

## **NCC / CCN**

# **33 SCOTT – BRANCHEMENT AUX RÉSEAUX MUNICIPAUX D'ÉGOUT ET D'EAU POTABLE**

## **SPECIFICATIONS**

Issued for Tender

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**33 CHEMIN SCOTT – BRANCHEMENT AUX RÉSEAUX  
MUNICIPAUX D'ÉGOUT ET D'EAU POTABLE**

Specifications  
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**Part 1      General**

**1.1      WORK COVERED BY CONTRACT DOCUMENTS**

- .1      Work of this Contract comprises renovation of Gatineau park visitor centre located at 33 Scott Road, Chelsea, Québec.

**1.2      WORK BY OTHERS**

- .1      Co-operate with other Contractors in carrying out their respective works and carry out instructions from NCC Representative.
- .2      Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to NCC Representative, in writing, any defects which may interfere with proper execution of Work.

**1.3      WORK SEQUENCE**

- .1      Construct Work in stages to accommodate NCC Representative's continued use of premises during construction.
- .2      Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3      Refer to contract drawings for precise work sequence and phases.
- .4      Maintain fire access/control.

**1.4      OWNER OCCUPANCY**

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

**1.5      OWNER FURNISHED ITEMS**

- .1      NCC Representative Responsibilities:
  - .1      Arrange for delivery of shop drawings, product data, manufacturer's instructions, and certificates to Contractor.
  - .2      Submit claims for transportation damage.
  - .3      Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.
- .2      Contractor Responsibilities:
  - .1      Review shop drawings, product data, and other submittals. Submit to NCC Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
  - .2      Receive and unload products at site.
  - .3      Handle products at site, including uncrating and storage.

- .4 Protect products from damage, and from exposure to elements.
- .5 Assemble, install, connect, adjust, and finish products.
- .6 Provide installation inspections required by public authorities.
- .7 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

**1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises. Arrange with NCC Representative to facilitate execution of work.

**1.7 EXISTING SERVICES**

- .1 Notify NCC Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give NCC Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify NCC Representative of findings.
- .4 Where unknown services are encountered, immediately advise NCC Representative and confirm findings in writing.
- .5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .6 Record locations of maintained, re-routed and abandoned service lines.

**1.8 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Other documents as specified.

**END OF SECTION**

**Part 1      General**

**1.1      ACCESS AND EGRESS**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, ramps or ladders independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.2      USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with NCC Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 NCC Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

**1.3      ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1 Execute work with least possible interference or disturbance to occupants and normal use of premises. Arrange with NCC Representative to facilitate execution of work.

**1.4      EXISTING SERVICES**

- .1 Notify NCC Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give NCC Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

**1.5      BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions. Smoking is not permitted.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE**

- .1     Submit to NCC Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2     Do not proceed with Work affected by submittal until review is complete.
- .3     Verify field measurements and affected adjacent Work are co-ordinated.
- .4     Contractor's responsibility for errors and omissions in submission is not relieved by NCC Representative's review of submittals.
- .5     Keep one reviewed copy of each submission on site.

**1.2                SHOP DRAWINGS AND PRODUCT DATA**

- .1     The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2     Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3     Allow 5 business days for NCC Representative's review of each submission.
- .4     Accompany submissions with transmittal letter, in duplicate, containing:
  - .1     Date.
  - .2     Project title and number.
  - .3     Contractor's name and address.
  - .4     Identification and quantity of each shop drawing, product data and sample.
  - .5     Other pertinent data.
- .5     Submissions include:
  - .1     Date and revision dates.
  - .2     Project title and number.
  - .3     Name and address of:
    - .1     Subcontractor.
    - .2     Supplier.
    - .3     Manufacturer.

- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.
- .6 Submit 1 electronic copy and two hard copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by NCC Representative.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1      General**

**1.1          REFERENCES**

- .1      Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2      Province of Quebec
  - .1      An Act Respecting Occupational Health and Safety, R.S.Q., c.S-2.1 (current edition) - Updated 2015.

