# SECTION 01 11 00

# SUMMARY OF WORK

## PART 1 GENERAL

### 1.1 SUMMARY

A. This section outlines in general the work to be done under the Contract at the Water Treatment Research and Process Optimization Facility (WTRPO) at the Winnipeg Water Treatment Plant (WTP).

B. Construct and test ducts, pipelines, tanks, and other facilities shown on the Contract Drawings and specified herein.

C. Supervise, organize, coordinate and direct construction operations of Sub-trades and Suppliers.

D. Supply, install, and put in continuous successful operation equipment and appurtenances specified herein. Include operating assistance to City as described herein.

E. In addition to constructing the works shown on the Drawings, design, construct, and maintain, unless otherwise specified or shown on the Contract drawings, temporary works and facilities required for the construction of the works. Remove temporary works and facilities when construction is completed. Temporary works and facilities include, but are not limited to the following:

1. Scaffolding
2. Electrical, instrumentation, and water services

### 1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The completed Work will provide City with a fully functional WTRPO facility in the Winnipeg WTP.

B. The Contract includes but is not limited to the following Work:

1. WTRPO – Mechanical
    a. Fabrication and installation of ozone contactors and filter columns. The Contractor will be responsible for furnishing all additional materials necessary to complete the installation.
    b. Installation of all process mechanical equipment (i.e. chemical feed systems, pumps, mixers, Dissolved Air Flotation (DAF) tank and saturator vessel, water holding tanks, ozone contactors, filter columns, air compressors, ozone generation and destruct equipment). The City will supply the process mechanical equipment (i.e. pumps, chemical feed pumps, chemical containment pallets, tanks, automated valves, mixers, scraper assembly, air compressors, ozone generation and destruct equipment) except for the ozone contactors and filter columns. The

Contractor will be responsible for furnishing all additional materials necessary to complete the installation (piping, tubing, fittings, manual valves, piping supports, panels, screws, nuts, bolts, fasteners, hardware, etc.).

c. Supply and installation of concrete equipment pads for the DAF recycle pump and air compressor, and the ozone generation and destruct equipment.
d. Supply and installation of residuals line from the WTRPO Facility to the thickened sludge equalization tank (TSET).
e. Supply and installation of an electric water heater.
f. Installation of combination safety shower and eyewash and mixing valve. The City will supply the combination safety shower and eyewash and mixing valve.
g. Supply and installation of process mechanical and plumbing materials (piping, tubing, fittings, valves, piping supports, screws, nuts, bolts, fasteners, hardware, etc.).
h. Supply and installation of Heating, Ventilation, and Air Conditioning (HVAC) materials and equipment (ducting, fans, etc.)

2. WTRPO – Electrical
   a. Installation, termination, and calibration of all instrumentation. The City will supply all instrumentation.
   b. Installation, termination, and calibration of Motor Control Centres (MCCs). The MCCs will be supplied by the City. The Contractor shall be responsible for all additional materials required to complete the installation.
   c. Installation, termination, testing, and calibration of new programmable logic control (PLC) panels. The PLC panels will be supplied by the City. The Contractor shall be responsible for all additional materials required to mount the panels and terminate all control cabling. The Contractor shall verify all field wiring including loop checks and submit completed test forms. Supply and installation of additional cable tray system in the process area.
   d. Supply and installation of new fibre optic cable including patch panels, terminations, testing and verification.
   e. Supply and installation of new 600 VAC and 120 VAC breaker panel boards. Supply and installation of 600-120/208 VAC dry type transformer
   f. The Contractor shall assist during plant start-up to trouble-shoot and correct wiring, adjust calibration, change equipment settings, etc., as necessary.
   g. Supply and Installation of lighting.
3. Testing and Commissioning of the WTRPO Facility.

## 1.3 WORK NOT COVERED BY CONTRACT DOCUMENTS

A. Supply of City-Furnished Products, as per Section 01 64 00.

1.4 CITY-FURNISHED PRODUCTS

A. Refer to Section 01 64 00, City-Furnished Products.

1.5 EQUIPMENT, MATERIAL, AND SERVICES PROVIDED BY THE CITY

A. The Contract Documents allow for an area on-site for the Contractor's use. The boundary limits must be strictly adhered to in order to minimize the impact to the natural conditions. If additional space is required, obtain agreement in writing from the City.

B. When required written notice is given, the City will take existing full-scale treatment processes out of service to allow for the installation of pipelines.

1.6 CONTRACT DRAWINGS

A. The Drawings are prepared in SI metric units.

B. For easy reference, Contract Drawings have been divided into General, Structural (for reference only), Process, Mechanical, HVAC and Plumbing, Electrical, and Instrumentation and Control and laid out in ascending numerical order by facility. Read the Drawings as a whole, since details applicable to one Section may appear on the Drawings of another Section or Sections.

C. Contract Drawings give general location of piping routes, ductwork routes, cable tray and raceway routes, and equipment. Except where specific dimensions are indicated, locate piping, ductwork, cable tray and raceway, and equipment to limit interference with existing equipment not to be removed.

D. Refer to Structural Drawings (for reference only) for dimensions and details which are not indicated on Process, Mechanical, HVAC and Plumbing, Electrical, or Instrumentation and Control Drawings.

E. Additional drawings showing details in accordance with which the Work is to be constructed may be supplied from time to time by the City or Contract Administrator. Such drawings are for the information of and assistance to the Contractor and will not become a basis for extra payment. The City or Contract Administrator may supply drawings covering additional work. These will be identified as additional work.

1.7 CONTRACT SPECIFICATIONS

A. For easy reference, the Contract Specifications are divided into divisions. Read the Specifications as a whole as details applicable to one division may appear in another division or divisions.

B. Coordinate and be responsible for the work done by Subcontractors.

1.8 WORK COMPLIANCE

A. Provide Work conforming to the lines, levels and grades specified or shown on the Contract Drawings.

B. Build Work in a thoroughly substantial and workmanlike manner, in accordance with the Contract Drawings and Specifications, subject to such modifications and additions as may be deemed necessary during its execution. In no case will payment be made for Work in excess of the requirements of the Drawings and Specifications, unless approved in writing by Contract Administrator and City.

1.9 ENGINEER DESIGN

A. Where specifications require work to be designed by an engineer, engage an engineer licensed in the Province of Manitoba to design such work.

1.10 EXAMINATION OF EXISTING CONDITIONS

A. The Contractor's attention is directed to the difficulty of work involved in the running of piping and electrical raceway routes through the existing structures and plant. The contract documents indicate the extent of work. However, it is the Contractor's responsibility to examine on site during the time of tendering the proposed pipe and electrical routings to develop a full appreciation of the scope of work.

B. The routings are to be generally kept within existing tunnels and structures as far as practicable.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 31 13

# PROJECT COORDINATION

## PART 1 GENERAL

### 1.1 RELATED WORK AT SITE

A. General:
1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at site by others.
2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.
3. Include sequencing constraints specified herein as a part of progress schedule.

### 1.2 CITY-FURNISHED PRODUCTS

A. Refer to Section 01 64 00, City-Furnished Products

### 1.3 FACILITY OPERATIONS

A. Continuous operation of the City's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified. In the event of conflict between construction activities and facility operations, facility operations have priority unless otherwise specified.

B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of the City's operations.

C. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by the City and Contract Administrator. Such authorization will be considered within 48 hours after receipt of Contractor's written request.

D. Process or Facility Shutdown:
1. The following will require shutdown at some time during the Work:
   a. One half of the residuals treatment process (i.e. washwater recovery tanks, gravity thickener, and thickened sludge equalization tank)
2. Provide seven 7 working days advance written request for approval of need to shut down a process or facility to the City and Contract Administrator.
1. Power outages will be considered upon 48 hours written request to the City and Contract Administrator. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.
2. Power outages will be required for the installation of the new motor control center sections and associated cabling.

3. Power outages will be required for the CP-X10 control panel 120 VAC UPS supply breaker additions.
4. Power outages will be required for the new hot water tank feeder breaker addition.
5. Lighting in the WTRPO room will require interruption for the addition of new lighting control relays.
6. Control network interruptions will be considered upon 48 hours written request to the City and Contract Administrator. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous communications to critical facility components.
7. Control network interruptions will be required for the addition of fibre optic cables, terminations, Ethernet switches in panel LCP-H10A

E. Do not proceed with Work affecting a facility's operation without obtaining the City's and Contract Administrator's advance approval of the need for and duration of such Work.

1.4 ADJACENT FACILITIES AND PROPERTIES

A. Examination:
1. After Effective Date of the Agreement and before Work at site is started, the Contractor, the Contract Administrator, and the City shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:
1. Record and submit documentation of observations made on examination inspections in accordance with paragraph CONSTRUCTION PHOTOGRAPHS
2. Upon receipt, the Contract Administrator will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of the Contractor, and the City.

1.5 CONSTRUCTION PHOTOGRAPHS

A. The Contractor must photographically document all phases of the project including preconstruction, construction progress, and post-construction.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 CUTTING, FITTING, AND PATCHING

A. Cut, fit, adjust, or patch Work to make Work complete.

B. Obtain prior written authorization of the Contract Administrator before commencing Work to cut or otherwise alter:
1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
2. Efficiency, maintenance, or safety of element.
3. Work of others.

C. Refinish surfaces to provide an even finish.
1. Refinish continuous surfaces to nearest intersection.
2. Refinish entire assemblies.
3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and Work is evident in finished surfaces.

D. Restore existing work and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown.

E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.

F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.

G. Remove specimens of installed Work for testing when requested by the Contract Administrator.

END OF SECTION

# SECTION 01 31 19

# PROJECT MEETINGS

## PART 1 GENERAL

### 1.1 GENERAL

A. The Contract Administrator will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within (7) seven calendar days after each meeting to participants and parties affected by meeting decisions.

B. The location of the meeting shall be at the Winnipeg WTP.

### 1.2 PRECONSTRUCTION CONFERENCE

A. Contractor shall be prepared to discuss the following subjects, as a minimum:
1. Required schedules.
2. Status of Bonds and insurance.
3. Sequencing of critical path work items.
4. Progress payment procedures.
5. Project changes and clarification procedures.
6. Requirements for use of site, access, site signs, office and storage areas, security, utilities, hoarding and temporary facilities.
7. Major product delivery and priorities.
8. Contractor’s safety plan and representative.
9. Contractor’s environmental management plan
10. Required Submittals.
11. Quality Control Plan.
12. Permits obtained by the Contractor.

