
COMMISSIONING FORMS

Part 1 GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 RELATED SECTIONS

- .1 Section 01 91 13 Commissioning Requirements.

1.3 INSTALLATION/START- UP CHECK LISTS

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Contract Administrator supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Contract Administrator. Check lists will be required during Commissioning and will be included in project Operating & Maintenance Manual at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.4 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Contract Administrator's approval.

COMMISSIONING FORMS

1.5

PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Contract Administrator's approval.

1.6

SAMPLES OF COMMISSIONING FORMS

- .1 Contract Administrator will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.7

COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Contract Administrator provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by Contract Administrator.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Contract Administrator with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.
 - .13 Forms to be both hard copy and electronic format with typed written results.

1.8

LANGUAGE

- .1 To suit the language profile of the awarded contract.

COMMISSIONING FORMS

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 Not Used.

END OF SECTION

SUMMARY OF WORK

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 City of Winnipeg General Conditions for Construction (Revision 2006-12-15) and Supplemental Conditions Part D.
- .2 Supplemental Conditions Part D2: Scope of Work.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises the replacement of HVAC systems and associated works, located at the West End Water Pollution Control Center (WEWPCC).

1.3 CONTRACT METHOD

- .1 Construct Work under stipulated price contract.
- .2 Relations and responsibilities between Contractor and subcontractors are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
 - .1 Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations there under when Contractor is required to furnish such bonds to.
 - .2 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to.

1.4 WORK SEQUENCE

- .1 Construct Work in stages to accommodate City's continued use of premises during construction. To this end the works shall generally be constructed in accordance with the sequence of construction highlighted in the Supplemental Conditions Part D2 Scope of Work.
- .2 Co-ordinate progress Schedule and co-ordinate with City and Contract Administrator during construction.
- .3 Required stages:
 - .1 Refer to Supplementary Conditions for a milestone date listing of key construction milestones.
- .4 Maintain fire access/control.

1.5 CONTRACTOR USE OF PREMISES

- .1 Restricted use of site until Substantial Performance.
- .2 Co-ordinate use of premises under direction of City personnel and Contract Administrator.

SUMMARY OF WORK

- .3 The Contractor, the City and the Contract Administrator, prior to construction, shall prepare a photographic record of existing conditions. This photographic record shall form the basis of defining all existing conditions prior to construction.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Contract Administrator.
- .7 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 CITY OCCUPANCY

- .1 City will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with City and Contract Administrator in scheduling operations to minimize conflict and to facilitate City usage.

1.7 PARTIAL CITY OCCUPANCY

- .1 Schedule and substantially complete designated portions of Work for City's occupancy/use prior to Substantial Performance of entire Work.
- .2 City will occupy all areas for purpose of on-going operations.
- .3 Execute each designated portion of Work prior to City occupancy. Contractor shall allow:
 - .1 Access for City personnel.
 - .2 Operation of HVAC and electrical systems.
 - .3 Access and operation of all effluent treatment and miscellaneous systems.
- .4 On occupancy, City will provide for occupied areas:
 - .1 Operation of HVAC and electrical systems.
 - .2 Maintenance.
 - .3 Operation of systems deemed normal to operation of effluent treatment facility.
 - .4 Security.
- .5 Interim Certificate of Completion for each designated portion of Work prior to City occupancy will not be granted in accordance with the City's standard General Conditions. Contractor shall allow once testing and commissioning of individual systems is complete and deemed ready for use:
 - .1 Access for City personnel.
 - .2 Operation of HVAC and electrical systems.
- .6 Contractor Responsibilities:

SUMMARY OF WORK

- .1 Designate submittals and delivery date for each product in progress schedule.
- .2 Review shop drawings, product data, samples, and other submittals. Submit to Contract Administrator notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
- .3 Receive and unload products at site.
- .4 Inspect deliveries jointly with City; record shortages, and damaged or defective items.
- .5 Handle products at site, including uncrating and storage.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises. Arrange with City personnel to facilitate execution of work.
- .2 Use only designated by City areas and routes, in building for moving workers and material.
 - .1 Protect walls, floors, roofs, equipment and other finished surfaces during construction activities.
 - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.

1.9 EXISTING SERVICES

- .1 Notify utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give 72 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to City personnel and operations traffic.
- .3 Provide alternative routes for personnel and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify of findings.
- .5 Submit schedule to and obtain approval from City personnel for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services when directed by City personnel to maintain critical building systems.

SUMMARY OF WORK

- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers in accordance with the authority-having-jurisdiction (COR) and City safe work policies.

1.10 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Record progress drawings.
 - .12 Construction progress meeting minutes.
 - .13 Up-to-date construction progress schedule.
 - .14 Labour & equipment reports.
 - .15 Other documents as specified.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

Part 3 EXECUTION

- .1 Not used.

