

**SECTION 01010**  
**SUMMARY OF WORK**

**PART 1      GENERAL**

1.01      WORK COVERED BY CONTRACT DOCUMENTS

- A.      The completed Work will provide the Owner with upgrades to the existing Wet Well at the North End Water Pollution Control Centre (NEWPCC), as specified in the contract documents, which will maintain its condition and keep it operational until construction of a second Wet Well, which is expected to be completed in the near future. A summary of the Work includes:
1.      Constructing a concrete wall in the overflow conduit to prevent water in the outfall pipe from entering the Wet Well.
  2.      Installing a debris net below the overflow conduit floor to prevent concrete from falling into the Wet Well.
  3.      Construction two access hatches in the Wet Well roof.
  4.      Removing the existing flap gates.
  5.      Removing and replacing all necessary pipes within the Wet Well.
  6.      Removing all abandoned pipes with the exception of the asbestos pipes.
  7.      Replacing the asbestos pipe hangers.
  8.      Removing all ladders and replacing the upper three.
  9.      Removing all platforms and beams.
  10.     Removing and replacing the handrails within the Wet Well building.
  11.     Removing and replacing all electrical within the Wet Well (with the exception of the LEL sensor and ultrasonic level transmitter) with electrical suitable for Class 1, Zone 1 hazardous locations. Wiring to the instrumentation would be replaced only.
  12.     Supplying and installing a new gas-fired make-up air unit on a new platform along with exhaust fan and stack on the Wet Well roof to heat 12 ACPH with turndown capacity.
  13.     Connection of instrumentation and controls to the existing DCS control system.
  14.     Supplying and replacement of motor control centre MCC M with new motor control centres, MCC MA and MCC MB and supply and installation of new transformers.
  15.     Landscaping the site and maintenance of trees and grass during the warranty period.
- B.      The Wet Well is a critical facility in the operation of the wastewater treatment plant and the construction methods and procedures must accommodate its

unique requirements. The facility receives raw sewage on a continuous basis and must remain in operation. Raw sewage produces both odorous and noxious gases, odorous emissions and environmental health and safety concerns must be managed. The Work within the Wet Well is considered confined entry work, with poor access and hazardous working conditions.

- C. MCC M is critical to the functioning of several systems within the Administration Building, including the raw sewage pumping system. The work will involve the planning and transitioning from the existing MCC to the new MCCs without undue interruption to the operation of the treatment plant.

## 1.02 DEFINITIONS

- A. Engineer: Where the word Engineer appears in reference to contract administration, it shall mean the Contract Administrator
- B. Owner: Means the City, as defined in Part C: General Conditions.
- C. Surge Well: The facility name and references to Surge Well have been replaced by the term Wet Well, and where Surge Well appears in reference to the NEWPCC structure, it shall be considered interchangeable with Wet Well.
- D. General Requirements: Refers to Division 1 of these specifications.

## 1.03 OWNER-FURNISHED PRODUCTS

- A. Contractor to provide all new Material as specified in the Contract Documents.

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

## **PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01040  
COORDINATION**

**PART 1 GENERAL**

1.01 SUBMITTALS

A. Informational:

1. Photographs:
  - a. Digital Images: Submit on compact disc or by other approved method of file transfer within 7 days of being taken.
  - b. Color Prints: Submit two copies, within 7 days of being requested.
2. Professional photographer is not required for this contract.
3. Professional videographer is required for videotaping training sessions for this contract.

B. Action:

1. Construction Sequencing Plan, for the work within the Wet Well.
2. Construction Sequencing Plan, for MCC M replacement.

1.02 RELATED WORK AT SITE

- A. The Contractor is advised that other work on-site includes work by other contractors in different process areas, and ongoing operation and maintenance activities. Numerous vehicles access the site on a continual basis and require clear access. The Contractor is to confine his activities to the designated areas to avoid disruption of work by others.
- B. There is no related work planned to be undertaken which requires direct coordination with the Wet Well Rehabilitation.

1.03 OWNER-FURNISHED PRODUCTS

- A. The Contractor will be provided copies of the Bid Opportunity as identified in the Supplemental Conditions. Maintain one copy in good order on-site.
- B. The Contractor shall provide all Plant, Material and incidentals for this work.

1.04 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during Work.

## 1.05 FACILITY OPERATIONS

- A. Contractor access to the NEWPCC is generally restricted, except as required for the completion of the specified work or as otherwise approved by the Contract Administrator.
- B. Continuous operation of Owner'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.
  - 1. The NEWPCC functions in response to incoming sewage flows, which are generated by domestic sewage and runoff from rainfall and snowmelt. The flow rates are variable depending on the time of day, the season of the year and weather conditions. The contractor is to make himself aware of the potential flow conditions and impact to the operations and plan his work accordingly.
  - 2. Work within the Wet Well is to be undertaken during winter months extending to the end of February. During this time the wastewater flows have historically been at a minimum and river levels are low. Maximum flows during this period when pumping is carried out on a continuous basis is about 250 ML/d.
  - 3. Raw sewage pumping can be shut down for short periods of time and must be coordinated in advance with the Owner and Contract Administrator. As a general guideline, during the winter months a shutdown commencing at 5:00 a.m. can continue until approximately 8:00 a.m. of any day, with the Wet Well rising from a low water level of about -4.50 to -1.50 during the shutdown period, depending on the flows and length of time out of service.
  - 4. The conduit from the Discharge Well to the outfall is a bypass to prevent flooding of the Discharge Well, and functions when raw sewage pumping rates exceed about 675 ML/d.
  - 5. The outfall conveys all treated water from the plant to the river. Its rate of flow generally matches that of the raw sewage pumps. It is currently directly connected to the Wet Well and at high flow rates or high river levels the water backs up to the Wet Well location. In May of 1995 the depth in the Outfall at the effluent discharge chamber, which is a short distance downstream of the Wet Well, was measured to be 1200 mm under low river level conditions and a raw sewage pumping rate of 250 ML/d. This would relate to a datum level of approximately +5.3 at the Wet Well.
  - 6. The six raw sewage pumps in the Administration Building are the only means of maintaining flow through the plant and avoiding raw sewage from spilling to the river. They have a combined capacity of 1060 ML/d. At low flow periods two to three pumps and their control

components can be taken out of service, and must be coordinated with the Owner and Contract Administrator.

7. MCC M provides power to both essential and non-essential loads within the Administration Building. Replacement of the MCC must be coordinated to avoid undue service disruptions. Power outages to the laboratory are not permitted during normal working hours. Early morning, evening and weekend work may be required to complete the replacement. Short intermittent power outages followed by re-energization may be necessary to maintain processes and operations within acceptable operational ranges.
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- C. Perform Work continuously during shut downs and while making critical connections and changeovers, and as required to prevent interruption of Owner's operations.
  - D. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
  - E. 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 Owner and Contract Administrator. Such authorization will be considered within 48 hours after receipt of Contractor's written request.
  - F. Construction Sequencing for Wet Well: Contractor to be responsible for construction sequencing to provide for Owner's continuous occupancy and operation during construction. The following example is a suggested sequence of construction and is intended for illustration purposes only, the Contractor is to investigate the site and construction requirements and develop a final construction sequence to complete the work, for approval by the Owner and Contract Administrator and incorporation into the schedule:
    1. Excavate approximately 0.9 meters of soil covering the Wet Well roof.
    2. Make two cutouts in the Wet Well roof to provide access for construction of the new concrete wall and work within the Wet Well. Cut out sections are to be secured prior to cutting to prevent concrete from falling into Wet Well.
    3. Provide temporary enclosure over access points to prevent odour emissions, and provide heat, ventilation and humidity control as required.
    4. Plug the outfall to prevent backflow water from entering the Wet Well. Contractor to determine method, such as sewer plug, sand bags or bulkhead. Confined entry procedures are required.
    5. Plug, seal off or restrict flows from the Discharge Well bypass conduit to prevent overflows from entering the outfall. Contractor to determine method, such as metal plate or pump lockout. Confined entry procedures are required.

