Part 1 General

1.1 REFERENCES

.1 Form A: Prices

.2 City of Winnipeg Standard Construction Specifications

.3 Section E Specifications

1.2 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

.1 General Requirements

.1 General Requirements will be measured and paid in accordance with E5.

.2 Surface Works

.1 All Surface Works items identified in Sections B and C on Form B: Prices that reference the City of Winnipeg Standard Construction Specifications will be measured and paid in accordance with that referenced specification.

.2 Traffic Signs

.1 Traffic Signs will be measured for payment on a unit basis for each size and paid for at the Contract Unit Price bid. The number of units to be paid for will be the total number of traffic signs supplied, and installed in accordance with Specification 10 14 53, accepted and measured by the Contract Administrator.

.3 Gates

.1 Gates will be measured for payment on a unit basis and paid for at the Contract Unit Price bid. The number of units to be paid for will be the total number of gates supplied, and installed in accordance with Specification 11 12 00, and the manufacturer's instructions including the foundation, housing, control unit, heater, electrical connections, barrier boom and pendulum support accepted and measured by the Contract Administrator.

.4 Bollards

.1 Bollards will be measured for payment on a unit basis and paid for at the Contract Unit Price bid. The number of units to be paid for will be the total number of bollards supplied and installed in accordance with Specification 32 40 10, accepted and measured by the Contract Administrator.

.5 Tree Relocation

.1 Tree Relocation will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for the trees identified on the drawings for relocation and will be relocated in accordance with Specification 32 93 11, accepted and measured by the Contract Administrator.

.3 Land Drainage Sewer

.1 All Land Drainage Sewer items identified in Section B on Form B: Prices that reference the City of Winnipeg Standard Construction Specifications will be measured and paid in accordance with that referenced specification.

.4 Wastewater Sewer

.1 All Wastewater Sewer items identified in Sections B and C on Form B: Prices that reference the City of Winnipeg Standard Construction Specifications will be measured and paid in accordance with that referenced specification.

.5 Forcemain

.1 All Forcemain items identified in Section B on Form B: Prices that reference the City of Winnipeg Standard Construction Specifications will be measured and paid in accordance with that referenced specification.

.2 Forcemain

.1 Forcemain will be measured for payment and paid in accordance with CW 2110 Clause 4.1. The lineal metres of forcemain paid will be the total lineal metres of forcemain supplied, and installed in accordance with Specification 33 34 00, accepted and measured by the Contract Administrator.

.6 Water

.1 All Water items identified in Sections B and C on Form B: Prices that reference the City of Winnipeg Standard Construction Specifications will be measured and paid in accordance with that referenced specification.

.7 Vent Pipe

.1 Vent Pipe will be measured for payment on a length basis and paid for at the Contract Unit Price bid. The number of lineal metres to be paid for will be the total number of lineal metres of vent pipe supplied and installed in accordance with Specification 33 47 23, accepted and measured by the Contract Administrator.

.8 Buildings – Structural, Mechanical, Electrical, Instrumentation

.1 Hauled Wastewater Receiving Building

.1 Hauled Wastewater Receiving Building will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for construction of the Hauled Wastewater Receiving Buildings constructed at the NEWPCC and the SEWPCC in accordance with Divisions 01, 03, 04, 05, 07, 08, 09, 21, and 31 accepted and measured by the Contract Administrator.

.2 Leachate Receiving Building

.1 Leachate Receiving Building will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for construction of the Leachate Receiving Buildings constructed at the NEWPCC in accordance with Divisions 01, 03, 04, 05, 07, 08, 09, 21, and 31 accepted and measured by the Contract Administrator.

.3 Electrical Works

.1 Electrical Works will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for the supply and installation of all electrical works in accordance with Division 26, accepted and measured by the Contract Administrator.

.4 Process Mechanical

.1 Process Mechanical Works will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for the supply and installation of all process mechanical works in accordance with Division 44, accepted and measured by the Contract Administrator.

.5 Process Control and Instrumentation

.1 Process Control and Instrumentation Works will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for the supply and installation of all process control and instrumentation works in accordance with Divisions 28 and 40, accepted and measured by the Contract Administrator.

.6 Mechanical Works

.1 Mechanical Works will be measured for payment on a lump sum basis and paid for at the Contract Unit Price bid. The lump sum amount to be paid will be for the supply and installation of all mechanical works in accordance with Divisions 22, and 23, accepted and measured by the Contract Administrator.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 General Conditions C11 Inspection

.2 Section 01 91 13 - General commissioning Requirements

.3 Section 01 78 00 – Closeout Submittals.

