1. Project Schedule

.1 Within 10 working days from Contract award date, meet with Contract Administrator to discuss scope and approach of project construction operations, submittals for review of project milestones and to be informed how and when data must be supplied to Contract Administrator to facilitate monitoring of work.

.2 Within 20 working days from Contract award date, provide to Contract Administrator, and revise as required, a project schedule and control system specified under this section for this Contract, as well as all information and assistance necessary to integrate work of this contract into the overall system.

.3 The schedule shall be based on techniques such as precedence or critical path method (CPM) for planning, scheduling, monitoring and reporting of project progress. The schedule must cover period of at least four months beginning from date of contract award, with activity durations not exceeding 15 days. Clearly identify all major schedule items, including, but not limited to:

.1 Project Award

.2 Submittal of shop drawings and samples

.3 Mobilization of equipment / Delivery of materials

.4 Pressure Test

.5 Demolition.

.6 Placement of major equipment

.7 Mechanical.

.8 Electrical.

.9 Commissioning.

.10 Winterizing

.11 Anticipated completion date.

.12 All project-specific milestones

2. Format

.1 Prepare a schedule in the form of a Gantt (horizontal bar) chart.

.2 Provide a separate bar for each trade and sub-trade, and major elements of construction.

.1 Submit listing to Contract Administrator for approval.

.2 List items in chronological order of the start of each item of work.

3. Updating, Monitoring and Reporting Progress

.1 Arrange for participation on site and off site of subcontractors and suppliers, as necessary, for purpose of planning, scheduling, updating and progress monitoring.

.2 Inspect whole of work with Contract Administrator at least once per month to establish progress on each current activity shown on applicable schedules, indicating changes in activity durations and start/finish/imposed dates. Include written explanations on activities which are over- running estimated time. If any such activities are on critical path, indicate

what corrective action will be taken to bring them back on schedule. Update and resubmit schedules including monthly cash flows as required.

.3 Immediately after distribution of monthly monitor reports meet with Contract Administrator to determine remedial actions and necessity for updating total project schedule.

End Section 01014

PART 1 - GENERAL

1. General

.1 The term "shop drawings" means plans, drawings, diagrams, illustrations, schedules, performance charts, brochures and other data, including site erection plans or drawings which are to be provided by the Contractor to illustrate details of a portion of the work.

.2 Submit to Contract Administrator for review shop drawings, product data and samples specified.

.1 Initial submission to be labeled - Not for Construction. Drawings to include all water treatment equipment, valves, piping and related works.

.2 Upon approval from Contract Administrator of initial submission provide all shop drawings.

.3 Until submittal is reviewed, work involving relevant product may not proceed.

.4 Where articles or equipment from any subtrade or specification section or plan attach to connect to other articles or equipment under any other subtrade or specification section or plan, be responsible and clearly indicate that all such attachments and connections (including electrical) have been properly coordinated, regardless of the trade, specification section or plan grouping under which the adjacent articles or equipment will be supplied or installed. Notify the Contract Administrator in writing if there are any deviations in the shop drawings from the requirements of the contract documents and any obvious or implied conflicts or errors between the various trades, specification sections and plans.

.5 The shop drawing review process is for the sole purpose of conformance with the general design concept. The shop drawing review shall not mean that the Contract Administrator approves the detail design inherent in the shop drawing. The responsibility the shop drawings shall remain with the Contractor submitting the shop drawings. The shop drawing review shall not relieve the Contractor of their responsibility for errors or omissions in the shop drawings or of their responsibility for meeting all requirements of the contract documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site for information that pertains solely to fabrication process or to techniques for construction and installation and for co-ordination of the work of all subtrades.

2. Shop Drawings

.1 Plans or drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work showing fabrication, layout, setting or erection details as specified in appropriate sections.

.2 Prior to submitting shop drawings for the Contract Administrator 's review, the Contractor shall review all shop drawings to confirm their meeting all requirements of the project and mark and sign his approval on the plans or drawings which shall certify review of submission, verification of field dimensions and compliance with contract documents.

.1 Indicate specification section and item number on all documents submitted. For each submission package provide a letter of transmittal indicating specifications sections and item numbers submitted for approval in submission package.

.3 Each shop drawing must be certified by manufacturer and as such, shall indicate that all product engineering has been performed to ensure the product will meet the requirements of the intended installation.

.4 Include all electrical wiring diagrams and installation plans or drawings for electrically powered equipment.

.5 Wherever documents are provided in S.I. units, all performance and dimensional data shall be submitted in S.I. units.

.6 Submit:

.1 Blackline copies.

.7 Submit:

.1 Three copies, of which two will be retained by Contract Administrator.

.8 Submissions as a minimum shall include:

.1 Delete information which is not applicable to the project.

.2 Supplement standard information to provide additional information applicable to project.

.3 Clearly indicated product or material, complete with model number and make.

.4 Show dimensions and clearances required.

.5 Show performance characteristics and capacities.

.6 Show wiring diagrams (where requested) and controls.

.7 Include overall specification and item numbers.

3. Product Data

.1 Certain specification sections specify that manufacturer's standard schematic plans or drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified.

.2 Submit in sets, not as individual submissions.

.3 Above will only be accepted if they conform to the following:

.1 Delete information which is not applicable to the project.

.2 Supplement standard information to provide additional information applicable to project.

.3 Clearly indicated product or material, complete with model number and make.

.4 Show dimensions and clearances required.

.5 Show performance characteristics and capacities.

.6 Show wiring diagrams (where requested) and controls.

.7 Include overall specification and item numbers.

4. Contractor's Responsibility

.1 Contractors responsibilities (as applicable to the General and Sub contractors):

.1 Design project and review shop drawings, product data and samples prior to submission to Contract Administrator.

.2 Verify:

.1 Field measurements

.2 Field construction criteria

.3 Catalogue numbers and similar data

.4 Conformance with the specification – compare specification numbers and item numbers to all required shop drawings.

.3 Co-ordinate each submittal with the requirements of the work of all trades and contract documents. The Contractor is responsible to ensure and confirm that applicable trades have reviewed and accepted the submission and made any and all required changes to construct a finished and operating project as required by the contract documents.

.4 Clearly identify any variations in the shop drawings from the contract requirements. If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submissions. If the Contract Administrator approves any such variation, the Contract Administrator shall issue an appropriate contact modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued. In all cases the Contractor is responsible for coordination of any and all changes with all applicable sub contractors.

.5 Responsibility for deviations in submittals from requirements of Contract documents and errors and omissions is not relieved by Contract Administrator 's review of submittals, unless Contract Administrator gives written acceptance of specified deviations.

.6 Notify Contract Administrator, in writing at time of submission, of deviations in submittals from requirements of Contract documents.

.7 After Contract Administrator 's review, distribute copies, maintain one copy on site.

5. Submission Requirements

.1 Allow for a 14 day period for review by the Contract Administrator for each individual submission.

.2 Accompany submissions with transmittal letter which lists shop drawings included for review, complete with specification and item numbers.

.3 No claims will be allowed that may arise because of delays in submissions, re-submissions and review of shop drawings.

.4 Obtain final review prior to ordering, fabricating or completing installation work.

.5 Initial submission - Provide three copies of shop drawings and product data to be reviewed by Contract Administrator (one copy to be returned upon completion of review). Each subsequent re-submission (until acceptance) also to include only three copies of the plans or drawings and data for review.

.6 After final acceptance produce 6 copies of product data and distribute as follows:

.1 Contractor - operating manual 3

.2 Contractor - file 1

.3 Contractor - site 2 (provide 1 field set to Contract Administrator).

6. Items for Submission

.1 In general supply shop drawings for all materials being incorporated into the works. The following is a partial listing of items of work to be submitted on the shop drawings:

.1 Mechanical and Electrical

.1 Pump.

.2 Valves.

.3 Water filtration equipment.

.4 Chemical feed systems and controls.

.5 UV disinfection equipment.

.6 Controls.

.2 The listing above does not supersede other items that may be requested on the plans or the specifications or other items requested by the Contract Administrator.

7. Record Drawings

.1 During construction revise all plans (and/or shop drawings) to indicate all changes that occurred during construction and revise plans to “record” copy. Indicate on the plans (and/or shop drawings) that such revisions have been completed. Provide two copies of record plans to Contract Administrator for review.

.1 Provide Contract Administrator monthly progress updates of as-builts and applicable copies as project proceeds.

.2 After Contract Administrator has reviewed initial record plans and drawings and deemed them to be “satisfactory” provide copies of all plans and drawings.

.3 Final record drawings are to be provided a minimum of 2 weeks prior to request for Substantial Performance.

8. Contract Administrator’s Review

.1 The Contract Administrator 's review pertains to general design only. Errors in dimensions, quantity or interference will be noted, if noticed, but this will not in any way relieve the Contractor from his responsibility for errors or omissions.

.2 Contract Administrator’s review may result in a request for revisions to shop drawings, product data or samples. Complete revisions ensuring all request for revision items have been addressed and resubmit for Contract Administrator’s review. If the second submission does not address all revisions requested in the first review the City of Winnipeg retains the right to hold the Contractor responsible for Contract Administrator’s costs of additional reviews at. Such additional costs may be deducted from the overall payments due.

End Section 01340

PART 1 - GENERAL

1.1 Clean Up and Final Cleaning of Work

.1 Maintain work in a tidy condition and free from accumulation of waste products and debris at all times.

.2 Remove all waste materials and debris from the site or dispose of as otherwise directed by the Contract Administrator. Do not burn waste material onsite.

.3 In addition to the requirements of the General Conditions, perform the following prior to application for Certificate of Substantial Performance:

.1 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, ceilings, walls and floors

.2 Make a thorough inspection of all finishes, fitments and equipment and ensure proper workmanship and operation

.3 Broom clean walks, floors and platforms.

.4 Remove all dirt and other disfigurations from interior and exterior surfaces.

.5 Clean and remove all debris and surplus materials.

.4 When work is substantially completed, remove all surplus materials, tools, construction machinery and equipment not required for the performance of the remaining work. Leave the work area clean, swept and washed down suitable for occupancy.

.5 When the Contract Administrator determines that the work completed is to his satisfaction, remove all surplus materials, tools, construction machinery and equipment. Also remove any waste products and debris.

1.2 Removal of Temporary Facilities

.1 Prior to application for Certificate of Substantial Performance, remove all temporary items used to aid the performance of work. Restore area to original (pre-construction) state.

1.3 Inspection/Takeover Procedures

.1 Prior to application for Certificate of Substantial Performance, carefully inspect all work and ensure that it is complete, that all processes and related equipment is fully operational, that all major and minor construction deficiencies are complete and/or corrected, that clean up works have been completed, and the building is in proper conditions for occupancy. Notify the Contract Administrator in writing, of satisfactory completion of inspection and request a Contract Administrator's inspection.

.2 During the Contract Administrator's inspection, a list of apparent deficiencies will be drawn up and signed by the Contract Administrator. This deficiency list may be amended if additional deficiencies are found during future inspections.