END OF SECTION

PROJECT MEETINGS

Part 1 GENERAL

1.1 ADMINISTRATIVE

- .1 The Contract Administrator shall administer project meetings throughout the progress of the work.
- .2 The Contract Administrator shall prepare agenda for meetings.
- .3 The Contract Administrator shall distribute written notice of each meeting four days in advance of meeting date.
- .4 The Contract Administrator shall provide physical space and make arrangements for meetings.
- .5 The Contract Administrator shall preside at meetings.
- .6 The Contract Administrator shall record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 The Contract Administrator shall reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, the Contract Administrator will request a project meeting of parties in the Contract to discuss and resolve administrative procedures and responsibilities.
- .2 Representatives of the City, Contract Administrator, Contractor, and major Subcontractors must be in attendance.
- .3 Representatives of the Contractor and Subcontractors attending the preconstruction meeting must be qualified and authorized to act on behalf of the party each represents.
- .4 After the time and location of this meeting has been established, the Contractor shall notify all parties concerned a minimum of ten days before the meeting.
- .5 The Contract Administrator will arrange space and facilities for this meeting.
- .6 The Contract Administrator will chair and record discussions and decision, and circulate the meeting notes to all parties concerned.
- .7 Agenda to include the following:
 - .1 Appointment and notification of official representatives of participants in the Work

PROJECT MEETINGS

- .2 Schedule of the Work, progress scheduling
- .3 Schedule of Shop Drawing submissions
- .4 Schedule for the procurement and delivery of specified equipment
- .5 Plant orientation program
- .6 Requirements for temporary facilities, Site signs, office, storage sheds, utilities, hoarding, Site access, and use
- .7 Site security
- .8 Health and Safety issues
- .9 Modification procedures, Contemplated Change Notices and Authorization for Contract Changes procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements as originated by the City or in the case of a savings, by the Contractor
- .10 Product and tool storage
- .11 Weather protection
- .12 As-Constructed Drawings
- .13 O & M Manuals
- .14 Commissioning, acceptance, and handover
- .15 Warranties
- .16 Monthly progress claims, administrative procedures, holdbacks
- .17 Appointment of inspection and testing agencies or firms
- .18 Insurances and transcript of policies
- .19 Communications routing and logistics
- .20 Access to the Site and Work areas (security)
- .21 Survey
- .22 A schedule for progress meetings
- .23 Photographs
- .24 Emergency telephone numbers
- .25 Other items as arise at the meetings

1.3 PROGRESS MEETINGS

- .1 The Contract Administrator shall schedule and administer progress meetings once every two weeks during construction and through the commissioning period.
- .2 Provide input to the Contract Administrator for the meeting agenda.
- .3 Representatives of the City, Contract Administrator, Contractor, and major Subcontractors must be in attendance. Arrange for the attendance of other trades and suppliers as necessary to address issues on the agenda.
- .4 Representatives of the Contractor, Subcontractors, and suppliers attending meetings must be qualified and authorized to act on behalf of the party each represents.
- .5 Agenda for construction progress meetings to include the following:
 - .1 Review and approval of minutes of previous meeting
 - .2 Field observations, problems, conflicts

PROJECT MEETINGS

- .3 Review submittal schedules: expedite as required.
 - .4 Review of off-site fabrication and delivery schedule
 - .5 Progress, schedule, during succeeding Work period
 - .6 Problems, which impede construction schedule
 - .7 Corrective measures and procedures to regain projected schedule
 - .8 Revisions to construction schedule
 - .9 Site coordination review
 - .10 Maintenance of quality standards
 - .11 Review of Site cleanliness
 - .12 Review of Site safety and security
 - .13 Review of temporary facilities
 - .14 Review requests for information
 - .15 Review of Contemplated Change Notices, Field Orders, Authorization for Contract Change, and Field Instructions
 - .16 Review proposed changes for effect on construction schedule and on completion date
 - .17 Review of progress payments
 - .18 Outstanding action items
 - .19 Date and location of next meeting
 - .20 Other business
- .6 The Contract Administrator will preside at the meetings.
- .7 The Contract Administrator will record notes of the project meetings, including significant proceedings, decision, "Action By" parties, dates for completion of duties, etc.
- .8 The Contract Administrator reserves the right to cancel any progress meetings or call additional meetings whenever he deems necessary.

1.4 SPECIAL MEETINGS

- .1 Special meetings may be requested by the Contract Administrator or Contractor to discuss specific issues. Generally, three days notice is required for special meetings. The agenda will be fashioned to suit the meeting. Minutes will be kept by the Contract Administrator.