6. Dewater and clean grit from the overflow conduit. Confined entry procedures are required.
  7. Remove flap gates in the overflow conduit. Confined entry procedures are required.
  8. Install debris mesh under the overflow conduit floor. Confined entry procedures are required.
  9. Construct concrete wall at the entrance of the Wet Well to prevent backflow from the outfall from entering Wet Well. Confined entry procedures are required.
  10. Drill holes in the bottom of the overflow conduit floor to drain water that may accumulate. Confined entry procedures.
  11. Remove Discharge Well bypass plug if applicable. Confined entry procedures.
  12. Remove outfall plug. Confined entry procedures.
  13. Complete work within Wet Well, place pre-cast concrete panels over hatches and seal.
- G. Construction Sequencing for MCC Replacement: Contractor to be responsible for construction sequencing to provide for Owner's continuous occupancy and operation during construction. The Contractor is advised that wiring schematics are not available for MCC M and that an inspection of the MCC is required prior to undertaking any work, and will be required to document the equipment requirements to fully replace the existing functionality and prepare a wiring schematic for the replacement. The following example is a suggested general sequence of construction and is intended for illustration purposes only, the Contractor is to investigate the site and construction requirements and develop a final construction sequence to complete the work for approval by the Owner and Contract Administrator and incorporation into the schedule:
1. Install a temporary panelboard with redundant equipment as shown on the drawings and provide power from a spare breaker located in compartment 8EL of the existing MCC.
  2. Rewire six essential loads from existing Sections 1 to 5 to spare locations in existing Sections 6 to 9.
  3. Rewire the two remaining essential loads in Sections 1 to 5 (from compartments 1A and 1C) to the temporary panelboard, thereby completing removal of all essential loads from Sections 1 to 5.
  4. Remove Section 1 to 5 enclosures and replace with new MCC MB.
  5. Connect all loads in Sections 1 to 5 as shown on the drawings, connect power from the new transformer.
  6. Rewire the seven (including three suction valves) remaining essential loads in Sections 6 to 9 to the temporary panelboard, thereby removing all essential loads from Sections 6 to 10.
  7. Remove the temporary panelboard power connection from the existing MCC and connect the temporary panelboard to the existing transformer.
  8. Remove Sections 6 to 10 and replace with MCC MA.

9. Connect all loads in Sections 6 to 10 as shown on the drawings, connect power from existing transformer.
10. Remove temporary panelboard.

H. Process or Facility Shutdown:

1. Provide **7** days advance written request for approval of need to shut down a process or facility to Contract Administrator.
2. Power outages will be considered upon 48 hours written request to Owner 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.
3. Schedule and complete connections to existing services within the time constraints approved by the Contract Administrator.

I. Install and maintain bypass facilities and temporary connections required to keep Owner's operations on line. Sequences of construction will be considered upon written request to Owner and Contract Administrator.

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

K. Relocation of Existing Facilities:

1. During construction, it is expected that minor relocations of Work will be necessary.
2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
4. Perform relocations to minimize downtime of existing facilities.
5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Contract Administrator.

## 1.06 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. After Effective Date of the Agreement and before Work at site is started, Contractor, Contract Administrator, and affected property owners and utility owners 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, 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 Owner.

1.07 CONSTRUCTION PHOTOGRAPHS

- A. Photographically document all phases of the project including preconstruction, construction progress, and post-construction.
- B. Provide digital images at a resolution of not less than 2 and not more than 4 mega pixels each.
- C. Print development shall be done by a commercial laboratory.
- D. Contract Administrator shall have the right to select the subject matter and vantage point from which photographs are to be taken.
- E. Preconstruction and Post-construction:
  1. After Effective Date of the Agreement and before Work at site is started, and again upon issuance of Substantial Performance, take a minimum of **48** photographs of construction site and property adjacent to perimeter of construction site.
- F. Construction Progress Photos:
  1. Photographically demonstrate progress of construction, showing every aspect of site and adjacent areas as well as interior and exterior of new or impacted structures.

1.08 REFERENCE POINTS AND SURVEYS

- A. Location and elevations are shown on Drawings for reference.
- B. Contractor's Responsibilities:



1. Provide survey and layout required to layout the Work.
2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
3. In event of discrepancy in data, request clarification before proceeding with Work.
4. Maintain complete accurate log of survey Work as it progresses as a Record Document.
5. On request of Contract Administrator, submit documentation.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**4.01 SALVAGE OF MATERIALS**

- A. Prior to demolition or removal of material or equipment, Contract Administrator will identify equipment and material to be retained by the Owner for salvage.
  1. Remove material with extreme care so as not to damage for future use.
  2. Promptly remove from Work area salvaged materials.
  3. Store materials where instructed by Owner.
- B. Meet with Contract Administrator prior to starting to dismantle equipment or piping designated to be salvaged. Contract Administrator will indicate locations where equipment is to be disconnected.
- C. Provide new or repair damaged equipment or material specified or indicated to be salvaged. Clean and protect equipment from dust, dirt, natural elements, and store as directed.

**4.02 CUTTING, FITTING, AND PATCHING**

- A. Cut, fit, adjust, or patch Work, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of 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. Weather- or moisture-resistant elements.
  3. Efficiency, maintenance, or safety of element.

- C. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown.
- D. 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.
- E. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.

**END OF SECTION**

**SECTION 01060**  
**REGULATORY REQUIREMENTS**

**PART 1      GENERAL**

1.1      SUBMITTALS

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

1.2      APPLICABLE CODES

- A.      Comply with the latest edition of the codes and standards referenced in Contract Documents and the following statutes and codes and all amendments thereto, including but not limited to:
  - 1.      Manitoba Building Code and Regulations.
  - 2.      Manitoba Workplace Safety and Health Act.
  - 3.      Manitoba Plumbing Code.
  - 4.      Manitoba Fire Code.
  - 5.      The Winnipeg Electrical By-Law
  - 6.      City of Winnipeg Building By-Laws
  - 7.      National Building Codes
  - 8.      Codes and Standards of the National Fire Protection Association (NFPA).

1.3      PERMITS, APPROVALS, AND LICENCES

- A.      Contractor will obtain and pay for the following permits and approvals:
  - 1.      Building Permit
  - 2.      All other permits, licences, certificates, and governmental inspections required for the performance of the Work.
- B.      Contractor shall examine the approvals and permits and conform to the requirements contained therein, and such requirements are hereby made a part of these Contract Documents as fully and completely as though the same were set forth herein. Failure to examine the approvals and permits will not relieve Contractor from compliance with the requirements stated therein.
- 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 all regular inspections and final inspections required.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.1 SAFETY**

- A. Provide Safe Work Plan as required in the Supplemental Conditions.
- B. Contractor shall be responsible for safety of employees and other persons entering the Site and shall take all measures necessary to ensure their safety.
- C. Comply with safety codes, and statutes, including those of Workers Compensation Board and Manitoba Workplace Safety and Health.
- D. Comply with the City of Winnipeg Water and Waste Department Asbestos Response Guide when working with or near asbestos.
- E. Work will be required under hazardous condition, comply with the Workplace Safety and Health Act including confined entry and fall protection.