B. The Preconstruction Meeting shall take place no later than ten (10) Working Days after the issuance of the Notice to Commence and shall be held at the Winnipeg WTP.

C. Attendees will include:
1. City’s representatives.
2. Contractor’s office representative.
3. Subcontractors’ representatives whom Contractor may desire or Contract Administrator may request to attend.
4. Contract Administrator’s representatives.
5. Others as appropriate.

### 1.3 PRELIMINARY SCHEDULES REVIEW MEETING

A. As set forth in Section 01 32 00, Construction Progress Documentation.

1.4 PROGRESS MEETINGS

A. The Contract Administrator will schedule regular progress meetings at site, conducted monthly to review the following:
   1. Health and safety issues
   2. Review of any comments on the previous meeting summaries,
   3. Review of the progress of the Work including comments regarding the progress schedule
   4. Schedule and status of Shop Drawing and Sample submittals
   5. Status of Contractor-issued requests for information
   6. Status of City-issued requests for quotation
   7. Status of change orders
   8. Status of Contractor claims
   9. Status of Payment Certificates
   10. Quality Control
   11. Other matters needing discussion and resolution

B. Attendees will include:
   1. City's representative(s), as appropriate.
   2. Contractor, Subcontractors, and Suppliers, as appropriate.
   3. Contract Administrator's representative(s).
   4. Others as appropriate.

1.5 PRE-COMMISSIONING MEETINGS

A. The Contract Administrator will schedule at least one pre-commissioning meeting beginning no later than sixty (60) Working Days after the issuance of the Notice to Commence to review testing and commissioning plans and schedules.

B. Attendees will include members of the Testing and Commissioning Group as defined in Section 01 91 14, Equipment Testing and Facility Startup.

1.6 FACILITY STARTUP MEETINGS

A. Schedule and attend a minimum of two (2) facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01 91 14, Equipment Testing and Facility Startup, and shall include preliminary discussions regarding such plan.

B. Agenda items shall include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.

C. Attendees will include:
   1. Contractor.
   2. Subcontractors whom Contractor deems to be directly involved in facility startup.
   3. Contract Administrator's representatives.
   4. City's operations personnel.

5. Others as required by Contract Documents or as deemed necessary by Contractor.

1.7 OTHER MEETINGS

A. In accordance with Contract Documents and as may be required by City and Contract Administrator.

B. The City reserves the right to call additional Site meetings, or to request the attendance of particular personnel at any meeting.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 32 00

# CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 GENERAL

### 1.1 SUBMITTALS

A. Informational Submittals:
   1. Detailed Progress Schedule:
      a. Submit initial detailed progress schedule within ten calendar (10) days after Effective Date of the Agreement.
      b. Submit an updated progress schedule at each update, in accordance with Article DETAILED PROGRESS SCHEDULE.
   2. Submit with each progress schedule submission:
      a. Contractor's certification that progress schedule submission is actual schedule being utilized for execution of the Work.
      b. Progress Schedule: Six legible copies and one electronic copy in Microsoft Project and as a PDF.
   3. Prior to final payment, submit a final updated progress schedule.

### 1.2 DETAILED PROGRESS SCHEDULE

A. In addition to requirements of General Conditions, submit detailed progress schedule beginning with Notice to Proceed and continuing through Completion.

B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.

C. When accepted by the Contract Administrator, detailed progress schedule will replace preliminary progress schedule and become baseline schedule. Subsequent revisions will be considered as updated progress schedules.

D. Format: In accordance with Article PROGRESS SCHEDULE - BAR CHART

E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

### 1.3 PROGRESS SCHEDULE – BAR CHART

A. Format:
   1. Unless otherwise approved, white paper, 11-inch by 17-inch sheet size.
   2. Title Block: Show name of project and the City, date submitted, revision or update number, and name of scheduler.
   3. Identify horizontally, across the top of the schedule, the time frame by year, month, and day.
   4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
   5. Legend: Describe standard and special symbols used.

B. Contents: Identify, in chronological order, those activities reasonably required to complete the Work, including as applicable, but not limited to:
   1. Obtaining permits, submittals for early product procurement, and long lead time items.
   2. Mobilization and other preliminary activities.
   3. Specified work sequences, constraints, and Milestones, including Substantial Performance date(s).
   4. Subcontract work.
   5. Major equipment fabrication and delivery dates.
   6. Delivery dates for City-furnished products, as specified in Section 01 11 00, Summary of Work.
   7. Equipment work.
   8. Mechanical work.
   9. Electrical work.
   10. Instrumentation and control work.
   11. Interfaces with City-furnished equipment.
   12. Leakage testing of process piping.
   13. Other important work for each major facility.
   14. Equipment and system startup and test activities.
   15. Project closeout and cleanup.
   16. Demobilization.

1.4 PROGRESS OF THE WORK

A. Updated progress schedule shall reflect:
   1. Progress of Work to within five (5) working days prior to submission.
   2. Approved changes in Work scope and activities modified since submission.
   3. Delays in submittals or resubmittals, deliveries, or Work.
   4. Adjusted or modified sequences of Work.
   5. Other identifiable changes.
   6. Revised projections of progress and completion.
   7. Report of changed logic.

B. If Contractor fails to complete activity by its latest scheduled completion date and this failure is anticipated to extend Contract Times (or Milestones), Contractor shall, within seven (7) calendar days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to acceptable current progress schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

C. The City may order Contractor to increase plant, equipment, labour force, or working hours if Contractor fails to:
   1. Complete a Milestone activity by its completion date.
   2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to the City.

1.5 SCHEDULE ACCEPTANCE

A. The Contract Administrator’s acceptance will demonstrate agreement that:
   1. Proposed schedule is accepted with respect to:

a. Contract Times, including Completion and all intermediate Milestones are within the specified times.
b. Specified Work sequences and constraints are shown as specified.
c. Specified City-furnished equipment or material arrival dates, or range of dates, are included.
d. Access restrictions are accurately reflected.
e. Startup and testing times are as specified.
f. Submittal review times are as specified.
g. Startup testing duration is as specified and timing is acceptable.

2. In all other respects, the Contract Administrator's acceptance of Contractor's schedule indicates that, in the Contract Administrator's judgement, the schedule represents reasonable plan for constructing Work in accordance with the Contract Documents. The Contract Administrator's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to the Contract Administrator's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Work in accordance with the Contract Documents.

B. Unacceptable Detailed Progress Schedule:
1. Make requested corrections; resubmit within ten (10) working days.
2. Until acceptable to the Contract Administrator as baseline progress schedule, continue review and revision process.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 33 00

# SUBMITTAL PROCEDURES

## PART 1 GENERAL

### 1.1 DEFINITIONS

A. Action Submittal: Written and graphic information submitted by Contractor, that requires the Contract Administrator's review.

B. Informational Submittal: Information submitted by Contractor, that does not require the Contract Administrator's review. Submittals not meeting conditions of the Contract will be returned.

### 1.2 PROCEDURES

A. Direct submittals to the Contract Administrator at the following address, unless specified otherwise. The mailing address for the Contract Administrator is provided in Section D4 of the Bid Opportunity 355-2014.

B. Electronic Submittals: Submittals shall be made in electronic format.
1. Each submittal shall be electronic file in Adobe Acrobat Portable Document Format (PDF). Use latest version available at time of execution of Agreement.
2. Electronic files that contain more than 10 pages in PDF format shall contain internal book marking from index page to major sections of 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 8.5 inches by 11 inches, or 11 inches by 17 inches. No other paper sizes will be accepted.
6. Submit new electronic files for each resubmittal.
7. Include copy of Transmittal of Contractor's Submittal form, located at end of section, with each electronic file.
8. Submit authorization for the Contract Administrator to reproduce and distribute each file as many times as necessary for Project documentation.
9. Detailed procedures for handling electronic submittals will be discussed at Preconstruction Conference.
10. Limit size of each electronic transmission to 8 MB.

C. List of Submittals
1. For each specification section submittal, Contractor shall provide a table listing all the submittals anticipated for that specification section. The table shall include the following information:
   a. Specification Section
   b. Total Number of Submittals for this section
   c. Shop drawings associated with each submittal
   d. Revision and status for each submittal

D. Transmittal of Submittal:
   1. Contractor shall:
      a. Review each submittal and check for compliance with Contract Documents.
      b. Stamp each submittal with 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 Documents.
         2) The Contract Administrator will not review submittals that do not bear Contractor's approval stamp and will return them without action.
         3) The Contract Administrator will not review submittals received directly from a Subcontractor or Supplier and will return them without action.
   2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form, Supplement-1 attached at end of this section.
   3. Identify each submittal with the following:
      a. Numbering and Tracking System:
         1) Sequentially number each submittal.
         2) Resubmission of submittal shall have original number with sequential alphabetic suffix.
      b. Specification section and paragraph to which submittal applies.
      c. Project title and the Contract Administrator's project number.
      d. Date of transmittal.
      e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
   4. Identify and describe each deviation or variation from Contract Documents.
   5. Include Contractor's written response to each of the Contract Administrator's review comments with resubmission of submittals stamped "Exceptions Noted, Resubmit".
   6. Submit Contractor's written acknowledgement and acceptance of each of the Contract Administrator's review comments on submittals stamped "Exceptions Noted".

E. 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 Documents.

F. Timeliness:

1. Schedule and submit in accordance with schedule of Shop Drawing and Sample submittals, and requirements of individual Specification sections.
2. Submit Shop Drawings and Samples well in advance of scheduled delivery date for associated equipment or material.
3. Coordinate submittals prepared by multiple trades such that information is available to allow prior review and sufficient review time where work of one trade interfaces with or affects work of another.

G. Processing Time:
1. Time for review shall commence on the Contract Administrator's receipt of submittal.
2. The Contract Administrator will act upon Contractor's submittal and transmit response to Contractor not later than ten (10) calendar days after receipt, unless otherwise specified.
3. Resubmittals will be subject to same review time.
4. Allow additional review time for complex equipment and systems.

H. Resubmittals:
1. Clearly identify each correction or change made and include revision date.
2. Provide clear response to each itemized comment by the Contract Administrator on the submittal, whether or not action has been taken, and description of action.
3. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmittals.

I. Incomplete Submittals:
1. The Contract Administrator will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
2. When any of the following are missing, submittal will be deemed incomplete:
   a. Contractor's review stamp, completed and signed.
   b. Transmittal of Contractor's Submittal, completed and signed.
   c. All requested information is not provided.
   d. Submittals missing Professional Engineer's seal and signature, where it is required.