.3 Complete all works requested in the listing of deficiencies and request a subsequent inspection. If the second inspection determines that deficiencies previously identified have not been addressed the City of Winnipeg retains the right to hold the Contractor responsible

for subsequent inspections, such additional costs shall be deemed liquidated damages and shall be deducted from the overall payments due.

.4 Training and winterizing will be considered an integral part of overall works in respect to completion.

.5 When it is considered that all deficiencies have been corrected, make application for certificate of final payment.

1.4 Performance Assurance

.1 Upon application for Certificate of Substantial Performance, forward to the Contract Administrator all inspection and approval certificates, test reports, warranties, maintenance manuals, operating instruction, record drawings and other requirements as specifically required by the contract documents.

1.5 Cleaning and Clean Up

.1 Upon completion and before final acceptance of work remove waste, surplus and useless excavated materials and rubbish resulting from works (as determined by Contract Administrator), to be removed and cleaned up to the satisfaction of the Contract Administrator.

.2 Haul any excavation and useless material from the site and dispose of in a manner acceptable to the Contract Administrator.

.3 Complete all clean up works within allotted construction days.

1.6 Deficiencies Inspection

.1 After clean up works have been completed request an inspection of the construction area to assess cleanup works and derive a deficiency list. This deficiency list may be amended if additional deficiencies are found during future inspections.

.2 Complete all works requested in the listing of deficiencies and request a subsequent inspection. If the second inspection determines that deficiencies previously identified have not been addressed the Contract Administrator retains the right to hold the Contractor responsible for subsequent inspections, such additional costs shall be deemed liquidated damages and shall be deducted from the overall payments due.

1.7 Start-up Tests

.1 Test all equipment and circuits installed in the presence of the Contract Administrator and co-operate with the suppliers of equipment to ensure equipment will operate in the manner intended, for turnover to the City of Winnipeg.

End Section 01700

PART 1 - GENERAL

1.1 Operating and Maintenance Manuals

.1 Other specification sections indicate O&M information, training and record drawings that are to be provided in hard copy and pdf. Incorporate all O&M data, training information and record drawings as requested into one overall submission. Provide index of entire submission.

.2 Prior to substantial completion of project submit to the Contract Administrator 2 final copies of Operations Data and Maintenance manual in English. Substantial Performance will not be considered until final manuals have been completed to the satisfaction of the Contract Administrator.

.1 Provide three final hard copies and three DVD-ROM version of final hard copy submitted.

.3 At least 25 days prior to the anticipated date for substantial performance submit to the Contract Administrator for review one draft copy of the operating and maintenance manuals.

.4 Submission to be made up as follows:

.1 Bind data in vinyl hard covered, 3 ring loose leaf binder for 215 x 280 mm size paper. Do not “overfill” binder, fill binders to a maximum of 85% of it’s intended capacity.

.1 Acceptable binder is Cardinal FreeStand EasyOpen D-Ring ClearVue presentation binder, normal non-locking or alternate binders (such as Avery) not acceptable.

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

.3 Assign a number and letter to each section in the manual. The number is to correspond to the specification numbering system and items shall be provided in the order that they appear in the specifications.

.4 Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of project; identify subject matter of contents.

.5 Prepare a table of contents for each volume, with each product or system description identified, in three parts as follows:

.1 Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.

.2 Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section for each category, identify names, addresses, and telephone numbers of subcontractors and suppliers.

.1 Significant design criteria.

.2 Operating instructions.

.3 List of equipment and parts list for each component.

.4 Maintenance instructions for equipment and systems.

.5 Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents - where applicable.

.3 Part 3: Project documents and certificates, including the following:

.1 Shop drawings and product data.

.2 Water quality and water balance reports.

.3 Certificates and originals of warranties.

.6 Contents each volume.

.1 Provide a table of contents with title of project; names, addresses, and telephone numbers of Sub-consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

.2 For each product or system 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 clearly 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 Warranties bind in copy of each as specified.

.5 Manuals for Equipment and Systems.

.1 For each item of equipment and each system include description of unit or system, and component parts identifying function, normal operating characteristics, and limiting conditions.

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

.2 Operating procedures include:

.1 Startup, break-in, and routine normal operating instructions and sequences.

.2 Regulation, control, stopping, shut-down, and emergency instructions.

.3 Summer, winter (winterizing), and any special operating instructions.

.3 Maintenance Requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.4 Include manufacturer's printed operation and maintenance instructions.

.5 Include sequence of operation by controls manufacturer.

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

.7 Provide control diagrams by controls manufacturer as installed.

.8 Provide Contractor's coordination drawings, with color-coded piping diagrams as installed.

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

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

.11 Additional Requirements as specified in individual product specification sections.

.12 Provide a listing in table of contents for design data, with tabbed dividers and space for insertion of data.

.13 Neatly type list and notes. Use clear drawings, diagrams or manufacturer's literature. Bind in copies of all guarantees.

.14 Utilize a separate pouch for drawings larger than 210 mm x 431 mm, one pouch per drawing.

.6 Include following information plus data specified:

.1 Description, operations and maintenance instructions for equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.

.2 Additional material used in project listed under various sections showing name of manufacturer and source of supply.

.3 List of suppliers names and addresses for each piece of equipment.

.4 Bind in copies of all guarantees.

.5 Refer to Mechanical and Electrical Divisions for specific details of Mechanical and Electrical data.

.6 Detailed operating instructions for all mechanical and electrical equipment.

.7 Service manuals outlining complete maintenance procedures and safety measures for all equipment.

.8 Illustrated parts list for all equipment, with local suppliers' names and addresses. In all cases the closest local distributor or authorized repair depot must be listed regardless of the initial purchase outlet.

.9 Final corrected and reviewed shop drawings for all equipment.

.10 Final corrected installation drawings for all equipment and equipment operation curves.

.11 Start-up test reports.

.12 Listing of maintenance material including stand by equipment.

.7 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by colored labeled tabs protected with celluloid covers fastened to hard paper dividing sheets.

.8 Group contents and sections according to equipment function (i.e. pump, filtration, chemical feed, UV, etc...) complete with related components.

.9 Include with each copy of Operations data and maintenance manual, a complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

.10 Update manuals as required to include commissioning data. Commissioning data to include a written copy of all program values entered into all equipment supplied.

.11 Do not include unnecessary information, advertising and theoretical data not directly related to equipment being supplied.

1.2 Instruction of Operating Staff

.1 See Section 01820.

End Section 01730

PART 1 - GENERAL

1.1 Section Includes

.1 Procedures for demonstration and instruction of equipment and systems as per Contract Administrator.

1.2 Description

.1 Demonstrate operation and maintenance of equipment and systems prior to Substantial Performance. See Section 01700 – Project Closeout and Section 01730 – Operation and Maintenance Requirements.

.2 Provide 7 day notice to Contract Administrator on operation and maintenance instruction to be given. Contract Administrator will provide list of City of Winnipeg's personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.3 Quality Control

.1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct City of Winnipegr's personnel, and provide written report that demonstration and instructions have been completed.

1.4 Submittals

.1 Commissioning: Submit schedule of time and date for commissioning of each item of equipment and each system a minimum of 2 weeks prior to submitting request for commissioning, for Contract Administrator 's approval.

.2 Demonstration/training: Submit schedule of time and date for of each item of equipment and each system prior to submitting request for Substantial Performance, for Contract Administrator 's approval.

1.5 Conditions for Training/Demonstrations

.1 Equipment has been inspected and put into operation in accordance with applicable Section.

.2 Testing, adjusting, and balancing has been performed and equipment and systems are fully operational.

.3 Provide copies of completed (after Contract Administrator's review) operation and maintenance manuals for use in demonstrations and instructions.

1.6 Preparations

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.7 Demonstrations and Instructions

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times.

.2 Produce a detailed, written plan for the start-up and initial operation, under design conditions, of the equipment and systems installed and constructed under the contract. The document, after review and approval by the Contract Administrator, will serve as the guidance manual for the commissioning process. The document shall be prepared and submitted to the Contract Administrator for review.

.3 When the installation work has been completed and before any equipment is operated, carry out the start-up of the equipment in coordination with the suppliers and carry out the following work

.1 Service all equipment in accordance with the manufacturer's instructions as required for initial operation of the equipment.

.2 Check the installation as to its workmanship.

.3 Check the controls including the supply voltage, heater overload settings and wiring connections.

.4 Perform further tests as directed by the Contract Administrator to confirm that the equipment is in accordance with the intent of the specifications.

.4 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

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

.6 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

.7 Include digital photos on CD and in paper form that demonstrates and describes various aspects and equipment instruction.

.8 Upon completion of start-up, submit to the Contract Administrator the suppliers' certificates stating that

.1 The equipment has been installed in accordance with the supplier's recommendations.

.2 The equipment was commissioned in the presence of the supplier and is now ready for permanent operation.

.3 The equipment has been properly lubricated, primed or serviced.

.4 Plant personnel have been instructed in the operation and maintenance of the equipment.

.5 Manufacturers' data have been provided to the Contractor for inclusion in Operating and Maintenance Manual.

.9 Once systems have been started up and accepted complete winterizing. Ensure O&M manual contains all information required for winterizing, follow instructions and update as required to ensure final instructions as printed are clear and concise.

1.8 Start-up

.1 Initial start up to occur prior to that stated in D13 CRITICAL STAGES completed as part of commissioning applies to:

.2 Initial start up consisting of filling wading pool, start pumps, start circulation systems and start water chemistry controller to occur prior to date stated in D13 CRITICAL STAGES.

.3 Complete start-up as part of commissioning, works to include:

.1 NOTE: Pool cannot be left full of water when personnel are not in attendance thus pool must be drained each day.

.2 Ensure all equipment and valve tags works are complete.

.3 Fill wading pool to 25 mm from the top. Provide brackets and method to neatly store fill piping used on a temporary basis.

.4 Prime pumps and set flow to spray feature to be 50% of available flow at 175 kPa (25 psi) to spray features.

.5 Determine pump running amps, shut off head and two points on the pump curve. Compare to factory pump curve and pump motor rates amps.

.6 Determine UV running amps and that control panel indicates that all systems are fully operational.

.7 Calibrate pH and ORP probes with standard solutions.

.8 Operate chlorine feeder at maximum through flowrate to determine the number of minutes to raise the chlorine in the pool from the base level to 1.5 mg/L and 2.5 mg/L above base level mg/L. Provide written documentation.

.9 Operate chlorine feeder at 2 gph throughput for 1 hour to determine the rise in the chlorine in the pool from the base level every 10 minutes. Provide written documentation.

.10 Operate chlorine feeder at 4 gph throughput for 1 hour to determine the rise in the chlorine in the pool from the base level every 10 minutes. Provide written documentation.

.11 Operate chlorine feeder at maximum through flowrate to determine the number of minutes to raise the chlorine in the pool from the base level to 1.5 mg/L and 2.5 mg/L above base level mg/L. Provide written documentation.