**END OF SECTION**

**SECTION 01200  
PROJECT MEETINGS**

**PART 1 GENERAL**

1.1 GENERAL

- A. Contract Administrator will schedule 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 4 working days after each meeting to participants and parties affected by meeting decisions.

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. Use of site, access, office and storage areas, security and temporary facilities.
7. Submissions
8. Major product delivery and priorities.
9. Contractor's safety plan and representative.

- B. Attendees will include:

1. Owner's representatives.
2. Contractor's office representative.
3. Contractor's resident superintendent.
4. Contractor's quality control representative.
5. Subcontractors' representatives whom Contractor may desire or Contract Administrator may request to attend.
6. Contract Administrator's representatives.
7. Others as appropriate.

1.3 PROGRESS MEETINGS

- A. Contract Administrator will schedule regular progress meetings at site, to review the Work progress, progress schedule, Shop Drawing and Sample submissions schedule, Application for Payment, contract modifications, and other matters needing discussion and resolution. Meetings will normally be

held **weekly**, but may be delayed or deferred at the discretion of the Contract Administrator, but will not be held less than bi-weekly.

B. Attendees will include:

1. Owner's representative(s), as appropriate.
2. Contractor, Subcontractors, and Suppliers, as appropriate.
3. Contract Administrator's representative(s).
4. Others as appropriate.

#### 1.4 QUALITY CONTROL AND COORDINATION MEETINGS

A. Scheduled by Contract Administrator as necessary to review test and inspection reports, and other matters relating to quality control of the Work of other contractors.

B. Attendees will include:

1. Contractor.
2. Quality control representative.
3. Subcontractors and Suppliers, as necessary.
4. Contract Administrator's representatives.

#### 1.5 PREINSTALLATION MEETINGS

A. When required in individual Specification sections, convene at site prior to commencing the Work of that section.

B. Require attendance of entities directly affecting, or affected by, the Work of that section.

C. Notify Contract Administrator **ten** days in advance of meeting date.

D. Provide suggested agenda to Contract Administrator to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

#### 1.6 FACILITY STARTUP MEETINGS

A. Schedule and attend a minimum of **two** facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01810, 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. Contractor's designated quality control representative.
3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
4. Contract Administrator's representatives.
5. Owner's operations personnel.
6. 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 Owner and Contract Administrator.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## SECTION 01300 SUBMITTALS

### PART 1 GENERAL

#### 1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor, that requires Contract Administrator's review.
- B. Informational Submittal: Information submitted by Contractor, that does not require Contract Administrator's review. Submittals not meeting conditions of the Contract will be returned.

#### 1.02 PROCEDURES

- A. Direct submittals to Contract Administrator, unless specified otherwise.
- B. 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 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) Contract Administrator will not review submittals that do not bear Contractor's approval stamp and will return them without action.
      - 3) 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 attached at end of this section **or** in format approved by Contract Administrator.
  - 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 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.
- C. 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.
  4. Index with labeled tab dividers in orderly manner.
- D. Timeliness: Schedule and submit in accordance with schedule of Shop Drawing and Sample submittals, and requirements of individual Specification sections.
- E. Processing Time:
  1. Time for review shall commence on Contract Administrator's receipt of submittal.
  2. Contract Administrator will act upon Contractor's submittal and transmit response, or if unresolved submit a status update, to Contractor not later than 20 days after receipt, unless otherwise specified. Contract Administrator will endeavor to act upon submittals in accordance with work schedules and contractor identified priorities.
  3. Resubmittals will be subject to same review time.
  4. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmittals.
  5. Allow additional review time for complex equipment and systems.
- F. Resubmittals: Clearly identify each correction or change made.
- G. Incomplete Submittals:
  1. 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. Insufficient number of copies.
- H. Submittals not required by Contract Documents:

1. Will not be reviewed and will be returned stamped “Not Subject to Review.”
2. Contract Administrator will keep one copy and return all remaining copies to Contractor.

### 1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual Specification sections.
- B. Shop Drawings:
  1. Shop Drawing submission and review by Contract Administrator is to ascertain general conformance to the design intent, and in no way relieves the Contractor of full responsibility for the design content of that portion of the work, or the quality, operation and performance of the Work.
  2. Shop Drawings include dimensioned line drawings and related specifications, information and literature for custom fabricated articles and equipment and catalogue drawings. Include Shop Drawings for temporary works for the purpose of construction, including shoring, falsework, temporary supports and sewer plugs and bulkheads.
  3. Catalogue Drawings include reprints of catalogue drawings of proprietary articles of standard fabrication and manufacture for the work.
  4. Include ISA data sheets for all instruments.
  5. Provide a schedule of Shop Drawing delivery in an orderly sequence, in conformance with the Preliminary and Detailed Progress Schedules. Allow for Processing Time as stipulated herein, or as otherwise approved by the Contract Administrator.
  6. Shop Drawing submissions containing design information are to include the seal of a qualified Professional Engineer registered or licenced in the Province of Manitoba.
  7. Copies: Six hard copies and an electronic file in AutoCAD version R2000 format as available, or with one reproducible, except copyrighted documents.
  8. 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.
  9. 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.
- 10. Product Data: Provide as specified in individual Specifications.
- 11. 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.
- 12. Units: Submit all Shop Drawings in SI metric units.
- 13. Content for Programmable Devices/Components/Sub-systems:
  - a. 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.
  - b. Functional description.
  - c. Performance data.
  - d. Physical, electrical and environmental requirements.
  - e. Location drawing.
  - f. Equipment descriptive literature.
  - g. Wiring details.
  - h. Configuration Records.
  - i. Bill of Materials showing:
    - 1) Description, make, model, part number and serial number for hardware items and programming tools.
    - 2) Publisher, title, version, part number, serial number, media type and size, and information contained on label for software items and programming tools.
    - 3) Title and publisher for each documentation item.
  - j. Title and part numbers for each DVD, CD-ROM and other storage devices.
  - k. Product description for each item including:
    - 1) Wiring and installation instructions.
    - 2) Functional description.
    - 3) Performance data.
    - 4) Physical, electrical and environmental requirements.
    - 5) Adapters and controllers.
  - l. Equipment layout drawings showing location of hardware, boards, jacks, cables and terminals.
  - m. Module locations, rack numbers.
  - n. Connected field tag numbers and wire numbers.
  - o. Terminal and terminal strip numbers.
  - p. Location and identifier and pin assignment of plugs, jacks and cables.
  - q. Configuration record. Include setup switch settings, operating parameter settings, soft switch settings and addresses.

- r. Interconnection Diagrams. Include wiring, cables, jacks, power supplies, processors, communications modules, racks, I/O modules and peripherals. Label terminals, jacks and pins. Show settings for jumpers and switches. Show address for each hardware module and point.
  - s. Description of operation covering internal logic, external process equipment and control devices and the associated process and control equipment actions.
14. Interconnection Drawings to detail interface to Owners existing ABB DCS System. Include control wiring and equipment diagrams, loop drawings and control philosophy describing the physical and operational interconnection.

C. Samples:

- 1. Copies: Two, 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.