**1.2          GENERAL REQUIREMENTS**

- .1      Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2      NCC Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

**1.3          RESPONSIBILITY**

- .1      Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2      Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.
- .3      Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

**1.4          UNFORSEEN HAZARDS**

- .1      When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise NCC Representative verbally and in writing.
- .2      When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator, Safety Officer and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise NCC Representative verbally and in writing.

**1.5 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with NCC Representative.

**1.6 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by NCC Representative.
- .2 Provide NCC Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 NCC Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1      General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 01 33 00 - Submittal Procedures.

**1.2            ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Submit written request in advance of cutting or alteration which affects:
  - .1      Structural integrity of elements of project.
  - .2      Integrity of weather-exposed or moisture-resistant elements.
  - .3      Efficiency, maintenance, or safety of operational elements.
  - .4      Visual qualities of sight-exposed elements.
  - .5      Work of Owner or separate contractor.
- .3      Include in request:
  - .1      Identification of project.
  - .2      Location and description of affected Work.
  - .3      Statement on necessity for cutting or alteration.
  - .4      Description of proposed Work, and products to be used.
  - .5      Alternatives to cutting and patching.
  - .6      Effect on Work of NCC Representative or separate contractor.
  - .7      Written permission of affected separate contractor.
  - .8      Date and time work will be executed.

**1.3            MATERIALS**

- .1      Required for original installation.
- .2      Change in Materials: Submit request to NCC Representative for substitution.

**1.4            PREPARATION**

- .1      Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2      After uncovering, inspect conditions affecting performance of Work.
- .3      Beginning of cutting or patching means acceptance of existing conditions.
- .4      Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5      Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

**1.5 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

**END OF SECTION**

**Part 1      General**

**1.1      PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by NCC Representative or other Contractors.
- .2      Remove waste materials from site at daily regularly scheduled times or dispose of as directed by NCC Representative. Do not burn waste materials on site.
- .3      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4      Provide on-site containers for collection of waste materials and debris.
- .5      Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .6      Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .7      Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

**1.2      FINAL CLEANING**

- .1      When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2      Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3      Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4      Remove waste products and debris other than that caused by NCC Representative or other Contractors.
- .5      Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .6      Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .7      Remove dirt and other disfiguration from exterior surfaces.
- .8      Sweep and wash clean paved areas.
- .9      Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

**Part 2        Products**

**2.1            NOT USED**

.1        Not Used.

**Part 3        Execution**

**3.1            NOT USED**

.1        Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with NCC Representative to review and discuss NCC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .3 Protect environment and prevent environmental pollution damage.

**1.2 RELATED REQUIREMENTS**

- .1 Section 01 74 11 - Cleaning

**1.3 REFERENCES**

- .1 Definitions:
  - .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the NCC Representative.
  - .2 Class III: non-hazardous waste - construction renovation and demolition waste.
  - .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
  - .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).
  - .5 Inert Fill: inert waste - exclusively asphalt and concrete.
  - .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
  - .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
  - .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .15 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities.
- .2 Reference Standards:
  - .1 Public Works and Government Services Canada (PWGSC)
    - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
    - .2 CRD Waste Management Market Research Report (available from PWGSC's Environmental Services).
    - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.

#### **1.4 USE OF SITE AND FACILITIES**

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by NCC Representative.

#### **1.5 WASTE PROCESSING SITES**

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

## **1.6 QUALITY ASSURANCE**

- .1 After award of Contract, a mandatory site examination will be held for this Project for Contractor and/or sub-contractors responsible for construction, renovation demolition/deconstruction waste management.
  - .1 Date, time and location will be arranged by NCC Representative.
- .2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator.

## **1.7 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by NCC Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect surface drainage, mechanical and electrical from damage and blockage.
- .6 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .7 Separate and store materials produced during project in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off site processing facility for separation.
  - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
  - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

## **1.8 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.

- .4 Tonnage reused or recycled.
- .5 Reused or recycled waste destination.
- .4 Remove materials on-site as Work progresses.