1.2 INSPECTION

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

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator.

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

.4 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. If such Work is found in accordance with Contract Documents, Contract Administrator shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

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

.2 Employment of inspection/testing agencies by the Contract Administrator does not relax the Contractor's responsibility to perform Work in accordance with Contract Documents.

.3 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 Contract Administrator at no cost to Contract Administrator. Pay costs for retesting and reinspection.

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 Contract Administrator in advance of requirement for tests, in order that attendance arrangements can be made.

.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 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.

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

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

1.7 REPORTS

.1 Submit 4copies of inspection and test reports to Contract Administrator.

.2 Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

1.9 MOCK-UPS

.1 A masonry mock-up is required for the brick and stone.

.2 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.3 Construct in locations acceptable to Contract Administrator as specified in specific Section.

.4 Prepare mock-ups for Contract Administrator’s review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.5 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.

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

.7 Remove mock-up at conclusion of Work or when acceptable to Contract Administrator.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.11 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-0121-[M1978(R2003)], Douglas Fir Plywood.

.2 CAN/CSA-S269.2-[M1987(R2003)], Access Scaffolding for Construction Purposes.

.3 CAN/CSA-Z321-[96(R2001)], Signs and Symbols for the Occupational Environment.

.2 Manitoba Department of Labour Guidelines.

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Refer to site plan for designated construction facilities location.

.2 Coordinate details of construction facilities with Contract Administrator and City.

.3 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.

.4 Coordinate location of construction facilities with Contract Administrator and City.

.5 Identify areas which have to be gravelled to prevent tracking of mud.

.6 Provide construction facilities in order to execute work expeditiously.

.7 Remove from site all such work after use.

.8 Restore construction facilities area to original conditions acceptable to Contract Administrator and City.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, platforms and temporary stairs

1.5 SHORING

.1 Maintain shoring in accordance with Manitoba Department of Labour guidelines

1.6 HOISTING

.1 Provide, operate and maintain hoists and cranesas 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.

1.7 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.

1.8 CONSTRUCTION PARKING

.1 Refer to site plan for designated construction facilities location. Parking will be confined to the construction facilities area.

.2 Twenty (20) vehicle stalls will be available to the Contractor for his use located at the NEWPCC. These spots are located north of the Work Site adjacent to the east fence, on the gravelled area only. Vehicles may not park on the asphalt surface. See Figure 1 in Appendix B.

.3 Contractor parking will be provided along the east side of Ed Spencer Drive at the SEWPCC.

.4 Parking will be permitted on site provided it does not disrupt performance of Work or the operation of the City of Winnipeg NEWPCC and or SEWPCC facilities.

.5 Provide and maintain adequate access to project site.

.6 Clean roadways where used by Contractor's equipment.

1.9 SECURITY

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

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 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Contract Administrator.

.2 Construction sign 2.43 m long x 2.48 m high of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, name of City, Contract Administrator and Contractor and Subcontractors, of design style approved by the Contract Administrator.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Locate construction sign where indicated or as directed by Contract Administrator.

.6 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.7 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Contract Administrator.

1.12 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.

.3 One lane of traffic on the entrance and exit roads **MUST** remain open at all times, 24 hours/day, 7 days/week.

.4 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

.5 Protect travelling public from damage to person and property.

.6 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.7 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.9 Dirt and dust control: adequate to ensure safe operation at all times.

.10 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.11 Provide snow removal during period of Work.

1.13 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

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 into the facility land drainage sewers (LDS) or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction or requirements of authorities having jurisdiction, whichever is more stringent.

.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

Part 1 General

1.1 RELATED SECTIONS

.1 General Conditions D9 – Safe Work Plan

.2 Supplemental Conditions D22 – Prime Contractor – The Workplace Safety and Health Act (Manitoba)

.3 Section 01 41 00 – Regulatory Requirements

.4 Section 01 52 00 - Construction Facilities.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.2 Manitoba Department of Labour guidelines

.3 Canadian Standards Association (CSA International)

.1 CSA-O121-M1978(R2003), 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 GUARD RAILS AND BARRICADES

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

.2 Provide as required by Manitoba Department of Labour guidelines

1.5 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.

1.6 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.

1.7 ACCESS TO SITE

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

1.8 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

.2 Facility entrance and roadway shall remain open during work activities at the entrance and receiving stations.

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 3days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.12 PROTECTION OF EXISTING VEGEATTION

.1 Protect existing vegetation from damage during performance of Work.