D. Action Submittal Dispositions: Contract Administrator will review, mark, and stamp as appropriate, and distribute marked-up copies as noted:

- 1. No Exceptions Taken:
  - a. Contractor may incorporate product(s) or implement Work covered by submittal.
  - b. Distribution:
    - 1) One copy furnished Owner.
    - 2) One copy furnished Resident Project Representative.
    - 3) One copy retained in Contract Administrator's file.
    - 4) Remaining copies returned to Contractor appropriately annotated.
- 2. Exceptions Taken:
  - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Contract Administrator's notations.
  - b. Distribution:

- 1) One copy furnished Owner.
  - 2) One copy furnished Resident Project Representative.
  - 3) One copy retained in Contract Administrator's file.
  - 4) Remaining copies returned to Contractor appropriately annotated.
3. Exceptions Taken, Resubmit Missing Components:
    - a. Make corrections or obtain missing portions, and resubmit.
    - b. Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Contract Administrator's notations.
    - c. Distribution:
      - 1) One copy furnished Owner.
      - 2) One copy furnished Resident Project Representative.
      - 3) One copy retained in Contract Administrator's file.
      - 4) Remaining copies returned to Contractor appropriately annotated.
  4. Exceptions Taken, Resubmit:
    - a. Contractor may not incorporate product(s) or implement Work covered by submittal.
    - b. Distribution:
      - 1) One copy furnished Resident Project Representative.
      - 2) One copy retained in Contract Administrator's file.
      - 3) Remaining copies returned to Contractor appropriately annotated.

#### 1.04 INFORMATIONAL SUBMITTALS

##### A. General:

1. Copies: Submit three copies, unless otherwise indicated in individual Specification section.
2. Refer to individual Specification sections for specific submittal requirements.
3. Contract Administrator will review each submittal. If submittal meets conditions of the Contract, Contract Administrator will forward copies to appropriate parties. If Contract Administrator determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Contract Administrator will retain one copy and return remaining copies with review comments to Contractor, and require that submittal be corrected and resubmitted.

##### 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. Installer: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements as specified in individual Specification sections.
  - 4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
  - 5. 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.
  - 6. Manufacturer's Certificate of Compliance
  - 7. Manufacturer's Certificate of Proper Installation.
- C. Construction Photographs and training Video in accordance with Section 01040, Coordination, and as may otherwise be required in Contract Documents.
- D. Contract Closeout Submittals: In accordance with Section 01780, Contract Closeout.
- 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 or registered in the province of Manitoba where required.
- 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 01430, Operation and Maintenance Data.
- H. Schedules:
- 1. Progress Schedules: In accordance with Section 01310, Progress Schedules.

2. Schedule of Shop Drawing and Sample Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01310, Progress Schedules.
  - 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 Contract Administrator, including reviewing and processing time.
  - b. On a monthly basis, submit updated schedule to Contract Administrator if changes have occurred or resubmittals are required.
  
- I. Special Guarantee: Supplier's written guarantee as required in individual Specification sections.
  
- J. Submittals Required by Laws, Regulations, and Governing Agencies:
  1. Submit promptly notifications, reports, certifications and otherwise as may be required, directly to the applicable federal, provincial, or local governing agency or their representative.
  2. Transmit to Contract Administrator for Owner'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: Shall contain signature of person responsible for test or report.
  2. Factory:
    - a. Identification of product and Specification section, type of inspection or test with referenced standard or code.
    - b. Date of test, Project title and number, and name and signature of authorized person.
    - c. Test results.
    - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
    - e. Provide interpretation of test results, when requested by Contract Administrator.
    - f. Other items as identified in individual Specification sections.
  3. 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 Contract Administrator.
  - i. Other items as identified in individual Specification sections.
- L. Testing and Startup Data: In accordance with Section 01810, Equipment Testing and Facility Startup.
- M. Training Data: In accordance with Section 01640, Manufacturers' Services.

1.05 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)

DATE: \_\_\_\_\_

**TO:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Submittal No.: \_\_\_\_\_

New Submittal       Resubmittal

Project: \_\_\_\_\_

Project No.: \_\_\_\_\_

Specification Section No.: \_\_\_\_\_

**(Cover only one section with each transmittal)**

Schedule Date of Submittal:  
 \_\_\_\_\_

**FROM:** \_\_\_\_\_  
 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

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 Signature)

**SECTION 01310  
PROGRESS SCHEDULES**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

**A. Informational Submittals:**

1. Preliminary Work Schedule:
  - a. Submit at least 5 working days prior to preconstruction conference.
2. Detailed Work Schedule:
  - a. Submit detailed work schedule within time specified in Supplemental Conditions.
  - b. Update detailed work schedule within 3 days of receiving Contract Administrator's approval of a schedule change.
  - c. Submit hard copy and electronic copy in Microsoft Office Project 2003 format, unless otherwise approved by Contract Administrator.
3. Progress Updates:
  - a. Submit actual work update at each progress meeting.
  - b. Provide hard copies for all attendees of the Progress Meetings.
  - c. Submit Narrative Progress Report at each progress meeting: Same number of copies as specified for schedule update.

**1.2 PRELIMINARY WORK SCHEDULE**

**A. Show an estimated work schedule, beginning with Notice to Proceed, and other major activities through to Completion.**

**B. Show activities including, but not limited to the following:**

1. Notice to Proceed.
2. Bonds, Insurance and Permits.
3. Mobilization
4. Submittals, with review time. Contractor may use schedule of Shop Drawings and Samples specified in Section 01300, Submittals.
5. Procurement and delivery time for major equipment.
6. Specified Work sequences and construction constraints.
7. Contract Milestone and Completion Dates.
8. Major structural, mechanical, equipment, electrical, and instrumentation and control Work.
9. System startup.
10. Demobilization.

### 1.3 DETAILED WORK SCHEDULE

- A. Further to the requirements of Supplemental Conditions, submit detailed work 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 Contract Administrator, detailed work schedule will replace preliminary work schedule and become baseline schedule. Subsequent revisions will be considered as updated work schedules.

### 1.4 WORK SCHEDULE – BAR CHART

- A. Format: In accordance with Supplemental Conditions - BAR CHART and CRITICAL PATH NETWORK.
  - 1. Title Block: Show name of project and Owner, date submitted, revision or update number.
  - 2. Identify horizontally, across the top of the schedule, the time frame by year, month, and day.
  - 3. Identify each task or activity with a unique number and a brief description of the Work associated with that activity.
  - 4. 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 those activities described in the Supplemental Conditions.

### 1.5 WORK SCHEDULE – CRITICAL PATH NETWORK

- A. Contents:
  - 1. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Completion.
  - 2. Show interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
  - 3. Identify the work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
  - 4. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones and work sequencing and constraints set forth in Section 01040, Coordination.

### 1.6 PROGRESS OF THE WORK

- A. Progress Updates for each task are to be plotted on the Detailed Work Schedule Gantt Chart for a comparison of planned to actual work.
- B. Progress Updates shall reflect:
  - 1. Progress of Work to within 2 working days prior to submission.
  - 2. Delays in submittals or resubmittals, deliveries, or Work.
  - 3. Adjusted or modified sequences of Work.
  - 4. Other identifiable changes.
  - 5. Revised projections of progress and completion.
  - 6. Report of changed logic.
- C. Produce detailed sub-schedules during Project, upon request of Contract Administrator, to further define critical portions of the Work such as facility shutdowns.
- D. 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 7 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.
- E. Owner 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. Maintain work progress in accordance with the Detailed Work Schedule and fails to submit a written plan acceptable to the Contract Administrator on corrective activities.
  - 3. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner.