.12 Set the pH controller feed rate to 0.25 and 0.50 of available flow for an hour period each. Record change in pH of pool water every 10 minutes. Provide written documentation.

.13 After water chemistry testing is complete initiate a UV wiper clean cycle.

.14 Drain the pool and simulate a winterizing procedure by draining the piping and systems to demonstrate that all lines and equipment can be drained

.15 Chemical feed systems including calibrations and calculating feed rates.

.16 Control and automation systems (manufacturer).

.17 Instrumentation and meters (manufacturer).

.18 Pumping systems.

.19 Winterizing- fully winterize systems.

.4 Final start up and commissioning to occur prior to date stated in D14 SUBSTANTIAL PERFORMANCE. Work completed as part of final start up applies to:

.1 Fill pool and obtain a fully functional system with proper chlorine and pH levels prior to 11:00 A.M.

.2 Clean all strainers.

.3 Operate pool for 5 hours ensuring all chemical feeds are automatic. Test chlorine and pH at least every 30 minutes.

.4 Ensure all systems are functional and automatic.

.5 Instrumentation and meters have been calibrated and functional.

.6 Pumping, filtration and UV systems are fully operational.

.7 Winterizing systems are in place.

1.9 Training

.1 Initial training completed date prior to date stated in D14 SUBSTANTIAL PERFORMANCE applies to:

.1 Water treatment process equipment (manufacturer).

.2 Chemical feed systems including calibrations and calculating feed rates.

.3 Control and automation systems.

.4 Instrumentation and meters.

.5 Pumping systems.

.6 Strainers/filter basket (cleaned at end of each day).

.7 Checks to ensure operating flow rates are normal and strainers do not need service.

.8 Winterizing.

.2 Final training completed prior to SUBSTANTIAL PERFORMANCE applies to:

.1 Water treatment process equipment.

.2 Chemical feed systems including calibrations and calculating feed rates.

.3 Control and automation systems .

.4 Instrumentation and meters .

.5 Pumping systems.

.3 Complete training reports after final start up as applicable to:

.1 Water treatment process equipment.

.2 Chemical feed systems including calibrations and calculating feed rates.

.3 Control and automation systems.

.4 Instrumentation and meters .

.5 Pumping system.

.4 Training reports to include specific procures and instructions for

.1 Spring start-up.

.2 Daily shut down.

.3 Daily start up.

.4 Daily operational procedures

.5 Winterization duties.

1.10 Winterizing

.1 In fall 2015 complete winterizing and related training:

.1 Drain all system within the building related to pumping, water treatment and circulation.

.2 Blow out drain lines.

.3 Review previous written instructions on winterizing procedures and update accordingly. Ensure all drain valves are tagged such as Drain-1, Drain-2, etc and referred to in the instructions.

1.11 Time Allocated For Instructions

.1 Ensure amount of time required for instruction of each item of equipment is as required, provide a minimum of 3 hours of instruction.

End Section 01820

PART 1 - GENERAL

1.1 Work Included

.1 The following list generally describes the scope of this Section:

.1 Ball Valves

.2 Check valves.

.3 Hose bibb and related equipment.

.4 Pressure relief valve.

.2 Work involves supplying and installing all valves shown on the Drawings.

.3 City of Winnipeg will remove existing backflow prevention valve and install new 50 mm reduced pressure backflow prevention valve vertically on the wall at no cost to this Contract.

1.2 Related Work

.1	Piping	Section 11250
.2	Mechanical	Division 15

1.3 Manufacturer

.1 Provide valves of the same type and same manufacturer throughout.

.1 All materials and products to be NSF/ANSI Standard 61 certified.

.2 Provide valves with the manufacturer's name and pressure rating clearly marked on the outside of the body.

1.4 Standards

.1 All materials and products in contact with potable water to be NSF61 approved.

PART 2 - PRODUCTS

2.1 Throttling Valves

.1 Throttling valves shall provide 100% unrestricted full flow area.

.2 Rate valve by manufacturer for use in continuous throttling position.

.3 Obtain Contract Administrator's approval for valve prior to ordering.

2.2 Ball Valves (PVC body)

.1 Full port full blocking true union with minimum working pressure of 1,000 kPa.

.2 All PVC construction.

.3 Double stem o-rings.

.4 Seats: Teflon with elastomer cushions.

.5 Seals: EPDM.

.6 NSF 61 certified..

.7 Base mounting pad.

.8 Socket ends.

.9 Valves shall be "Chemline Type 21", Chemtrol/Nibco Tru-Bloc/Tru Union or approved equal in accordance with B7.

2.3 Ball Check Valves (PVC body)

.1 Minimum working pressure of 1,000 kPa for 12- 50 mm valves and 700 kPa for 65-100 mm sizes.

.2 All PVC construction.

.3 Seals: EPDM.

.4 NSF/ANSI 61 certified..

.5 Suitable for both horizontal and vertical lines.

.6 True Union Socket ends for 12- 50 mm valves and single union for 65-100 mm sizes.

.7 Valves shall be "Chemline BT or BC Series", Chemtrol/Nibco Tru-Bloc/Tru Union or approved equal in accordance with B7.

.8 Applies to CHV-102.

2.4 Solenoid Valve

.1 On erosion control inlet line: See Section 15200..

.2 On CO_2 feed line: See Section 15200.

2.5 Combination Flow Meter/Check Valves

.1 Combined check valve and flow meter.

.2 Size: 50 x 65 (2” x 2.5”).

.3 NSF 50 listed.

.4 FlowVis FC-V.

2.6 Wafer Check Valves

.1 Use wafer style silent check to Val-matic 1,400, Apco series 300, Crispin WC or approved equal in accordance with B7

.2 Valves shall be suitable for a working pressure of 1,000 kPa.

.3 Applies to CHV-101 NOTE: Confirm existing suction pump size and match size as required regardless of sizing shown on plans.

2.7 Reduced Pressure Zone Backflow Preventer

.1 City of Winnipeg to supply and install a 50 mm FPT reduced pressure zone backflow prevention assembly in similar location as existing unit.

.2 Unit supply by City of Winnipeg to be Watts Series LF909 or approved equal in accordance with B7.

2.8 Pressure Sustaining Valve

.1 Install automatic pressure sustaining valves in the pool return to maintain a consistent pressure at the spray pad distribution manifold. The valve shall be a hydraulically operated, pilot controlled, modulating valve. The valve shall be quick opening and slow closing to prevent surges.

.2 Standard of Acceptance: Singer 106PR, Cla-val, 90-01 Pressure Relief & Pressure Sustaining Valve or approved equal in accordance with B7.

2.9 Sample Tap

.1 Each sample Tap (boiler drain) and related equipment shall include the boiler drain complete with backflow preventer to prevent possible contamination of potable water. Backflow preventer shall be Watts 9D or approved equal in accordance with B7.

.2 Each boiler drain shall be Emco 10820 sediment faucet 13 mm size installed with drop-ear elbows.

.3 Utilize brass fittings directly tapped into fittings or piping for all sample taps.

.4 Provide one 8 m (25 ft.) length of 13 mm rubber garden hose complete with threaded adapter ends and wall mounting rack. Provide mounting hardware required for installation.

2.10 Hose Bibbs (Boiler Drain)

.1 Each hose bibb and related equipment shall include the hose bibb complete with backflow preventer to prevent possible contamination of potable water. Backflow preventer shall be Watts 9D or approved equal in accordance with B7.

.2 Each hose bibb shall be Emco 10820 sediment faucet 13 mm size installed with drop-ear elbows.

.3 Interior Reconnect piping to allow operator to use existing hose for washdown around the pool.

PART 3 - EXECUTION

3.1 Equipment

.1 Install valves in accordance with the manufacturer's recommendations and as shown on the drawings.

.2 Place valves in “open” position prior to tightening flange bolts unless otherwise stated by Manufacturer.

.3 Co-ordinate work with piping installation in accordance with Section 11250.

3.2 Sample Taps

.1 Locate sample taps for sampling water before and after each chemical injection location, not all sample locations are shown on the plans.

.2 Locate sample taps to obtain a representative sample as directed by Contract Administrator.

3.3 Backflow Preventer-

.1 Reduced Pressure Type 50 mm Watts Series LF909 Backflow preventer will be installed by City of Winnipeg at no cost to this contract in accordance to the following specifications: Meet with City to review installation and location of unit at time of install.

.1 Install backflow preventer on water service line.

.2 Remove existing backflow preventer and install new unit vertically in the same location.

.3 Install as per manufacturer's recommendations, provincial plumbing code, CSA B64.10-01 and by a certified backflow installer.

.4 Test operation of device by a certified backflow tester and tag valve with test tag.

.5 Pipe vents to a near existing drain in floor.

.6 Connect inlet piping to City supply, connection of outlet(s) by others.

.7 Support as required.

End Section 11240

PART 1 - GENERAL

1.1 Related Work

.1	Valves	Section 11240
.2	Mechanical	Division 15

1.2 Work Included

.1 Supplying and installing process piping.

1.3 Testing

.1 Test all piping systems to withstand a hydrostatic pressure equal to the 350 kPa.

.2 Flush all systems thoroughly prior to testing.

.3 Conduct tests with all equipment connected, support bracing, anchoring and blocking in place.

.4 Pressurize sections between valves with valves closed and hold pressure for one hour.

.5 Test piping system for period of 1 hour.

PART 2 - PRODUCTS

2.1 Piping and Fittings

.1 Use CSA certified PVC Schedule 80 piping for all process piping unless otherwise indicated in the specifications or indicated on the plans.

.2 PVC pipe shall be potable water approved type 1 Grade 1 in accordance with ASTM D-1784.

.3 All bolts and nuts shall be the proper size and strength for the pipe diameter and 1035 kPa working pressure.

.4 All fittings shall be PVC Schedule 80 CSA B137. unless otherwise stated on plans.

.5 Use Sch 80 male or female adapters to provide threaded ends to PVC piping.

.6 All pipe and fittings 12 mm or smaller to be brass unless otherwise indicated.

2.2 PVC Cement

.1 PVC cement - Use heavy bodied type equivalent to Ipex 717. Clear type not acceptable.

.2 Primer - use Ipex P-70.

2.3 Flanges

.1 For PVC pipe use vanstone type PVC Sch 80 solvent weld flanges.

2.3 Gaskets

.1 Use NSF/ANSI 61 or approved full face gaskets.

.1 Gaskets shall be full face red rubber, 1.6 mm thick or approved equal in accordance with B7.

2.4 Nuts Bolts, Fasteners and Screws

.1 Use stainless steel type 316 (a) nuts, washers and bolts (b) screws and (c) fasteners in the assembly of valves, flanges, supports, fittings, hangers, etc.

.1 Ensure all bolts/nuts and washers have a grade identification mark on one face.

.2 Stamped ASTM A320/A320M.

.3 Provide manufacturers certification of product material type.

2.5 Domestic Supply Pipe

.1 Copper

.1 Water - Interior domestic piping - Copper pipe Type M (hard). Solder for joints shall not contain any lead, i.e. nickel instead of lead.

