1. INTENT

.1 This Section describes the general requirements for all equipment under the Contract relating to the supervision of installation, testing, operation, and performance verification. The Contractor shall be responsible for the assistance with installation work, testing, operation, and performance verification of the equipment (either pre-purchased by the City or supplied under this Contract) in this Contract.

2. EXPERTISE AND RESPONSIBILITY

.1 The Contract Administrator recognizes the expertise of the manufacturer.

.2 Should the Contract Administrator issue an Addendum, field order, change order, or instruction to change the Work which would, in the opinion of the Contractor, compromise the success or safety of the Work, then it shall be incumbent on the Contractor to notify in writing the Contract Administrator to this effect within two (2) Calendar Days.

3. EQUIPMENT DELIVERY

.1 The Contractor shall be responsible for all equipment at the Site or any alternate storage location.

.2 The Contractor shall ensure that he is fully informed of precautions to be taken in the unloading of the equipment and subsequent storage including any required maintenance.

.3 If off-site storage of equipment is required, moving the equipment to the Site for installation shall be at the Contractor’s cost.

4. INSTALLATION

.1 If necessary, or if so directed by the Contract Administrator during the course of installation, the Contractor shall contact the manufacturer’s representative to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in an appropriate manner.

.2 If it is found necessary, or if so directed by the Contract Administrator, the Contractor shall arrange for the manufacturer’s representative to visit the Site to provide assistance during installation, all at the Contractor’s cost.

.3 Prior to completing installation, the Contractor shall inform the manufacturer’s representative and arrange for the attendance at the Site of the manufacturer's representative to verify successful installation.

.4 The manufacturer’s representative shall conduct a detailed inspection of the installation including alignment, electrical connections, belt tensions, rotation direction, running clearances, lubrication, workmanship and all other items as required to ensure successful operation of the equipment.

.5 The manufacturer’s representative shall identify any deficiencies in the installation.

.6 The deficiencies shall be rectified by the Contractor and the manufacturer’s representative will be required to re-inspect the installation, at the Contractor’s cost.

.7 When the manufacturer's representative accepts the installation, he shall certify the installation by completing **Form 102 – Certificate of Satisfactory Installation,** attached to this Specification.

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

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

.10 Provide separate copies of Form 102 for each tagged piece of equipment.

CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

CERTIFICATE OF READINESS TO INSTALL
FORM 101

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

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

_____ _____
(Authorized Signing Representative of the Contractor) Date

CERTIFICATE OF SATISFACTORY INSTALLATION
FORM 102

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

OUTSTANDING DEFECTS: _____

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE
FORM 103

We certify that the equipment listed below operates satisfactorily and meets its specified operating criteria. No defects in the equipment were found. The equipment is therefore classed as "conforming".

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

1. Acknowledgement of Receipt of O&M Manuals.

_____ _____
(Authorized Signing Representative of the City) Date

END OF SECTION

1. GENERAL

1.1 Inspection

.1 Contractor's Inspection: Contractor to conduct inspection of the Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify the Contract Administrator in writing of satisfactory completion of the Contractor's Inspection and that corrections have been made.

.2 Request the Contract Administrator's Inspection.

.3 Correct any incomplete work and request the Contract Administrator for re-inspection.

.2 Contract Administrator's Inspection:

.1 Contract Administrator and Contractor are to inspect work and identify defects and deficiencies.

.2 Contractor to correct work as directed.

.3 Contract Administrator will re-inspect corrected incomplete work when requested by the Contractor.

.3 Completion: submit written certificate that the following have been performed:

.1 Work has been completed and inspected for compliance with the Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Operation of systems have been demonstrated to the City's personnel.

.5 Commissioning of Work has been completed in accordance with the Contract Documents and all forms executed and provided to the Contract Administrator.

.6 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Contract Administrator and Contractor. If Work is deemed incomplete by the Contract Administrator, complete outstanding items and request re-inspection.

1.2 Cleaning

.1 Maintain the working area in a clean and orderly manner as the Work progresses, and upon completion of construction, remove all waste materials, and all temporary facilities from the Site.