J. Submittals not required by Contract Documents:
1. Will not be reviewed and will be returned stamped "Not Subject to Review."
2. The Contract Administrator will keep one copy and return all remaining copies to Contractor.

K. Do not revise submittals after they have been reviewed and stamped "No Exceptions Taken" or "Exceptions Noted".

L. The Contract Administrator will complete up to two reviews of each submittal at no cost to Contractor. The City will deduct cost of additional reviews from Contract Price.

1.3 ACTION SUBMITTALS

A. General:

1. Prepare and submit Action Submittals required by individual Specification sections.
2. The Contract Administrator will review Action Submittals only for general conformance with design concept and general compliance with Contract Documents. The Contract Administrator's review does not relieve Contractor from compliance with requirements of Contract Documents nor from errors in submittals or Contractor's design.
3. Contractor is responsible for confirmation of dimensions at jobsite; 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.
4. At the Contract Administrator's option, the Contract Administrator's review comments and review stamp will be placed either directly on submitted copies of Shop Drawings or on separate submittal review comment form.

B. Shop Drawings:
1. Copies: Six (6), and one reproducible, except copyrighted documents. Six (6) copies of copyrighted materials and one electronic copy.
2. Identify and Indicate:
   a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
   b. Equipment and Component Title: Identical to title shown on Drawings.
   c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
   d. Project-specific information drawn accurately to scale.
3. Manufacturer's standard schematic drawings and diagrams as follows:
   a. Modify to delete information that is not applicable to the Work.
   b. Supplement standard information to provide information specifically applicable to the Work.
4. Product Data: Provide as specified in individual Specifications.
5. Foreign Manufacturers: When proposed, include following additional information:
   a. Names and addresses of at least two companies that maintain technical service representatives close to Project.
   b. Complete list of spare parts and accessories for each piece of equipment.
6. Units: Submit all Shop Drawings in SI metric units.
7. Required submittals include but are not limited to:
   a. Catalogue Drawings: Include reprints of catalogue drawings of proprietary articles of standard fabrication and manufacture for the work.
   b. Shop Drawings: Include dimensioned line drawings and related specifications, information and literature for custom fabricated articles and equipment.
   c. ISA data sheets for all instruments.

C. Samples:
1. Copies: Two (2) unless otherwise specified in individual Specifications.
2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:

a. Manufacturer name.
b. Model number.
c. Material.
d. Sample source.

3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
4. Full-size Samples:
   a. Size as indicated in individual Specification section.
   b. Prepared from same materials to be used for the Work.
   c. Cured and finished in manner specified.
   d. Physically identical with product proposed for use.
5. Do not use materials in Work which are in any way inferior to Samples submitted and reviewed. Match accepted samples.
6. Review of samples notwithstanding, materials that are unsound or imperfect when delivered to site will be rejected.
7. Retain reviewed samples on site readily available to the Contract Administrator.

D. Action Submittal Dispositions: the Contract Administrator will review, mark, and stamp as appropriate, and distribute marked-up copies or submittal review comment forms as noted:
   1. No Exceptions Taken (NET):
      a. Contractor may incorporate product(s) or implement Work covered by submittal.
      b. Distribution:
         1) One copy furnished the City via email
         2) One copy retained in the Contract Administrator's file.
         3) Remaining copies returned to Contractor appropriately annotated.
   2. Exceptions Noted (EN):
      a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with the Contract Administrator's notations.
      b. Distribution:
         1) One copy furnished the City.
         2) One copy retained in the Contract Administrator's file.
         3) Remaining copies returned to Contractor appropriately annotated.
   3. Exceptions Noted, Resubmit (ENR):
      a. Make corrections or obtain missing portions, and resubmit.
      b. Contractor may not incorporate product(s) or implement Work covered by submittal, except portions where indicated Contractor may begin to incorporate product(s) or implement Work covered by the submittal in accordance with the Contract Administrator's notations.
      c. Distribution:
         1) One copy furnished the City.
         2) One copy retained in the Contract Administrator's file.
         3) Remaining copies returned to Contractor appropriately annotated.

## 1.4 INFORMATIONAL SUBMITTALS

A. General:
1. Copies: Submit one (1) reproducible copy, unless otherwise indicated in individual Specification section.
2. Refer to individual Specification sections for specific submittal requirements.
3. Where work is to be designed by Contractor, comply with applicable codes and submit Shop Drawings signed and sealed by professional engineer licensed in province of Work.
4. The Contract Administrator will review each submittal for general conformance with design intent and general compliance with Contract Documents. The Contract Administrator's review does not relieve the Contractor from compliance with requirements of Contract documents nor from errors in the submittal or Contractor's design.

B. Certificates:
1. General:
   a. Provide notarized statement that includes signature of entity responsible for preparing certification.
   b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual Specification sections.
3. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
4. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual Specification sections.
5. Certificates as required by Section 01 43 33, Contractor's Field Services.

C. Construction Photographs: In accordance with Section 01 31 13, Project Coordination and as may otherwise be required in Contract Documents.

D. Contract Closeout Submittals: In accordance with Section 01 77 00, Closeout Procedures.

E. Contractor-Design Data:
1. Written and graphic information.
2. List of assumptions.
3. List of performance and design criteria.
4. Summary of loads or load diagram, if applicable.
5. Calculations.
6. List of applicable codes and regulations.
7. Name and version of software.
8. Information requested in individual Specification section.
9. Seal and signature of professional engineer licensed in the province of Manitoba.

F. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification sections.

G. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.

H. Schedules:
1. Schedule of Shop Drawing and Sample Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
   a. Show for each, at a minimum, the following:
      1) Specification section number.
      2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
      3) Estimated date of submission to the Contract Administrator, including reviewing and processing time.
   b. On a monthly basis, submit updated schedule to the Contract Administrator if changes have occurred or resubmittals are required.
2. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.

I. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.

J. Submittals Required by Laws, Regulations, and Governing Agencies:
1. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, provincial, or local governing agency or their representative.
2. Transmit to the Contract Administrator for the City's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.

K. Test and Inspection Reports:
1. General:
   a. Shall contain signature of person responsible for test or report.
   b. Complete an equipment report prior to the site testing each item of rotating mechanical equipment. During testing complete the remainder of the equipment report. A sample of the equipment report is included at the end of this Section. Submit the reports for inclusion in the Installation, Operation and Maintenance manual.
2. Field: As a minimum, include the following:
   a. Project title and number.
   b. Date and time.
   c. Record of temperature and weather conditions.
   d. Identification of product and Specification section.
   e. Type and location of test, Sample, or inspection, including referenced standard or code.
   f. Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.

g. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
h. Provide interpretation of test results, when requested by the Contract Administrator.
i. Other items as identified in individual Specification sections.
j. Inspection Includes:
   1) Soundness (without cracked or otherwise damaged parts).
   2) Completeness of installation as specified and as recommended by manufacturer.
   3) Correctness of setting, alignment, and relative arrangement of various parts of system.
k. Operate, test, and adjust equipment to prove it is correctly installed to operate under the intended conditions.
l. Modify or replace equipment or materials failing required tests.
m. Perform additional testing required due to changes of materials requested by Contractor or due to failure of materials or construction to meet specifications.
n. Mandatory forms follow this section include: Contractor Submittal Transmittal, Equipment Report Form, Extra Work Report, and Pressure Testing Report.

L. Maintenance Materials:
1. For the equipment supplied under this Contract, submit special tools, lubricants, maintenance materials, spare parts, Manuals, As-built Drawings, and reports to the Contract Administrator.
2. Submissions to include a complete list of items delivered. Submissions must be acknowledged in writing as being received by the Contract Administrator.
3. Submit manuals a minimum of one (1) week prior to commissioning of the equipment.
4. Submission of manuals in a state as reviewed and accepted deficiency free is a prerequisite for Substantial Performance.

M. Testing and Startup Data: In accordance with Section 01 91 14, Equipment Testing and Facility Startup.

N. As-Built Documents: In accordance with Section 01 77 00, Closeout Procedures.

O. Bills of Materials:
1. Provide two (2) copies of complete Bill of Materials for all equipment, valves, and instrumentation, not including City-Furnished Products, as specified in Section 01 64 00.
2. Provide copies on letter size paper arranged and bound together alphabetically in separate three-ring binders.

1.5 SUPPLEMENTS

A. The supplements listed below, following “End of Section”, are part of this Specification.
1. Forms: Transmittal of Contractor’s Submittal

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

**TRANSMITTAL OF CONTRACTOR'S SUBMITTAL**
(ATTACH TO EACH SUBMITTAL)

CH2MHILL

DATE: _____

| | |
|---|---|
| **TO**: _____ | Submittal No.: _____ |
| _____ | ☐ New Submittal ☐ Resubmittal |
| _____ | Project: _____ |
| _____ | Project No.: _____ |
| _____ | Specification Section No.: _____ |
| | **(Cover only one section with each transmittal)** |
| **FROM**: _____ | Schedule Date of Submittal: |
| Contractor | _____ |
| _____ | |
| _____ | |
| _____ | |

| **SUBMITTAL TYPE:** | ☐ Shop Drawing | ☐ Sample | ☐ Informational |
|---|---|---|---|

**The following items are hereby submitted:**

| Number of Copies | Description of Item Submitted (Type, Size, Model Number, Etc.) | Spec. and Para. No. | Drawing or Brochure Number | Contains Variation to Contract | |
|---|---|---|---|---|---|
| | | | | No | Yes |
| | | | | | |
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| | | | | | |

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
Contractor (Authorized

SECTION 01 35 29.01

HEALTH AND SAFETY

PART 1 GENERAL

1.1 REFERENCES

A. Canadian Standards Association (CSA):
1. C22.1-12, Canadian Electrical Code.
2. Z797-09, Code of Practice for Access Scaffold – First Edition.

B. Canada Labour Code, Part 1, Canada Occupational Safety and Health Regulations

C. Manitoba Electrical Code.

D. Manitoba Fire Code.

E. Applicable National Fire Protection Association Codes and Standards.

F. Workplace Safety and Health Act of Manitoba

G. Manitoba Regulation 217, Part 35, Workplace Hazardous Materials Information System.

H. The Workers Compensation Act RSM 1987 – Updated 2006

1.2 CONSTRUCTION – SAFETY MEASURES

A. The Contractor shall meet or exceed the latest revision of all local, federal, provincial laws, regulations, standards, and industry best practices relating to health and safety.