Part 2 PRODUCTS

- .1 Not Used.

Part 3 EXECUTION

- .1 Not Used.

END OF SECTION

SUBMITTAL PROCEDURES

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 79 00 Demonstration & Training
- .2 Section 01 78 00 Close-out Submittals.

1.2 REFERENCES

- .1 City of Winnipeg Construction Specification No. CW1110 – General Instructions.

1.3 ADMINISTRATIVE

- .1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.
- .10 Keep one reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

SUBMITTAL PROCEDURES

- .2 In accordance with City of Winnipeg Construction Specification No. CW1110 – General Instructions.

1.5 SAMPLES

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

1.6 MOCK-UPS

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.7 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Contract Administrator.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 locations.
 - .1 Viewpoints and their location as determined by Contract Administrator.
- .4 Frequency of photographic documentation: as directed by Contract Administrator.
 - .1 Upon completion of: framing and services before concealment, of Work, and as directed by Contract Administrator.

1.8 CERTIFICATES AND TRANSCRIPTS

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

SUBMITTAL PROCEDURES

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 Not Used.

END OF SECTION

REGULATORY REQUIREMENTS

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 The City of Winnipeg Standard Construction Specifications Section CW1110-General Instructions.

1.2 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBCC), Manitoba Building Code (MBC), City of Winnipeg Building Bylaw, provincial Department of Labour – Mechanical and Engineering Branch including amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Conform to the latest issue of codes, standards, regulations or technical references specified as amended and revised on date for receipt of Bids.
- .3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Contract Administrator.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Contract Administrator.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Contract Administrator.

1.4 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

1.5 PERMITS & INSPECTIONS BY AHJ's

- .1 Obtain, pay for and co-ordinate all required, building permits, equipment permits, mechanical and electrical permits, supervised start-up inspections, building, mechanical and electrical inspections as required by the authorities-having-jurisdiction (AHJ) over the Work of this Contract.

REGULATORY REQUIREMENTS

Part 2 PRODUCTS

2.1 NOT USED

Part 3 EXECUTION

3.1 NOT USED.

END OF SECTION

QUALITY CONTROL

Part 1 GENERAL

1.1 REFERENCES

- .1 City of Winnipeg General Conditions for Construction, (2006-12-15)
- .2 Section 03 30 00 Cast-in-Place Concrete.
- .3 Section 04 05 12 Masonry Mortar and Grout

1.2 INSPECTION

- .1 Access for inspection in accordance with C11.
- .2 Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.
- .2 Submit for list of proposed testing agencies to Contract Administrator for approval prior to construction.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to City. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

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

QUALITY CONTROL

- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

- .1 Refer to City General Conditions for Construction, C11.7.
- .2 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .3 Make good other Contractor's work damaged by such removals or replacements promptly.
- .4 If in opinion of Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, City will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Contract Administrator.

1.7 REPORTS

- .1 Submit electronic copies in PDF file format of inspection and test reports to Contract Administrator.
- .2 Provide copies to subcontractor of work being inspected or tested.

1.8 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by City and may be authorized as recoverable.

1.9 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Contract Administrator.
- .3 Prepare mock-ups for Contract Administrator review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

QUALITY CONTROL

- .5 If requested, Contract Administrator will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Contract Administrator.

1.10 MILL TESTS

- .1 Submit mill test certificates as requested.

1.11 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical systems.
- .2 Refer to Section for definitive requirements.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

- .1 Not Used.

END OF SECTION

CONSTRUCTION FACILITIES & SUPPORT SERVICES

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 City of Winnipeg General Conditions for Construction (Revision 2006-12-15) and Supplemental Conditions Part D.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding ramps ladders swing staging platforms temporary stairs.

1.5 HOISTING

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists and cranes to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

- .1 Limited parking for Contractor and Subcontractor staff will be permitted on site as directed by the Contract Administrator or City's representative.
- .2 Provide and maintain adequate access to project site.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- .3 Clean roadways and staging areas where used by Contractor's equipment.

1.8 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 OFFICES

- .1 The City will provide a meeting space of sufficient size to accommodate site meetings and furnished with drawing laydown table and IT connections.
- .2 The Contractor and Subcontractors shall provide their own offices as necessary. Coordinate the location of these offices with Contract Administrator and/or City staff.
- .3 Provide marked and fully stocked first-aid case in a readily available location.
- .4 Contract Administrator's site office.
 - .1 Not required.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 CONSTRUCTION SIGNAGE

- .1 The City does not require a project sign for this project..
- .2 No other signs or advertisements, other than warning signs, are permitted on site.
- .3 Placement of warning or informational signs are subject to the approval of Contract Administrator.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Contract Administrator.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Contract Administrator.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work in areas where dictated by construction activities.
- .14 Remove, upon completion of work, haul roads designated by Contract Administrator.