## **1.9 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

## **Part 2 Execution**

### **2.1 APPLICATION**

- .1 Do Work in compliance with WRW and WSSP.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### **2.2 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 11 - Cleaning.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1 Notify NCC Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request NCC Representative inspection.
  - .2 NCC Representative Inspection:
    - .1 NCC Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates in English and French that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Equipment and systems: tested, adjusted and fully operational.
    - .4 Operation of systems: demonstrated to Owner's personnel.
    - .5 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by NCC Representative, Contractor, and Municipality of Chelsea.
    - .2 When Work is incomplete according to NCC Representative, complete outstanding items and request re-inspection.
  - .5 Commencement of Lien and Warranty Periods: date of NCC Representative's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
  - .6 Final Payment:
    - .1 When NCC Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

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

**1.3 FINAL CLEANING**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1      General**

**1.1          ADMINISTRATIVE REQUIREMENTS**

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

**1.2          AS -BUILT DOCUMENTS AND SAMPLES**

- .1      Maintain, in addition to requirements in General Conditions, at site for NCC Representative one record copy of:
  - .1      Contract Drawings.
  - .2      Specifications.
  - .3      Change Orders and other modifications to Contract.
  - .4      Reviewed shop drawings, product data, and samples.
  - .5      Field test records.
  - .6      Inspection certificates.
  - .7      Manufacturer's certificates.
- .2      Maintain record documents in clean, dry and legible condition.
  - .1      Do not use record documents for construction purposes.
- .3      Keep record documents and samples available for inspection by NCC Representative.

**1.3          FINAL SURVEY**

- .1      Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

#### **1.4 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .9 Provide installed control diagrams by controls manufacturer.
- .10 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .11 Include test and balancing reports as specified in Section 01 91 13 - General Commissioning (Cx) Requirements.
- .12 Additional requirements: as specified in individual specification sections.

#### **1.5 MATERIALS AND FINISHES**

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

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .2 Store components subject to damage from weather in weatherproof enclosures.
- .3 Store paints and freezable materials in a heated and ventilated room.
- .4 Remove and replace damaged products at own expense and for review by NCC Representative.

**1.7 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to NCC Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that NCC Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to NCC Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with NCC Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by NCC Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the

- organizations of Contractors, subcontractors, manufacturers or suppliers involved.
- .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .3 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
  - .4 Procedure and status of tagging of equipment covered by extended warranties.
  - .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
  - .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
  - .11 Written verification to follow oral instructions.
    - .1 Failure to respond will be cause for the NCC Representative to proceed with action against Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

<b>Part 3</b>	<b>Execution</b>
<b>3.1</b>	<b>NOT USED</b>
.1	Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .3 Section 01 35 29.06 - Health and Safety Requirements

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Provide shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.5 SITE CONDITIONS**

- .1 Review designated substance report and take precautions to protect environment.
- .2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify NCC Representative immediately.
  - .1 Do not proceed until written instructions have been received from NCC Representative.
- .3 Notify NCC Representative for access or services.

**Part 2 Products**

**2.1 EQUIPMENT**

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.

- .2 Demonstrate that tools and machinery are being used in manner which allows for salvage of materials in best condition possible.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Protection:
  - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
  - .2 Keep noise, dust, and inconvenience to occupants to minimum.
  - .3 Protect building systems, services and equipment.
  - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .3 Disconnect and re-route electrical, telephone and communication service lines. Post warning signs on electrical lines and equipment which must remain energized to serve other products during period of demolition.
- .4 Disconnect and cap designated mechanical services.
  - .1 Sewer and water lines: remove in accordance with requirements of authority having jurisdiction.

**3.2 CLEANING AND RESTORATION**

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Upon completion of project, reinstate areas affected by Work to match condition of adjacent, undisturbed areas.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 74 11 - Cleaning

**1.2 REFERENCES**

- .1 CSA International
  - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit demolition drawings:
  - .1 Submit for review and approval by NCC Representative shoring and drawings stamped and signed by professional engineer registered or licensed in the Province of Québec, showing proposed method.
- .3 Sustainable Design Submittals:
  - .1 Construction Waste Management:
    - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
  - .2 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with authorities having jurisdiction.

