

Part 1 General

1.1 ADMINISTRATIVE

- .1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit 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.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable. Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .5 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and affected adjacent Work are co-ordinated.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator.
- .9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in The Province of Manitoba, Canada. Where noted in the Technical Specifications.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .1 Prior to construction, the contractor shall submit a schedule of shop drawing submittals and anticipated equipment deliveries.
- .4 Allow 14 days for Contract Administrator review of each submission.
- .5 Adjustments made on shop drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .6 Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Contract Administrator's review, distribute copies.
- .10 Submit 6 prints of shop drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.

- .11 Submit 6 copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit 6 copies of test reports for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit 6 copies of certificates for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit 6 copies of manufacturers instructions for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit 6 copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Contract Administrator.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit 6 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Contract Administrator.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 The review of shop drawings by the Contract Administrator is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Contract Administrator approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Contract Administrator;s business address.
- .3 Notify Contract Administrator in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- .6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Revise content of documents as required prior to final submittal.
- .4 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, four final copies of operating and maintenance manuals in English.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 Furnish evidence, if requested, for type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .8 Pay costs of transportation.

1.2 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dxf dwg format on CD.

1.3 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project; Date of submission; names.
 - .1 Addresses, and telephone numbers of Contract Administrator and Contractor, Design-Builder with name of responsible parties.
 - .2 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.4 AS-BUILTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Contract Administrator one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples. Field test records.
 - .6 Inspection certificates.
 - .7 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Contract Administrator.

1.5 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Contract Administrator.

- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.6 EQUIPMENT AND SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .4 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .5 Provide servicing and lubrication schedule, and list of lubricants required.
- .6 Include manufacturer's printed operation and maintenance instructions.
- .7 Include sequence of operation by controls manufacturer.

- .8 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .9 Provide installed control diagrams by controls manufacturer.
- .10 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .11 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .13 Include test and balancing reports.
- .14 Additional requirements: as specified in individual specification sections.

1.7 MATERIALS AND FINISHES

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications sections.

1.8 SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site, place and store.
- .4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.9 MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.

- .3 Deliver to site; place and store.
- .4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.10 SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to site; place and store. Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.

1.11 STORAGE, HANDLING AND PROTECTION

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

1.12 OPERATING AND MAINTENANCE MANUALS

- .1 For the guidance of the City's operating and maintenance personnel, the Contractor shall prepare O&M Manuals for the Work, describing in detail the construction of each part of the Work and the recommended procedure for operation, servicing and maintenance.
- .2 Three (3) advance copies of the manuals shall be submitted two months prior to Substantial Performance of the Work for review and comments. A maximum of eight weeks after review, six (6) copies of the final manuals shall be submitted. Each copy shall be clearly titled to show all of the information required by the Specifications as well as operational information including: the item of Work concerned, a City's Contract number, the name and address of the Contractor, the issue date, operational information on equipment, cleaning and lubrication schedules, filters, overhaul and adjustment schedules.
- .3 All instruction in these manuals shall be in simple language to guide the City in the proper operating and maintenance of this installation.
- .4 In addition to hard copies specified above, submit one (1) O&M Manual in electronic format (MS Word for text; Acrobat PDF for graphics). Organize contents into applicable sections of Work, parallel to Specifications Break-down.