1.14 CONTRACTOR'S SUPPORT FUNCTION - SUMMARY

- .1 The Contractor shall provide all materials and services and perform all installation comprised in the Work with the exception of items supplied or to be done by the City. Without limiting the Summary of Work to be done by the Contractor and specific works listed in other Sections such supply and installation work shall include,
 - .1 Provision of such qualified and competent personnel as may be necessary to do the construction supervision management, labour relations, purchasing, administration, supervision, accounting, storekeeping, extra work and cost estimating, scheduling, check out, and start-up for the construction installation work specified.
 - .2 Provision of all materials required for installation in the work other than those supplied by the City and provision of all materials incidental to the work for City supplied equipment and material.
 - .3 Provision of all labour for installation, check out, commissioning, start-up and start-up of standby equipment included in the work until accepted by the Contract Administrator.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- .4 Provision of all material, labour, and facilities required for the unloading, loading, transporting and storing of materials and service equipment, including the payment of freight to and from the site for equipment and materials supplied by the Contractor.
- .5 Provision of all non-consumable construction tools and construction facilities and the supply of all consumable construction tools and materials in accordance with the General and Supplemental Conditions.
- .6 Provision of expediting services required to ensure that all materials necessary for the work, other than those supplied by the City, are delivered to the site in the proper and orderly manner required maintaining the progress and schedule of construction.
- .7 Provision of room and board and living allowances as may be required for all Contractors' employees engaged on the work.
- .8 Provision of travel and travel time allowances for all Contractors' employees engaged on the work.
- .9 Co-ordinating the work of this Contract with the Contract Administrator and the Contractor's subcontractors and work by Others so that there is no interference with or delay caused to the work.
- .10 The supply and erection of temporary construction facilities required for this Contract in areas approved by the Contract Administrator.
- .11 The exercising of great care at all times to avoid damage to or interference with installations being installed by Others.
- .12 Clean up all debris left in carrying out the Work of this Contract. The debris shall be hauled off site by the Contractor to landfill or equivalent recycling facility as dictated by the appropriate regulatory agency.
- .13 Materials and equipment to be removed and replaced as part of the Contract Works will generally be disposed of off-site by the Contractor as part of the Work. The City may elect to salvage certain components for future use or spares; prior to removing materials and equipment from site confirm with City operating staff which components are to be set aside for City salvage. The co-ordination of this work and labour to set aside items identified for salvage is considered incidental to the Work and no separate payment for this service will be considered by the Contract Administrator.
- .14 The Contractor shall recognize that continuous clean-up shall be necessary to ensure safety of personnel and continuity of WEWPCC operations. Prior to the Contractor leaving the work area for extended periods, or when required by the Contract Administrator such as weekends, he shall perform a major cleanup.
- .15 The Contractor shall provide qualified technicians and trades people to perform all necessary pre-commissioning testing, and to assist others during all phases of system commissioning.