## 1.7 NARRATIVE PROGRESS REPORT

- A. Format:
  - 1. Organize same as progress schedule.
  - 2. Activities and tasks are to be cross referenced to the detailed work schedule and progress update.
  - 3. Identify reporting period and date submitted.
- B. Contents:
  - 1. Number of days worked over the period, work force on hand and construction equipment on hand for Contractor and all Subcontractors..

2. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved.
3. Contractor's plan for management of site (e.g., lay down and staging areas, construction traffic), utilization of construction equipment, and identification of potential Contract changes.
4. Identification of new activities and sequences as a result of executed Contract changes.
5. Documentation of weather conditions over the reporting period, and any resulting impacts to the work.
6. Document operational conditions, requests and directives over the reporting period that have or will have any resulting impacts to the work.
7. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact.
8. Changes to activity logic.
9. Changes to the critical path.
10. Identification of, and accompanying reason for, any activities added or deleted since the last report.
11. Steps taken to recover the schedule from Contractor-caused delays.

#### 1.8 SCHEDULE ACCEPTANCE

- A. Contractor shall be responsible for performing the work within the times stipulated in the Supplemental Conditions, which are fixed dates required to be met unless modified by formal Change in Work. Intermediate dates stipulated in the Preliminary and Detailed schedules are for work planning, project control and site activity coordination.
- B. Progress Updates:
  1. Contract Administrator will review progress updates as information and review is not intended to modify the Detailed Work Schedule.
  2. Contract Administrator's review shall not be interpreted as acceptance. 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. 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.
- C. Unacceptable Preliminary Progress Schedule:
  1. Make requested corrections; resubmit within 4 days.
- D. Unacceptable Detailed Progress Schedule:
  1. Make requested corrections; resubmit within 4 days.

2. Until acceptable to Contract Administrator as baseline progress schedule, continue review and revision process.
- E. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to Contract Administrator's acceptance of baseline progress schedule, shall be delineated in Narrative Report current with proposed updated progress schedule.
- F. Change to Detailed Work Schedule
1. Contractor shall identify and provide justification for requested changes to the Detailed Work Schedule by a written change request.
  2. The Contract Administrator shall determine whether a Change in Work related to the Contract Time or Completion Dates is warranted and whether a corresponding change to the completion dates is required.
  3. If a change to the completion dates is approved, the Contractor shall revise the Detailed Work Schedule in accordance with Contract Administrator's formal decision.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01400**  
**QUALITY CONTROL**

**PART 1      GENERAL**

1.1      **QUALITY CONTROL**

- A. Contractor is to provide services of independent inspection companies to perform the following routine quality control services, without additional cost to the Owner:
  - 1. Concrete cylinder testing, for cast-in-place concrete.
  - 2. Welding of structural steel and pipe joints.
- B. Tests by independent agencies do not relieve Contractor of his own quality control.
- C. Owner may request samples at any reasonable time. Cooperate with Contract Administrator. Provide concrete and other materials for tests as may be required.
- D. Additional testing required to prove the adequacy of construction shall be at Contractor's expense, where the routine test shows the construction to be inadequate or where Contractor's materials and procedures have not been as specified or when work has proceeded without observation.
- E. Such additional testing or retesting will be performed by a testing agency approved by Owner.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01430**  
**OPERATION AND MAINTENANCE DATA**

**PART 1 GENERAL**

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Contract Administrator's review of operations and maintenance (O&M) data, as required by individual Specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for 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 are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 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 final disposition completed by 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.

1.04 DATA FORMAT

- A. Prepare job specific and customized portions of the manuals in Microsoft Office Word 2003 and AutoCAD R2000 formats for subsequent turn over to the Owner.
- B. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format and on electronic media.
- C. Instructional Manual Format (Preliminary):



1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
2. Size: 8-1/2 inches by 11 inches, minimum.
3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
  - a. Project title.
  - b. Designate applicable system, equipment, material, or finish.
  - c. Identity of separate structure as applicable.
  - d. Identity of equipment number and Specification section.
4. Title Page:
  - a. Contractor name, address, and telephone number.
  - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
    - 1) Identify area of responsibility of each.
    - 2) Provide name and telephone number of local source of supply for parts and replacement.
5. Table of Contents:
  - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
  - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
6. Paper: 20-pound minimum, white for typed pages.
7. Text: Manufacturer's printed data, or neatly typewritten.
8. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
9. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.

D. Data Compilation Format (Final):

1. Compile all Contract Administrator-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
  - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
  - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. \_\_\_ OF \_\_\_", and list:
    - 1) Project title.
    - 2) Contractor's name, address, and telephone number.
    - 3) 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.

- c. 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.
- d. Table of contents neatly typewritten, arranged in a systematic order:
  - 1) Include list of each product, indexed to content of each volume.
  - 2) Designate system or equipment for which it is intended.
  - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
- e. Section Dividers:
  - 1) Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
  - 2) 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.
- f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

E. Electronic Media Format:

- 1. Provide all job specific and customized documents as well as all available Manufacturers' data in Microsoft Word and AutoCAD formats. Use Manufacturers' standard electronic format, or PDF of data compilation format where not available.

1.05 SUBMITTALS

A. Informational:

- 1. Data Outline: Submit two copies of a detailed outline of proposed organization and contents of final data prior to preparation of preliminary data.
- 2. Preliminary Data:
  - a. Submit three copies for Contract Administrator's review.
  - b. If data meets conditions of the Contract:
    - 1) One copy will be returned to CONTRACTOR.

- 2) One copy will be forwarded to Resident Project Representative.
- 3) One copy will be retained in Contract Administrator's file.
- c. If data does not meet conditions of the Contract:
  - 1) All copies will be returned to CONTRACTOR with Contract Administrator's comments (on separate document) for revision.
  - 2) Contract Administrator's comments will be retained in Contract Administrator's file.
  - 3) Resubmit three copies revised in accordance with Contract Administrator's comments.
3. Final Data: Submit three copies in format specified herein.

## 1.06 DATA FOR EQUIPMENT AND SYSTEMS

### 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:
    - 1) Identify specific product or part installed.
    - 2) Identify data applicable to installation.
    - 3) Delete references to inapplicable information.
  - c. Function, normal operating characteristics, and limiting conditions.
  - d. Performance curves, engineering data, nameplate data, and tests.
  - e. Complete nomenclature and commercial number of replaceable parts.
  - f. 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.
  - g. Spare parts ordering instructions.
  - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
  - a. Format:
    - 1) Provide reinforced, punched, binder tab; bind in with text.
    - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
    - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.

- 4) 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.
5. Instructions and Procedures: Within text, as required to supplement product data.
- a. Format:
    - 1) Organize in consistent format under separate heading for each different procedure.
    - 2) Provide logical sequence of instructions for each procedure.
    - 3) Provide information sheet for Owner's personnel, including:
      - a) Proper procedures in event of failure.
      - b) Instances that might affect validity of guarantee or Bond.
  - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
  - c. Operating Procedures:
    - 1) Startup, break-in, routine, and normal operating instructions.
    - 2) Test procedures and results of factory tests where required.
    - 3) Regulation, control, stopping, and emergency instructions.
    - 4) Description of operation sequence by control manufacturer.
    - 5) Shutdown instructions for both short and extended duration.
    - 6) Summer and winter operating instructions, as applicable.
    - 7) Safety precautions.
    - 8) Special operating instructions.
  - d. Maintenance and Overhaul Procedures:
    - 1) Routine maintenance.
    - 2) Guide to troubleshooting.
    - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
6. Guarantee, Bond, and Service Agreement: In accordance with Section 01780, Contract Closeout.