- .5 In addition to information called for in the Specification, include the following:
 - .1 Title sheet, labels “Operation and Maintenance Instructions”, and containing project name and date.
 - .2 List of contents:
 - .1 Brochures/catalogue excerpts of all architectural, structural, mechanical and electrical components of the Work.
 - .2 Documentation of all test results.
 - .3 Complete set of equipment and assembly drawings.
 - .4 Installation, start-up, O&M Manuals
 - .5 Commissioning data sheets and reports
 - .6 Air balancing reports
 - .7 Spare parts lists and prices, and special tools requirements and prices
 - .8 Any specific product or maintenance manual requirements from the Specification.
 - .3 Reviewed Shop Drawings of all equipment.
 - .4 As-Constructed Drawings of all civil, structural, process equipment, mechanical, electrical, instrumentation and controls installations.
 - .5 Full description of entire mechanical system and operation.
 - .6 Names, addresses, and telephone numbers of all major sub-contractors and suppliers.
 - .7 Detailed operations and maintenance instructions for all items of equipment, including a preventative maintenance program.
- .6 The Contractor shall modify and supplement the manual as required by the Contract Administrator.
- .7 Provide list of spare parts and consumables, including name and address of nearest supplier.
- .8 The O&M Manuals shall be supplied to the City before equipment delivery and provision shall be made for additions and deletions, which may be dictated by the City’s operational experience. Where these amendments to the manuals are indicated to be necessary during initial operation before acceptance, the Contractor shall supply the amended Sections free of charge.
- .9 Payment for this item of the Work, as listed in Form B: Prices, will not be issued until all requirements for the O&M Manuals have been satisfied.

1.13 AS-CONSTRUCTED DRAWINGS

- .1 After award of Contract, the Contract Administrator will provide a complete set of Drawings for the purpose of maintaining Project As-Constructed Drawings. Electronic files in AutoCAD format will be supplied. Accurately record significant deviations from Contract Documents caused by Site conditions and changes ordered by the Contract Administrator. Update daily.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 This Section contains requirements for training the City staff, by persons retained by the Contractor specifically for the purpose, in the proper operation and maintenance of the equipment and systems installed under this Contract.
- .2 Training sessions are required during the equipment testing.
- .3 The intent is that the City should receive sufficient training on the equipment and systems that they are going to operate and maintain. The Contract Administrator shall have the authority to determine the duration and content of each training session required.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates. Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

1.3 LOCATION

- .1 Where specified, conduct training sessions for the City staff, operations and maintenance personnel, on the operation, care and maintenance of the equipment systems installed under this Contract. Training will take place at the Site of the Work and under the conditions specified in the following paragraphs.
- .2 Field training sessions will take place at the Site of the equipment.

1.4 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.5 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled agreed upon times, at the equipment designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

1.6 TIME ALLOCATED FOR INSTRUCTIONS

- .1 The Contractor shall provide a minimum of 12 hours of on-site instruction to the City Maintenance personnel.
 - .1 The instructions shall be given over a minimum of two days.
 - .2 The Contract Administrator shall be present at the instruction sessions.
- .2 The Contractor shall utilize Manufacturer's Representatives for the following systems and equipment.
 - .1 The natural gas generator.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 GENERAL REQUIREMENTS

- .1 Conduct training in conjunction with the equipment testing period. Schedule classes such that classroom sessions are interspersed with field instruction in logical sequence. Arrange to have the training conducted on consecutive days.
- .2 Provide final O & M Manuals, as defined in Section 013330 - Submittal Procedures, for the specific equipment to the City at four weeks prior to the start of any training.

3.2 OPERATOR HANDS-ON TRAINING

- .1 As Minimum, hands-on equipment training for operations personnel will include:
 - .1 Identifying instrumentation: location of primary element; location of instrument readout; discuss purpose, basic operation, and information interpretation.
 - .2 Discussing, demonstrating and performing standard operating procedures and daily visual inspection of system operation.
 - .3 Discussing and performing the preventative maintenance activities.
 - .4 Discussing and performing start-up and shutdown procedures.
 - .5 Performing the required exercise procedures.
 - .6 Performing routine disassembly and assembly of equipment if applicable.
 - .7 Identifying and reviewing safety items and performing safety procedures, if feasible.

3.3 MAINTENANCE HANDS-ON TRAINING

- .1 Hands-on equipment training for maintenance and repair personnel will include:
 - .1 Locating and identifying equipment components.
 - .2 Reviewing the equipment function and theory of operation.
 - .3 Reviewing normal repair procedures.
 - .4 Performing routine start-up and shutdown procedures.
 - .5 Reviewing and performing the safety procedures.
 - .6 Performing City - approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and trouble shooting equipment.
 - .7 Reviewing and using Contractor's manuals in the hands-on training.