1.15 CONSTRUCTION SERVICES - SUMMARY

- .1 Without limiting the services specifically requested in this and other Sections the Contractor shall as a minimum be responsible for the following construction services:
 - .1 Installation/Removal
 - .1 Provide construction facilities and temporary controls in order to execute work expeditiously.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- .2 Remove from site all such work after use.
- .3 Heating & hoarding
 - .1 Erect hoarding to protect public, workers, public and private property from injury or damage.
 - .2 Hoarding shall provide control of contaminants that may affect on-going operations at the WEWPCC.
 - .3 Temporary heating as required to carry-on the works within the temperature ranges dictated by the operations being carried out and/or material requirements.
- .4 Weather Enclosures
 - .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
 - .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work area for temporary heat.
- .5 Dust Tight Screens
- .6 Provide dust tight screens or partitions to localize dust-generating activities, and for protection of works, finished areas of work and WEWPCC operations.
- .7 Maintain and relocate protection until such work is complete.
- .8 Provide necessary ventilation for protection of equipment and workers within dust-fume generating areas.
- .9 Dewatering,
 - .1 Provide temporary drainage and pumping facilities to keep work areas free from standing water.
- .10 Sanitary Facilities
 - .1 Provide as required to meet local workplace health and safety requirements.
- .11 Temporary Ventilation
 - .1 Provide temporary ventilation during construction period to remove fumes and vapours and to allow proper curing of paint systems, including attendance and maintenance.
 - .2 Construction heaters if used inside building must be vented to outside or be non-flameless type.
 - .3 Maintain temperatures of minimum 10 ° C in areas where construction is in progress, unless indicated otherwise in specifications, (painting requirements may dictate higher temperatures).
 - .4 Ventilate heated areas and keep building free of welding exhaust or other combustion gases and paint off-gassing solvent vapours.
 - .5 Permanent heating system of building or portions thereof may be used when available. Be responsible for damage thereto.
 - .6 Provide all temporary ventilation required and dictated by legislation to safely work in *confined-space-areas*.
- .2 Communication
 - .1 The Contractor shall provide at his own expense, telephone, and other communication facilities he may require.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- .3 Off-loading and Warehousing of City and Contractor Supplied Material
 - .1 Material arriving at the Site after the Contractor arrives on site shall be off-loaded and placed in appropriate storage by the Contractor in areas designated by the Contract Administrator. Suitable protection where necessary shall be supplied by the Contractor.
 - .2 The Contractor shall be responsible for proper storage of the equipment and all further handling of the equipment until the equipment is installed and accepted by the Contract Administrator.
 - .3 The Contractor shall cooperate with the Contract Administrator to perform proper receiving documentation such as material receiving reports, inspection reports, overs and shortage, and damage reports.
- .4 Tool Crib
 - .1 The Contractor shall be responsible for his own tool crib in a Contractor supplied trailer.
 - .2 The Contractor shall be responsible for all equipment, harnesses, monitoring instruments, etc. as dictated by work to be executed in Confined-Space-Areas. THE CITY WILL NOT MAKE EQUIPMENT AVAILABLE FOR THIS PURPOSE.
- .5 Shop Inspection and Expediting
 - .1 The Contractor shall provide shop inspection and expediting and freight forwarding of all equipment purchased by the Contractor.
- .6 Temporary Power & Lighting
 - .1 The Contractor shall provide all auxiliary lighting for his work.
 - .2 The City will make existing 115V, convenience receptacles available for use by the Contractor.
 - .3 Provide and pay for any temporary power required during construction for equipment power requirements beyond what can be operated from a convenience receptacle.
- .7 Responsibility for Equipment and Materials
 - .1 If equipment or material is supplied, equipment and materials are to be supplied by the City shall, unless otherwise specified, be turned over to the Contractor upon arrival at Site. From the time the Contractor takes delivery of any equipment until the time it has been installed and accepted by the Contract Administrator, the Contractor shall assume full responsibility for the equipment. Upon receipt, the Contractor shall assure himself that the equipment is in good order. Acceptance by the Contractor shall be taken as confirmation that the equipment was received in good order unless he has advised the Contract Administrator otherwise.
 - .2 Manufacturer's storage, handling, installation, check-out, lubrication, and start-up instruction and details shall be followed exactly wherever such instructions are available with the equipment.
 - .3 Improper installation of equipment and materials, due to failure in complying with these requirements, authorizes the Contract Administrator to require removal and reinstallation at no increase in Contract Price.
 - .4 All work completed or in progress as well as buildings, machinery, and equipment that may be damaged through execution of the Contractor's work shall be protected by the Contractor. Such protection shall remain

CONSTRUCTION FACILITIES & SUPPORT SERVICES

- and be maintained until its removal is approved by the Contract Administrator.
- .8 Project Cleanliness
 - .1 Maintain the work in tidy condition, free from accumulation of waste products and debris.
 - .2 Remove waste material and debris from site and deposit in outdoor enclosed waste container at end of each working day. Dispose of materials off-site at required frequency.
 - .3 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.
 - .4 Remove construction debris, waste materials, packaging material from work site daily.
 - .5 Clean dirt or mud tracked onto paved or surfaced roadways.
 - .9 Security Fencing
 - .1 Erect appropriate temporary measures around any hazardous areas to prevent unauthorized access.
 - .10 Permits and Fees
 - .1 Obtain all necessary permits and pay associated fees.
 - .11 Fire Protection
 - .1 Maintain on site portable fire extinguishers and employ fire watches as required by the authority having jurisdiction and WEWPCC safety guidelines.
 - .12 Cutting and Patching
 - .1 General
 - .1 The equipment, ducting and piping installation Work specified in this Contract includes the installation by the Contractor of equipment, piping, ducting and materials by the Contractor. Cutting and patching is required to implement this work. Providing the necessary cutting and patching and related architectural and civil works shall be co-ordinated by and provided by the Contractor using trade persons skilled and regularly involved in the Work being carried out. These works may be simply detailed/described on the drawings; it is the responsibility of the Contractor to fully investigate and provide the services and materials necessary to execute these works.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

CONSTRUCTION FACILITIES & SUPPORT SERVICES

Part 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

TEMPORARY BARRIERS AND ENCLOSURES

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 52 00 Construction Facilities & Support Services.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121, Douglas Fir Plywood.