B. Be solely responsible for safety of the Work under this Contract and for complying with and ensuring that every person on the Site complies with the requirements contained within the Contract documents and regulatory requirements.

C. Perform the Work, or ensure that it is performed, in a manner to avoid risk of injury, security or damage to persons or property, adjacent property, or environment.

D. Perform a health and safety pre-qualification of all lower-tiered subcontractors prior to contract award and only accept lower-tiered subcontractors that have demonstrated an ability to comply with health and safety requirements and are below industry average for incidents.

E. Provide safe access, egress, and equipment in accordance with the Workplace Safety and Health Act of Manitoba.

F. Designate a qualified safety representative at the Project site with responsibility for preventing accidents and implementing and supervising the Safety Plan and other safety

programs. The safety representative shall attend all project safety meetings, participate fully in all activities outlined in the Safety Plan and shall devote whatever time is necessary to perform such duties properly. Contractor's safety representative shall provide the City and Contract Administrator with requested information and shall have the authority to immediately correct safety deficiencies.

G. Prior to the commencement of the Work, review and become fully familiarized with all local, provincial, and federal regulatory requirements and the following documentation:
   1. Winnipeg WTP site safety rules, emergency evacuation, spill response procedures, permits, and other applicable procedures.
   2. Contract Documents.

H. In event of a conflict between any provisions of the various regulatory requirements, the most stringent provision shall govern.

I. Ensure that all employees and subcontractors are competent, as prescribed by the applicable legislation, in performing the Work and have been trained accordingly.

J. Prior to commencement of any Work, throughout the Work as required, and at the City's request, make the following documentation available:
   1. A copy of the Contractor's project specific Health and Safety Plan.
   2. Emergency response and evacuation procedures, including local contact names and numbers.
   3. Procedures in the event of a spill including local contact names and numbers.
   4. Training and orientation training records of employees or subcontractors.
   5. Applicable Material Safety Data Sheets.

K. Establish, maintain, and mark clear paths of access and egress for routine and emergency personnel and vehicles.

L. Erect signage acceptable to the City at all entry points to the Site identifying the name, address, and telephone number of the Contractor and to advise personnel and visitors entering the Site of the requirements respecting entry.

M. Ensure adequate coordination and communication between all parties on site in regards to safety.

N. In addition to the Workplace Safety and Health Act of Manitoba and applicable Regulations reporting requirements, report all incidents, near misses, spills, environmental damage, and property damage to the City and Contract Administrator immediately. An incident investigation must be conducted and a copy of the complete report provided to the City and Contract Administrator within 24 hours.

O. Provide a copy of all Ministry of Labour inspection reports, orders, and charges to the City and the Contract Administrator immediately.

1.3 SPECIAL PROTECTION AND PRECAUTIONS

A. Comply with the Winnipeg WTP Health and Safety Procedures where necessary. The City will provide orientation to a specified representative of the Constructor. Provide orientation training to all Contractor's staff, subcontractors, Contract Administrator, and visitors on Site and maintain a record of this training.

1.4 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

A. Comply with applicable health and safety regulatory requirements, including but not limited to Workplace Hazardous Materials Information System (WHMIS) regulations.

B. Maintain a copy of the current Material Safety Data Sheets (MSDSs) for all hazardous chemicals or substances brought onsite by Contractor or any lower-tiered subcontractors.

C. If such materials or substances are part of any item requiring a shop drawing or other submittal, provide the MSDS with the submittal.

D. Provide and maintain a copy of MSDSs to the City and Contract Administrator.

1.5 MATERIAL HANDLING

A. Store, stack, place, remove, and handle materials on Site in a stable and secure manner so as not to endanger the safety of personnel or cause damage to property.

B. Secure materials which, by virtue of their configuration or weight, cannot be stored or stacked in a secure and stable manner, against tipping, collapse, or falling by use of appropriate bracing systems, structures, or equipment.

C. Ensure that vehicles, construction machinery, and materials handling equipment are only operated on the Project by persons suitably qualified to do so.

1.6 PERMITS

A. Observe rules of the facility and the City.

B. Prior to starting work which requires welding, cutting, open flame, or heat, complete and obtain approval on a Welding and Cutting Permit or Hot Work Permit from the City or Contract Administrator.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 41 00

# REGULATORY REQUIREMENTS

## PART 1 GENERAL

### 1.1 SUBMITTALS

A. Quality Control Submittals: Submit certificates from inspecting authorities for electrical work, and pressure piping among others.

### 1.2 APPLICABLE CODES

A. Comply with the latest edition of the codes and standards referenced in Contract Documents and following statutes and codes and all amendments thereto:
   1. National Building Code of Canada, with Manitoba Amendments
   2. Manitoba Workplace Health and Safety Act
   3. Occupational Health and Safety Act and Regulations for Construction Projects, covering safety, hazardous materials, and Workplace Hazardous Material Information.
   4. Manitoba Building Code.
   5. Canadian Environmental Protection Act
   6. Environment Act, Manitoba
   7. Codes and Standards of the National Fire Protection Association (NFPA).
   8. Manitoba Fire Code Regulation, 216/2006
   9. Canadian Electrical Code.
   10. Manitoba Electrical Code
   11. Standard for Building Construction Operations FCC No. 301 by Fire Commissioner of Canada.
   12. Provincial Hydro Electrical Safety Codes and Bulletins.
   13. CSA Certificate Standards and Electrical Bulletins.
   14. Ministry of Labour, Occupational Health and Safety Branch Health & Safety Guidelines Engineering Data Sheets.

### 1.3 PERMITS, APPROVALS, AND LICENCES

A. The Contractor shall apply for, obtain, and pay for all permits, approvals, and licenses required for the project, including but not limited to:
   1. Building permit.
   2. Electrical permit

B. The City will provide Contractor with a clean set of Drawings and Specifications, as necessary, for each application.

C. Where electrical enclosures and panels do not have CSA labels, arrange for each such electrical enclosure or panel to be inspected by the provincial electrical safety inspector.

D. Arrange for regular inspections and a final inspection with:
   1. The provincial electrical safety inspector.
   2. Building Inspector.

E. Arrange for all other regular inspections and final inspections required.

F. The Contractor shall be solely responsible, without limitations, for any delays arising from the Contractor's failure to plan for the required inspections and to ascertain the availability of the Permit/Approval/Licensing Inspectors to complete the required inspections for the Works under this Contract. The related costs and expenses incurred by the Contractor shall be borne by the Contractor, with no change in the Contract Price and/or Contract Time.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 43 33

# CONTRACTOR'S FIELD REQUIREMENTS

## PART 1 GENERAL

### 1.1 DEFINITIONS

A. Person-Day: One person for 8 hours within regular Contractor working hours.

### 1.2 SUBMITTALS

1. Qualifications of Contractor's Representative
2. Form 100: Certificate of Equipment Delivery
3. Form 102: Certificate of Satisfactory Installation
4. Functional test results (equipment test reports)
5. Form 103: Certificate of Equipment Satisfactory Performance
6. Performance test report
7. Form 104: Certificate of Satisfactory Process Performance

### 1.3 QUALIFICATION OF CONTRACTOR'S REPRESENTATIVE

A. Authorized representative of the contractor, and experienced in the installation and maintenance of respective equipment, subsystem, or system.

B. Representative subject to acceptance by the Contract Administrator. No substitute representatives will be allowed unless prior written approval by such has been given.

## PART 2 PRODUCTS (Not Used)

## PART 3 EXECUTION

### 3.1 EQUIPMENT DELIVERY

A. The Installation Contractor shall be responsible for receiving, off-loading, and placing into storage all equipment at the Site. Certificate of Equipment Delivery (Form 100), a copy of which is attached to this Section, shall be completed.

### 3.2 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

A. Furnish Contractor's services when required by an individual specification section, to meet the requirements of this Section.

B. Where time is necessary in excess of that stated in the Specifications for Contractor's services, or when a minimum time is not specified, the time required to perform the specified services shall be considered incidental.

C. Schedule Contractor's services to avoid conflict with other onsite testing or other Contractor's onsite services.

D. Determine, before scheduling services, that all conditions necessary to allow successful testing have been met.

E. Only those days of service approved by the Contract Administrator will be credited to fulfill the specified minimum services.

F. When specified in individual specification sections, Contractor's onsite services shall include:
   1. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer.
   2. Revisiting the site as required to correct problems and until installation and operation are acceptable to the Contract Administrator.
   3. Resolution of assembly or installation problems attributable to, or associated with, respective Contractor's products and systems.
   4. Assistance during functional and performance testing, and facility startup and evaluation.
   5. Additional requirements may be specified elsewhere.

3.3 INSTALLATION ASSISTANCE

A. After installation is complete, the Contractor's representative shall verify successful installation.

B. The Contractor's representative shall conduct a detailed inspection of the installation including alignment, mechanical connections, piping, lubrication, workmanship, and all other items as required to ensure successful operation of the equipment.

C. The Contractor's representative shall identify any outstanding deficiencies in the installation.

D. The deficiencies shall be rectified by the Installation Contractor and the Contractor's Representative shall re-inspect the installation.

E. When the Contractor's representative accepts the installation, Certificate of Satisfactory Installation (Form 102), attached to this Specification shall be signed by the Contractor's Representative, the Contract Administrator, and the City.

F. Deliver the completed Form 102 to the Contract Administrator prior to departure of the Contractor's representative from the Site.

G. Tag the equipment with a 100 mm x 200 mm card stating "EQUIPMENT CHECKED. DO NOT RUN." stenciled in large black letters. Sign and date each card.

H. Separate copies of Form 102 shall be furnished for each individual unit process item of equipment. In addition, furnish a copy of Form 102 for the entire system supplied under this Contract.

## 3.4 FUNCTIONAL TESTING

A. After the installation has been verified and any identified deficiencies have been remedied, the equipment shall be subjected to functional testing. Ready-to-test determination will be by the Contract Administrator based at least on the following:
   1. Adequate completion of work adjacent to, or interfacing with, equipment to be tested, including items to be furnished by Others.
   2. Equipment and electrical tagging complete.
   3. Availability and acceptability of Contractor's representative to assist in testing of respective equipment.
   4. Receipt of:
      a. Certificate of Equipment Delivery (Form 100)
      b. Certificate of Satisfactory Installation (Form 102)
   5. Final Operation and Maintenance Manuals.
   6. Notification by Contractor of equipment readiness for testing.