.2 Remove surplus or salvaged materials belonging to the Contractor from the Site.

.3 Vacuum clean interior building areas when ready for painting, and continue vacuuming as needed.

.4 Remove grease, dust, dirt, stains, labels, finger prints and other foreign materials from sight on exposed interior and exterior finished surfaces, including glass and other polished surfaces.

.5 Clean lighting reflectors, lenses and other lighting surfaces.

.6 Broom clean paved surfaces, rake clean other surfaces of ground.

.7 Remove debris and surplus materials from roof areas and accessible concealed spaces.

.8 Remove snow and ice from access to the building.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

1. GENERAL

1.1 Submittals

.1 Submittals: in accordance with Section E4 – Shop Drawings.

.2 Prepare instructions and data using personnel experienced in the maintenance and operation of described products.

.3 A Copy will be returned after final inspection with the Contract Administrator's comments.

.4 Revise the content of the documents as required prior to final submittal.

.5 Four (4) weeks prior to Substantial Performance of the Work, submit to the Contract Administrator six (6) final paper copies of the Operating and Maintenance (O&M) Manuals and one (1) electronic copy (PDF) in S.I. Units.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of the same quality and manufacture as the products provided in Work.

.7 Furnish evidence, if requested, for type, source and quality of the products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.9 Pay costs of transportation.

1.2 Operation Manual

.1 Organize data as an instructional manual.

.2 Provide 215 x 280 mm extension type catalogue binders bound with heavy weight bright blue fabric, hot stamped in silver lettering front and spine. Acropress, Cerlox or similar light weight or special hole binders are not acceptable.

.3 When multiple binders are used, correlate the data into related consistent groupings. Identify contents of each binder on the spine.

.4 Letter each binder as follows:

.1 Front Face

.1 Full identification of title of project

.2 Contract Administrator - full identification title

.3 Design Consultants - full identification title

.4 Contractor - full identification title

.5 Sub Contractors - full identification title

.2 Spine

.1 Full identification of title of project

.2 copy number

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Arrange each individual binder as follows, using colored divider tabs which shall be laminated mylar plastic and which shall be colored according to section of the manual.

.7 Each division of the manual i.e. mechanical, electrical, process equipment etc. shall be a complete manual and shall in general be in the following format with the divider tabs as noted:

.1 Tab 1.0 Title Page

.1 Project title

.2 City of Winnipeg

.3 Name, address, and telephone number for:

.1 Contract Administrator

.2 Contractor

.3 Sub-Contractor(s)

.2 Index of all divider tabs

.1 Project title

.2 Volume number

.3 Table of Contents broken out into three columns as follows:

.1 Item No.

.2 Specification reference No

.3 Description of item

.3 Tabs

.4 Tab Title Page

.1 Item description

.2 Manufacturer

.3 Agent name

.4 Agent Address

.5 Agent telephone number

.6 Agent fax number

.7 Item No.

.8 Specification No.

.9 General description

.5 Tab Contents:

.1 Part number specific to the item provided

.2 Description specific to the item provided

.3 Product information specific to the item provided (Manufacturers data, shop drawings, bulletins)

.4 Operating procedures and instruction specific to the item provided

.5 Preventative maintenance program specific to the item provided

.6 Servicing schedules specific to the item provided

.7 Spare parts list specific to the item provided

.8 Start-up documentation and check sheets (if applicable)

.9 List of drawings

1.3 Record Documents

.1 As specified in other sections of the Specification, the Contractor is required to prepare record drawings, to provide survey notes, to supply test results and other documentation. Such information shall be turned over to the Contract Administrator before Total Performance.

.2 Maintain, in addition to the requirements in the Specifications, at Site for City 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

.6 Field test records

.7 Inspection certificates

.8 Manufacturer's certificates

.3 Store record documents and samples in the field office apart from documents used for construction. Provide files, racks, and secure storage.