.2 Replace damaged vegetation designated as protected.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance good recycling practice.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 General Conditions C-3

.2 Section 01 78 00 – Closeout Submittals.

1.2 REFERENCES

.1 City's identification of existing survey control points and property limits.

1.3 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Contract Administrator.

1.4 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Contract Administrator.

.4 Report to Contract Administrator when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

.1 Establish lines and levels, locate and lay out, by instrumentation.

.2 Stake for grading, fill and topsoil placement and landscaping features.

.3 Establish pipe invert elevations.

.4 Stake batter boards for foundations.

.5 Establish foundation and floor elevations.

.6 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Contract Administrator of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Contract Administrator

1.7 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Contract Administrator of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Contract Administrator.

1.8 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 Maintain a complete and accurate control and survey of foundations and major site improvements showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

.4 Record and maintain records of directional boring control and survey. Record locator instrument position and elevation at intervals of no more than 4 metres.

1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Contract Administrator.

.2 On request of Contract Administrator, submit documentation to verify accuracy of field Contract Administratoring work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.10 SUBSURFACE CONDITIONS

.1 Promptly notify Contract Administrator in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Contract Administrator determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Division 22

.2 Division 23

.3 Division 44

1.2 REFERENCES

1.3 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 not associated with this project.

.2 Reuse and recycle the maximum amount of waste as possible.

.3 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.

.4 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 Provide on-site a minimum of 2 dump containers for collection of waste materials and debris.

.7 Clean interior/exterior Work areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.1 The City will not perform any cleaning operations prior to the Contractor starting the Work or at any time during the progress of the Work. The Contractor is responsible for all cleaning operations.

.8 Store volatile waste in anti spill covered metal containers, and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris other than that caused by City or other Contractors not associated with the project.

.5 Clean existing interior building work areas affected by construction dust and debris. Clean existing piping and building areas that are affected by carry over of construction dust and debris.

.6 Remove waste materials from site at regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.8 Pay all disposal / dumping/ recycling/ tipping fees for waste disposal.

.9 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.10 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floor.

.11 Clean lighting reflectors, lenses, and other lighting surfaces. Clean dust an dirt from the interior of electrical power and control panels.

.12 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.13 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.14 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.15 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.16 Remove dirt and other disfiguration from exterior surfaces.

.17 Clean and sweep roofs, gutters, areaways, and sunken wells.

.18 Sweep and wash clean paved areas. Clean debris and dirt from catch basins and manholes.

.19 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.20 Clean roofs, downspouts, and drainage systems.

.21 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.22 Remove snow and ice from access to building.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 78 00 Closeout Submittals

.2 Section 01 79 00 Demonstrating and Training

.3 .Section 01 91 13 General Commissioning (Cx) Requirements

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor to 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's inspection.

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

.2 Contract Administrator's Inspection:

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

.2 Contractor to correct Work as directed.

.3 Re-inspect corrected incomplete work when request by the Contractor.

.3 Completion Tasks: submit written certificates in English 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 fully operational.

.4 Operation of systems: demonstrated to City's personnel.

.5 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and 01 91 41 – Commissioning Training and copies of final Commissioning Report submitted to Contract Administrator.

.6 Work: complete and ready for final inspection.

.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 City and Contract Administrator, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Contract Administrator considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Final Payment:

.1 When Contract Administrator considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.7 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 77 00 – Closeout

.2 Section 01 79 00 – Demonstration and Training.

.3 Section 01 91 40 – Commissioning Training

1.2 REFERENCES

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Contract Administrator, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Two weeks prior to commissioning of the Work, submit to the Contract Administrator, six final copies of operating and maintenance (O&M) manuals in English. The Contract Administrator will review and comment on the O&M manuals. Incorporate the Contract Administrators comments into the O&M manuals.

.2 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work. Prepare and maintain a check list for the spare parts turned over to the City. Prepare a transmittal receipt for all spare parts turned over to the City. The transmittal receipt is to be signed by the City's representative. Provide a copy of the transmittal receipt to the Contract Administrator.

.3 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 FORMAT

.1 Organize data as instructional manual.

.2 Binders from individual suppliers is not acceptable. Contractor to compile all separate information into one document.

.3 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.4 When multiple binders are used correlate data into related consistent groupings.

.1 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, process flow, 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.

.1 Bind in with text; fold larger drawings to size of text pages.

.10 Provide all information noted above in the following format:

.1 1:1 scaled CAD files in dwg format on CD;

.2 *.pdf format on CD.

1.6 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Contract Administrator, Contractor and Sub-contractors and Suppliers.