**1.4 SITE CONDITIONS**

- .1 Review "Designated Substance Report" and take precautions to protect environment.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify NCC Representative immediately.
  - .1 Proceed only after receipts of written instructions have been received from NCC Representative.
- .3 Notify NCC Representative before disrupting building access or services.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Inspect site with NCC Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
  - .1 Immediately notify NCC Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
  - .2 Immediately notify the NCC Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

**3.2 PREPARATION**

- .1 Protection of In-Place Conditions:
  - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
  - .2 Keep noise, dust, and inconvenience to occupants to minimum.
  - .3 Protect building systems, services and equipment.
  - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
  - .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Demolition/Removal:
  - .1 Remove items as indicated.

**3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 01 33 00 - Submittal Procedures.
- .2      Section 01 78 00 - Closeout Submittals
- .3      Section 01 74 11 - Cleaning

**1.2                REFERENCES**

- .1      National Plumbing Code (2015)
- .2      Quebec Plumbing Code (2010)

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Submit manufacturer's instructions, printed product literature and data sheets for the water meter and the backflow preventer and include product characteristics, performance criteria, physical size, finish and limitations.
- .3      Shop Drawings:
  - .1      Indicate on drawings:
    - .1      Mounting arrangements.
    - .2      Operating and maintenance clearances.
  - .2      Shop drawings and product data accompanied by:
    - .1      Detailed drawings of bases, supports, and anchor bolts.
    - .2      Manufacturer to certify current model production.
    - .3      Certification of compliance to applicable codes.

**1.4                CLOSEOUT SUBMITTALS**

- .1      Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2      Operation and Maintenance Data: submit operation and maintenance data for water meter and backflow preventer for incorporation into manual.
  - .1      Operation and maintenance manual approved by, and final copies deposited with, NCC Representative before final inspection.
  - .2      Operation data to include:
    - .1      Operation instruction for systems and component.
    - .2      Description of actions to be taken in event of equipment failure.
  - .3      Maintenance data to include:
    - .1      Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

- .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
  - .1 Equipment performance verification test results.
  - .2 Special performance data as specified.
- .5 Approvals:
  - .1 Submit 2 copies of draft Operation and Maintenance Manual to NCC Representative for approval. Submission of individual data will not be accepted unless directed by NCC Representative.
  - .2 Make changes as required and re-submit as directed by NCC Representative.
- .6 Site records:
  - .1 NCC Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur.
  - .2 Make available for reference purposes and inspection.
- .7 As-built drawings:
  - .1 Prior to start of Testing, Adjusting and Balancing for plumbing systems, finalize production of as-built drawings.
  - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - .3 Submit to NCC Representative for approval and make corrections as directed.
  - .4 Perform testing, adjusting and balancing using as-built drawings.
  - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .8 Submit copies of as-built drawings for inclusion in final TAB report.

**1.5 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .2 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Execution**

**2.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for water meter and backflow preventer installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of NCC Representative.
  - .2 Inform NCC Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from NCC Representative.

**2.2 PAINTING REPAIRS AND RESTORATION**

- .1 Restore to new condition, finishes which have been damaged.

**2.3 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**2.4 DEMONSTRATION**

- .1 NCC Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

**2.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**2.6 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1    Section 01 33 00 - Submittal Procedures.
- .2    Section 01 74 11 – Cleaning
- .3    Section 23 05 05 - Installation of Pipework.
- .4    Section 23 05 23.01 - Valves - Bronze

**1.2                REFERENCES**

- .1    National Plumbing Code (2015)
- .2    Quebec Plumbing Code (2010)
- .3    American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
  - .1    ANSI/ASME B16.15-2013, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2    ANSI/ASME B16.18-12, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3    ANSI/ASME B16.22-2013, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4    ANSI/ASME B16.24-2011, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .4    ASTM International Inc.
  - .1    ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2    ASTM A536-84(2014), Standard Specification for Ductile Iron Castings.
  - .3    ASTM B88M-13, Standard Specification for Seamless Copper Water Tube (Metric).
- .5    American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
  - .1    ANSI/AWWA C111/A21.11-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .6    Canadian Standards Association (CSA International)
  - .1    CSA B242-05(R2011), Groove and Shoulder Type Mechanical Pipe Couplings.
- .7    Department of Justice Canada (Jus)
  - .1    Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .8    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).