3.4 TRAINING COMPLETION FORMS AND PAYMENT

- .1 Training for the Contractor - supplied equipment shall be conducted prior to commissioning.
- .2 The Contract shall not be considered complete, for the purpose of issuing a Certificate of Substantial Performance, until the training has been provided.
- .3 Form T1: to be completed for initial training. One (1) form to be used for each item of equipment or system for which training has been provided.
- .4 Form T2: to be completed for training during the warranty period. One (1) form is to be used for each equipment/ system for which has been provided.
- .5 Payment for this work will be released only when the training has been completed to the City's satisfaction and the respective forms signed.
- .6 A sample of Forms T1 and T2 are attached to this Specification Section.

CERTIFICATE OF SATISFACTORY TRAINING
FORM T1

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO. _____

(Trainer)

Date

(Authorized Signing Representative of the City)

Date

CERTIFICATE OF SATISFACTORY TRAINING
FORM T2

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO. _____

(Trainer)

Date

(Authorized Signing Representative of the City)

Date

Part 1 General

1.1 GENERAL

- .1 At the time of the commissioning, the Contract Administrator shall advise the Contractor of the commissioning requirements. These requirements are dependent on the anticipated operational requirements of the Perimeter Road Pumping station at the time.
- .2 The Contractor shall refer to all Divisions for details on the commissioning procedures not included in this Section.
- .3 The Contractor shall note that on materials and equipment installed in this Contract, warranty will not begin until issuance of Total Performance.

1.2 INTENT

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

1.3 DEFINITIONS

- .1 System: for the purpose of this Specification Section, a system shall be defined as the equipment, piping, controls, ancillary devices, electrical power, etc., which together perform a specific function at the facility.
- .2 Commissioning: for the purpose of this Specification Section, commissioning shall be defined as the successful operation of a system in accordance with its design requirements for a period of 28 days, the last seven of which shall be consecutive, unless otherwise specified.
- .3 Acceptance: for the purpose of this Specification Section, acceptance shall be defined as the formal turnover of a system to the City for his operation and maintenance. This shall occur after the successful end of commissioning of each system through a formal agreement between the Contract Administrator, the City, and the Contractor. Success of the commissioning period is determined by the Contract Administrator.

1.4 COMMISSIONING TEAM

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

1.5 COMMISSIONING PLAN

- .1 Develop a detailed methodology for the commissioning of each system at least 45 calendar days prior to planned start of commissioning. The plan shall be drafted by the Contractor and Contract Administrator and include the following:
 - .1 Detailed schedule of events, including but not limited to the schedule for completion of testing of all component parts of the system prior to commissioning of a system.
 - .2 Tests necessary to verify compliance with performance specifications.
 - .3 Planned attendance schedule for manufacturer's representatives.
 - .4 Drawings and sketches as required to illustrate the planned sequence of events.
 - .5 List and details for all temporary equipment (pumps, etc.) required to facilitate Commissioning.
 - .6 List of all personnel who the Contractor plans for commissioning and handover with information indicating their qualifications for this Work.
- .2 The commissioning plan shall be reviewed prior to its implementation. The Contract Administrator shall be the final arbiter.

1.6 EQUIPMENT

- .1 All process, mechanical, electrical, control, and miscellaneous equipment related to a system shall be successfully installed and tested in accordance with specific requirements noted in other Divisions.
- .2 As required in Section 01 78 00 – Closeout Submittals, O&M Manuals will be submitted and reviewed by the Contract Administrator.
- .3 Staff training sessions shall be completed.
- .4 Temporary equipment will be installed and tested as necessary to ensure that it function reliably and consistently through the commissioning period.