.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. Refer to Section 01 33 00 – Submittal Procedures for method of identifying relevant product 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.

.6 Training: refer to Section 01 79 00 - Demonstration and Training

1.7 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 Specification.

- .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 Contract Administrator.

1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings. .

.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.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.9 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.

.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 23 05 93 – Testing, Adjusting, and Balancing.

.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 location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing Contract Administrator.

.2 Include approved listings in Maintenance Manual.

.5 Maintain check list of spare parts delivered to City.

.6 Obtain transmittal 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; 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; place and store.

.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 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Contract Administrator.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 91 41 - Commissioning Training

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to City personnel two weeks prior to date of substantial performance.

.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 45 00 Quality Control.

.4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 23 05 93 – Testing, Adjusting, and Balancing 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 designated location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:

.1 Refer to specific sections for hours of instruction.

1.3 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's 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.

1.4 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

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.

.2 Related Sections:

.1 Section 01 77 00 – Closeout Procedures
.2 Section 01 78 00 – Closeout Submittals
.3 Section 01 79 00 – Demonstrating and Training
.4 Section 01 91 41 –Commissioning Training
.5 D13 – Detailed Work Schedule

.3 Acronyms:

.1 AFD - Alternate Forms of Delivery, service provider.
.2 BMM - Building Management Manual.
.3 Cx - Commissioning.
.4 EMCS - Energy Monitoring and Control Systems.
.5 O&M - Operation and Maintenance.
.6 PI - Product Information.
.7 PV - Performance Verification.
.8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
.2 Ensure appropriate documentation is compiled into the O&M manuals.
.3 Effectively train O&M staff.

.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

.1 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.2 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

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

1.5 PRE-CX REVIEW

.1 During Construction:

.1 Co-ordinate provision, location and installation of provisions for Cx.

.2 Before start of Cx:

.1 Ensure installation of related components, equipment, sub-systems, systems is complete.

.2 Fully understand Cx requirements and procedures.

.3 Have Cx documentation shelf-ready.

.4 Understand completely design criteria and intent and special features.

.5 Submit complete start-up documentation to Contract Administrator.

.6 Have Cx schedules up-to-date.

.7 Ensure systems have been cleaned thoroughly.

.8 Complete TAB procedures on systems, submit TAB reports to Contract Administrator for review and approval.

.9 Ensure "Record Drawing" system schematics, including plant single line diagrams and P & ID as indicated in 26 05 01 – Common Work Results – Electrical, are available.

.3 Inform Contract Administrator in writing of discrepancies and deficiencies on finished works.

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Contract Administrator before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with D13.4 – Detailed Work Schedule.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

.1 Approval of Cx reports.
.2 Verification of reported results.
.3 Repairs, retesting, re-commissioning, re-verification.
.4 Training.

1.8 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings D.13 – Detailed Work Schedule

.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.4 At 75% construction completion stage. D13 – Detailed Work Schedule Contract Administrator to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:

.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.6 Ensure subcontractors and relevant manufacturer representatives are present at 75% and subsequent Cx meetings and as required.

1.9 STARTING AND TESTING

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.10 WITNESSING OF STARTING AND TESTING

.1 Provide 10 days notice prior to commencement.

.2 Contract Administrator to witness of start-up and testing.

1.11 MANUFACTURER'S INVOLVEMENT

.1 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Contract Administrator.

.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.

.2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.2 Integrity of warranties:

.1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

.2 Verify with manufacturer that testing as specified will not void warranties.

.3 Qualifications of manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 To report results in clear, concise, logical manner.

1.12 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Conduct start-up and testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: follow accepted start-up procedures.

.3 Operational testing: document equipment performance.

.4 System Performance Verification (PV): include repetition of tests after correcting deficiencies.

.5 Prior to substantial performance: verification to include fine-tuning.

.3 Correct deficiencies and obtain approval from Engineer after distinct phases have been completed and before commencing next phase.

.4 Document require tests on approved PV forms.

.5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Contract Administrator. If results reveal

that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:

.1 Minor equipment/systems: implement corrective measures approved by Contract Administrator.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Contract Administrator.

.3 If evaluation report concludes that major damage has occurred Contract Administrator shall reject equipment.

.1 Rejected equipment to be removed from site and replaced with new.

.2 Subject new equipment/systems to specified start-up procedures.

1.13 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Contract Administrator for approval before commencement of commissioning.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists.

.4 Start-up reports,

.5 Step-by-step description of complete start-up procedures, to permit Contract Administrator to repeat start-up at any time.