- .9 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-80-2013, Bronze Gate, Globe, Angle and Check Valves.
- .10 National Research Council (NRC)/Institute for Research in Construction
  - .1 NRCC 38728, National Plumbing Code of Canada (NPC) – 2015.
- .11 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Closeout Submittals:
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **Part 2 Products**

### **2.1 PIPING**

- .1 Domestic cold water system, within building.
  - .1 Above ground: copper tube, hard drawn, type K: to ASTM B88M.
  - .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

### **2.2 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
- .6 NPS 1 and smaller: wrought copper to ANSI/ASME B16.22; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

### **2.3 JOINTS**

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

- .3 Solder: 95/5 tin copper alloy.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

## **2.4 BALL VALVES**

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, soldered:
  - .1 To ANSI/ASME B16.18, Class 150.
  - .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install in accordance with national Plumbing Code.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 Buried tubing:
  - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
  - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

### **3.3 VALVES**

- .1 Isolate equipment, fixtures and branches with ball valves.

### **3.4 PRESSURE TESTS**

- .1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

### **3.5 PRE-START-UP INSPECTIONS**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.

### **3.6 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
  - .2 Certificate of static completion has been issued.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
  - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
- .4 Rectify start-up deficiencies.

### **3.7 PERFORMANCE VERIFICATION**

- .1 Scheduling:
  - .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- .2 Procedures:
  - .1 Verify that flow rate and pressure meet Design Criteria.
  - .2 Verify compliance with safety and health requirements.
  - .3 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

### **3.8 OPERATION REQUIREMENTS**

- .1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

### **3.9 CLEANING**

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

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 – Cleaning
- .3 Section 23 05 05 - Installation of Pipework

**1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM D2564-12, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-Series B1800-15, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.
- .3 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-36-00, Commercial Adhesives.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Store at temperatures and conditions recommended by manufacturer.

**Part 2 Products**

**2.1 PIPING AND FITTINGS**

- .1 For buried and above ground DWV piping to:
  - .1 CAN/CSA B1800.

## **2.2 JOINTS**

- .1 Solvent weld for PVC: to ASTM D2564.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with National Plumbing Code (2015).

### **3.3 PERFORMANCE VERIFICATION**

- .1 Cleanouts:
  - .1 Ensure accessible and that access doors are correctly located.
  - .2 Open, cover with linseed oil and re-seal.
  - .3 Verify cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Ensure fixtures are properly anchored, connected to system and effectively vented.

### **3.4 CLEANING**

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

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 33 00 - Submittal Procedures.
- .2        Section 01 78 00 - Closeout Submittals

**1.2                REFERENCES**

- .1        ASTM International
  - .1        ASTM A126-04(2014), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2        ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .2        American Water Works Association (AWWA)
  - .1        ANSI/AWWA C700-15, Standard for Cold Water Meters-Displacement Type, Metal Alloy Main Case.
  - .2        ANSI/AWWA C701-15, Standard for Cold Water Meters-Turbine Type for Customer Service.
  - .3        ANSI/AWWA C702-10, Standard for Cold Water Meters-Compound Type.
- .3        CSA International
  - .1        CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.
  - .2        CSA B79-08(R2013), Commercial and Residential Drains and Cleanouts.
  - .3        CAN/CSA-B356-10, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4        Efficiency Valuation Organization (EVO)
  - .1        International Performance Measurement and Verification Protocol (IPMVP).
    - .1        IPMVP 2007 Version.

**1.3                ADMINISTRATIVE REQUIREMENTS**

- .1        Pre-installation Meetings:
  - .1        Convene pre-installation meeting 1 week prior to beginning on-site installation, with NCC Representative to:
    - .1        Verify project requirements.
    - .2        Review installation and substrate conditions.
    - .3        Co-ordination with other building construction subtrades.
    - .4        Review manufacturer's written installation instructions and warranty requirements.