B. The Contractor shall conduct all necessary checks to equipment and if necessary, conduct further flushing, cleaning, or other remedial measures required to ensure satisfactory operation prior to confirming the equipment is ready to run.

C. The Contractor shall then notify the Contract Administrator of his readiness to demonstrate the functional operation of the equipment. The Contract Administrator shall attend, as expeditiously as possible.

D. 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.

E. On satisfactory completion of the one (1) hour functional demonstration, the equipment shall be stopped and critical parameters and equipment systems shall be rechecked.

F. The equipment shall then be run continuously for at least one (1) day. During this period, as practicable, conditions shall be simulated which represent the full range of operating conditions. These conditions shall be mutually agreed by the Contractor and the 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.

G. Should the functional testing reveal any defects, then those defects shall be promptly rectified and the functional tests shall be repeated to the satisfaction of the Contract Administrator. If the defects are attributed to the Contractor, additional costs to repeat functional tests shall be the responsibility of the Contractor.

H. Equipment Test Reports: Provide written test reports for each item of equipment tested, to include the minimum information:
   1. City/Project Name.
   2. Equipment or item tested.
   3. Date and time of test.
   4. Type of test performed (Functional).

5. Test conditions.
6. Test results.
7. Signature space for Contractor and Contract Administrator representatives.

I. On successful completion of the functional test, Certificate of Equipment Satisfactory Performance (Form 103) attached to this Specification shall be signed by the Contractor's Representative, the Contract Administrator, and the City.

J. When, in Contract Administrator's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase.

3.5 PERFORMANCE TESTING

A. Equipment shall be subjected to a performance test in accordance with the Specifications. Performance testing shall not commence until equipment has been accepted by the Contract Administrator as having satisfied the functional test requirements.

B. 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 test(s) and receipt of the test reports.

C. Should the performance tests reveal any defects, then those defects shall be promptly rectified and the performance tests shall be repeated to the satisfaction of the Contract Administrator. If the defects are attributed to the Contractor, additional costs incurred due to repeat functional tests, and/or performance tests shall be the responsibility of the Contractor.

D. On successful completion of the performance tests, Certificate of Satisfactory Process Performance (Form 104) attached to this Specification shall be signed by the Contractor's Representative, the Contract Administrator, and the City. Issuance of Form 104 shall initiate Total Performance.

3.6 SUPPLEMENTS

A. The supplements listed below, following "End of Section", are part of this Specification.
1. Forms:
a. Form 100: Certificate of Equipment Delivery
b. Form 102: Certificate of Satisfactory Installation
c. Form 103: Certificate of Equipment Satisfactory Performance
d. Form 104: Certificate of Satisfactory Process Performance

END OF SECTION

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## Form 100
## CERTIFICATE OF EQUIPMENT DELIVERY

1. We certify that the equipment listed below has been delivered into the care and custody of the Installation Contractor. The equipment has been found to be in satisfactory condition. There is no visible evidence of exterior damage or defects.

**Project:** WTRPO Facility – Mechanical and Electrical Work
**Equipment Description:**
**Equipment Supply Bid Opp. No.:** 355-2014
**Equipment Install Bid Opp. No.:**
**Equipment Tag No.:**
**Specification Reference:**

| Print Name | Signature | Date |
|---|---|---|
| (Authorized Representative of City) | | |
| Print Name | Signature | Date |
| (Authorized Representative of Contractor) | | |
| Print Name | Signature | Date |
| (Authorized Representative of Contract Administrator) | | |

Winnipeg

**Water and Waste Department • Service des eaux et des déchets**

## Form 102
## CERTIFICATE OF SATISFACTORY INSTALLATION

We have completed our checks and inspection of the installation of our equipment as listed below and confirm that it is satisfactory and that any defects have been remedied except any as noted below.

**Project:** WTRPO Facility – Mechanical and Electrical Work
**Equipment Description:**
**Equipment Supply Bid Opp. No.:** 355-2014
**Equipment Install Bid Opp. No.:**
**Equipment Tag No.:**
**Specification Reference:**
**Outstanding Defects:**

| Print Name | Signature | Date |
|---|---|---|
| (Authorized Representative of City) | | |

| Print Name | Signature | Date |
|---|---|---|
| (Authorized Representative of Contractor) | | |

Water and Waste Department • Service des eaux et des déchets

## Form 103
## CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE

We certify that the equipment listed below has been continuously operated for a minimum of one (1) day and that the equipment operates satisfactorily and meets it's specified operating criteria. No defects in the equipment were found and as such are classified as "conforming".

**Project:** WTRPO Facility – Mechanical and Electrical Work
**Equipment Description:**
**Equipment Supply Bid Opp. No.:** 355-2014
**Equipment Install Bid Opp. No.:**
**Equipment Tag No.:**
**Specification Reference:**

| Print Name | Signature | Date |
|---|---|---|
| (Authorized representative of City) | | |
| Print Name | Signature | Date |
| (Authorized representative of Contractor) | | |
| Print Name | Signature | Date |
| (Authorized representative of Contract Administrator) | | |

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## Form 104
## CERTIFICATE OF SATISFACTORY PROCESS PERFORMANCE

We certify that the process system listed below has been continuously operated and tested as per the Specifications using process fluid and that the equipment meets its Performance Testing and Operating Criteria. No defects in the process system were found and as such are classified as “conforming”.

**Project:** WTRPO Facility – Mechanical and Electrical Work
**Equipment Description:**
**Equipment Supply Bid Opp. No.:** 355-2014
**Equipment Install Bid Opp. No.:**
**Equipment Tag No.:**
**Specification Reference:**

| Print Name | Signature | Date |
|---|---|---|
| (Authorized Representative of City) | | |
| Print Name | Signature | Date |
| (Authorized Representative of Contractor) | | |
| Print Name | Signature | Date |
| (Authorized Representative of Contract Administrator i.e. Commissioning Lead or Design Discipline Lead) | | |

# SECTION 01 45 16.13

# CONTRACTOR QUALITY CONTROL

## PART 1 GENERAL

### 1.1 REFERENCES

A. Canadian Construction Documents Committee (CCDC)
   1. CCDC 2-08, Stipulated Price Contract.

B. Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect As Of: May 14, 2004.

### 1.2 INSPECTION

A. Allow the Contract Administrator access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

B. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the Contract Administrator instructions, or law of Place of Work.

C. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

D. The Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

### 1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by City for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by City.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Contract Administrator at no cost to City. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

A. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

B. Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

A. Notify appropriate agency and the Contract Administrator in advance of requirement for tests, in order that attendance arrangements can be made.

B. Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

C. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

A. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Contract Administrator as failing to conform to Contract Documents. Replace or re execute in accordance with Contract Documents.

B. Make good other Contractor's work damaged by such removals or replacements promptly.

C. If in opinion of the Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the City will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Contract Administrator.

1.7 REPORTS

A. Submit four (4) copies of inspection and test reports to the Contract Administrator.

B. Provide copies to the Subcontractor of work being inspected or tested and to the manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

A. Furnish test results and mix designs as requested.

B. Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the Contract Administrator and may be authorized as recoverable.

1.9 MOCK UPS

A. Prepare mock ups for Work specifically requested in specifications.

B. Construct in locations acceptable to the Contract Administrator or as specified in specific Section.

C. Prepare mock ups for the Contract Administrator's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

D. Failure to prepare mock ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

E. If requested, the Contract Administrator will assist in preparing schedule fixing dates for preparation.

F. Remove mock up at conclusion of Work or when acceptable to the Contract Administrator.

G. Mock ups may remain as part of Work.

1.10 EQUIPMENT AND SYSTEMS

A. Submit adjustment and balancing reports for mechanical and electrical systems.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

# SECTION 01 61 00

# COMMON PRODUCT REQUIREMENTS

## PART 1 GENERAL

### 1.1 REFERENCES

A. Canadian Standards Association (CSA):
   1. C22.2 No. 100-04, Motors and Generators – Sixth Edition.

B. Manufacturers Standardization Society of the Valves and Fitting Industry:
   1. SP-6, Standard Finishes for Contact of Pipe Flanges and Connecting – End Flanges of Valves and Fittings.

C. National Building Code of Canada with Manitoba Amendments

### 1.2 DEFINITIONS

A. Products:
   1. New items for incorporation in the Work, whether purchased by Contractor or the City for the Project, or taken from previously purchased stock and may also include existing materials or components required for reuse.
   2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
   3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

### 1.3 DESIGN REQUIREMENTS

A. Be responsible for designing braces and anchors to the structure, and anchors to bases for elements of architectural, mechanical, process, and electrical systems included in the Work in accordance with this Section unless a design is specifically provided within the Contract Documents. Braces and anchors shall be designed by a qualified professional engineer licensed in the Province of Manitoba.

B. Provide systems, equipment, and components, including supports and anchorages, in accordance with provisions of latest edition of National Building Code of Canada with Manitoba Amendments.

### 1.4 PREPARATION FOR SHIPMENT

A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.

B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.

C. Extra Materials, Special Tools, Test Equipment, and Expendables:
   1. Furnish as required by individual Specifications.
   2. Schedule:
      a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
      b. Transfer to the City shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
   3. Packaging and Shipment:
      a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
      b. Prominently displayed on each package, the following:
         1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
         2) Applicable equipment description.
         3) Quantity of parts in package.
         4) Equipment manufacturer.
   4. Deliver materials to site.
   5. Notify the City upon arrival for transfer of materials.
   6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to the City.

D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify the Contract Administrator of anticipated date of equipment arrival.

1.5 DELIVERY AND INSPECTION

A. Deliver products in accordance with accepted current progress schedule and coordinate to avoid conflict with the Work and conditions at site.

B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable. Include ULC labels on products so specified.

C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at site. Inspect for completeness and evidence of damage during shipment.

D. Remove damaged products from site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.6 HANDLING, STORAGE, AND PROTECTION

A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by the City.

B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.

C. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 15 degrees C. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.

B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.

C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.

D. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.

E. Equipment, Components, Systems, Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable provincial and local health and safety regulations.

F. Regulatory Requirement: Coating materials shall meet federal, provincial, and local requirements limiting the emission of volatile organic compounds and for worker exposure.

G. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, stainless steel, or hot-

dip galvanized or aluminum coated 12 mm mesh expanded steel. Provide hot-dip galvanized or stainless steel accessories and supports, including bolts. Eliminate sharp edges with suitable borders neatly welded.