1.7 CONTROLS

- .1 All controls which are the responsibility of this Contractor shall be installed and tested prior to commissioning.
- .2 The Contract Administrator shall arrange for the simulation of the control sequences or shall allow for the operation of the system without the features included in the Work of others. Every effort shall be made to ensure that the commissioning period provides for the full and comprehensive operation of the equipment under all anticipated normal and adverse operating conditions.

1.8 MANPOWER

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

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

1.9 OPERATING DESCRIPTIONS

- .1 Operating descriptions shall be prepared by the Contract Administrator for the plant systems. Other information outlining the operating requirements shall also be available from the Contract Administrator. The Contractor will review these descriptions and will make himself familiar with the requirements in order that he can undertake commissioning in an appropriate manner.

1.10 DESIGN PARAMETERS

- .1 Design parameters for the systems to be commissioned shall be as defined in the Specifications and/or the operating descriptions. The commissioning team will identify to the Contractor, which parameters shall be modified prior to commissioning and shall be responsible for any subsequent changes during the commissioning period.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 PREPARATIO

- .1 Each items of equipment included in the system to be commissioning shall be satisfactorily tested and operated for a period of three (3) consecutive days.
- .2 Piping, wiring, and other conduit systems shall be finished and tested.
- .3 Electrical connections shall be completed and inspected to the satisfaction of the governing authorities.
- .4 All other regulatory inspections shall be completed to the satisfaction of the governing authorities.
- .5 Control systems shall be completed and related control software debugged.

3.2 SEQUENCE

- .1 For each system, the following sequence of events shall be followed:
 - .1 O&M Manuals shall be available at least 14 days prior to the start of commissioning.
 - .2 The Contract Administrator will make operating descriptions available prior to testing. Draft operating descriptions are included in this Contract.

- .3 Initial operator training shall be undertaken two weeks prior to commissioning.
- .4 Equipment performance tests shall be conducted successfully.
- .5 Start and run system in manual mode.
- .6 Turn separate items of equipment to automatic in a planned and logical manner. Ensure that the control system is operating the equipment in a manner which precludes damage of the equipment and which is consistent with the process operating requirements.
- .7 Commence commissioning period of 28 days. The equipment shall operate continuously and successfully through the last seven days of a commissioning period. Minor failures shall not void the commissioning period. A minor failure is defined as one which does not present a safety hazard, does not impact overall process functioning and can be temporarily overcome by the use of available standby equipment. The last seven days of the commissioning period shall be restarted if a critical failure occurs. A critical failure shall be deemed as one, which prohibits the process from functioning successfully for an eight hour period or one, which creates a safety hazard.
- .8 Upon completing the commissioning period, the system shall be granted formal acceptance by the Contract Administrator.

3.3 ACCEPTANCE

- .1 The commissioning of a system shall be considered acceptable when the equipment has operated in a stable manner, satisfying the design criteria for a period of 28 days, the last seven of which shall be continuous and consecutive, unless otherwise specified.
- .2 When a system has been commissioned satisfactorily, the system shall be formally accepted for operating and routine maintenance by the City's forces. On successful completion of Commissioning Form 104 – Certificate of Satisfactory Process Performance attached to this Specification will be signed by the representative of the manufacturer, Contractor, Contract Administrator, and the City.
- .3 An acceptance meeting must be held at the end of the 28 day test to confirm the status of each system.
- .4 Notice of Acceptance of for the entire project will be granted when all systems have been commissioned and accepted, and all requirements of the General Conditions have been completed.

**CERTIFICATE OF SATISFACTORY PROCESS PERFORMANCE
FORM 104**

We certify that the equipment listed below has been operated and tested as per the Specification using water and that the equipment meets its performance testing criteria. The equipment is therefore classed as “conforming”.

Project: _____

System Description: _____

Tag No(s): _____

Reference Specification (s): _____

(Authorized Signing Representative of the Manufacturer)

Date

(Authorized Signing Representative of the Contractor)

Date

(Authorized Signing Representative of the Contract Administrator)

Date

(Authorized Signing Representative of the City of Winnipeg)

Date

END OF SECTION