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Indicate on drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details accessories.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Manufacturers' Field Reports: manufacturers' field reports specified.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.
  - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
  - .2 Details of operation, servicing and maintenance.
  - .3 Recommended spare parts list.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

### **Part 2 Products**

#### **2.1 CLEANOUTS**

- .1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Access Covers:
  - .1 Wall Access: face or wall type, polished nickel bronze square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

#### **2.2 BACK FLOW PREVENTERS**

- .1 Preventers: to CSA-B64 Series, application double check valve assembly.

- .2 Product: Watts Series ES-719 double check valve assemblies or equivalent

### **2.3 HOSE BIBBS AND SEDIMENT FAUCETS**

- .1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.

### **2.4 WATER METERS**

- .1 Contractor to provide and installed by contractor. Shall be installed according to Municipality of Municipality of Chelsea standards.

### **2.5 STRAINERS**

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS 2 and under, bronze body, screwed ends, with brass cap.

### **2.6 BACK WATER VALVE**

- .1 To be normally open.
- .2 Back water valve to be CSA B182 (PVC) approved
- .3 Product to be : FULLPORT BACKWATER VALVE by *MAINLINE Backflow Products* or approved equivalent by NCC Representative

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for plumbing specialties and accessories installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of NCC Representative and Municipality of Chelsea.
  - .2 Inform NCC Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from NCC Representative.

### **3.2 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

### **3.3 INSTALLATION**

- .1 Install in accordance with National Plumbing Code.
- .2 Install in accordance with manufacturer's instructions and as specified.

### **3.4 CLEANOUTS**

- .1 Install cleanouts at base of soil and waste stacks, at locations required code, and as indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

### **3.5 BACK FLOW PREVENTERS**

- .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.

### **3.6 HOSE BIBBS AND SEDIMENT FAUCETS**

- .1 Install at bottom of risers, at low points to drain systems, and as indicated.

### **3.7 STRAINERS**

- .1 Install with sufficient room to remove basket for maintenance.

### **3.8 WATER METERS**

- .1 Install water meter according to Municipality of Municipality of Chelsea standards.

### **3.9 BACK WATER VALE**

- .1 To be installed where indicated.

### **3.10 START-UP**

- .1 Timing: start-up only after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Certificate of static completion has been issued.
- .2 Provide continuous supervision during start-up.

### **3.11 TESTING AND ADJUSTING**

- .1 General:
  - .1 Test and adjust plumbing specialties and accessories : General Requirements, supplemented as specified.
- .2 Timing:
  - .1 After start-up deficiencies rectified.
  - .2 After certificate of completion has been issued by authority having jurisdiction.
- .3 Application tolerances:
  - .1 Pressure at fixtures: +/- 70 kPa.
  - .2 Flow rate at fixtures: +/- 20%.

- .4 Cleanouts:
  - .1 Verify covers are gas-tight, secure, yet readily removable.
- .5 Strainers:
  - .1 Clean out repeatedly until clear.
  - .2 Verify accessibility of cleanout plug and basket.
  - .3 Verify that cleanout plug does not leak.
- .6 Hose bibbs, sediment faucets:
  - .1 Check for leaks, replace compression washer if required.
- .7 Water meters:
  - .1 Verify location and accessibility.
  - .2 Test meter reading accuracy.

### **3.12 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.13 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Air-Conditioning and Refrigeration Institute (ARI)
  - .1 ARI 1010-02, Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.
- .2 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-B45 Series-02(R2008), CSA Standards on Plumbing Fixtures.
  - .2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for fountains and coolers, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

**1.3 CLOSEOUT SUBMITTALS**

- .1 Provide operation and maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.
- .2 Include:
  - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.
  - .3 List of recommended spare parts.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 MANUFACTURED UNITS**

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: mechanical drawings to govern.
- .5 Drinking fountains:
  - .1 DF-1 : To be ELKAY EZH2O Bottle Filling Station with High-Efficiency GreenSpec Listed Single Filtered Water Cooler Model LZSGWS or approved equivalent by NCC Representative.