1.3 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.4 HOARDING

- .1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.
- .2 Apply plywood panels vertically as indicated flush and butt jointed.
- .3 Provide one two lockable truck entrance gate gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .5 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
- .6 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre. Provide one lockable truck gate. Maintain fence in good repair.
- .7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells and open edges of floors and roofs.

TEMPORARY BARRIERS AND ENCLOSURES

- .2 Provide as required by governing authorities.

1.6 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.7 DUST TIGHT SCREENS

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.8 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.9 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.11 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Contract Administrator locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.12 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling and dispose of off site.

TEMPORARY BARRIERS AND ENCLOSURES

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

.1 Not Used.

END OF SECTION

COMMON PRODUCT REQUIREMENTS

Part 1 GENERAL

1.1 REFERENCES

- .1 The City of Winnipeg Standard Construction Specifications CW1110 - General Instructions
- .2 Within text of each specifications section, reference may be made to reference standards, codes or regulations. Conform to the most recent edition of these standards, codes and regulations.
- .3 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .4 If there is question as to whether products or systems are in conformance with applicable standards, Contract Administrator reserves right to have such products or systems tested to prove or disprove conformance.
- .5 Cost for such testing will be borne by Contract Administrator in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Contract Administrator based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify

COMMON PRODUCT REQUIREMENTS

Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

- .2 In event of failure to notify Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of [Contract Administrator].
- .9 Touch-up damaged factory finished surfaces to Contract Administrator's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by City will be paid for by City. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specification, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions; Contract Administrator will establish course of action.

COMMON PRODUCT REQUIREMENTS

- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Contract Administrator, whose decision is final.

1.8 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.10 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate. Field confirm all layouts prior to construction using certified for construction shop drawing dimensional data.
- .2 Inform Contract Administrator of conflicting installation. Install as directed.

1.12 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

COMMON PRODUCT REQUIREMENTS

- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive stainless steel fasteners and anchors for securing exterior work, unless other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 316 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Contract Administrator.

1.15 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by City and local governing authorities, with minimum of disturbance to Work, and/or building occupants or operations.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

- .1 Not Used.

COMMON PRODUCT REQUIREMENTS

END OF SECTION

CLEANING

Part 1 GENERAL

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by City or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

Part 3 EXECUTION

3.1 Not Used.

END OF SECTION

CLEANING

CLOSEOUT PROCEDURES

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 11 Cleaning.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Contract Administrator in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Contract Administrator inspection.
- .2 Contract Administrator Inspection:
 - .1 Contract Administrator and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificates in that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Certificates required by Building Inspector, Utility companies, Department of Labour, Manufacturer's Representative report (where requested), etc.: submitted.
 - .5 Operation of systems: demonstrated to City's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Contract Administrator.
 - .7 Submission of project operation & maintenance manuals.
- .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Contract Administrator, and Contractor.
 - .2 When Work incomplete according to Contract Administrator, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Remove surplus materials, excess materials, rubbish, tools and equipment.

CLOSEOUT PROCEDURES

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 Not Used.

END OF SECTION

CLOSEOUT SUBMITTALS

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 31 19 Project Meetings,
- .2 Section 01 45 00 Quality Control,
- .3 Section 01 79 00 Demonstration & Training.
- .4 D27 Warranty.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with contractor's representative and Contract Administrator, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and warranty requirements.
 - .2 Contract Administrator to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, four final copies of operating and maintenance manuals and Record Documents in English (hard paper copies) and one electronic copy (PDF file format).
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 FORMAT

- .1 Organize data as instructional manual.

CLOSEOUT SUBMITTALS

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

1.5

CONTENTS - PROJECT RECORD DOCUMENT – O&M MANUAL

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

CLOSEOUT SUBMITTALS

- 1.6 AS -BUILT DOCUMENTS AND SAMPLES**
- .1 Maintain, in addition to requirements in General Conditions, at site for Contract Administrator one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
 - .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
 - .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
 - .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
 - .5 Keep record documents and samples available for inspection by Contract Administrator.
- 1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**
- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided to Contract Administrator.
 - .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
 - .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
 - .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.

CLOSEOUT SUBMITTALS

- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.8 FINAL SURVEY

- .1 Not Applicable this project.

1.9 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

CLOSEOUT SUBMITTALS

- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

1.10 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.11 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Contract Administrator.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Contract Administrator.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site location as directed; place and store.

CLOSEOUT SUBMITTALS

- .4 Receive and catalogue items.
 - .1 Submit inventory listing to Contract Administrator.
 - .2 Include approved listings in Maintenance Manual.

1.12 DELIVERY, STORAGE AND HANDLING

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

1.13 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Contract Administrator for approval.
- .3 Warranty management plan to include required actions and documents to assure that Contract Administrator receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Contract Administrator for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with City's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

CLOSEOUT SUBMITTALS

- .8 Conduct joint 6 month and 12 month warranty inspection, measured from time of acceptance, by Contract Administrator.

- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.

- .10 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.

- .11 Procedure and status of tagging of equipment covered by extended warranties.

- .12 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

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

- .14 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

Part 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

CLOSEOUT SUBMITTALS

Part 3 EXECUTION

.1 Not Used.

END OF SECTION

DEMONSTRATION AND TRAINING

Part 1 GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to City's personnel four weeks prior to date of final inspection.
- .2 City: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13 General Commissioning Cx Requirements.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 23 05 93 Testing, Adjusting & Balancing and Section 01 91 13 General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location and at classroom provided by City.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: provide amount of time required for instruction of each item of equipment or system to City operating personnel. The level of instruction provided shall be to the satisfaction of the personnel and the Contract Administrator.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Contract Administrator approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

DEMONSTRATION AND TRAINING

1.3

QUALITY ASSURANCE

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct City's personnel.
 - .2 Provide written report that demonstration and instructions have been completed.

Part 2

PRODUCTS

2.1

NOT USED

- .1 Not Used.

Part 3

EXECUTION

3.1

Not Used.

END OF SECTION

COMMISSIONING REQUIREMENTS

Part 1 GENERAL

1.1 GENERAL

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

1.2 RELATED REQUIREMENTS

- .1 Section 01 91 33 Commissioning Forms.

1.3 INTENT

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

1.4 DEFINITIONS

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

1.5 COMMISSIONING TEAM

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

COMMISSIONING REQUIREMENTS

- 1.6 COMMISSIONING PLAN**
- .1 Develop a detailed methodology for the commissioning of each system at least 90 calendar days prior to planned start of commissioning. The plan shall be drafted by the Contractor and Contract Administrator and include the following:
 - .1 Detailed schedule of events, including but not limited to the schedule for completion of testing of all component parts of the system in accordance with this Section prior to commissioning of a system.
 - .2 Planned attendance schedule for manufacturer's representatives.
 - .3 Contingency plans in the event of a process malfunction
 - .4 Drawings and sketches as required to illustrate the planned sequence of events.
 - .5 List and details for all temporary equipment (fans, etc.) required to facilitate Commissioning.
 - .6 List of all personnel who the Contractor plans for commissioning and handover with information indicating their qualifications for this Work.
 - .7 The commissioning plan shall be submitted for review to the Contract Administrator prior to its implementation.
 - .8 Sample testing, pre-start up checks, acceptance testing and integration testing forms are attached for a specific system.
- 1.7 EQUIPMENT**
- .1 As required in Section 01 33 00 – Submittals, O&M Manuals will be submitted and reviewed by the Contract Administrator.
 - .2 Staff training sessions shall be completed.
 - .3 Temporary equipment will be installed and tested as necessary to ensure that it functions reliably and consistently through the commissioning period.
- 1.8 CONTROLS**
- .1 All controls which are the responsibility of this Contractor shall be installed and tested prior to commissioning.
 - .2 The Contract Administrator shall arrange for the simulation of the control sequences or shall allow for the operation of the system without the features included in the Work of others. Every effort shall be made to ensure that the commissioning period provides for the full and comprehensive operation of the equipment under all anticipated normal and adverse operating conditions.
- 1.9 PLANT UTILITY SERVICES**
- .1 The City shall provide power, chemicals, and other ancillary services as necessary to operate the plant through the commissioning period. Provisions of these services shall be limited to reasonable levels.
- 1.10 MANPOWER**
- .1 Supply all staff required during commissioning as necessary to assist the City's staff in the operation of the plant.

COMMISSIONING REQUIREMENTS

- .2 Supply competent staff capable of maintaining, repairing, and adjusting the equipment and controls to achieve the intended design functions during the commissioning period.
- .3 Ensure equipment manufacturer's representatives are available as necessary to certify adjustments in equipment, to guide in setting correct operating limits, and to generally provide input as required for the appropriate operations of the equipment.

1.11 OPERATING DESCRIPTIONS

- .1 Operating descriptions shall be prepared by the Contract Administrator for the plant system. Other information outlining the operating requirements shall also be available from the Contract Administrator. The Contractor will review these descriptions and will make themselves familiar with the requirements in order that he can undertake commissioning in an appropriate manner.
- .2 Draft operating descriptions in the form of Control Narratives and block logic diagrams are appended to these technical specifications. The Control narratives and block logic diagrams are preliminary and will be updated, by the Contract Administrator, on the basis of reviewed shop drawings once received. As such minor logic revisions, instrumentation tags, etc. may be revised. The draft operating descriptions are presently in sufficient detail to highlight the works required and are deemed to be adequate to allow for a fixed price quote by the Contractor. Final revisions by the Contract Administrator shall not be construed by the Contractor as extra work.