2.6 Hangers and Supports

.1 All pipe hangers or supports to be constructed of rust proof materials - galvanized steel or stainless steel unless specifically stated elsewhere in specifications or shown on the plans.

.1 For galvanized coat all cut ends with zinc rich primer.

.2 Hanger and support spacing and alignment as per pipe manufacturer's recommendations.

.3 Hangers for piping off walls and ceilings to be Anvil -Strut or Uni-Strut type. Loads to building members only. Ensure loading does not exceed available design loading of support member.

2.7 Stainless Steel Piping and Fittings

.1 Pool fill pipe through wall:

.1 Pipe: MSS short length Type A, A403 Gr. W ASTM A 778.

.2 Schedule 10S or Schedule 40.

.3 304 or 316 stainless steel.

.4 Fittings: 150 pound forged stainless steel weld neck or slip on, A812 Gr. F-316L, ANSI B16.5.

.5 Fittings: Short radius.

.2 Pool fill piping and Fittings: Exterior.

.1 Use 75 mm PVC Sch 40 in two equal lengths.

.2 At wall use 75 mm stainless steel Camlock to provide a male end c/w lockable duct cover.

.3 One length of pipe (equal between building and pool): Provide 75 mm stainless steel Camlock to provide a male end connection at each end.

.4 One length of pipe (equal between building and pool): Provide 75 mm stainless steel Camlock to provide a female end connection at one end.

.5 Provide a 45 degree PVC Sch 40 SxS elbow as required to ensure pipe discharge is directed towards center of pool.

2.8 Stainless Anti-Seize Compound

.1 For assembly of all stainless steel threaded connections: Provide a smooth, non-separating formula consisting of a lithium soap thickened grease into which is compounded to Stainless Steel, aluminum as well as graphite lubricants and corrosion fighting inhibitors.

.2 Rated for stainless steel use.

PART 3 - EXECUTION

3.1 Pipe Assembly

.1 Dry fit all piping prior to final solvent welding.

3.2 Mis-alignment

.1 Do not use coupling(s) to correct mis alignment between pipes.

.2 Install all piping true and plumb.

3.3 PVC Joint Solvent Welding Procedure

.1 Cut end of pipe square; remove all burs from the inside and outside of the pipe with a file. Cut 15° chamfer to a depth of 2.5 mm. Clean pipe with a clean, dry rag.

.2 Check pipe and fittings for fit (**DRY**). For proper fit the pipe must fully bottom in the socket with no interference but without excessive tolerance. Use brush applicator for sizes less than 75 mm or roller applicator for sizes greater than 75 mm to apply primers and cement.

.3 Using proper applicator apply primer freely to fitting socket keeping the surface wet for minimum 10-15 seconds. Redip the applicator in primer as required. Remove puddling by tilting the socket to allow excess to run to waste. Apply primer to the pipe in the same manner as the socket. A second application of primer in the socket is required if the fitting surface is especially hard.

.4 Immediately and while surfaces are still wet apply appropriate P.V.C. cement with the appropriate applicator. Cement must be in a fluid condition, if it is "gel-like" or "ropey" it should not be used.

.5 Stir the cement and apply a full even layer of cement to the pipe. Flow the cement on with the applicator - do not brush it out to a thin paint type layer which will dry in a few seconds.

.6 Apply a medium layer of cement to the fitting socket; avoiding puddling cement in the socket. Apply a second full layer of cement to the pipe.

.7 Assemble the pipe and fitting without delay. Cement must be wet. Ensure the pipe bottoms in the fitting socket. If possible, twist the pipe 1/8 to 1/4 turn as you insert it. Hold the pipe together for 15-30 seconds to eliminate push out.

.8 After assembly the joint should have a ring or bead of cement completely around the junction of the pipe and fitting. If voids in this ring are present sufficient cement was not applied and the joint may be deemed defective.

.9 Handle newly assembled joints carefully until initial set has taken place. Initial set times are as per the following.

Temperature Range	Pipe Sizes 12 to 32	Pipe Sizes 40 to 50	Pipe Sizes 60 to 200
16° to 38°C	2 min	5 min	30 min
5° to 16°C	5 min	10 min	2 hrs
-15° to 5°C	10 min	15 min	12 hrs

* In damp or humid weather allow 50% more set time; extended set times are required for chemical applications.

Note - Initial set time is the necessary time needed before the joint can be carefully handled.

3.4 Pipe Insulation

.1 Insulate pipe and equipment through washroom area as shown on the plans.

.2 See Section 15180.

3.5 Stainless Steel Fasteners for Threads

.1 To mitigate galling

.1 Use an anti-seize lubricant made specifically for reducing or eliminating galling between stainless steel fasteners on the mating threaded parts.

.1 Lubricate both internal and external threads.

.2 Use a very low rpm setting whenever using power tools.

.3 Use washers to provide a smooth bearing surface reducing friction between nut and flange.

.4 Torque bolts in a proper bolting sequence, in a minimum of four stages, as specified.

.1 Apply 30% of the final torque value required following the recommended bolt torque sequence of a star or cross-bolt pattern.

.2 Increase the torque to approximately60% of the final torque required.

.3 Repeat, increasing the torque to the final torque value.

.4 Retorque all studs. All studs should be retorqued with a rotational pattern at the final value of torque until no further rotation of the nuts can be achieved. This may require several passes, as torquing of one stud typically causes relaxation in adjacent studs. Continue torquing until equilibrium has been achieved.

.5 After tightened ensure at least one thread protruding through the nut.

.6 Complete final tightening of bolt/nut assemblies using a calibrated torque wrench.

3.6 Saddle Clamps

.1 Drill hole through discharging tapping of saddle clamp.

.2 Install and secure to ensure a tight fit without causing pipe deformation, prior to drilling the hole into the pipe.

.3 Drill round type hole with sharp clean edges the maximum diameter allowed by the saddle.

.4 Ensure cuttings and plug (core) from drilling the hole does not fall into the pipe.

3.7 Hangers and Supports

.1 Install hangers to support all piping and equipment. If supporting a non rigid pipe on an exterior wall utilize supports as required to run pipe straight without “drooping”.

.2 Use sufficient hangers to restrain all piping and equipment from movement.

.3 Ensure all brackets used are constructed of rust proof materials.

.4 Secure piping to the wall, floor and ceiling in a firm manner that results in “no movement” under all operating conditions.

End Section 11250

PART 1 - EQUIPMENT

1.1 Manufacturer's Nameplates

.1 Provide metal nameplate on each piece of equipment, mechanically fastened with raised or recessed letters.

.2 Locate nameplates so that they are easily read.

1.2 Lamacoids

.1 All labels to be lamacoids.

.2 Provide shop drawings indicating lamacoid designations (wording). Size of markers shall be minimum 12 x 65 mm. Use 25 mm lettering wherever possible.

.3 For purposes of shop drawing submission consider the following sizes. Label sizes on shop drawings.

Lamacoid Size 1: 10 x 50 mm 1 line 3 mm high letters

.4 Submit list of nameplates for review prior to engraving. Wording on nameplates and labels to be approved by Contract Administrator prior to manufacture.

.5 Identification to be English.

.6 Securely fasten to equipment with screws or chains as required.

.7 Provide proposed and finalized list of nameplates in electronic format (MS Word or MS Excel).

1.3 System Labels

.1 Provide laminated plastic plates with black face and white centre of minimum size 90 x 40 x 2.5 mm nominal thickness, engraved with 6 mm high lettering.

.2 Fasten labels securely in conspicuous place. Where labels cannot be mounted to cool surface, provide standoffs.

.3 Identify equipment type and number using the identification system shown in the P&ID.

.4 Submit list of labels in electronic format for review prior to engraving.

1.4 Mechanical System Identification Labels

.1 Fasten identification labels securely in conspicuous place. Where labels cannot be mounted to cool surface, provide standoffs.

.2 Identify equipment type and number (i.e. BAV-109).

.3 Use abbreviations as per legend on plans and P&ID drawing

.4 Label all equipment, valves and process equipment as to identification including sequential numbering, descriptive purpose and function or normal position as per the following:

Valve # Valve type Size (in mm) Service Purpose Position

Examples are.

.1 BAV102 Pool Fill 3 closed.

.2 BAV105 Chlorine rate control throttled.

.5 Submit list of labels in electronic format for review prior to engraving.

1.5 Electrical System
Identification Labels

.1 Install designator lettering on all electrical equipment.

.2 Use Lamacoid plastic engraving sheet, black face, white core, mechanically (with self tapping screws) or adhesively attached as directed by Contract Administrator. Label maker and adhesive industrial tape will be accepted.

.3 Label each electrical device,

.4 Provide type written panel directories to indicate equipment and location thereof by each circuit breaker. Securely mount all directories on the inside cover of the panel door and provide a transparent protective cover.

.5 Provide shop drawings indicating Lamacoid designations (wording). Size of markers shall be minimum 12 x 65 mm.

1.6 Pipe Marking

.1 Blank self-adhesive pipe markers to be custom labeled by Factory with the following designations: Note choose background and letter colors. Standard of acceptance: Seton.ca

.1 1 card- Size "CC labeled as per the following:

.1 “DOMESTIC WATER" white words on blue background.

.2 1 card for each label wording below- Size "SC8 labeled as per the following:

.1 “CHLORINATOR FEED" white words on blue background.

.2 “CHLORINATOR OUTLET" white words on blue background.

.3 “TREATED WATER" white words on blue background.

.4 “PUMP DISCHARGE" white words on blue background.

.5 “POOL FILL" white words on blue background.

.6 “WORDING TO BE DETERMINED" white words on blue background.

.7 “WORDING TO BE DETERMINED" white words on blue background.

.2 Directional Arrows: available in multiple colors. 1”x 108” roll is $40; 2” x 54” roll is $46/roll, 4” x 108” is $146

.1 Roll 2” W x 54” long: blue/white arrows.

.3 Standard of acceptance: Seton.ca or approved equal in accordance with B7.

PART 2 - PIPING

.1 Identify medium in piping with markers showing name and service including, directional flow arrows.

.2 Locate markers on piping systems so they can be seen from floor, at start and end points of runs, at each piece of equipment and at major manual and automatic valves immediately upstream of valves.

PART 3 - VALVES AND EQUIPMENT

.1 Provide laminated plastic plate tags with 12 mm lettering and numbers, secured with non-ferrous chains or "S" hooks for valves and operating controllers.

.2 Consecutively number valves in systems- incorporate tag descriptions.

.3 Submit list of nameplates for review prior to engraving.

End Section 15020

PART 1 - GENERAL

1.1 Scope of Work

.1 Insulate piping as described below:

.1 All piping through washrooms between storage room and mechanical room.

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01340 - Shop Drawings, Product Data, Samples and Mock-ups.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves and jointing recommendations.

1.3 References

.1 CAN/CGSB-51.9- Mineral Fibre Thermal Insulation for Piping and Round Ducting.

.2 ASTM C547 - 07e1 Standard Specification for Mineral Fiber Pipe Insulation

.3 CAN/CGSB-51.10- Mineral Fibre Board Thermal Insulation.

.4 CGSB 51.11- Mineral Fibre Thermal Insulation Blanket.

.5 ASTM C 553Specification for Mineral Fiber Blanket and Thermal Insulation for Commercial and Industrial Applications.

.6 ASTM C 612Specification for Mineral Fiber Block and Board Thermal Insulation.

.7 ASTM C 449/C 449MStandard Specification for Mineral Fiber-Hydraulic-setting Thermal Insulating and Finishing Cement.

.8 ASTM E 84-, Test Methods for Surface Burning Characteristics on Building Materials.

.9 ASTM E 96Test Methods for Water Vapor Transmission of Materials.

.10 Can/ULC-S102Surface Burning Characteristics of Building Materials and Assemblies.

.11 TIAC National Insulation Standards, Section 5: Commercial Piping.

1.4 Delivery, Storage and Handling

.1 Store insulation in original packaging and protect from weather and construction damage.

.2 Protect insulation from physical damage caused by dirt, water, snow, chemicals and mechanical damage.

1.5 Qualifications

.1 Applicator: Company specializing in performing the work of this section with a minimum of three years of experience and a member of TIAC.

PART 2 - PRODUCTS

2.1 General

.1 Components of insulation system to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with CAN/ULC-S102.

.2 Materials to be tested in accordance with ASTM C411 and ASTM E 84.

2.2 P-1 Formed Mineral Fibre to 2.3 °C

.1 Materials:

.1 CGSB 51-GP-9M, rigid mineral fiber sleeving for piping.

.2 Acceptable materials: Fiberglass Canada Inc., Knauf Fiber Glass, Manson Insulation In. and Manville Corporation.

.2 Thermal Conductivity "k" shall not exceed 0.034 W/m. °C at 24°C mean temperature when tested in accordance with ASTM C335.

.3 Thickness: 25 mm unless otherwise stated.

2.3 Fastenings

.1 For insulation systems:

.1 Tape: self adhesive, aluminum, ULC labelled for less than 25 flame spread and less than 50 smoke developed

.1 Acceptable material: Fattal tape by S. Fattal Canvas Inc.

.2 Lap seal adhesive: quick-settings and lap sealing of vapour barriers.

.1 Acceptable material: Childers CP.80 Foster 87-75 asbestos free at $6m^2/L$.

.3 Lagging adhesive: fire retardant coating.

.1 Acceptable material: Cilders CP.50A-HV2 and Foster 30-36 asbestos free at 1.25 m^2/L.

2.4 Insulation Cement

.1 To CAN/CGSB-51.12.

2.5 Jackets

.1 PVC- applies to pipe and fittings.

.1 Apply in accordance with CGSB 51-GP-2M and CAN 4-S102.2.

.2 0.50 mm (0.020") thick minimum.

.3 Install PVC jacket over all pipe and fittings to be insulated.

.4 Fitting covers, pre-moulded to match.

.5 Fastenings standard to manufacture.

PART 3 - EXECUTION

3.1 Application

.1 Apply insulation to pipe and fittings after pressure tests have been completed and approved.

.2 Surfaces shall be clean and dry during application of insulation and finishes.

.1 Do not install any insulation material if it becomes wet because of transit or job site exposure to moisture or water.

.3 Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations and as specified herein.

3.2 Installation

.1 Complete work by licensed journeymen.

.2 Install in accordance with ANSI/NFPA 90A and ANSI/NFPA 90B and manufacturer's recommendations.

.3 Install insulation with smooth and even surfaces, with round shapes laid to true circular and concentric shape, shaped to blend with fitting insulation and adjacent covering; with full length section and tight to insulated object.

.4 Seal and finish exposed ends and other terminations with insulating cement.

.5 Finish joints so they will shed water and are completely sealed.

.6 Do not apply PVC jacketing too tightly. Slide joints plus PVC thickness must work together to prevent cracks and puckering.

.7 Use PVC cement sparingly as heavy application can cause puckering and cracks.

.8 Use clear caulk/adhesive.

3.3 Fastenings

.1 Secure pipe insulation by tape at each end center of each section, but not greater than 900 mm on centers.

End Section 15180

PART 1 - GENERAL

1.1 Description of Work

.1 The work shall consist of the supply and installation of all labour, materials, consumable and equipment necessary for the installation of a water treatment and control system for an existing wading pool/spray pad. Include everything requisite and necessary to properly complete the entire system, notwithstanding that every item may not be specifically mentioned.

.1 Complete pressure testing of the two existing drain lines with water prior to the date shown in Section D13 CRITICAL STAGES.

.2 Complete demolition of existing equipment and piping. Separate items to be incorporated into the work from the items that are surplus.

.3 Securely mount the pump UV and other equipment off the floor by use of a rust-proof stand.

.4 Mount the water chemistry controller, flow through cell for probes and $C0_2$ controller on a PVC or HDPE backboard and be wired, plumbed and tested prior to shipping.

.5 Secure piping and valves to the walls using straight runs and neat bends.

.6 Provide a complete automatic pH control system using CO_2. And chlorine dosing using an erosion feeder.

.7 Complete all plumbing, mechanical and electrical systems.

.8 Building available electrical supply: See Section 16010 item 1.1.

.9 Start up, commissioning and training: See Section 01820.

1.2 Work Included

.1 The following list generally describes the scope of provide and install work under this section:

.1 Pumping Equipment

.2 Filtration equipment

.3 Water Treatment Assembly consisting of an automatic pH and chlorine feed system.

.4 UV disinfection system.

.5 All connecting piping, valves and fittings.

.6 Pool fill systems.

.7 Pool drain to remain as is.

1.3 Compliances

.1 Complete works in compliance with local regulations & codes, national and international standards, applicable health codes, and authorities having jurisdiction.

.2 Manufacture components in accordance with CSA or CUL certified and bear the appropriate approval stamp in a visible location.

.3 Provide National Sanitation Foundation (NSF) 50 or equivalent approvals of equipment supplied, where applicable.

1.4 Record Drawings

.1 Obtain separate set of drawings and mark the variations as the work progresses in order to complete a record of equipment and services installed at variance with locations and methods shown on original drawings.

1.5 Use of Existing Pipe and Valves

.1 Valves that are in like new condition and of the proper size can be reused upon approval of Contract Administrator. Do not use a pipe coupling within 300 mm of a valve that is being reused.

.2 Existing pipe that in a useable position and of a suitable size can be reused upon approval of Contract Administrator. One example is the existing piping that extends from the present storage room to the equipment room that transports City water that is being used for pool top up.

.3 At start of project remove piping and related accessories from wall and sort potential valves and any piping that are proposed for re-use into a separate pile. Obtain Contract Administrator's approval for re-use.

1.11 Accessibility

.4 Install equipment and piping with adequate clearances for head room, passage, operation and service.

1.12 Tests

.1 Provide tests on equipment, systems and materials as may be requested by the Contract Administrator.

.2 Carry out tests for such lengths of time and at such a time as determined by Contract Administrator. Before final completion and acceptance of work to verify performance requirements.

.3 Completion of tests is not evidence of acceptance of tested part of contract.

.4 No claim for damage will be made for injury or breakage of parts due to tests.

1.13 Electrical

.1 Electrical equipment supplied under this section shall be CSA approved and bear CSA labels. Motors shall be tested to NEMA MG.1 standards or CSA C22.2 #52 and shall conform to insulation and dielectric strength.

.2 Motors shall have conduit terminal boxes and adequate starting protective equipment as defined by the local power utility and as outlined in the Manitoba Electrical Code.

.3 Existing electrical supply is 120/240 V 3 phase 4 wire. Provide motors and electrical equipment as required and suitable for available electrical supply that is existing.

1.14 System Start Up

.1 Be responsible to review Section 01730 and 01820. Include requirements as outlined in in scope of work.

.2 Retain fully qualified operators to start up all systems.

.3 Cycle all components of the complete system to duplicate normal operating conditions and test all water chemistry control system components.

1.15 Training

.1 Be responsible to review Section 01730 and 01820. Include training requirements as outlined.

.2 Training shall include spring start-up, typical weekly maintenance and operation, and winterization duties.

1.16 Electrical Supply

.1 Use existing electrical breaker panel.

1.17 Approved Equals

.1 Provide request for approved alternative equal in accordance with B7 SUBSTITUTES for any specific product listed below products

1.18 Drain Covers

.1 Existing covers on drains are: holes and solid type.

.2 City of Winnipeg will supply new slotted covers to replace existing covers.

.3 Be responsible to install new City of Winnipeg supplied covers.

1.19 Submittals

.1 Submit for review in accordance with Section 01340, engineering drawings showing the following.

.1 Complete description in sufficient detail to permit comparison with the specifications.

.2 Dimensions and installation requirements.

.3 Descriptive information including catalogue cuts and manufacturers' specifications for all major components.

.4 Electrical schematics and layouts.

.5 UV:

.1 Provide documentation (as part of shop drawing submission) that unit is fully approved by UL/MET, ANSI/NSF50 2010.

.2 The UV System shall have CSA, or cUL listing, be NSF-50 2012 certified.

.3 Include company information including descriptions of quality control procedures and certifications.

.4 Confirmation that Manufacturer maintains spare or replacement parts in North America for delivery within 2 days, indicate location of stocking parts.

.2 Submit for O&M manuals in accordance with Section 01730.

PART 2 - PRODUCTS

2.1 Process Feed Pump

.1 No-rib integral strainer basket on suction end of pump.

.2 Self priming with 0.75 m lift.

.3 Shut off head minimum 80 ft. minimum TDH of 70 ft @ 60 gpm.

.4 Electrical supply to motor: as required for existing service supply..

.5 Standard of Acceptance.

.1 Haywood TriStar SP3210EE Series or approved equal in accordance with B7.

2.2 Cartridge Filter

.1 Filter exterior molded from a glass reinforced copolymer material. .

.2 Minimum 700 ft^2 of filter area with dual quad cluster cartridge elements.

.3 Cartridge filter as filter media to be rated with an effective particulate removal of 10-20 microns.

.4 50 mm end connections with full 50 mm internal piping.

.5 Combination pressure and filter cleaning cycle indicating gauge.

.6 Winterizing drain at bottom.

.7 Headloss: 4 ft @ 60 gpm.

.8 Manual air release valve.

.9 NSF listed.

.10 Standard of acceptance: Haywood HCF7030C or approved equal in accordance with B7.

2.3 UV Disinfection

.1 Overall assembly to consist of a reactor, separate in-line strainer (to capture any glass should the quartz tube surrounding a light bulb break), control panel, UV intensity monitor, high temperature shut down, cleaning (wiper) system, transformer (as required) and circuit breaker.

.2 Design unit as per the following parameters;

.1 UV minimum dosage at flow rate of 65 at end of lamp life: 40 mJ/cm^2 based on constantly monitoring the full re-circulating flow rate. End of lamp life to be minimum 98% of specified new lamp output.

.2 Ultraviolet transmittance @ 253.7 nm: 93%.

.3 Flow rate: Peak– 75 us gpm.

.4 Headloss through the UV system shall not exceed 300 mm under design flow rate conditions.

.5 ASNI inlet/outlet flange connections. All ports or vents shall be threaded NPT.

.6 Complete with appropriate brackets or feet for ease of installation in either vertical or horizontal mounting, as based on unit supplied.

.7 Electrical: connections as required to utilize building existing power supply. Provide breaker as required. See Section 16010 item 1.1.

.3 Strainer basket: Provide a separate strainer basket (with flanged or union ends) suitable to catch any internal pieces that may be subject to breakage.

.1 UV mesh (#20, 1/32" opening size).

.2 Suitable to operate at 265 L/min (60 gpm) at less than 150 mm head loss when clean.

.3 Minimum pipe size ends 65 mm (2 ½").

.4 Complete with inlet and outlet pressure gauges.

.5 National NSS-06-065-0101 c/w NSS-06-CST-UVMSH mesh or approved equal in accordance with B7.

.4 General

.1 Lamp.

.1 Ultraviolet lamp shall be low or medium pressure high intensity. Lamp shall be designed to emit continuous Ultraviolet wavelengths in the range of 200 nm to 400 nm. This will provide optimal disinfection benefits and destruction of the Monochloramine, Dichloramine, and Trichloramine compounds. Lamp must remain unaffected by temperature variance of 5 - 20º Celsius.

.2 The lamp system must provide a constant dose of not less than 40 mj/cm^2 until the end of the lamp life based on constantly monitoring the full re-circulating flow rate, not on a side stream treatment. Power stepping systems are not acceptable.

.3 Ultraviolet intensity monitor: factory calibrated to provide intensity in mw/cm^2, monitors providing percentage of lamp output not acceptable. It must include a built-in alarm system to notify operator when output level drops below required level of 40 mj/cm^2 (or operator set dosing levels).

.4 Ultraviolet chamber temperature control system: to maintain system integrity in the event of flow interruptions to the chamber.

.5 Suitable to operate in an environment with ambient relative humidity of 5-90% and ambient air temperature of 0-40ºC.

.6 All metal components in contact with the feed water shall be Type 316 L stainless steel.

.5 Cleaning (Wiper) System

.1 Equip UV reactor with a automatic on-line sleeve wiping system. The wiping system to be automatically initiated by the Control Panel, and will operate while the UV system is in operation.

.2 .Be able to continue providing disinfection while the automatic cleaning system is in operation.

.3 Incorporate Direct Shaft Encoding for positional location.

.4 Wiper power supply shall be 24 volt DC.

.5 Indicate wiper faults on the control system display.

.6 Wiper System to utilize “Intelligent Operation” for automatic start-up commissioning.

.1 Records wiper position at chamber ends. Position must be fixed and not dependent on a timed interval or component striking end of chamber.

.2 Establish a travel run without setting limit adjustments to ensure system integrity and longevity.

.7 Operate the automatic wiping system on a timed cycle. The frequency of wiping cycles shall be field adjustable via the operator interface. Manual wiping system control shall also be through the operator interface.

.6 Control Panel

.1 The operator interface shall be a monitor that is menu driven, and shall display the following system information when prompted: reactor status, individual lamp status, failure of a specific lamp, lamp bank operating hours, dose either above or below minimum value, UV Intensity, power level, chamber high temperature, alarms, alarm history.

.2 Provide 4.5 m of cable between control panel and reactor.

.3 Design the control panel to be installed within a 4.5 m of the UV Reactor. Manufacturer of UV system to furnish water resistant power and data cabling (c/w strain relief) between UV reactor and control panel. Factory end of cable(s) on reactor end, bare wire on control panel end. Wire(s) between reactor and control panel to be suitable for installation through PVC conduit.

.7 UV Intensity Sensor

.1 Provide one (1) side-mounted UV intensity sensor.

.2 Design the sensor to measure only the germicidal portion of the light emitted by a UV lamp. The detection system shall be factory calibrated, sensors that can be field calibrated will not be permitted.

.8 Temperature Switch

.1 Fit a temperature switch to reactor for protection against heat build-up under no flow or drained chamber conditions

.2 The temperature switch shall cause the UV system to shut down and alarm in event of higher than recommended water temperature (or air temperature if the lamps are operated in a dewatered situation).

.9 Drain Valve

.1 Furnish reactor with a drain valve connection and drain valve so the reactor can be dewatered for inspection or cleaning or winterizing after the inlet and outlet valves are closed.

.10 Spare Parts: Supply the following spare parts and safety equipment.

.1 1 UV Lamp.

.2 1 lamp sleeve.

.3 1 wiper shaft seal.

.4 4 Litre lime-a way or other cleaning chemical with suitable wiping cloths.

.5 1 Face Shield(s), able to block UV light wavelengths between 200 and 400 mm.

.11 Start/Stop Control

.1 Provide a remote on/off relay to allow a switch to be used to engage the unit to on/off.

.12 Guarantee

.1 Ballasts: The ballasts shall be warranted for 5 years, prorated after 1 year.

.2 UV lamps: Ultraviolet bulbs shall be warranted for a minimum period of 8,000 hours. Intermittently operated lamps (≥ 1 on/off cycles per day) will be replaced free of charge should failure occur prior to 4,000 hours and replacement will be prorated between 4,000 and 8,000 hours.

.13 Standard of acceptance.

.1 ETS-ECP110-4SP, Trojan in or approved equal in accordance with B7- all subject to items of supply as indicated above.

2.4 Disinfection and pH Control

.1 Chemical Controller.

.1 Supply a programmable chemical automation system for continuous monitoring and automatic control of pH and sanitizer ORP (oxidation-reduction potential). The controller shall also display the Langelier saturation index.

.2 The controller shall automatically activate the appropriate chemical feeders in order to maintain the sanitizer activity level within +/- 10 mV (millivolts) of ORP and the pH within +/- 0.1 pH unit of the set-points selected by the operator. All set-point and calibration levels shall be adjustable with a numeric keypad mounted on the front panel of the unit.

.3 Use a NEMA 4X rated (IP66) lockable fiberglass cabinet to house the controller. Use NEMA 4X connectors to maintain rating.

.4 Control to display ORP, pH, descriptive alarm messages, ppm indicator lights, which track with the ORP and a constant pH of 7.5,vVisual pH and disinfectant feed pump indicator lights, which are activated as chemicals, are being fed and blink during pause mode of proportional feed and Flashing red LED alarm indicator for Hi/ Lo pH, ORP, current values, , control mode and operational status for ORP and pH. LCD graphic display screen and sample stream low or no flow failsafe condition

.5 To be NEMA 4x rated.

.6 The controller shall have the capability to calibrate all sensor inputs, depending on the accuracy needed, using either 1, 2, or 3-point calibration to determine respectively the origin, slope and curvature of the calibration curve.

.7 The controller shall include programmable high and low alarm levels for pH and ORP with operator-selectable feed lockout and alarm buzzer options. A remote alarm relay shall be included in parallel with alarm buzzer for operator-selectable voltage or dry contact output. The remote alarm shall notify the main spray park controller and spray park operations should cease when pH or ORP readings are unacceptable.

.8 The controller shall continuously monitor and alert for failure of ORP and pH probes using dynamic probe testing before the water chemistry gets out of range. Failure alarms based on safety timers or out-of-range alarms will not be considered equal.

.10 Alarms:

.1 The controller shall also have programmable alarms for pH, ORP, sample stream low flow & no flow and chemical overfeed. All alarm conditions shall activate a master alarm signal..

.11 Probes:

.1 Probes shall be easily removable for cleaning and calibration and shall include calibration solution for a minimum of 12 calibration checks after start up is complete.

.12 Password:

.1 The controller shall have two security password levels with one for operators and one for the distributor.

.13 Flowcell:

.1 Flowcell: Utilize a PVC flowcell to provide precise sample flow rate and water velocity regulation past the probes. Provide 12 mm ports for potentiometric probes (ORP and pH), 6 mm ports for temperature probe and acid wash injection, and a clear acrylic front viewing window. Provide 12 mm PVC isolation valves, 6 mm wet test valve and flow switch. .

.14 Backboard Mounting:

.1 Mount the water chemistry controller, flow through cell for probes (ORP and pH), wiring box and $C0_2$ controller on a PVC or HDPE backboard of a size of 610 mm x 915 mm. Wire, plumb and test assembly prior to shipping.

.15 Include a clearly labeled on/off switch to allow the operator to turn the unit on/off daily without use of the key pad.

16 Shall operate a solenoid valve on the erosion feeder supply line, be responsible for choosing voltage of solenoid valve to be compatible with controller.

17 Shall operate a booster pump when the erosion feeder solenoid is energized to supply water flow to the erosion chlorine feeder. Provide secondary relay and wiring box on backboard suitable to operate solenoid and booster pump.

.18 Shall operate a solenoid valve on the CO_2 feeder supply line.

.19 Turn on/Off: set up to ensure water chemistry controller and related feed system are full operational whenever process pump is turned off. Thus turn off water chemistry controller and related feed systems electrical supply when process feed pump is not operating.

.20 Standard of Acceptance:

.1 Santa Barbara Control Systems, Chemtrol PC2000.

.2 BECS Technology: BECSys3 or BECSys5.

.2 Chemical feed system- pH.

.1 Chemical feed system: CO_2 type feed system. Provide flow control unit c/w diffuser/injector fitting with integral check valve housed in a FRP enclosure.

.1 Provide 3 CO_2 cylinders.

.2 Feed diffuser/injector fitting.

.1 The Diffuser/Injector fitting shall be NPT PVC body complete with polyethylene diffuser and polyethylene check valve.

.2 The diffuser shall cause CO_2 to totally dissolve into solution without evidence of CO_2 bubbling in the pool basin.

.3 The diffuser/ injector fitting shall have a ¼" (6 mm) OD tube to ¼" (6 mm) NPT polyethylene check valve with a 1½ lb spring to prevent the flow of water into the feed unit.

.3 Provide a method to advise operator of the need to change feed tanks.

.4 Feed flow control unit:

.1 Include a brass solenoid valve rated for 120 VAC and 8 watts with a pressure rating of 100 PSIG (690 kPa).

.2 Control the CO_2 feed rate by a rate adjusting flow meter scaled from 0-30 Standard Cubic Feet Per Hour.

.3 The solenoid valve shall provide on/ off control of CO_2 feed gas through electrical activation by a water chemistry controller to maintain the desired pH set point.

.4 The solenoid valve, flow meter and connecting tubing/ fittings shall mounted in an FRP enclosure with is mounted on a common backboard with the water chemistry controller and flow through cell.

.5 Provide two 50 lb CO_2 cylinders.

.3 Chemical feed system- chlorine.

.1 Chemical feeder: calcium hypochlorite tablet type feed system.

.2 System design to draw a sidestream from the main water flow introducing a portion of this to the chlorinator where the tablets are eroded at a controlled rate. The chlorination injection booster pump returns the resulting chlorinated solution back into the main water line or holding tank.

.3 Injection rate to be automatically controlled based upon ORP monitoring and a controller.

.4 System components such as controllers, flow cells, CO_2 feed components to be mounted on a backboard with the appropriate mechanical, electrical, instrumentation and connections to the systems controller.

.5 Include a 25 mm FPT or larger brass solenoid valve rated for 120 VAC with a pressure rating of 100 PSIG (690 kPa).

.1 Provide relays and control from water chemistry controller to open/close of solenoid valve on erosion feeder inlet based on call for chlorine addition.

.2 Be responsible to choose voltage.

.6 Provide a variable area flow meter with a range of 0.88 to 8.8 gpm with 40 mm PVC socket end connections.

.1 PVC tube.

.2 Provide

.1 Standard of acceptance: Chemline Plastics FSA02000.

.7 Provide booster pump to boost pressure by 7 ft @ 6 gpm.

.1 Provide NPT ends.

.2 Provide relays and control from water chemistry controller to start/stop pump based on open/closed of solenoid valve on erosion feeder inlet.

.3 Provide PVC unions to facilitate removing pump for service.

.4 Standard of acceptance Grundfos UP 15-29- 87 watts.

.8 Provide 30 kg of tablets after spring start up is complete.

.9 Standard of Acceptance: Accu-Tab 3012 or approved equal in accordance with B7.

2.5 Pressure and Vacuum Gauges

.1 To be calibrated with minimum 2% accuracy.

.2 To have minimum 65 mm face.

.3 Pressure gauges: 63mm, 316 stainless steel case, glycerin filled with a range of 0-50 PSI

.4 Vacuum gauges: 63mm, 316 stainless steel case, glycerin filled with a range of 30-0" Hg and +/- 2% accuracy. Vacuum gauges shall be installed on the suction ends of the pumps.

.5 To have a scale of 0-50 psi unless otherwise noted on plans or specified elsewhere in the specifications.

.6 Gauges on suction lines to have dual scale display range (PSI/kPa)

.7 Provide shut off valves as required to allow servicing of gauges.

.8 To be glycerin filled.

.9 Mount gauges onto brass saddles i.e. Ford S70.

.10 Standard of Acceptance

.1 ENFM, 7211 or 7214 Series.

.2 Marshall Instruments Inc., Severe Service.

2.6 Hangers and Supports

.1 All pipe hangers, supports and brackets to be galvanized steel or stainless steel.

.2 Hangers for piping off walls and ceilings to be Anvil-Strut or Uni-Strut type.

.3 Submit shop drawings for approval on all hangers and supports for piping.

2.7 Eye Wash Assembly

.1 Provide pedestal mounted eye/face wash - hand and foot operated c/w hot and cold throttling valves and check valves on each line – Speakman 480, Guardian G1704 HFC, Bradley S19-210X or approved equal in accordance with B7.

.2 Thermostatic mixing valve to meet ANSI Z358.1. Leonard model TA 300, Powers ES150RB or approved equal in accordance with B7.

2.8 Safety Signage

.1 Provide safety signs in 0.040 aluminum with a baked enamel finish 10”x7" in size

.2 Individual sign messages as per OSHA standards are available from "REVERE - SETON" (toll free 1-800-263-1635), Brady (as distributed by Acklands), North Safety Products or approved equal in accordance with B7 and as follows.

.1	Danger - Chemical Storage	(# S0043)
.2	Notice – No Smoking	(# S0604)
.3	Safety First - Eyewash Station	(#S0549)
.4	Caution - Eye and Glove Protection Must Be Worn When Handling Chemicals	(#S0281)

2.9 Process Flow Diagram Display

.1 Provide one mounted single mat frames for process flow drawing.

.1 Select grade: chemically treated to reduce acidity when the pulp is still in liquid form.

.2 Mounting board: Secure diagram to a foam board that has a self-adhesive side, ensure no air bubbles.

.2 Black metal grooved frame 25 mm wide, overall frame dimensions 610 mm x 914 mm.

.3 40 mm wide light grey matte with beveled edge (white).

.4 Acrylic: anti glare glazing, drawing to be raised.

.5 Provide Contract Administrator with red-lined flow diagram, full valve tag list. List each valve on re-line drawing.

.6 Contract Administrator to revise process flow diagram to record and provide Contractor with paper copy with dimensions of approximately 559 mm x 864 mm.

.7 Hanging: Plastic coated wire, hangers for attaching wire to frame and two wall bumpers.

.8 Provide shop drawings.

.9 Hang frame on mechanical room building wall with two supports, location field determined by Contract Administrator.

PART 3 - EXECUTION

3.1 Pressure Testing Existing Piping

.1 Complete pressure testing of the two existing drain lines with water to 105 kPa (15 psi) by the use of test plugs and gauges.

.2 If there is any leakage provide make up water to determine the leakage rate in an hour to maintain 105 kpa.

3.2 Equipment Bases

.1 Provide concrete or corrosion resistant fabricated bases to raise all mechanical equipment minimum 100 mm above the floor. Do not install any mechanical equipment directly on floor.

.1 Concrete bases: ensure new concrete is “tied” to existing concrete with drilled in place anchors.

.2 Fabricated bases: Secure to concrete floor with drilled in place anchors.

.3 Use PVC type base and galvanized brackets to wall to support Cl feeder approximately 750 mm above the floor.

.2 Provide shop drawings and obtain Contract Administrator approval.

3.3 Chemical Feed - Chlorine

.3 Assembly and position the chlorine chemical feed system in convenient positions, following manufacturer's instructions. Install chemical per locations specified.

.4 Mount backboard and all related connections to equipment on backboard in a neat manner.

.5 Provide all connections and appurtenances necessary for a complete operating system.

.6 Provide PVC unions on both sides of solenoid valve.

.7 Plug controllers into a 120 V receptacle.

3.4 Chemical Feed System- CO_2

.1 Neatly run tubing between controller and injection location. Run tubing inside PVC pipe through washroom area.

.2 Provide PVC unions on both sides of solenoid valve.

.3 Provide bases and stands as required support and restrain cylinder. Install and secure all systems as required.

3.5 Hangers and Brackets

.1 Install hangers, brackets and brackets to support all piping and equipment.

.2 Use sufficient hangers to restrain all piping and equipment from movement.

.3 Shall be secured to the wall, floor and ceiling in a firm manner.

.4 Ensure all brackets and hangers used are constructed of rust proof materials.

3.6 Eye Wash

.1 Locate eye wash in an accessible location.

.2 Run hot and cold water to unit. Tee into existing hot water tank inlet and outlet in equipment room.

.3 Install check valves on all piping interconnecting hot and cold water.

.4 Install thermostatic mixing valve in an accessible location as per manufacturer’s instructions.

3.7 UV System

.1 Securely mount reactor unit in an accessible location considering space requirement for servicing (removal) of bulbs.

.2 Consider sensor removal distance for service in placement of reactor and any appurtenances.

.3 Pipe as required to ensure unit remains full of water at all times. For end discharge units provide a full size elbow to match UV outlet size.

.4 Ensure weight of unit is transferred directly to the floor without having weight on pipe or fittings.

.5 Install manual type vent valve at top of unit.

.6 Provide a manual 12 mm ball valve on piping/fittings above unit to allow air into assembly to facilitate draining operations

.7 Secure control panel to an accessible wall.

.8 Install strainer for containing possible sleeve glass breakage in an accessible location to allow access for easy removal of basket. Provide nearby shut off valves as required to prevent pipes from draining when basket is removed for cleaning.

.9 Complete all electrical connections as required to the reactor and control panel.

.10 Complete commissioning by a qualified factory trained technician. See Section 01820.

.1 Measure and record UVT of water during commissioning.

3.8 Piping, Valves and Fittings

.1 Install all piping, making all piping connections.

.2 Remove all scale, dirt and other foreign material from piping and equipment.

3.9 Pool Fill Main Piping

.1 Neatly cut hole through building brick exterior to provide a constant size opening with a clearance around pipe not to exceed 10 mm.

.2 Use color match caulking to caulk space between pipe and hole in block wall.

.3 Use a length of stainless steel pipe through building wall complete with stainless steel male cam lock fitting. Place cam lock fitting to minimize protrusion into walking path.

.4 Provide stainless steel female cap and a means to lock cap onto male end at wall.

.5 Piping from wall to pool:

.1 Provide two equal lengths of 75 mm Sch 40 pipe with PVC camlock connection to allow pool to be filled.

.2 Use 45º elbow to direct flow into pool.

.3 Cut pipe to extend 25 mm past top edge of pool to provide an air gap during filling.

.4 Provide hangers in storage room to store exterior fill pipe on wall.

3.10 Pool Fill Top Up Piping

.1 Use existing 50 mm pipe that runs between equipment room and mechanical room to supply City water supply to mechanical room.

.2 Use existing 50 mm HDPE piping between mechanical room and pool to provide top up fill to pool. Increase pipe size to minimum 150 mm to allow connection of valved fill line from .1 item above.

.3 Alter existing piping as required to provide connection between items .1 and .2 above with an air gap. NOTE: ORP/pH flow cell drain also connects to this piping with an air gap.

.4 Provide minimum 40 mm air gap between pipes at an elevation of 1.2 m above floor. Ensure there is no splashing when pool top up fill is operating.

3.11 Winterizing

.1 Provide drain valves for complete gravity drain type winterizing of all equipment and piping whether drain valves are shown on the plans or not.

.2 Provide red line drawings to contract administer for any drain valves added to the system c/w tag number.

.3 Provide flexible pipe with suitable end to connect to drain valves (including filter drain). Size pipe to allow all drainage water to be piped to a drain or outdoors without significant water being drained onto the floor.

3.12 Works in Existing Building

.1 Process Flow Diagram: Attach picture frame on building wall (frame height and exact location to be field determined by Contract Administrator).

.2 Maintain operation of all existing building domestic water supply including all existing hose bibs, washrooms, etc.

.3 Relocate existing spray pad piping if additional wall space is required to install new equipment.

.4 Splash Features header: Disconnect and plug existing copper water supply from city service to splash pad header.

.5 Re-connect existing building water supply piping after new backflow preventor discharge.

.6 Make attempt to re-use and re-hang existing shelving, hooks, hose, etc on available wall space.

.7 Make connections watertight and neat.

3.13 Testing

.1 Test pump, UV, filter and equipment.

.2 Test pressure shall be 350 kPa. Test pressure shall be maintained without loss for a period of one hour. Isolate all low pressure equipment and instruments prior to testing. Operate all valves and other devices during the test period.

PART 1 - GENERAL

1.1 General

.1 Supply of various electrical components are included in Divisions other than Division 16. Be responsible to review all specifications sections and all related shop drawings as prepared by the various project sub contractors as related to required electrical works. Be responsible to make all electrical components operational as required by the contract documents. Supply materials and complete works as required to fully integrate and make work operational and integrated if not specifically itemized in other Divisions.

.2 The building is serviced by a Siemens EQ 418100 120/240V 3 phase 4 wire 100 amp panel with 18/36 circuits. There are sufficient spare and unused circuits available for the proposed works.

.3 Use existing breaker panel to feed the electrical devices as required. Provide breakers as required, remove unused breakers.

.4 Complete electrical works as required for new building, controls, panels and related works.

1.2 Commissioning and Training

.1 Be responsible to review Section 01730 and 01820 and include commissioning and training requirements as outlined in Section 01730 and 01820 in scope of work.

1.3 Codes and Standards

.1 Do complete installation in accordance with CSA C22. 1-02 except where specified otherwise.

.2 Complete all works under an electrical permit and obtain inspections as required

1.4 Laws, Rules, and Ordinances

.1 The installation of the electrical systems shall comply with the requirements o the Canadian Electrical Code, latest edition, the Manitoba Hydro inspection department, and all provincial and municipal laws, rules and ordinances and to the satisfaction of the Contract Administrator.

.2 In cases of conflict between the Electrical Code and the plans and specifications the most stringent shall govern however the minimum requirements of the Electrical Code must be met or exceeded at all times.

.3 In cases of conflict between the Electrical Code, the Electrical Safety Authority and this document the most stringent shall govern however the minimum requirements of the Electrical Code and Electrical Safety Authority must be met or exceeded at all times.

1.5 Permits, Fees and Inspection

.1 Obtain all necessary electrical permits and pay all fees.

.2 Submit to Electrical Inspection Department necessary number of drawings and specifications for examination and approval prior to commencement of work.

.1 Pay associated permit and inspection fees.

.3 Be responsible for the arranging inspection of the work by Electrical Safety Authority.

.4 Notify Contract Administrator in writing of changes required by Electrical Inspection Department.

.5 Furnish to Contract Administrator the Hydro Inspection Department Acceptance Certificate on completion of work. Certify that there are no outstanding issues in other correspondence that is not shown on the Acceptance Certificate.

1.6 Responsibility

.1 Install all work promptly and in advance of concrete pouring or similar work

.2 Run conduit in or below the concrete to service electrical works that cannot be serviced directly from a wall.

.3 Be responsible for excavation and backfilling of power and/or control cables.

.4 Protect finished and unfinished work from damage due to the carrying out of the work.

1.7 Workmanship

.1 Execute all work in a first class and workmanlike manner.

.2 Ensure all supports, hangers and securing devices are solid and substantial.

.3 Neatly lay out all work in its mechanical appearance and logically arrange for simplicity of installation, accessibility and electrical efficiency.

.4 Provide to other trades and obtain from other trades all dimensional information as may be required to install and locate openings, piping and conduit for all electrical related equipment or material supplied under this section. Ensure openings, conduit and piping line up on the same plane in all directions with equipment to be connected. Obtain and confirm dimensions of all equipment to be serviced prior to cutting or placing openings or conduit to ensure proper alignment and placement of openings or conduit.

.5 Rigidly attach panels, boxes, cabinets, switch boxes, etc., to the structure by means of lag bolts, tamp-ins or other approved means of support.

1.8 Materials and Equipment

.1 Equipment and materials to carry CSA, ULC or cUL approval and conform with applicable standards, **no exceptions or alternatives.**

.2 Use stainless steel fasteners for all appurtenances for all works.

1.9 UV Unit

.1 Provide breaker as required.

.2 Install transformer as may be required.

.3 Provide start stop switch wired to remote start stop relay in UV panel.

.4 Run cable between reactor and control panel along divider wall between washrooms in a PVC conduit.

.5 Neatly store and wrap any excess cable between control panel and reactor.

.6 Provide on/off switch to allow operator to turn UV control panel on and off.

1.10 Process Feed Pump

.1 Provide breaker as required.

.2 Provide on/off switch to allow operator to turn pump on and off on a daily basis.

.3 Interconnect power supply to water chemistry controller such that pump cannot be turned on without turning on complete water chemistry control systems.

1.11 Breakers

.1 Provide breakers for new equipment in existing breaker panel as required to match existing.

.2 As a minimum provide new breakers for feed pump, UV and water chemistry controller.

1.12 Shop Drawings

.3 Refer to "General Specification" Section 01340 "Shop Drawings, Product Data & Samples" for shop drawing submission details and requirements. Prepare all required shop drawings in accordance with Section 01340 and as requested within Division 16.

1.13 Maintenance Manuals

.1 Supply maintenance instructions for each piece of major equipment apparatus in accordance with Section 01730, properly indexed and identified for maintenance and operation. Refer to Section 01730. Include all shop drawings and any other equipment which the Contract Administrator shall designate.

1.14 Identification

.1 Install designator lettering on all electrical equipment.

.2 Use lamicoid plastic engraving sheet, black face, white core, mechanically attached with self tapping screws. Label maker and adhesive industrial tape is acceptable.

.3 Label each switch, switch unit, receptacle, control panel, motor starter, contactor, actuated valves, meters, etc. For disconnects, starters and contactors indicate equipment being controlled and voltage. Label all equipment as to identification including sequential numbering, descriptive purpose, circuit used and function or normal position.

1.15 Testing

.1 On completion, measure insulation resistance and comply with Table 24 of the Canadian Electrical Code. The insulation resistance shall be in compliance with the latest edition of the Canadian Electrical Code. If this insulation resistance test is less than required by the Code, the defective circuits or equipment shall be replaced. Submit data sheets with values measured.

.2 Test all wiring and connections for continuity and grounds before equipment is energized.

.3 Before energizing system, check all connections and set and calibrate all relays and instruments for proper operation.

1.16 Mounting

.1 Unistrut

.1 Provide Unistrut or other approved metallic U-channel support complete with associated fittings to mount all control panels.

.2 Where the protective coating of U-channel support material is disturbed or bare metal is exposed due to drilling, filing, sawing through, or by other means, restore the protective coating by applying appropriate primer prior to painting.

End Section 16010

PART 1 - GENERAL

1.1 References

.1 CSA C22.2 No. 0.2 Test Methods for Electrical Wires and cables.

.2 CAN/CSA C22.2 No. 131, Type Teck 90 Cable.

PART 2 - PRODUCTS

2.1 Wiring

.1 Use copper for all wiring.

.2 Minimum wire size minimum #12 AWG AC90 with 600 Volt insulation unless otherwise specified or a heavier gauge is required for application.

.3 Armoured Cables BX.

.1 Copper conductors with RW90. Cross-link polyethylene insulated for 600 volts, rated not less than 90^0C, and bare copper grounding conductor wrapped with bare interlocked aluminum armor..

.2 All conductors #12 AWG or larger shall be stranded, Type RW90, cross-link polyethylene insulated for 1000 volts and rated for not less than 90^0C .

.3 Use armoured cable (BX) for lighting tails (maximum 3 m).

.4 Control Cables.

.1 Single conductor wire to be 98% conductivity copper type TEW or TBS insulation rated at 600 V, solid or stranded conductor as required, size as noted on Drawings and specified herein, 90^0C insulation and manufactured to CSA Specification C22.2, No. 38.

.2 Cable for power and control shall be based on Teck 90 armoured cable, with stranded copper conductors, 90^0 C insulation, rated at 600 V ac, manufactured to CSA Specification C22.2, No. 131, integral copper ground wire, PVC inner jacket, aluminum interlocking armour, and PVC outer jacket having heat, flame, and moisture retardant properties. Flame retardancy of outer jacket to be rated in accordance with CSA Standard C22.2, No. 0.3

.5 Use Teck 90 armoured cable for end connections at motors.

.1 CSA FT-4.

.2 CSA C22.2 No. 131.

PART 3 - EXECUTION

3.1 Installation

.1 Support conductors at intervals not exceeding 1.5m. Where cables are run in close proximity to each other, they shall be grouped and installed in a neat and workman-like manner. Tie wire or perforated strap will not be accepted.

.2 All exposed wiring shall be in conduit with appropriate fittings. Conduit in contact with earth shall be rigid PVC.

End Section 16122

PART 1 - GENERAL

1.1 General

.1 Acceptable construction method is PVC conduit or Teck cable unless otherwise stated.

.1 PVC conduit shall be rigid, conduit assemblies shall be FT-4 rated.

1.2 Location of Conduits

.1 Drawings do not indicate conduit runs.

.2 Locate conduit in a neat manner.

PART 2 - PRODUCTS

2.1 Conduits and Teck Cable

.1 Rigid PVC conduit unless otherwise noted.

.2 Flexible liquid-tight metal conduit where noted only. Provide metal conduits:

.1 To service feed pump.

.2 To service booster pump..

.3 Minimum conduit size: 19 mm.

.4 Teck cable: FT-4 rated.

.5 Minimum Teck conductor size #14 AWG for Lighting and controls wiring and, #12 AWG for power feeder circuits.

2.2 Outlet Boxes

.1 Provide PVC CSA approved outlet, junction and pull boxes.

.1 FT-4 rated.

.2 Provide gang boxes where wiring devices are grouped.

.3 Provide approved Teck cable connectors for connection of Teck cables to boxes and enclosures.

2.3 Conduit Fastenings

.1 Two hole PVC straps to secure surface conduits smaller than 50 mm. Two hole PVC coated steel straps for conduit larger than 50 mm.

.2 Stainless steel channel type supports and fittings for two or more conduits at 2 m on center.

.3 Use stainless steel screws, maintain vapor barrier where applicable.

2.4 Conduit Fittings

.1 Fittings: manufactured for use with conduit, Teck cable or cable tray specified as applicable. Coating same as conduit, Teck cable.

.1 FT-4 rated.

.2 Factory elbows where 90° bends are required for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT and Teck cables.

PART 3 - EXECUTION

3.1 Conduit and Teck Cable Installation

.1 Equip vertical runs of conduits with pull boxes containing approved wire strain supports at intervals as required by Code.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.3 Use conduit or Teck cables for all wiring unless otherwise indicated in the specifications. All devices shall be surface mounted types.

.4 When pulling conductors into conduit, do not use any lubricant which is harmful to the conduit or to the insulation of the conductors.

.5 Lay out conduit as to avoid interference with other work and so that it can drain with no pockets in which water can collect.

.6 Where runs are exposed on the surface, support conduit or Teck cable at intervals not exceeding 1.5 m and as per Canadian Electrical Code Part 1.

.7 Provide liquid-tight flexible connection shall be provided to all motors and miscellaneous equipment.

.8 Replace conduit if kinked or flattened more than 1/10 of its original diameter.

.9 Run square and parallel or perpendicular to building lines.

.10 Group conduits, Teck cables wherever possible in a neat and workmanlike manner, properly supported with approved hangers, securely anchored to surface channels.

.11 Maintain FT-4 rating.

3.4 Box Installation

.1 Rigidly attach outlet boxes to the building structure in an approved manner.

.2 Support boxes independently of connecting conduits.

.3 Where blank coverplates are installed on outlet boxes, they shall match the outlet boxes.

3.5 Identification

.1 Provide lamicoid identification labels as specified.

End Section 16132