H. Provide materials and equipment listed by ULC and/or CSA wherever standards have been established by that agency.

I. Equipment Finish:
1. Provide manufacturer's standard finish and color, except where specific color is indicated.

J. Special Tools and Accessories: Furnish to the City, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.

K. Lubricants:
1. Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by the City.
2. Provide Canadian made lubricants readily available in Canada. To the extent possible, provide lubricants compatible with products currently used in the City's maintenance operations.
3. Furnish lubricants in original sealed containers, correctly identified as to brand and grade.

L. Nameplates:
1. Provide for all equipment and motors, securely mounted in a readily visible location.
2. 16-gauge stainless steel with 6 mm high die-stamped inscriptions.
3. Inscriptions to include the following as a minimum:
    a. Motors: In accordance with the requirements of C22.2 No. 100.
    b. Equipment: Model number, serial number, size, performance data at rated capacity, impeller diameter, speed, efficiency, and other pertinent data, as applicable.
4. Data in SI metric units.

M. Bolted Connections: Project bolt ends minimum 3 mm but not more than one bolt diameter beyond nut faces.

N. Flanges: Arrange with bolt holes straddling vertical centreline. Provide flanges finished in accordance with MSS SP-6.

## PART 3 EXECUTION

### 3.1 INSPECTION

A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

### 3.2 INSTALLATION

A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.

B. No shimming between machined surfaces is allowed.

C. Repaint painted surfaces that are damaged prior to equipment acceptance.

D. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at site, available for review at all times.

E. For material and equipment specifically indicated or specified to be reused in the Work:
   1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.

### 3.3 ADJUSTMENT AND CLEANING

A. Perform required adjustments, tests, operation checks, and other startup activities.

### 3.4 LUBRICANTS

A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by the City.

END OF SECTION

SECTION 01 64 00

CITY-FURNISHED PRODUCTS

PART 1 GENERAL

1.1 CITY-FURNISHED PRODUCTS

A. P-X101: Raw Water Pump; End Suction Centrifugal
   1. Quantity: 2 (1 Duty, 1 Spare)

B. P-X301/ X302: Ozone Contactor Pumps
   1. Quantity: 3 (2 Duty, 1 Spare)

C. P-X401/ X402: Filter Pumps
   1. Quantity: 3 (2 Duty, 1 Spare)

D. P-X403: Filter Backwash Pump;
   1. Quantity: 1

E. P-X201: DAF Recycle Pump (3 hp), 392-7, Aurora
   1. Quantity: 1

F. P-X501/X502/X507/X508: Peristaltic Chemical Feed Pumps; Qdos 30 Universal Plus with ReNu pump head, Watson & Marlow
   1. Quantity: 5 (4 Duty, 1 Spare)

G. P-X503/X504: Peristaltic Chemical Feed Pumps; 520UmAN/R2, Watson & Marlow
   1. Quantity: 3 (2 Duty, 1 Spare)

H. 15m box of 0.5mm bore x 1.6mm wall Pumpsil tubing, Watson & Marlow
   1. Quantity: 1

I. 15m box of 0.5mm bore x 1.6mm wall Marprene tubing, Watson & Marlow
   1. Quantity: 1

J. P-X505/X506: Piston Chemical Feed Pumps (tubing included); QVG50 with RH00CTCLF pump head, FMI
   1. Quantity: 3 (2 Duty, 1 Spare)

K. MXR-X110/X111: 150 mm inch - Static Mixers (Sch. 80 PVC)
   1. Quantity: 2 (2 Duty)

L. MXR-X310/X311/X312/X313/X314/X430/X431: 50 mm inch – Static Mixers (Sch. 80 PVC)
   1. Quantity: 7 (7 Duty)

M. TK-X509: Chemical Solution Tank (57 L, polyethylene)

1. Quantity: 1

N. MXR-X509: Solution Tank Mixer (1/20 hp, high speed mixer)
1. Quantity: 1

O. AHU-X332: Air Preparation Skid with Manual Pressure and Flow Control and Auto-drain (Air Compressor, 0.7 hp, + Dryer), Atlas Copco
1. Quantity: 1

P. G-X330: Ozone Generator, GSA-10, WEDECO
1. Quantity: 1

Q. GD-X331: Ozone Off-gas Destruct System with Blower and Vacuum Breaker Valve, COD 28, WEDECO
1. Quantity: 1

R. DEM-X333: Demisters
1. Quantity: 1

S. Ozone Diffusers, CD-15SM
1. Quantity: 2

T. Filter Underdrain Nozzles, City
1. Quantity: 8

U. TK-X210: DAF Tank, City
1. Quantity: 1

V. TK-X211: DAF Overflow Tank, City
1. Quantity: 1

W. TK-X320: Ozonated Water Tank, City
1. Quantity: 1

X. TK-X410: Filtered Water Tank, City
1. Quantity: 1

Y. TK-X220: Saturator Vessel, City
1. Quantity: 1

Z. CMP-X221: Air Compressor, DLKC6580V2-1, Delta, with ancillary devices
1. Quantity: 1

AA. Chemical Containment Pallets (4 drums, 120 gal)
1. Quantity: 3

BB. Chemical Containment Platforms (Carboys, 12 gal)
1. Quantity: 3

CC. Stainless Steel Combination Shower and Eye/Face Wash with Mixing Valve
1. Quantity: 1

DD. FV- X1010: Flow Control Valve, 75mm Mounted to an Electric Actuator.
1. Quantity: 1

EE. Motor Control Center (MCC)

FF. PLC control panels CP-H10B and CP-X10

GG. Instrumentation as identified in Division 29, Section 29 40 21, Instrumentation Index.

HH. Process Instrumentation and Control System (PICS) applications software program.
1. Associated special services to be provided by City:
   a. Supply, installation, and functional testing of software.
   b. Functional testing Performance testing
   c. Training of City's personnel.
2. Work to be performed by Contractor:
   a. Provide assistance in verifying field I/O and loop checks.
   b. Provide assistance during start-up to correct wiring, identify and repair wiring issues.

1.2 INFORMATION FURNISHED BY CITY

A. Shop drawings related to City-furnished products will be made available for Contractor's use in performing the work under this section.

B. Manufacturer's installation, operation, and maintenance instructions for City-furnished products will be made available.

1.3 SUBMITTALS

A. Action Submittals:
1. Shop Drawings:
   a. Shop Drawings for City supplied equipment will be provided to the Contractor.
   b. The Contractor shall submit shop Drawings showing the layout, location, and identification of materials provided by Contractor for installation of City-furnished products.
   c. Include pipe, fittings, valves, specialties, hangers, supports, equipment, and required specialties.
   d. Accurately show openings in floors, walls, and other parts of structure.
   e. Provide electrical and instrumentation diagrams to indicate connecting and interconnecting electrical and control work.
   f. Submit complete list of materials to be furnished, and include data necessary to allow the City to determine their fitness for the work.

1.4 TRANSFER OF PRODUCTS

A. Unless indicated otherwise, items will be furnished f.o.b. the Project site.

B. Upon delivery, conduct with the City or Contract Administrator a joint inspection for the purpose of identifying product, general verification of quantities, and observation of apparent condition. Such inspection will not be construed as final or as receipt of any product that, as a result of subsequent inspections and tests, are determined to be nonconforming.

C. Damaged or incomplete products to be returned for replacement will not be unloaded, except as necessary to expedite return shipment. The City will submit claims for transportation damage and expedite replacement of damaged, defective, or deficient items.

D. Indicate signed acceptance of delivery on a copy of the invoice.

E. If Contractor is not prepared to accept delivery of City-furnished products by either the specified Estimated Date of Arrival or such City-confirmed delivery date, as specified herein, associated costs incurred by the City shall be borne by Contractor. Such costs may include, but not be limited to, demurrage, interest, insurance costs, additional administrative and engineering costs, additional factory and field technical support, additional storage and reshipping costs, cost escalation, and extended warranty costs due.

1.5 UNLOADING, STORAGE AND MAINTENANCE

A. Subsequent to transfer, Contractor shall have complete responsibility for unloading City-furnished products. Unload product in accordance with manufacturers' instructions, or as specified.

B. Store, protect, and maintain product to prevent damage until final acceptance of completed work. Damage to or loss of products after date of transfer to Contractor shall be repaired to original condition, or replaced with new identical products, at the discretion of the Contract Administrator.

C. Maintain complete inventory of all City-furnished products after their transfer to Contractor.

1.6 SCHEDULING AND SEQUENCING

A. Include sequencing constraints specified herein as part of progress schedule.

B. The City will keep Contractor informed of probable delivery date changes.

C. The City will confirm delivery date with Contractor ten (10) calendar days prior to scheduled delivery, and within 24 hours of expected delivery time.

D. Where a pre-installation meeting is required by this Section, provide a minimum of ten (10) calendar days' advance written notice to the City of the proposed date for starting installation.

E. Provide a minimum of ten (10) calendar days notice to City that City-furnished product is ready for all special services listed herein to be furnished by the City.

1.7 EXTRA MATERIALS

A. Unless otherwise specified, the City will take acceptance of, and be responsible for storing associated extra materials and special tools upon delivery.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in conformance with City-furnished product shop drawings and installation instructions.

B. Provide all interconnecting structures, equipment, piping, electrical and instrumentation work, finish painting, and appurtenances to achieve a complete and functional system.

C. Anchor Bolts:
1. Where required, supply and install anchor bolts, fasteners, washers, and templates needed for installation of City-furnished equipment.
2. Size and locate anchor bolts in accordance with City-furnished product shop drawings and installation instructions.

D. Mechanical and electrical equipment shall be properly aligned, plumb and level, with no stresses on connecting piping or conduit.

E. Verify direction of motor rotation before starting equipment drives.

F. Verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding, and proper functions.

G. Pump Installation:
1. Level base by means of steel wedges (steelplates and steel shims). Wedge taper not greater than 6 mm per 300 mm. Use double wedges to provide level bearing surface for the pump and driver base. Accomplish wedging so there is no change of level or springing of baseplate when anchor bolts are tightened.
2. Adjust pump assemblies so driving units are properly aligned, plumb, and level with driven units and all interconnecting shafts and couplings. Do not compensate for misalignment by use of flexible couplings.