1.12 DESIGN PARAMETERS

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

Part 2 PRODUCTS

- .1 Not Used.

Part 3 EXECUTION

3.1 GENERAL

- .1 Existing power, heating utilities can be utilized for testing. Any temporary ancillary services required to complete the System Start-Up, Acceptance Testing and Integration Testing are the responsibility of the Contractor.
- .2 Should the System Start-Up, Acceptance Testing or Integration Testing reveal any defects, then those defects shall be promptly rectified and the System Start-Up, Acceptance Testing and/or Integration Testing shall be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Contract, the Contract Administrator, or the City, due to repeat of System Start-Up, Acceptance Testing and/or Integration Testing shall be the responsibility of the Contractor.

COMMISSIONING REQUIREMENTS

- .3 Initial operator training shall be undertaken two weeks prior to commissioning.
- .4 O&M Manuals shall be available as per the requirements of Section 21 05 01 at least 14 days prior to the start of commissioning.

3.2 SYSTEM START-UP

- .1 Each item of equipment included in the system to be commissioned shall be satisfactorily tested.
 - .1 Inform the Contract Administrator at least 14 days in advance of conducting the tests and arrange for the attendance of the manufacturer's representative.
 - .2 The manufacturer's representative will conduct all necessary checks to equipment and if necessary, advise the Contractor of any further checking, flushing, cleaning, or other Work needed prior to confirming the equipment is ready to run.
 - .3 The Contractor shall then operate the equipment for at least one hour to demonstrate to himself the operation of the equipment and any required ancillary services. Any remedial measure required to ensure satisfactory operation shall be promptly undertaken.
- .2 Piping, wiring, and other conduit systems shall be finished and tested.
- .3 Electrical connections shall be completed and inspected to the satisfaction of the governing authorities.
- .4 Contractor shall obtain and pay for all inspections and approvals required by the Department of Labour and any authorities having jurisdiction.
- .5 All other regulatory inspections shall be completed to the satisfaction of the governing authorities.
- .6 Control systems shall be completed and the related control software debugged.

3.3 ACCEPTANCE TESTING

- .1 For each system, the following sequence of events shall be followed:
 - .1 The Contractor shall notify the Contract Administrator of his readiness to demonstrate the operation of the equipment. The Contract Administrator shall attend, as expeditiously as possible.
 - .2 The Contract Administrator will make operating descriptions available prior to testing.
 - .3 With the assistance of the manufacturer's representative, the Contractor will demonstrate that the equipment is properly installed. Alignment, piping connections, electrical connections, etc., will be checked and if appropriate, code verifications provided.
 - .4 Start and run in manual mode (non PLC mode). Local controls shall be satisfactorily verified by cycling the equipment through several start-stop operations, modulating its output, or some combination. Operating parameters such as temperature, pressure, voltage, vibration, etc., will be checked to ensure that they are within the specified or manufacturer's recommended limits, whichever is more stringent.

COMMISSIONING REQUIREMENTS

- .5 On satisfactory completion of the demonstration, the equipment will be stopped and critical parameters, such as alignment, will be rechecked.
- .6 The Contractor shall affix to the tested equipment a 100 mm by 200 mm card reading “Operable Condition – Do Not Operate without Contractor’s Permission.” stencilled on in large black letters.

3.4 INTEGRATION TESTING

- .1 Start and run in automatic PLC mode. PLC operation shall be satisfactorily verified by inducing all minor and major alarm conditions to ensure the system reacts as intended.
- .2 All components and systems shall be operated in the automatic/manual and the remote/local modes as required to prove proper PLC operation.
- .3 Commence commissioning period of 28 days. The equipment shall operate continuously and successfully through the last seven days of a commissioning period. Minor failures shall not void the commissioning period. A minor failure is defined as one which does not present a safety hazard, does not impact overall process functioning and be temporarily overcome by the use of available standby equipment. The last seven days of the commissioning period shall be re-started if a critical failure occurs. A critical failure shall be deemed as one, which prohibits the process from functioning successfully for an eight hour period or one, which creates a safety hazard.
- .4 The Contractor shall submit the results of the integration testing to the Contract Administrator, documented and summarized in a format acceptable to the Contract Administrator. The Contract Administrator reserves the right to requires additional testing. No equipment shall be accepted and handed over to the City prior to the satisfactory completion of the integration testing and receipts of the test reports.

3.5 ACCEPTANCE TESTING

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

END OF SECTION