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. Functional description.
- 4. Wiring details.
- 5. Configuration Records; record of switch settings, program listings and parameter settings, after commissioning.
- 6. Maintenance manuals.
- 7. User guides, technical reference and programming manuals.
- 8. CD-ROMs or DVD copies of:
  - a. Manuals.
  - b. Settings, databases and templates. Include both native format of files and ASCII-exported version.
  - c. Application programs.
- 9. Cable and software for use on Owner's notebook computer for revising/downloading the settings and software.

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.
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.

#### 1.07 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.

#### 1.08 SUPPLEMENTS

##### A. The supplements listed below, following "End of Section", are part of this Specification.

1. Forms: Maintenance Summary Form.

**PART 2 PRODUCTS (NOTUSED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**





8. LUBRICANT LIST

<b>Reference Symbol</b>	<b>Name</b>	<b>Name</b>	<b>Name</b>	<b>Name</b>	<b>Name</b>
List symbols used in No. 7. above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

<b>Part No.</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Cost</b>
Note: Identify parts provided by this Contract with two asterisks.				

**SECTION 01500**  
**CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

**PART 1 GENERAL**

1.01 REFERENCES

- A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto identified in Section 01060, including:
1. Manitoba Workplace Safety and Health Act.
  2. Public Health Act.
  3. City of Winnipeg Building By-Laws.
  4. NFPA, National Fire Prevention Standard for Safeguarding Building Construction Operations.

1.02 SUBMITTALS

- A. Informational Submittals:
1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
  2. Temporary Utility Submittals:
    - a. Electric power supply and distribution plans.
    - b. Water supply and distribution plans.
  3. Temporary Construction Submittals:
    - a. Contractor's and Contract Administrator's field office plans
    - b. Parking area plans.
    - c. Laydown and staging area location plan and storage building plans.
    - d. Security, fencing and protective barrier locations and details.
    - e. Traffic Control and Routing Plans.
    - f. Temporary enclosures, ventilation and heating plans.
    - g. Plan for maintenance of existing plant operations.

**MOBILIZATION**

- B. Mobilization shall include, but not be limited to, these principal items:
1. Obtaining required permits.
  2. Moving field offices and equipment onto site.
  3. Security and protective fencing.
  4. Installing temporary construction power, wiring, and lighting facilities.
  5. Providing onsite communication facilities, including telephones.
  6. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.

7. Arranging for and erection of Contractor's work and storage yard.
  8. Posting Manitoba Workplace Safety and Health Act notices and establishing safety programs and procedures.
- C. Use area designated for Contractor's temporary facilities as shown on Drawings or otherwise directed by Contract Administrator.

#### 1.03 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Erect a barrier fence around work areas to restrict pedestrian access.
- C. Keep Owner informed of serious onsite accidents and related claims.
- D. Use of Explosives: No blasting or use of explosives will be allowed onsite

### **PART 2 PRODUCTS**

#### 2.01 CONTRACTOR'S FIELD OFFICE

- A. Contractor shall provide and maintain a field office of suitable size, suitably lighted, heated, ventilated and equipped, for own use.
- B. Include a general meeting room with a table and chairs adequate to accommodate project meetings as specified in Section 01200.
- C. Equip field office with first aid equipment to a minimum as recommended by regulations.

#### 2.02 CONTRACT ADMINISTRATOR'S FIELD OFFICES

- A. Provide an office for the Contract Administrator.
- B. If the Contract Administrator's office is to be located in same structure as superintendent's office, it shall be partitioned off and provided with separate, lockable entrance.
- C. Furnish equipment specified for exclusive use of Contract Administrator and its representatives.
- D. Ownership of equipment furnished under this article will remain, unless otherwise specified, that of Contractor.
- E. Office Equipment-General:
  1. Bottled Water Service: One.

2. Paper Towel Dispenser with Towels: One.
3. Office Desk: One.
4. Office Chair: One.
5. Folding Table: One,
6. Steel Folding Chairs: Two.
7. Wastepaper Basket: One
8. First-Aid Kit: One.
9. Carbon Dioxide (10-Pound) Fire Extinguisher: One.

## 2.03 PROJECT SIGN

- A. Provide and maintain one, 2400 mm wide by 1200 mm high sign constructed of 19 mm exterior high density overlaid plywood. Sign shall bear name of Project, Owner, Contractor, Contract Administrator, and other participating agencies. Lettering shall be blue applied on a white background by an experienced sign painter. Paint shall be exterior type enamel. Information to be included will be provided by Contract Administrator.
- B. Erect project sign at a location acceptable to Contract Administrator as soon as Work commences on Site and maintain in position until Completion. Relocate project sign when necessary or directed by Contract Administrator.
- C. Provide signage requirements in compliance with Manitoba Workplace Safety and Health Act requirements, either incorporated into the project sign, or in addition to.

## PART 3 EXECUTION

### 3.01 CONTRACT ADMINISTRATOR'S FIELD OFFICE

- A. Make available for Contract Administrator's use prior to start of the Work at site, to remain on the site until Total Performance has been achieved.
- B. Locate where directed by Contract Administrator; level, block, tie down, skirt, provide stairways, and relocate when necessary and approved. Construct on proper foundations, provide proper surface drainage and connections for utility services.
- C. Provide sanitary facilities in compliance with provincial and local health authorities.
- D. Maintain in good repair and appearance, and provide minimum of weekly cleaning service and replenishment, as required, of paper towels, paper cups, hand soap, toilet paper, first-aid kit supplies, and bottled water.

### 3.02 TEMPORARY UTILITIES

#### A. Power:

1. Contractor is responsible for providing power. Make arrangements for obtaining temporary electric power service, metering equipment, and pay all costs for the electric power used during contract period, except for portions of the Work designated in writing by Contract Administrator as substantially performed.
2. Cost of electric power used in performance and acceptance testing will be borne by Owner.

#### B. Lighting: Provide temporary lighting to meet all applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.

#### C. Heating, Cooling, and Ventilating:

1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity. Costs for temporary heat shall be borne by Contractor.
2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.
4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
5. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.

#### D. Water:

1. Make arrangements for and bear costs of providing water required for drinking by construction personnel during construction.
2. Contractor to provide all construction and maintenance water at no additional cost to Owner.

#### E. Sanitary and Personnel Facilities:

1. Owner's washroom facilities are not to be used by Contractor. Provide and maintain facilities for Contractor's employees, Subcontractors, and all other onsite employer's employees. Service, clean, and maintain

facilities and enclosures. Comply with the regulations under the Public Health Act, including sewage holding facilities and water storage.

F. Communication Services:

1. No incoming calls allowed to Owner's plant telephone system.

G. Fire Protection: Furnish and maintain on site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

### 3.03 PROTECTION OF WORK AND PROPERTY

A. General:

1. Maintain in continuous service all existing oil and gas pipelines, power, telephone or communication cable, water mains, sewers, power lines, and all other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
2. Where completion of the Work requires temporary or permanent removal and/or relocation of existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
3. Protect, shore, brace, support, and maintain pipes, conduits, drains, and other utility construction uncovered or otherwise affected by construction operations.
4. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
5. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
6. Notify utility offices that may be affected by construction operation at least 2 days in advance.
  - a. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
7. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
8. Maintain original site drainage wherever possible.
9. Prevent dust and dirt from entering existing buildings or areas where equipment is stored or is operating. Prevent dust, water or other

deleterious substances from entering areas with existing electrical, heating ventilating, pumping, and other equipment.