.4 Label record documents and file in accordance with Section number listings in the List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.5 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.6 Keep record documents and samples available for inspection by the Contract Administrator.

1.4 Recording Actual Site Conditions

.1 Record information on set of black line opaque drawings, provided by the Contract Administrator.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with the 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, and field test records as required by individual Specifications Sections.

1.5 Equipment and Systems

.1 Each Item of Equipment and Each System: include the description of the unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions.

Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 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.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide a servicing and lubrication schedule, and a list of lubricants required.

.7 Include Manufacturer's printed O&M instructions.

.8 Include the sequence of operation by the controls Manufacturer.

.9 Provide original Manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by the controls Manufacturer.

.11 Provide the Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with the location and function of each valve, keyed to flow and control diagrams.

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

.14 Include test and balancing reports.

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

1.6 Materials and Finishes

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

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

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

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

1.7 Spare Parts

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

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

.3 Deliver to site; place and store.

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

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

1.8 Maintenance Materials

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

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

.3 Deliver to site; place and store.

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

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

1.9 Special Tools

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

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

.3 Deliver to site; place and store.

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

1.10 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

1.11 Warranties and Bonds

.1 Submit warranty information made available during the construction phase, to Contract Administrator for approval prior to each monthly pay estimate.

.2 Conduct 12 month warranty inspection, measured from time of acceptance, by Contract Administrator.

.3 Respond in timely manner to oral or written notification of required construction warranty repair work.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

1. GENERAL

1.1 General

.1 This Specification covers all operations relating to the commissioning of the Pumping Station.

.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

.3 Commissioning is a planned program of systematic tests, procedures and checks carried out on individual and integrated systems after they have been completely installed and verified as functional and Contractor's Performance Verification responsibilities have been completed and approved.

.4 Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with the Contract Documents and design criteria and intent.

.2 Ensure appropriate documentation is compiled and included in the O&M manuals.

.3 Train City's staff.

.5 The Contractor shall provide, commission, and turn over to the City a complete operating Pumping Station and associated Works.

.6 For commissioning purposes the term Pumping Station shall mean the Work of this Contract entirely.

.7 Items in this portion of the Contract that require commissioning include, but are not limited to:

.1 Pumps, piping, monorail, valves

.2 Natural gas generator

.3 Control systems

.4 HVAC systems

.8 Testing and commissioning shall normally proceed in the following steps:

.1 Hydrostatically test the wet well for concrete integrity.

.2 Test pump performance using draw-down testing.

.3 Commission the emergency generator.

.4 Commission all HVAC systems.

.5 Test all other individual items and items forming sub-systems, ready for operation.

.6 Commission the Work of this Contract entirely.

.7 Turn over the Work to the City.

.9 Testing and commissioning shall be performed by the Contractor, in the presence of the Contract Administrator.

.10 The Contractor shall inform all Subcontractors and Suppliers/Manufacturers of the requirements herein and include all costs for the following services in his Bid Price for the Work specified. Where a minimum amount of time is stated in the specifications for a Manufacturer's services, any additional time required to perform the specified services satisfactorily shall be at no additional cost to the City.

.11 The Contractor is responsible for all chemicals, power, consumables during Commissioning, Performance Verification and Acceptance Testing.

1.2 Preparation

.1 Establish a written detailed procedure and schedule and submit to the Contract Administrator at least 14 calendar days prior to the commencement of Commissioning. The commissioning plan shall include:

.1 Detailed schedule of events

.2 Method for introducing flow

.3 Planned attendance schedule for manufacturer’s representatives

.4 Detailed procedures and order of events

.5 Drawings and sketches as required to illustrate the planned sequence of events

.2 The commissioning plan shall be reviewed and agreed by the Contract Administrator/City prior to its implementation.

.3 Follow the procedure and schedule unless otherwise agreed.

.4 Inspect all material and product to ensure that the Work is complete, that Material and product are in place and secure, and that the recommendations of the Manufacturer/Supplier have been complied with.

.5 Inspect and clean all pipe, equipment, and all electrical connections.

1.3 Personnel

.1 A team comprised of personnel from the Contractor, Contractor’s sub-trades and representatives from various equipment Suppliers/manufacturers will conduct the Work of commissioning.

.2 The Contractor shall be responsible for overall co-ordination and direction of the Work with input/approval from the Contract Administrator and the City.

.3 Provide competent, experienced, factory trained technical personnel to supervise the installation, inspection, testing and commissioning of product supplied and installed under this Contract.

.4 The Contractor shall provide and pay for all such personnel, regardless of the length of time required to commission the Work.

.5 The Contractor shall provide personnel representing the appropriate trades, including control and instrumentation 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.

1.4 Testing Individual Equipment

.1 Every individual item of equipment shall be tested by itself and in combination with related items to ensure that the item and the subsystem are in perfect operating condition, comply with specified requirements and are ready for operation.

.2 All testing, checking, calibration, adjustments, making of connections, setting, lubrication and other requirements shall be carried out and a brief report submitted to the Contract Administrator for each item tested individually.

.3 Other sections of the Specifications may contain specific testing, cleaning, disinfecting, balancing and operation requirements that are to be followed in conjunction with this Section.

.4 Inspection and testing shall include, but shall not be limited to:

.1 soundness - without damaged parts,

.2 completeness in all details as specified,

.3 correctness of setting, alignment and arrangements of parts,

.4 adequacy and correctness of packing, sealing and lubrication.

.5 Contactor assumes liabilities and cots for inspections. Including disassembly and reassembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.5 Controls

.1 All controls which are the responsibility of the 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.

1.6 Commissioning

.1 Commissioning shall include the Contractor's operation of the facilities as a complete system for one (1) calendar day, followed by the City's staff operating the facilities under the

guidance of the Contractor for one (1) additional calendar day. These are minimum times based upon demonstration of satisfactory operation.

.2 During the Commissioning period the Contractor shall appoint one qualified person to lead the commissioning group of Contractor's personnel, Subcontractor's personnel and manufacturer's / supplier's representatives.

.3 Operation of any part of an existing system shall be performed by the City only.

.4 The Contract Administrator may order changes in procedure, operation methods or may take whatever actions are necessary to ensure correct commissioning.

.5 During the Commissioning period, the Contractor shall demonstrate that the operation of the facility as a whole, as well as all components, is correct and in accordance with the Contract requirements.

.6 All components shall be demonstrated over the entire range of operation specified, including variations in flow, pressures, speeds and controls.

.7 All malfunctions, alarms, safety devices, interlocks, and annunciation shall be demonstrated by simulation of malfunctions as necessary.

.8 During the initial commissioning period, only the Contractor shall operate the systems installed in this Contract, and the City's personnel shall observe and receive operation instructions.

.9 During the second period of the commissioning the City's personnel will operate the facility under the guidance and supervision of the Contractor. At the end of the commissioning period the City will assume complete responsibility for operation of the facility.

1.7 Non-Conformance to Performance Verification Requirements

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during commissioning, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by Contract Administrator, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by the Contractor. Above cost to be in form of progress payment reductions or hold-back assessments.

1.8 Completion of Commissioning

.1 Upon completion of commissioning leave system in normal operating mode.

.2 Complete Form 104 – Certificate of Satisfactory Commissioning for each equipment, controls, instrument and sub-system.

.3 Commissioning to be considered complete when Contract commissioning deliverables including Form 104 have been submitted and accepted by Contract Administrator.

.4 When changes are made to baseline components or system settings established during commissioning process, provide updated commissioning form for affected item.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 Installation Assistance and Inspections

.1 The Contractor shall coordinate with the suppliers for the provision of the supplier services for all equipment specified herein. The Contractor shall coordinate and expedite the provision of these field services for the pump, gen-set, MCC and HVAC equipment and include all the related costs in the Bid Submission.

.2 The Contractor shall ensure that skilled servicemen from the suppliers of equipment have instructed the Contractor in the proper installation of the equipment and that the Contractor has obtained and understands all necessary written installation instructions.

.3 Toward the end of the installation period, after informing the Contract Administrator, notify the supplier to send his skilled servicemen to check over the completed installation of equipment specified. The servicemen shall make a detailed check of the installation including alignment, belt tension, bolt tensions, running clearances, lubrication and workmanship and all other items as required to ensure proper operation of the equipment. Promptly remedy any defects to the satisfaction of the supplier's skilled servicemen. The equipment shall then be run and tested in the presence of the serviceman, the Contractor and the Contract Administrator.

.4 The supplier's skilled serviceman shall then certify that the installation is satisfactory.

3.2 Start Up Assistance

.1 Notify the Contract Administrator fourteen (14) calendar days ahead of the date when startup is to take place. Have the supplier send a skilled serviceman to the Site. The visit to Site may be concurrent with the check of satisfactory installation if mutually agreed by the supplier, the Contractor and the Contract Administrator.

.2 On his start-up visit the supplier's skilled serviceman shall make all necessary checks to equipment and if necessary advise the Contractor as to any further checking, flushing or cleaning required prior to confirming that the equipment is ready to run.

.3 The Contractor and the supplier's skilled representative shall then operate the equipment for at least four (4) hours to demonstrate to themselves the operation of the equipment and controls and shall take all necessary remedial steps to ensure satisfactory operation.

.4 The Contractor shall then notify the Contract Administrator of his readiness to demonstrate the operation of the equipment and the Contract Administrator shall arrange to promptly attend such demonstration together with the City's representative.

.5 The Contractor and the serviceman shall then demonstrate to the Contract Administrator's satisfaction that the equipment is properly aligned, that there is no pipe stress, etc. The Contractor shall carry out such tests as required by the Contract Administrator. All pieces of equipment shall be tested in the presence of the Contract Administrator to ascertain that the equipment conforms with the Contract requirements (i.e. pump flow tests, power draw tests, emergency generator, instruments, HVAC and other electrical systems). The results of such tests shall be recorded by the Contractor on forms whose format has been agreed to by the Contract Administrator and the completed forms, signed by the Contractor, shall be given to the Contract Administrator. The Contractor shall arrange to provide all chemicals to demonstrate satisfactory operation.

.6 Should the demonstration reveal any defects then such shall be promptly rectified by the Contractor and the demonstration of the equipment repeated to the satisfaction of the Contract Administrator. Should such repeat demonstration require a second, or subsequent visit to the Site by the Contract Administrator and / or City's representative, then the additional costs incurred shall be paid for by the Contractor. Upon satisfactory completion of this demonstration the equipment shall then be commissioned as scheduled by the Contractor and approved by the Contract Administrator.

3.3 City's Operator Training

.1 Arrange with the Supplier of Contractor supplied equipment for the provision of a qualified Supplier's representative to provide training of the operations staff with respect to the operation and maintenance of the lift station equipment, as specified in these specifications.

.2 The training sessions shall be in accordance with the respective equipment specifications. Training sessions shall be undertaken prior to successful completion of the commissioning activities for the specified Work.

.3 Minimum number of days to be allowed for to meet the requirements of installation assistance, start-up assistance, commissioning and operator training. The Contractor may combine trips for installation, start-up assistance, commissioning, and operator training. Where full days are not required, partial days are acceptable.

.1 Pumps: Start-up – 1 day, Training – 1 day

.2 Electrical Instrumentation and Controls and HVAC: Start-up – 1 day, Training – 1 day

.3 Natural Gas Generator: Start-up – 1/2 day, Training – 1/2 day

END OF SECTION

CERTIFICATE OF SATISFACTORY COMMISSIONING

FORM 104

Commissioning has been completed in accordance with the specification, except as noted below:

PROJECT: _____

ITEM OF EQUIPMENT: _____

TAG NO.: _____

REFERENCE

SPECIFICATION: _____

OUTSTANDING DEFECTS: _____

_____

(Contractor, Name, Signature) Date

_____

(Equipment Supplier, Name, Signature) Date