3. After pump and driver have been set in position, aligned, and shimmed to proper elevation, grout space between bottom of baseplate and concrete foundation with a poured, nonshrinking grout of the proper category, as specified in Section 03 60 00, Grouting. Remove wedges after grout is set and pack void with grout.
4. Connect suction and discharge piping without imposing strain to pump flanges. Pump discharge and suction flexible couplings or bellows shall not be considered to compensate for misalignment.
5. Pipe pump drain(s) to hub drain or scupper.

## 3.2 FIELD FINISHING

A. Products will be delivered with prime and finish coat(s) applied.
1. Touch up or repair damage to coatings resulting from unloading, storage, installation, testing, and startup.
2. Touch up, repair, or complete repainting shall match color of original paint, and shall be fully compatible with applied primers and finish.

## 3.3 PRODUCT PROTECTION

A. Immediately after installation, lubricate components in accordance with manufacturer's instructions.

B. Follow manufacturer's instructions for protection and maintenance during storage, after installation but prior to testing and startup, and after startup but prior to acceptance.

C. Furnish incidental supplies including lubricants, cleaning fluids, and similar products as needed for protecting and maintaining the City-furnished products.

## 3.4 TESTS AND INSPECTION

A. Perform tests and inspections of installed products in accordance with requirements shown herein, Section 01 91 14, Equipment Testing and Facility Startup and manufacturer's instructions.

END OF SECTION

# SECTION 01 77 00

# CLOSEOUT PROCEDURES

## PART 1 GENERAL

### 1.1 SUBMITTALS

A. Informational Submittals:
   1. Submit prior to application for final payment.
      a. As-Built Documents: As required in General Conditions.
      b. Approved Shop Drawings and Samples.
      c. Special Bonds, Special Guarantees, and Service Agreements.
      d. Releases or Waivers of Liens and Claims: As required in General Conditions.
      e. Releases from Agreements.
      f. Extra Materials: As required by individual Specification sections.

### 1.2 AS-BUILT DOCUMENTS

A. Quality Assurance:
   1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain as-built documents.
   2. Accuracy of Records:
      a. Coordinate changes within as-built documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
      b. Purpose of Project as-built documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
   3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
   4. Prior to submitting each request for progress payment, request the Contract Administrator's review and approval of current status of as-built documents. Failure to properly maintain, update, and submit as-built documents may result in a deferral by the Contract Administrator to recommend whole or any part of Contractor's Application for Payment, either partial or final.

## PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 MAINTENANCE OF AS-BUILT DOCUMENTS

A. General:
1. Promptly following commencement of Contract Times, secure from the Contract Administrator at no cost to Contractor, one complete set of Contract Documents.
2. Delete Engineer title block and seal from all documents.
3. Label or stamp each as-built document with title, "AS-BUILT DOCUMENTS," in neat large printed letters.
4. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation:
1. Maintain documents in a clean, dry, legible condition and in good order. Do not use as-built documents for construction purposes.
2. Make documents and Samples available at all times for observation by the Contract Administrator.

C. Making Entries on Drawings:
1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
   a. Color Coding:
      1) Green when showing information deleted from Drawings.
      2) Red when showing information added to Drawings.
      3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
   a. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
   b. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
   c. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and the Contract Administrator's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on as-built drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
   a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
   c. Make identification so descriptive that it may be related reliably to Specifications.

## 3.2 FINAL CLEANING

A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for Certificate of Substantial Performance; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire site or parts thereof, as applicable.
   1. Leave the Work and adjacent areas affected in a cleaned condition.
   2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
   3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
   4. Clean floors.
   5. Hose clean loading areas.

B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

# SECTION 01 78 23

# OPERATION AND MAINTENANCE DATA

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Detailed information for the preparation, submission, and the Contract Administrator's review of operations and maintenance (O&M) data for equipment supplied under this Contract.

### 1.2 DEFINITIONS

A. Preliminary Data: Initial and subsequent submissions for the Contract Administrator's review.

B. Final Data: Contract Administrator-accepted data, submitted as specified herein.

C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations include but are not limited to lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

D. Instructional Manual: An organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual systems, subsystems and components as specified in individual sections of this specification.

### 1.3 SEQUENCING AND SCHEDULING

A. Equipment and System Data:
   1. Preliminary Data:
      a. Do not submit until Shop Drawing for equipment or system has been reviewed and accepted by the Contract Administrator.
      b. Submit prior to shipment date.
   2. Final Data: Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Performance of Project.

### 1.4 DATA FORMAT

A. Prepare preliminary data in the form of an instructional manual as described in Section 1.4 B. Prepare final data in the form of an instruction manual as described in Section 1.4 C.

B. Preliminary Instructional Manual Format:
1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
   a. Three hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data
2. Size: 8-1/2 inches by 11 inches, minimum.
3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___"," and list:
   a. Project title.
   b. Contractor's name, address, and telephone number.
   c. If entire volume covers equipment or system provided by one Supplier include the following:
      a. Identity of general subject matter covered in manual.
      b. Identity of equipment number and Specification section.
4. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
5. Table of contents neatly typewritten, arranged in a systematic order:
   a. Include list of each product, indexed to content of each volume.
   b. Designate system or equipment for which it is intended.
   c. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
6. Section Dividers:
   a. Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
   b. Fly-Leaf:
      a. For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
      b. List with each product:
         1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
         2) Identify area of responsibility of each.
         3) Provide local source of supply for parts and replacement.
      c. Identity of separate structure as applicable.
      d. Maintenance Summary (Format in accordance with paragraph 1.6.D)
7. Assemble and bind material in same order as specified in the Contract Documents.
8. Material shall be suitable for reproduction, with quality equal to original.

C. Final Instructional Manual Format:
1. Compile all Contract Administrator-accepted preliminary O&M data into a hard-copy, hard-bound set as detailed in Section B above and in electronic media format as described in Section D.

D. Electronic Media Format:
1. Portable Document Format (PDF):
a. After all preliminary data has been found to be acceptable to the Contract Administrator, submit O&M data in PDF format on CD.
b. Files to be exact duplicates of Contract Administrator -accepted preliminary data. Arrange by specification number and name.
c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.
d. PDF files to be indexed and searchable.
e. CD Cover: Identify with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___"," and list:
a. Project title.
b. Contractor's name, address, and telephone number.
c. Identity of equipment number and Specification section.
2. Manufacturers' standard electronic format.

1.5 SUBMITTALS

A. Informational:
1. Data Outline: Submit two (2) copies of a detailed outline of proposed organization and contents of final data prior to preparation of preliminary data.
2. Preliminary Data:
a. Submit two (2) copies for the Contract Administrator's review.
b. If data meets conditions of the Contract:
a. One copy will be returned to Contractor.
b. One copy will be retained in the Contract Administrator's file.
c. If data does not meet conditions of the Contract:
a. All copies will be returned to Contractor with the Contract Administrator's comments (on separate document) for revision.
b. The Contract Administrator's comments will be retained in the Contract Administrator's file.
c. Resubmit two (2) copies revised in accordance with the Contract Administrator's comments.
3. Final Data: Submit four (4) copies in format(s) specified herein.

1.6 DATA FOR SYSTEMS, SUBSYSTEM AND COMPONENTS

A. Content For Each Unit (or Common Units) and System:
1. Product Data:
a. Include only those sheets that are pertinent to specific product.
b. Clearly annotate each sheet to:
a. Identify specific product(s) or part(s) installed.
b. Identify data applicable to installation.
c. Delete references to inapplicable information.
c. Function, normal operating characteristics, and limiting conditions.
d. Serial Numbers
e. Performance curves, engineering data, nameplate data, and tests reports for all pumps.
f. Complete nomenclature and commercial number of replaceable parts.

g. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
h. Spare parts ordering instructions.
i. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, and terminals).

2. Charts of valve tag numbers, with the location and function of each valve.
3. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
   a. Format:
      a. Provide reinforced, punched, binder tab; bind in with text.
      b. Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
      c. Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
      d. Identify Specification section and product on Drawings and envelopes.
   b. Relations of component parts of equipment and systems.
   c. Control and flow diagrams.
   d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
4. Instructions and Procedures: Within text, as required to supplement product data.
   a. Format:
      a. Organize in consistent format under separate heading for each different procedure.
      b. Provide logical sequence of instructions for each procedure.
      c. Provide information sheet for the City's personnel, including:
         1) Proper procedures in event of failure.
         2) Instances that might affect validity of guarantee or Bond.
   b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
   c. Operating Procedures:
      a. Startup, break-in, routine, and normal operating instructions.
      b. Test procedures and results of factory tests where specified.
      c. Regulation, control, stopping, and emergency instructions.
      d. Description of operation sequence by control manufacturer.
      e. Shutdown instructions for both short and extended duration.
      f. Summer and winter operating instructions, as applicable.
      g. Safety precautions.
      h. Special operating instructions.
   d. Maintenance and Overhaul Procedures:
      a. Routine maintenance.
      b. Guide to troubleshooting.
      c. Disassembly, removal, repair, reinstallation, and re-assembly.
5. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Closeout Procedures.

B. Content for Each Electric or Electronic Item or System:
   1. Description of Unit and Component Parts:
      a. Function, normal operating characteristics, and limiting conditions.
      b. Performance curves, engineering data, nameplate data, and tests.
      c. Complete nomenclature and commercial number of replaceable parts.
      d. Interconnection wiring diagrams, including control and lighting systems.
   2. Circuit Directories of Panelboards:
      a. Electrical service.
      b. Controls.
      c. Communications.
   3. List of electrical relay settings, and control and alarm contact settings.
   4. Electrical interconnection wiring diagram, including control and lighting systems.
   5. As-installed control diagrams by control manufacturer.
   6. ISA S20 data sheets for all instruments.
   7. Operating Procedures:
      a. Routine and normal operating instructions.
      b. Sequences required.
      c. Safety precautions.
      d. Special operating instructions.
   8. Maintenance Procedures:
      a. Routine maintenance.
      b. Guide to troubleshooting.
      c. Adjustment and checking.
      d. List of relay settings, control and alarm contact settings.
   9. Manufacturer's printed operating and maintenance instructions.
   10. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Content for Programmable Devices/Components/Sub-systems:
   1. The following requirements are minimum requirements applicable to programmable equipment such as VFDs, ASDs, microprocessor based devices, PLCs, Human-Machine-Interfaces, computers, and other programmable devices. Additional requirements may be specified elsewhere.
   2. As-Constructed version of shop drawings.
   3. Wiring details.
   4. Configuration Records; record of switch settings, program listings and parameter settings, after commissioning.
   5. Maintenance manuals.
   6. User guides, technical reference and programming manuals.
   7. CD-ROMs copies of:
      a. Manuals.
      b. Settings, databases and templates. Include both native format of files and ASCII-exported version.