B. Site Security:

1. Erect a temporary security fence for safety and protection of existing facilities. Maintain fence throughout construction period. Obtain Contract Administrator's written permission before removal of temporary security fencing.
2. Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

C. Equipment Cleaning: Keep equipment clean so that no debris is deposited on plant roadways. Contain construction debris in designated area within working limits. Dispose of debris off-site as specified.

D. Trees and Plantings:

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on the Drawings to remain undisturbed.
  - a. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of Contract Administrator.
  - b. Dispose of removed trees in a legal manner off the site.
2. Replace each plant that dies as a result of construction activities.

E. Dewatering:

1. Construct, maintain, and operate sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain foundations and parts of the Work free from water.

### 3.04 TEMPORARY CONTROLS

A. Air Pollution Control:

1. Minimize air pollution from construction operations.
  - a. Burning: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to site.
  - b. Control escape of odours air from the wastewater treatment facilities.

B. Noise Control:

1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
  2. Use only vehicles and equipment equipped with effective muffling devices.
- C. Water Pollution Control:
1. Do not cause or permit action to occur which would cause an overflow to existing waterway.
  2. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

### 3.05 STORAGE YARDS AND BUILDINGS

- A. Coordinate requirements with Section 01600, Material and Equipment.
- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- C. Temporary Storage Buildings:
1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
  2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
  3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

### 3.06 ACCESS ROADS

- A. Coordinate with Contract Administrator operations affecting traffic and access. Provide at least 72 hours' notice to Contract Administrator of operations that will alter access to the site
- B. Upon completion of construction, restore ground surface disturbed by access road construction to original

### 3.07 PARKING AREAS

- A. Park only in areas designated for the Contractor, or as otherwise instructed by the Owner or Contract Administrator.
- B. No employee or equipment parking will be permitted on Owner's existing paved areas, except as specifically designated for Contractor's use.



- C. Parking area not designated as Contractor's work area must remain clean and free for public parking.

3.08 VEHICULAR TRAFFIC

- A. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- B. The existing roadway may for designated periods of time be barricaded and designated for the exclusive use of the Contractor. Coordinate requirements with Contract Administrator before road closure.

3.09 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in Specification sections, and as required herein.

**END OF SECTION**

**SECTION 01600**  
**MATERIAL AND EQUIPMENT**

**PART 1 GENERAL**

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner 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.

1.02 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 250 m above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of minus 40 degrees C to plus 35 degrees C unless otherwise specified.

1.03 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 Owner 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: Notify Contract Administrator upon arrival for transfer of materials.
  - 5. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Contract Administrator of anticipated date of arrival.
- E. Factory Test Results: Reviewed and accepted by Contract Administrator before product shipment as required in individual Specification sections.

#### 1.04 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. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- 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.

## 1.05 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01500, Construction Facilities and Temporary Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- 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. Connect and operate continuously all space heaters furnished in electrical equipment.
- D. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- E. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- F. Hazardous Materials: Prevent contamination of personnel, storage building, and site. Meet requirements of product specification, codes, and manufacturer's instructions.

## **PART 2 PRODUCTS**

### 2.01 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. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. 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 OSHA, provincial, and local health and safety regulations.
- G. Regulatory Requirement: Coating materials shall meet federal, provincial, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. 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. For outdoors application, prevent entrance of rain and dripping water. Eliminate sharp edges with suitable borders neatly welded.
- I. Provide materials and equipment listed by ULC wherever standards have been established by that agency.
- J. Equipment Finish:
  - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
  - 2. If manufacturer has no standard color, provide equipment with gray finish as approved by Contract Administrator.
- K. Special Tools and Accessories: Furnish to Owner, 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.
- L. 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 Owner.
2. Provide Canadian made lubricants readily available in Canada. To the extent possible, provide lubricants compatible with products currently used in Owner's maintenance operations.
3. Furnish lubricants in original sealed containers, correctly identified as to brand and grade.

M. 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 CSA 2.2, No. 0, No. 11, No. 54, and No. 77.
  - 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.
5. Provide lamicoid labels and equipment tag numbers for all equipment and instruments on the process control system.

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

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

P. Bearings: Unless otherwise specified, provide bearings for rotating equipment suitable for ABMA B-10 life expectancy of minimum 100,000 working hours at rated conditions of service.

## 2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to North American standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 6 mm minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible. Oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

C. Equipment Base Plates:

1. Common base plate for equipment and driver, fabricated from heavy cast iron or welded structural steel section minimum 13 mm thick.
2. Provided with mounting plates minimum 19 mm thick for equipment and driver with mounting surfaces machined to average arithmetical roughness height of 3.0 microns maximum.
3. Provided with grout holes, vent holes, and anchor bolt holes.
4. For equipment where leakage or condensation may occur, equipped with drip lip or gutter, 25 mm NPT bossed drain connection at low point, and drain piping to building drainage system.

2.03 SOURCE QUALITY CONTROL

- A. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- B. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

**PART 3 EXECUTION**

3.01 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.

3.02 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.
  - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.03 FIELD FINISHING

- A. In accordance with Section individual Specification sections.

3.04 ADJUSTMENT AND CLEANING

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

3.05 LUBRICANTS

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

**END OF SECTION**



**SECTION 01640  
MANUFACTURERS' SERVICES**

**PART 1 GENERAL**

1.01 DEFINITIONS

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

1.02 SUBMITTALS

- A. Informational Submittals:

1. Training Schedule: Submit not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.
2. Lesson Plan: Submit proposed lesson plan not less than 21 days prior to scheduled training and revise as necessary for acceptance.
3. Training Session Videos: Furnish Owner with two complete sets of videos fully indexed and cataloged with printed label stating session and date taped.

1.03 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified elsewhere.
- B. Representative subject to acceptance by 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**

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' 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 manufacturers' services, or when a minimum time is not specified, the time required to perform the specified services shall be considered incidental.
- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' 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 Contract Administrator will be credited to fulfill the specified minimum services.
- F. When specified in individual specification sections, manufacturer's onsite services shall include:
  - 1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
  - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
  - 3. Providing copies of all manufacturers' representatives field notes and data to Contract Administrator.
  - 4. Revisiting the site as required to correct problems and until installation and operation are acceptable to Contract Administrator.
  - 5. Resolution of assembly or installation problems attributable to, or associated with, respective manufacturer's products and systems.
  - 6. Assistance during functional and performance testing, and facility startup and evaluation.
  - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.
  - 8. Additional requirements may be specified elsewhere.

### 3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When specified in individual Specification section, submit prior to shipment of product or material.
- B. Signed by product manufacturer certifying that product or material specified conforms to or exceeds specified. Attach supporting reference data, affidavits, and certifications as appropriate.

### 3.03 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by the equipment manufacturer's representative.
- B. Such form shall certify that the signing party is a duly authorized representative of the manufacturer, is empowered by the manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to assure that the equipment is complete and operational.

### 3.04 TRAINING

#### A. General:

1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01430, Operation and Maintenance Data.
3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

#### B. Training Schedule:

1. For equipment and systems that require training services, provide:
  - a. Respective manufacturer and training qualifications.
  - b. Estimated training dates.
2. Allow for multiple sessions when several shifts are involved.
  - a. Allow for 5 separate training sessions.
3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
4. Coordinate with Section 01310, Progress Schedules, and Section 01810, Equipment Testing and Facility Startup.

#### C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare for each required course, containing the following minimum information:

1. Title and objectives.
2. Recommended types of attendees (e.g., managers, engineers, operators, maintenance).
3. Course description and outline of course content.
4. Format (e.g., lecture, self-study, demonstration, hands-on).
5. Instruction materials and equipment requirements.
6. Resumes of instructors providing the training.

#### D. Pre-startup Training:

1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01430, Operation and Maintenance Data.

2. Complete at least 14 days prior to beginning of facility startup.
- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.
- F. Taping of Training Sessions:
1. Filming to be undertaken by professional videographer, in accordance with Section 01040.
  2. Furnish audio and color video taping of instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions.
  3. Use DVD format, suitable for playback on standard equipment available commercially in Canada.
  4. Submit 6 copies.

### 3.05 SUPPLEMENTS

- A. The supplements listed below, following "End of Section", are part of this Specification.
1. Forms: Manufacturer's Certificate of Proper Installation.

**END OF SECTION**

## MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER \_\_\_\_\_ EQPT SERIAL NO: \_\_\_\_\_

EQPT TAG NO: \_\_\_\_\_ EQPT/SYSTEM: \_\_\_\_\_

PROJECT NO: \_\_\_\_\_ SPEC. SECTION: \_\_\_\_\_

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- Installed in accordance with Manufacturer's recommendations.
- Inspected, checked, and adjusted.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections meet quality and safety standards.
- All applicable safety equipment has been properly installed.
- Functional tests.
- System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: \_\_\_\_\_, 20\_\_

Manufacturer: \_\_\_\_\_

By Manufacturer's Authorized Representative: \_\_\_\_\_

(Authorized Signature)

**SECTION 01780  
CONTRACT CLOSEOUT**

**PART 1 GENERAL**

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
  - a. As-Built Documents:
  - b. Training and Operating Manuals
  - c. Testing Reports
  - d. Photographs and videos
  - e. Special Guarantees, Warranties and Service Agreements.
  - f. Releases from Agreements.
  - g. Final Application for Payment.
  - h. Extra Materials, spare parts, special tools: As required by individual Specification sections.

1.02 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 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 Contract Administrator to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases where side agreements have been made.

- B. In the event Contractor is unable to secure written releases:
1. Inform Owner of the reasons.
  2. Owner or its representatives will examine the site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement.
  3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory Bond in a sum to cover legal claims for damages.
  4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 MAINTENANCE OF AS-BUILT DOCUMENTS**

- A. Format:
1. Standard format will be based on initial hand marking of paper copies, with subsequent updating of electronic files by Contract Administrator.
  2. Electronic initial recording format will be considered subject to review and approval by Contract Administrator.
- B. General:
1. Promptly following commencement of Contract Times, secure from 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.
- C. 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 Contract Administrator.

D. 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. Depths of various elements of foundation in relation to finished main floor data if not shown or where depth differs from that shown.
    - b. Horizontal and vertical locations of existing and new Facilities and appurtenances, and other structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
    - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
    - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
    - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and 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,” “PVC 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.

3.02 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; and 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 satisfactory to Contract Administrator.
  2. Remove grease, dirt, dust, paint, stains, labels, and other foreign materials from exposed surfaces.
  3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
  4. Clean all floors and windows.
  5. Broom clean exterior paved driveways, sidewalks and parking areas.
  6. Rake clean all other surfaces.
  7. Clean ducts, blowers, and coils of heating and ventilation units operated during construction and replace filters.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

### 3.03 RELAMPING

- A. If permanent lighting fixtures and lamps are used during construction period prior to Substantial Performance, supply and install new lamps in fixtures or turn over spare lamps to Owner.
- B. Replace incandescent lamps, except in emergency lighting systems, or turn over complete set of spare lamps to Owner.
- C. Replace fluorescent lamps, or turn over spare lamps to Owner, in quantity proportional to the approximate hours used. Supply lamps of equal lifetime rating.

**END OF SECTION**

**SECTION 01810**  
**EQUIPMENT TESTING AND FACILITY STARTUP**

**PART 1 GENERAL**

1.01 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 Contract Administrator to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- D. Performance Test: A test performed in presence of Contract Administrator and after any required functional test, to demonstrate and confirm that individual equipment meets the performance requirements specified in individual sections.
- E. 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.
- F. Unit process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as exhaust fan, or HVAC unit.

1.02 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 14 days prior to start of related testing.
    - b. Facility Startup and Performance Evaluation Plan: Submit at least 14 days prior to commencement of startup.
  - 3. Certification of calibration for testing equipment, when so specified.
  - 4. Documentation of HVAC systems balancing results, when so specified.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.01 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 01200, Project Meetings, and shall be available at all times during the testing and the facility startup and performance evaluation period.

3.02 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 01640, Manufacturers' Services, when required by individual Specification sections.
    - d. Schedule equipment testing and facility startup meetings to discuss test schedule, plan of test, materials required, facilities operations interface, and Owner involvement.
    - e. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.
  - 2. Equipment Test Report Form: Provide written test report form for each item of equipment to be tested, to include the minimum information:
    - a. Owner/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 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, measuring airflow (L/s) static pressure, and component pressure losses.
4. Ready-to-test determination will be by 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
  - f. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
  - g. Satisfactory fulfillment of other specified manufacturers' responsibilities.
  - h. Equipment and electrical tagging complete.
  - i. Delivery of all spare parts and special tools.

**B. Functional Testing:**

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Owner, Contract Administrator, and manufacturer's representative in writing at least 14 days prior to scheduled date of testing.
- 3. When, in 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 Contract Administrator's signature on Equipment Test Report.

**C. Performance Testing:**

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Contract Administrator at least 14 days prior to scheduled date of test.

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

### 3.03 FACILITY STARTUP AND PERFORMANCE EVALUATION

#### A. General:

1. Support Owner's operations personnel throughout Facility Startup and Performance Evaluation Period.
2. Equipment shall be accepted by 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 Owner.
6. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays.
7. Schedule ongoing Work so as not to interfere with or delay the completion of facility startup.
8. After the facility is operating, complete performance testing of those items of equipment not previously tested.

#### B. Facility Startup and Performance Evaluation Plan:

1. Develop a plan in conjunction with Contract Administrator detailing step-by-step instructions for startup of each unit process and the complete facility.
2. Include a method of evaluation and overall performance report for each unit process.
3. When computer subsystem application software is furnished by Owner coordinate with furnishing supplier for specific startup instructions.
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 minimally include 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. Services and equipment 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. Owner Responsibilities:
1. Provide operational input in developing a Facility Startup and Performance Evaluation Plan detailing step-by-step instructions for startup of each unit process and the complete facility.
  2. Provide gas, power, and other items as required for testing and facility startup, unless otherwise indicated.
  3. Operate process units and devices, with support of Contractor.
- D. Facility Startup Period:
1. Startup sequencing of unit processes shall receive the prior approval of the Contract Administrator.
  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 Contract Administrator, facility or designated portion has operated in manner intended for **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 **2** consecutive hours.
    - c. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
    - d. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
    - e. As determined by 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, 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.

3.04 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**

<b>OWNER:</b> _____	<b>PROJECT:</b> _____
<b>Unit Process Description: (Include description and equipment number of all equipment and devices):</b>	
_____	
_____	
_____	
<b>Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):</b>	
_____	
_____	
_____	
_____	
<b>Startup Requirements (Water, power, chemicals, etc.):</b> _____	
_____	
<b>Evaluation Comments:</b> _____	
_____	
_____	
<b>Contractor Certification that Unit Process is capable of performing its intended function(s), including fully automatic operation:</b>	
<b>Firm Name:</b> _____	
<b>Startup Representative:</b> _____	<b>Date:</b> _____, 20
(Authorized Signature)	