1.14 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit to Contract Administrator for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

1.15 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.16 START OF COMMISSIONING

.1 Notify Contract Administrator at least 10 days prior to start of Cx.

.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.17 INSTRUMENTS / EQUIPMENT

.1 Submit to Contract Administrator for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.2 Provide the following equipment as required:

.1 2-way radios.

.2 Ladders.

.3 Equipment as required to complete work.

1.18 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under accepted simulated operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

1.19 WITNESSING COMMISSIONING

.1 Contract Administrator to witness activities and verify results.

1.20 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

1.21 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction Contract Administrator.

.2 Report problems, faults or defects affecting Cx to Contract Administrator in writing. Stop Cx until problems are rectified. Proceed with written approval from Contract Administrator.

1.22 COMPLETION OF COMMISSIONING

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Substantial Performance.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Contract Administrator.

1.23 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.24 TRAINING

.1 In accordance with Section 01 91 41 - Commissioning (Cx) - Training.

1.25 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.26 OCCUPANCY

.1 Cooperate fully with Contract Administrator during stages of acceptance and occupancy of facility.

1.27 INSTALLED INSTRUMENTATION

.1 Use instruments installed under Contract for TAB and PV if:

.1 Accuracy complies with these specifications.

.2 Calibration certificates have been deposited with Contract Administrator.

.2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.28 PERFORMANCE VERIFICATION TOLERANCES

.1 Application tolerances:

.1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 5% of specified values.

.2 Instrument accuracy tolerances:

.1 To be of higher order of magnitude than equipment or system being tested.

.3 Measurement tolerances during verification:

.1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 This Section specifies roles and responsibilities of Commissioning Training.

.2 Related Sections:

.1 Section 22
.2 Section 23
.3 Section 26
.4 Section 33

1.2 TRAINEES

.1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Supervisor, process operators, maintenance staff, and technical specialists as required.

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

.1 Contract Administrator will provide:

.1 Descriptions of systems.
.2 Instruction on design philosophy, design criteria, and design intent.

.2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:

.1 Start-Up, operation, shut-down of equipment, components and systems.
.2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
.3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.

.3 Contractor and equipment manufacturer to provide instruction on:

.1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out performance verification (PV) tests.

1.4 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:

.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
.2 Effective on-going inspection, measurements of system performance.
.3 Proper preventive maintenance, diagnosis and trouble-shooting.

.4 Ability to update documentation.

.5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:

.1 "Record Drawing" Contract Documents.

.2 Operating Manual.

.3 Maintenance Manual.

.4 Management Manual.

.5 TAB and PV Reports.

.3 Training materials to be in a format that permits future training procedures to same degree of detail.

.4 Supplement training materials:

.1 Transparencies for overhead projectors.

.2 Multimedia presentations.

.3 Manufacturer's training videos.

.4 Equipment models.

1.6 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Coordinate scheduled times with the Contract Administrator and the City.

.3 Provide four (4) separate training sessions

.4 The scheduled times are to be approved by the City of Winnipeg NEWPCC and SEWPCC facilities.

.5 Provide a commissioning schedule the Contract Administrator at least one month prior to the training.

.6 Deliver training during regular working hours, training sessions to be 3 hours in length or as stated elsewhere.

.7 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

.1 Be responsible for:

.1 Implementation of training activities,

.2 Coordination among instructors,

.3 Quality of training, training materials,

.4 Coordinating schedule with Contract Administrator and City.

.2 Contract Administrator and City will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Contract Administrator.

.1 Report to include the names of the attendees.

.4 The Contract Administrator will arrange the videotaping of the training session.

1.8 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:

.1 Review of facility and occupancy profile.
.2 Functional requirements.
.3 System philosophy, limitations of systems and emergency procedures.
.4 Review of system layout, equipment, components and controls.
.5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
.6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
.7 Maintenance and servicing.
.8 Trouble-shooting diagnosis.
.9 Inter-Action among systems during integrated operation.
.10 Review of O&M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.9 VIDEO-BASED TRAINING

.1 Provide manufacturer's videotapes used as training tool to the Contract Administrator for review.

.2 The Contract Administrator will be videotaping the commissioning and training sessions.

.3 The Contractor shall cooperate and coordinate the documenting and the videotaping of the training session with the Contract Administrator.

.4 On-Site training videos:

.1 Contractor to cooperate with the Contract Administrator and the videographer during the videoing sessions.
.2 To be performed after systems are fully commissioned.
.3 Organize into several short modules to permit incorporation of changes.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION