation, at no cost to the City.
- .7 When the Manufacturer's Representative accepts the installation, he shall certify the installation by completing Form 102, attached to this Specification.

### **3.4 Operation and Performance Verification**

- .1 Equipment will be subjected to a demonstration, running test, and performance tests after the installation has been verified and any identified deficiencies have been remedied.
- .2 The Manufacturer's Representative will conduct all necessary checks to equipment and if necessary, advise the Contractor of any further checking, flushing, cleaning, or other Work needed prior to confirming the equipment is ready to run.
- .3 The Contractor shall then operate the equipment for at least one (1) hour to demonstrate to himself the operation of the equipment and any required ancillary services. Any remedial measures required to ensure satisfactory operation shall be promptly undertaken.
- .4 The Contractor shall then notify the Contract Administrator of his readiness to demonstrate the operation of the equipment. The Contract Administrator shall attend, as expeditiously as possible.

### **EQUIPMENT INSTALLATION**

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- .5 With the assistance of the Manufacturer's Representative, the Contractor will demonstrate that the equipment is properly installed. Alignment, piping connections, electrical connections, etc., will be checked and if appropriate, code certifications provided.
- .6 The equipment shall then be run for one (1) hour, minimum. Local controls shall be satisfactorily verified by cycling the equipment through several start-stop operations, modulating its output, or some combination. Operating parameters such as temperature, pressure, voltage, vibration, etc., will be checked to ensure that they are within the specified or manufacturer's recommended limits, whichever is more stringent.
- .7 On satisfactory completion of the one-hour demonstration, the equipment will be stopped and critical parameters, such as alignment, will be rechecked.
- .8 The equipment will be restarted and run continuously for three (3) days minimum, unless otherwise stated by the manufacturer. During this period, as practicable, conditions will be simulated which represent maximum or most severe, average, and minimum or least severe conditions. These conditions will be mutually agreed by the Manufacturer's Representative, the Contractor, and Contract Administrator on the basis of the information contained in the Specifications, as well as the methods utilized to create the simulated conditions and the time periods allotted to each.
- .9 Performance tests will be conducted either concurrent with or subsequent to the running test, as practicable and agreed between the Contract Administrator, the Manufacturer's Representative, and the Contractor.
- .10 Performance tests shall be as dictated in the Specifications for each item of equipment or as reasonably required by the Contract Administrator to prove adherence to the requirements listed in the Specification.
- .11 The Contractor shall submit the results of the performance tests to the Contract Administrator, documented and summarized in a format acceptable to the Contract Administrator. The Contract Administrator reserves the right to request additional testing. No equipment shall be accepted and handed over to the City prior to the satisfactory completion of the performance tests and receipt of the test reports.
- .12 Should the initial demonstration, running test or performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, running tests, and/or performance tests shall be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Contractor, the Contract Administrator, or the City, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor.
- .13 On successful completion of the demonstration, running test, and performance tests, Form 103 attached to this Specification will be signed by the Manufacturer's Representative, the Contractor, and the Contract Administrator.

**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF EQUIPMENT DELIVERY  
FORM 100**

We certify that the equipment listed below has been delivered into the care of the 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 of the Manufacturer's Representative)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contract Administrator)

\_\_\_\_\_  
Date

**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF READINESS TO INSTALL  
FORM 101**

I have familiarized the installer 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 Manufacturer)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Subcontractor)

\_\_\_\_\_  
Date

I certify that I have received satisfactory installation instructions from the equipment manufacturer/  
supplier.

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_

\_\_\_\_\_

**EQUIPMENT INSTALLATION**

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**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 Manufacturer)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)

\_\_\_\_\_  
Date



## TRAINING

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### 1. GENERAL

#### 1.1 Description

- .1 This Section contains requirements for training the City's Operations Staff, by persons retained by the Contractor specifically for the purpose, in the proper operation and maintenance of the equipment and systems installed under this Contract.
- .2 As a minimum, the Contractor is to allow at least four (4) four, (4) hour sessions of training.
- .3 The intent is that the City's Operations Staff should receive sufficient training on the equipment system that they are going to operate and maintain. The Contract Administrator shall have the authority to determine the duration and content of each training session required.
- .4 Coordinate and finalize with the Contract Administrator on training schedules and duration of each training session.

#### 1.2 Quality Assurance

- .1 Where required by the equipment specifications, provide on-the-job training of the City's Operations Staff. Training sessions will be conducted by qualified, experienced two years minimum, factory-trained representatives of the various equipment suppliers. Training includes instruction of City's Personnel in equipment operation and preventive maintenance and instruction on mechanics, electronics, and instrumentation and communications equipment operators (technicians) in normal maintenance up to major repair.
- .2 The trainer(s) proposed by the Contractor shall be experienced in "training" plant operators and shall have relevant experience in similar work.

#### 1.3 Submittals

- .1 Submit the following information in accordance with Section 01300. For phased testing and start-up activities, separate submittals can be prepared for equipment items or systems. The material will receive a "NO EXCEPTIONS TAKEN" or "MAKE NOTED CORRECTIONS" status by the Contract Administrator no later than four weeks prior to delivery of the training:
  - .1 Training manuals, handouts, visual aids, and other reference materials for each training session to be conducted by the Contractor's trainer(s).
  - .2 Date, time, and subject of each training session.
  - .3 Training schedule. Concurrent classes will not be allowed.

#### 1.4 Equipment Training

- .1 Operator Training
  - .1 As a minimum, classroom equipment training for operations personnel will include:
    - .1 The equipment's specific location in the plant and an operational overview. Use slides and drawings to aid discussion.

## TRAINING

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- .2 Purpose and plant function of the equipment.
  - .3 The operating theory of the equipment.
  - .4 Start-up, shutdown, normal operation, and emergency operating procedures, including system integration and electrical interlocks, if any.
  - .5 Safety items and procedures.
  - .6 Routine preventive maintenance, including specific details on lubrication and maintenance of corrosion protection of the equipment and ancillary components.
  - .7 Operator detection, without test instruments, of specific equipment trouble symptoms.
  - .8 Required equipment exercise procedures and intervals.
  - .9 Routine disassembly and assembly of equipment if applicable for purposes such as operator inspection of equipment.
- .2 Operator Hands-On Training
- .1 As a minimum, hands-on equipment training for operations personnel will include:
    - .1 Identifying instrumentation: location of primary element; location of instrument readout; discuss purpose, basic operation, and information interpretation.
    - .2 Discussing, demonstrating, and performing standard operating procedures and daily visual inspection of system operation.
    - .3 Discussing and performing the preventive maintenance activities.
    - .4 Discussing and performing start-up and shutdown procedures.
    - .5 Performing the required equipment exercise procedures.
    - .6 Performing routine disassembly and assembly of equipment if applicable.
    - .7 Identifying and reviewing safety items and performing safety procedures, if feasible.
- .3 Maintenance Training
- .1 Classroom equipment training for the maintenance and repair personnel will include:
    - .1 Basic theory of operation.
    - .2 Description and function of equipment.
    - .3 Routine start-up and shutdown procedures.
    - .4 Normal and major repair procedures.

## TRAINING

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- .5 Equipment inspection and troubleshooting procedures including the use of applicable test instruments and the "pass" and "no pass" test instrument readings.
  - .6 Routine and long-term calibration procedures.
  - .7 Safety procedures.
  - .8 Preventive maintenance.
- .4 Maintenance Hands-On Training
- .1 Hands-on equipment training for maintenance and repair personnel will include:
    - .1 Locating and identifying equipment components.
    - .2 Reviewing the equipment function and theory of operation.
    - .3 Reviewing normal repair procedures.
    - .4 Performing routine start-up and shutdown procedures.
    - .5 Reviewing and performing the safety procedures.
    - .6 Performing City-approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and troubleshooting equipment problems.
    - .7 Reviewing and using Manufacturer's or Supplier's manuals in the hands-on training.
2. **PRODUCTS (NOT USED)**
3. **EXECUTION (NOT USED)**

**END OF SECTION**

## COMMISSIONING

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### 1. GENERAL

#### 1.1 General

- .1 The Contractor shall refer to all Divisions for details on the commissioning procedures not included in this Section.
- .2 The Contractor shall note that on materials and equipment installed in this Contract, warranty will not begin until issuance of Total Performance.

#### 1.2 Intent

- .1 This Section describes the Contractor's responsibilities in the commissioning and handover of the process, electrical, and other systems to be installed as part of this Work.

#### 1.3 Definitions

- .1 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.
- .2 Commissioning: for the purpose of this Specification Section, commissioning shall be defined as the successful operation of a system in accordance with its design requirements for a period of twenty one (21) days, the last seven (7) of which shall be consecutive, unless otherwise specified.
- .3 Acceptance: for the purpose of this Specification Section, acceptance shall be defined as the formal turnover of a system to the City for his operation and maintenance. This shall occur after the successful end of commissioning of each system through a formal agreement between the Contract Administrator, the City, and the Contractor. Success of the commissioning period is determined by the Contract Administrator.

#### 1.4 Commissioning Team

- .1 The Work of commissioning will be conducted by the Contractor, the City, and the Contract Administrator.
- .2 The City's appointed staff shall represent process personnel and operating staff.
- .3 The Contractor shall provide personnel representing the appropriate trades, including instrumentation and control (I&C) personnel during the commissioning. These personnel shall be skilled workmen, able to expedite any minor repairs, adjustments, etc., as are required to complete commissioning with as few delays as possible.

#### 1.5 Commissioning Plan

- .1 Develop a detailed methodology for the commissioning of each system at least ninety (90) calendar days prior to planned start of commissioning. The plan shall be drafted by the Contractor and Contract Administrator and include the following:
  - .1 Detailed schedule of events.

## COMMISSIONING

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- .2 Planned attendance schedule for manufacturer's representatives.
- .3 Contingency plans in the event of a process malfunction.

### 1.6 Equipment

- .1 All electrical, control, and miscellaneous equipment related to a system shall be successfully installed and tested. Form 103 shall be executed for each item.
- .2 Operating and Maintenance (O&M) Manuals will be submitted and reviewed by the Contract Administrator.
- .3 Staff training sessions shall be completed.

### 1.7 Manpower

- .1 Supply all staff required during commissioning as necessary to assist the City's staff in the operation of the plant.

## 2. PRODUCTS (NOT USED)

## 3. EXECUTION

### 3.1 Preparation

- .1 Each item of equipment included in the system to be commissioned shall be satisfactorily tested and Form 103 completed.
- .2 Wiring, and other conduit systems shall be finished and tested.
- .3 Electrical connections shall be completed and inspected to the satisfaction of the governing authorities.
- .4 All other regulatory inspections shall be completed to the satisfaction of the governing authorities.

### 3.2 Acceptance

- .1 The commissioning of a system shall be considered acceptable when the process has operated in a stable manner, satisfying the design criteria for a period of twenty one (21) days, the last seven (7) of which shall be continuous and consecutive, unless otherwise specified.
- .2 When a process system has been commissioned satisfactorily, the process system shall be formally accepted for operation and routine maintenance by the City's forces. On successful completion of Commissioning, Form 104 – Certificate of Satisfactory Process Performance attached to this Specification will be signed by the representative of the Manufacturer, Contractor, Contract Administrator, and the City.
- .3 An acceptance meeting must be held at the end of the twenty one (21) day test to confirm the status of each system.



## **OPERATION AND MAINTENANCE MANUALS**

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### **1. GENERAL**

#### **1.1 Description**

- .1 This Section supplements the requirements for the provision of Operation and Maintenance (O&M) Manuals.
- .2 Furnish complete operations manuals and maintenance information as specified in this Section for installation check-out, operation, maintenance and lubrication requirements for each unit of mechanical, electrical, and instrumentation equipment or system and each instrument.
- .3 In some instances, this requirement is reinforced by additional references within individual Specification Sections; however, the inclusion or exclusion of additional references within the Contract shall not supersede or otherwise limit the generality of the foregoing and these requirements shall govern.
- .4 Customize the operations manuals and maintenance information to describe the equipment actually furnished. Do not include extraneous data for models, options or sizes not furnished. When more than one model or size of equipment type is furnished, show the information pertaining to each model, option or size.

#### **1.2 Submittals**

- .1 The submission and acceptance of the “Equipment Operating and Maintenance Instruction” manual is a condition precedent to the certification of Substantial Performance.
- .2 Submit operation manuals and maintenance information in accordance with Section 01300. Submittals may be checked for general compliance with the requirements of this Section.
- .3 Submit complete operations manuals and maintenance information as soon as possible after review of project submittals but no later than thirty (30) days before the date of Substantial Performance.
- .4 Submit O&M data in electronic format.
- .5 Submit seven (7) printed and bound copies.

#### **1.3 General Requirements**

- .1 Provide materials of equal clarity and quality as the originals.
- .2 Provide drawings, diagrams and Manufacturer's literature which are legible.
- .3 All instructions in the O&M Manuals are to be in simple language.
- .4 Edit Manufacturers' standard documents to delete extraneous information not applicable to the equipment, assembly, subassembly or material supplied. Cross out or remove and eliminate any extraneous material for models, options or sizes not furnished.

## OPERATION AND MAINTENANCE MANUALS

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### 2. PRODUCTS

- .1 Refer to individual Sections.

### 3. EXECUTION

#### 3.1 Contents and Organization

- .1 Arrange the O&M Manual to match the numbering system in the Specifications.
- .2 Provide the Manufacturers' standard O&M Manuals for the equipment or instrument supplied. If the Manufacturers' standard manuals do not contain all the required information, provide the missing information in supplementary documents and Drawings.
- .3 When more than one (1) piece of identical equipment or instruments is supplied, provide only one (1) set of O&M manuals.
- .4 One (1) set of O&M manuals may be provided when more than one piece of similar equipment or instruments are supplied, such as different sizes of the same model and all similar pieces are covered in the same standard Manufacturer's O&M Manual.
- .5 When similar equipment or instruments are provided by the same Manufacturer, but are not covered in the same standard Manufacturer's O&M Manual, their specific manuals may be included in the same electronic manual.
- .6 Provide a cover page as the first page of each manual, with the following information:
  - .1 Contract name and number.
  - .2 Equipment number, or if more than one piece of equipment is provided, equipment numbers for equipment or instruments covered by the manual. Include functional description of equipment after each number.
- .7 Provide a table of contents listing the contents of the manual and identifying where specific information can be located.
- .8 Include the specific information described below in the O&M Manuals:
  - .1 General Information:
    - .1 Functional title of the system, equipment, material, or instrument.
    - .2 Relevant Specification Section number and Drawing reference.
    - .3 Address and telephone number of the Manufacturers and the nearest Manufacturers' Representative.
  - .2 Equipment Data:
    - .1 Insert Specification Section and completed equipment and instrumentation data sheets for equipment supplied. Attach all Addenda, Change Orders and Change Directives that refer to that specific item of equipment.

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- .3 Operation Information:
  - .1 Include the Manufacturers' recommended step-by-step procedures for starting and stopping under normal and emergency operation. Include all specified modes of operation including recommended operation after the assembly or equipment has been in long term storage.
  - .2 Provide control diagrams with data and information to explain operation and control of systems and specific equipment. Identify normal operating set points and alarm conditions.
  - .3 Provide technical information on all alarms and monitoring devices provided with the equipment.
- .4 Technical Data:
  - .1 Insert Manufacturers' technical specification and data sheets.
  - .2 Insert Manufacturers' certified performance and calibration curves for the equipment and instruments.
- .5 Maintenance Information:
  - .1 Provide descriptions and schedules for Manufacturers' recommended routine preventative maintenance procedures including specific lubrication recommendations. Indicate service intervals as appropriate: daily; weekly; monthly; quarterly; semi-annually; annually; or after "X" hours of operation.
- .6 Maintenance Instructions:
  - .1 Provide requirements to set up and check out each system for use. Include all required and recommended step-by-step inspections, lubrications, adjustments, alignments, balancing and calibrations. Include protective device settings and warnings and cautions to prevent equipment damage and to insure personnel safety.
  - .2 Provide Manufacturers' description of routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair.
  - .3 Provide Manufacturers' recommendations on procedures and instructions for correcting problems and making repairs.
  - .4 Provide step-by-step procedures to isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or requires replacement.
  - .5 Provide step-by-step procedures and list special required tools and supplies for removal, replacement, disassembly and assembly of components, assemblies, subassemblies, accessories and attachments. Provide tolerances, dimensions, settings and adjustments required.
- .7 Assembly Drawings:
  - .1 Provide Drawings which completely document the equipment, assembly, subassembly or material for which the instruction is written. Provide the following

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Drawings as applicable: fabrication details, wiring and connection diagrams, electrical and piping schematics, block or logic diagrams, shop drawings, installation drawings, layout and dimension drawings and electrical component fabrication drawings.

- .2 Provide clear and legible illustrations, Drawings and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies and subassemblies.

.8 Bills of Materials:

- .1 Provide a clear, legible copy of the bill of materials that was shipped with the equipment. The bill of materials should list all equipment, instruments, components, accessories, tools and other items that were shipped with the equipment.

.9 Lubrication Data:

- .1 Provide a table showing recommended lubricants for specific temperature ranges and applications.
- .2 Provide charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- .3 If the equipment or instrument is not lubricated, add a sheet under this Tab with the words "Not Applicable".

### **3.2 Field Changes**

- .1 Following the acceptable installation and operation of an equipment item, modify and supplement the item's instructions and procedures to reflect any field changes or information requiring field data.

### **3.3 Warranties**

- .1 Provide hard cover 3-ring binder for 215 mm x 280 mm paper labelled "Warranties" with three (3) copies of:
  - .1 A list, in Specification Section order, of all warranties and guarantees required by the Contract Documents and all Manufacturers' standard warranties and guarantees. Include contact names and telephone numbers. Indicate the time frame of each warranty or guarantee on the list.
  - .2 Include, in Specification Section order, a copy of all written warranties and guarantees, which are required by the Contract Documents. Include all additional standard warranties and guarantees received by the Contractor.

**END OF SECTION**