D. Maintenance Summary:
   1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.

2. Format:
    a. Use Maintenance Summary Form bound with this section or electronic facsimile of such.
    b. Each Maintenance Summary may take as many pages as required.
    c. Use only 8-1/2-inch by 11-inch size paper.
    d. Complete using typewriter or electronic printing.
3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
    a. Data to be consistent with manufacturer's bill of materials/parts list furnished in O&M manuals.
    b. "Unit" is the unit of measure for ordering the part.
    c. "Quantity" is the number of units recommended.
    d. "Unit Cost" is the current purchase price.

## 1.7 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:
1. Manufacturer's data, giving full information on products:
    a. Catalog number, size, and composition.
    b. Color and texture designations.
    c. Information required for reordering special-manufactured products.
2. Instructions for Care and Maintenance:
    a. Manufacturer's recommendation for types of cleaning agents and methods.
    b. Cautions against cleaning agents and methods that are detrimental to product.
    c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:
1. Manufacturer's data, giving full information on products:
    a. Applicable standards.
    b. Chemical composition.
    c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

## 1.8 SUPPLEMENTS

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

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

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. |
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8. LUBRICANT LIST

| REFERENCE SYMBOL | [SHELL] | [STANDARD OIL] | [GULF] | [ARCO] |
|---|---|---|---|---|
| List symbols used in No. 7. above. | List equivalent lubricants, as distributed by each manufacturer for the specific use recommended. | | | |
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9. 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. | | | | |

# SECTION 01 91 14

# EQUIPMENT TESTING AND FACILITY STARTUP

## PART 1 GENERAL

### 1.1 DEFINITIONS

A. Facility: Entire Project, or an agreed-upon acceptable portion, including all of its unit processes.

B. Field Quality Control: Term, as used in individual Specification sections, which refers to specified on-site functional and performance testing of equipment.

C. Functional Test: Test or tests in presence of the Contract Administrator and City to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.

D. City-Furnished Equipment Supplier: Party under separate contract with the City to furnish identified equipment or systems for incorporation into this Project.

E. Performance Test: A test performed in presence of the Contract Administrator and City and after any required functional test, to demonstrate and confirm that systems, subsystems and/or components meet the performance requirements specified in individual sections.

F. Source Quality Control: Term, as used in individual Specification sections, which refers to specified testing performed on specified equipment at manufacturer's facility prior to shipment.

G. Unit process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as mixing, clarification, ozonation, filtration, and chemical metering.

### 1.2 SUBMITTALS

A. Informational Submittals:
   1. Completed Manufacturer's Certificate of Proper Installation as required by individual Specification sections. Submit prior to beginning Facility Startup procedures.
   2. Testing:
      a. Functional and performance test schedules, test plan, procedures, and log format. Submit at least fourteen (14) days prior to start of related testing.
      b. Facility Startup and Performance Evaluation Plan: Submit at least twenty one (21) days prior to commencement of startup.
   3. Certification of calibration for testing equipment, when so specified.

1.3 COORDINATION WITH EXISING SYSTEM SUBSYSTEM AND/OR COMPONENTS

A. Testing, Startup and Commissioning of new systems, subsystems and components must be coordinated with existing facilities as agreed upon by the City's representative and the Contract Administrator.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 CONTRACTOR'S TESTING AND STARTUP REPRESENTATIVE

A. Designate and furnish one or more Contractor's personnel to coordinate and expedite testing and facility startup.

B. Such person or persons shall be present during equipment testing and facility startup meetings specified in Section 01 31 19, Project Meetings, and shall be available at all times during the testing and the facility startup and performance evaluation period.

3.2 EQUIPMENT TESTING

A. Preparation:
   1. General:
      a. Complete installation of each unit and related processes before testing, including all related manufacturer's representative services.
      b. Furnish qualified manufacturer's representatives, when required by individual Specification sections, to assist in testing.
      c. Obtain from equipment manufacturer's representative the Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01 43 33, Manufacturers' Field Services, as specified by individual Specification sections.
      d. Schedule equipment testing and facility startup meetings to discuss test schedule, plan of test, materials, chemicals and liquids required, facilities operations interface, and the City involvement.
      e. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.
      f. Provide written documentation of functional and performance test results on Contractor's form for each piece of equipment tested. Provide space on form for the Contract Administrator's signature verifying that testing has been completed as per specification.
   2. Equipment Test Report Form: Provide written test report form for each item of equipment to be tested, to include the minimum information:
      a. City/Project Name.
      b. Equipment or item tested.
      c. Date and time of test.
      d. Type of test performed (Functional or Performance).
      e. Test conditions.

f. Test results.
g. Signature space for Contractor and the Contract Administrator representatives.

3. Cleaning and Checking: Prior to beginning functional testing:
   a. Calibrate testing equipment in accordance with manufacturer's instructions.
   b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
   c. Lubricate equipment in accordance with manufacturer's instructions.
   d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
   e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
   f. Check power supply to electric-powered equipment for correct voltage.
   g. Adjust clearances and torque.
   h. Test piping for leaks.
   i. Balance HVAC systems to AABC or NEBB standards, measuring airflow (L/s) static pressure, and component pressure losses in coordination with the requirements specified in individual sections.
4. Ready-to-test determination will be by the Contract Administrator based at least on the following:
   a. Notification by Contractor of equipment readiness for testing.
   b. Acceptable testing plan.
   c. Acceptable Operation and Maintenance Manuals.
   d. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
   e. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested, including items to be furnished by the City.
   f. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
   g. Equipment and electrical tagging complete.
   h. Delivery of all spare parts and special tools.

B. Functional Testing:
1. Conduct as specified in individual Specification sections.
2. Notify the City and the Contract Administrator in writing at least ten (10) days prior to scheduled date of testing.
3. When, in the Contract Administrator's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by the Contract Administrator's signature on Equipment Test Report.

C. Performance Testing:
1. Conduct as specified in individual Specification sections.
2. Notify the Contract Administrator and the City at least fourteen (14) days prior to scheduled date of test.

3. Performance testing shall not commence until equipment has been approved by the Contract Administrator as having satisfied functional test requirements specified.
4. Follow approved testing plan and detailed procedures specified.
5. Source and type of fluid, gas, or solid for testing shall be as specified.
6. Unless otherwise indicated, furnish all labor, materials, and supplies for conducting the test and taking all Samples and performance measurements.
7. Prepare performance test report summarizing test method and results.
8. When, in the Contract Administrator's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by the Contract Administrator's signature on Equipment Test Report.

## 3.3 FACILITY STARTUP AND PERFORMANCE EVALUATION

A. General:
1. Support the City's operations personnel throughout Facility Startup and Performance Evaluation Period.
2. Equipment shall be accepted by the Contract Administrator as having met requirements of specified functional testing prior to facility startup.
3. Sequence each unit process to the point that the complete facility is operational for evaluation of unit process and facility performance.
4. Demonstrate proper operation of required interfaces within and between individual unit processes.
5. Include equipment furnished by the City.
6. Schedule ongoing Work so as not to interfere with or delay the completion of facility startup.
7. After the facility is operating, complete performance testing of those items of equipment not previously tested where agreed upon by the Contract Administrator.

B. Facility Startup and Performance Evaluation Plan:
1. Develop a plan in conjunction with the City's representative and the Contract Administrator detailing step-by-step instructions for startup of each unit process and the complete facility including the order in which systems, subsystems and components will be started.
2. Include details of coordination with existing systems, subsystems and components.
3. Include a method of evaluation and overall performance report for each unit process.
4. Plan shall consist of bound copies of Startup and Performance Evaluation Forms. Use one form for each unit process; use example form attached, or one designed by Contractor.
5. Startup and Performance Evaluation Form will include, but not be limited to the following:
   a. Description of unit process being started.
   b. All equipment and devices included in the unit process.

c. Unit process startup procedures (i.e., valves to be open/closed, order of equipment startup).
d. Requirements for water, power, and chemicals needed for startup.
e. Contractor Certification that each unit process is capable of performing its intended function(s), including fully automatic operation.
f. Space for evaluation comments.

C. City Responsibilities:
1. Assist Contractor in developing a Facility Startup and Performance Evaluation Plan as required.
2. Provide water, power, chemicals, and other items as required for testing and facility startup, unless otherwise indicated.
3. Operate process units and devices, with support of Contractor.
4. Provide labor and materials as required for sampling and laboratory analyses.

D. Facility Startup Period:
1. Startup sequencing of unit processes shall be as defined in the Facility Start up Plan
2. Make adjustments, repairs, and corrections necessary to complete facility startup.
3. Startup of entire facility or any portion thereof shall be considered complete when, in opinion of the Contract Administrator, facility or designated portion has operated in manner intended for five (5) continuous days without significant interruption. This period is in addition to training, functional, or performance test periods specified elsewhere.
4. Significant Interruption: May include any of the following events:
a. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
b. Failure to meet specified performance for more than two (2) consecutive hours.
c. Failure of any critical equipment or unit process that is not satisfactorily corrected within five (5) hours after failure.
d. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within eight (8) hours after failure.
e. As determined by the Contract Administrator.
5. A significant interruption will require startup then in progress to be stopped and restarted after corrections are made.

E. Facility Performance Evaluation:
1. During the Facility Startup Period, conduct a performance evaluation for purpose of evaluating full capabilities of facility and performance of computer system, until all unit processes are operable and under control of computer system.
2. Certify, on the Facility Performance Evaluation Form, that each unit process is capable of performing its intended function(s), including fully automatic and computerized operation.

3.4 SUPPLEMENT

A. Supplement listed below, following "End of Section," is a part of this Specification:
1. Startup and Performance Evaluation Form.

END OF SECTION

## STARTUP AND PERFORMANCE EVALUATION FORM

**OWNER:**_____ **PROJECT:**_____

**Unit Process Description: (Include description and equipment number of all equipment and devices):**

_____

_____

_____

_____

**Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):**

_____

_____

_____

_____

_____

**Startup Requirements (Water, power, chemicals, etc.):**____

_____

_____

**Evaluation Comments:**_____

_____

_____

_____

**Contractor Certification that Unit Process is capable of performing its intended function(s), including fully automatic operation:**

**Firm Name:**_____

**Startup Representative:**_____ **Date**:_____, **20**

**(Authorized Signature)**