**Part 3 Execution**

**3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2 INSTALLATION**

- .1 Mounting heights:
  - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
  - .2 Wall-hung fixtures: as indicated, measured from finished floor.
  - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.
- .2 Drinking fountains:
  - .1 In accordance with ARI 1010.

**3.3 ADJUSTING**

- .1 Conform to water conservation requirements specified this Section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust water cooler, drinking fountain flow stream to ensure no spillage.
- .3 Checks:
  - .1 Refrigerated water coolers: operation, temperature settings.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

**3.4 CLEANING**

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

**END OF SECTION**

**Part 1      General**

**1.1      RELATED REQUIREMENTS**

- .1      Section 01 33 00 - Submittal Procedures
- .2      Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .3      Section 01 74 11 – Cleaning
- .4      Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.2      REFERENCES**

- .1      Canadian General Standards Board (CGSB)
  - .1      CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2      Green Seal Environmental Standards (GSES)
  - .1      Standard GS-11-2008, 2nd Edition, Environmental Standard for Paints and Coatings.
- .3      National Fire Code of Canada – 2010 (NFCC)
- .4      South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1      SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2      SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

**1.3      ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4      QUALITY ASSURANCE**

- .1      Sustainability Standards Certification:
  - .1      Low-Emitting Materials: provide listing of sealant used in building, comply with VOC and chemical component limits or restriction requirements].

**1.5      DELIVERY, STORAGE AND HANDLING**

- .1      Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2      Delivery and Acceptance Requirements:
  - .1      Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

- .3 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Execution**

### **2.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **2.2 CONNECTIONS TO EQUIPMENT**

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

### **2.3 CLEARANCES**

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer without interrupting operation of other system, equipment, components.

### **2.4 PIPEWORK INSTALLATION**

- .1 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material.
- .3 Install pipework to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.
- .5 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .6 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .7 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .8 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .9 Group piping wherever possible and as indicated.
- .10 Ream pipes, remove scale and other foreign material before assembly.

- .11 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .12 Valves:
  - .1 Install in accessible locations.
  - .2 Remove interior parts before soldering.
  - .3 Install with stems above horizontal position unless indicated.
  - .4 Valves accessible for maintenance without removing adjacent piping.
  - .5 Use ball valves at branch take-offs for isolating purposes except where specified.
  - .6 Install butterfly valves between weld neck flanges to ensure full compression of liner.

## **2.5 SLEEVES**

- .1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated. To be Coordinated with civil trade.
- .2 Material: schedule 40 black steel pipe.
- .3 Product: Mechanical compression joint "LINK SEAL"
- .4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Installation:
  - .1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
  - .2 Other floors: terminate 25 mm above finished floor.
  - .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
  - .4 Elsewhere:
    - .1 Provide space for firestopping.
    - .2 Maintain fire rating integrity.
  - .5 Ensure no contact between copper pipe or tube and sleeve.

## **2.6 SEISMIC SUPPORT**

- .1 All seismic support to be approved and stamped by a seismic professional engineer registered or licensed in Province of Quebec.

## **2.7 EXISTING SYSTEMS**

- .1 Connect into existing piping systems at times approved by NCC Representative.
- .2 Request written approval by NCC Representative 10 days minimum, prior to commencement of work.
- .3 Be responsible for damage to existing plant by this work.

**2.8 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and/or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1      General**

**1.1      RELATED REQUIREMENTS**

- .1      Section 01 33 00 - Submittal Procedures
- .2      Section 01 78 00 - Closeout Submittals.
- .3      Section 01 74 11 - Cleaning

**1.2      REFERENCES**

- .1      American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  - .1      ANSI/ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch).
  - .2      ANSI/ASME B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.
- .2      ASTM International
  - .1      ASTM A276/A276M-15, Standard Specification for Stainless Steel Bars and Shapes.
  - .2      ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.
  - .3      ASTM B283/B283M-14a, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
  - .4      ASTM B505/B505M-14, Standard Specification for Copper-Base Alloy Continuous Castings.
- .3      Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
  - .1      MSS-SP-25-2013, Standard Marking System for Valves, Fittings, Flanges and Unions.
  - .2      MSS-SP-80-2013, Bronze Gate Globe, Angle and Check Valves.
  - .3      MSS-SP-110-2010, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

**1.3      ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.
- .3      Shop Drawings:
  - .1      Submit data for valves specified in this Section.

#### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Valves:
  - .1 Except for specialty valves, to be single manufacturer.
- .2 End Connections:
  - .1 Connection into adjacent piping/tubing:
    - .1 Copper tube systems: solder ends to ANSI/ASME B16.18.
- .3 Ball Valves:
  - .1 NPS 2 and under:
    - .1 Body and cap: cast high tensile bronze to ASTM B62.
    - .2 Pressure rating: Class125 2760-kPa CWP.
    - .3 Connections: solder ends to ANSI.
    - .4 Stem: tamperproof ball drive.
    - .5 Stem packing nut: external to body.
    - .6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.
    - .7 Stem seal: TFE with external packing nut.
    - .8 Operator: removable lever handle.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Remove internal parts before soldering.
- .3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

**3.2 CLEANING**

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

**END OF SECTION**

**Part 1      General**

**1.1          RELATED REQUIREMENTS**

- .1      Section 01 33 00 - Submittal Procedures
- .2      Section 01 78 00 - Closeout Submittals
- .3      Section 01 74 11 - Cleaning

**1.2          REFERENCES**

- .1      National Plumbing Code (2010)
- .2      American Society of Mechanical Engineers (ASME)
  - .1      ASME B31.1-2014, Power Piping.
- .3      ASTM International
  - .1      ASTM A125-96(2013)e1, Standard Specification for Steel Springs, Helical, Heat-Treated.
  - .2      ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3      ASTM A563-07a(2014), Standard Specification for Carbon and Alloy Steel Nuts.
- .4      Factory Mutual (FM)
- .5      Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1      MSS SP58-2009, Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application and Installation.
- .6      Underwriter's Laboratories of Canada (ULC)

**1.3          ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.
- .3      Shop Drawings:
  - .1      Submit shop drawings for:
    - .1      Bases, hangers and supports.
    - .2      Connections to equipment and structure.
    - .3      Structural assemblies.
- .4      Certificates:

- .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturers' Instructions:
  - .1 Provide manufacturer's installation instructions.
- 1.4 CLOSEOUT SUBMITTALS**
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.5 DELIVERY, STORAGE AND HANDLING**
  - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements:
    - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- Part 2 Products**
- 2.1 SYSTEM DESCRIPTION**
  - .1 Design Requirements:
    - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
    - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
    - .3 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
    - .4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- 2.2 GENERAL**
  - .1 Fabricate hangers, supports and sway braces in accordance with MSS SP58.
- 2.3 PIPE HANGERS**
  - .1 Finishes:
    - .1 Pipe hangers and supports: galvanized after manufacture.
    - .2 Use electro-plating galvanizing process or hot dipped galvanizing process.

- .3 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut carbon steel retaining clip.
    - .1 Rod: 9 mm UL listed.
  - .2 Cold piping NPS 2 1/2 or greater: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed to MSS-SP58.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed approved to MSS SP58.
  - .2 Cold piping NPS 2 1/2 or greater: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed.
- .4 Upper attachment to concrete:
  - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP58.
- .5 Hanger rods: threaded rod material to MSS SP58:
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
  - .3 Do not use 22 mm or 28 mm rod.
- .6 Pipe attachments: material to MSS SP58:
  - .1 Attachments for steel piping: carbon steel black galvanized.
  - .2 Attachments for copper piping: copper plated black steel.
  - .3 Use insulation shields for hot pipework.
  - .4 Oversize pipe hangers and supports.
- .7 Adjustable clevis: material to MSS SP58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.
- .8 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.
- .9 U-bolts: carbon steel to MSS SP58 with 2 nuts at each end to ASTM A563.
  - .1 Finishes for steel pipework: black galvanized.

- .2 Finishes for copper pipework: black epoxy coated galvanized, with formed portion plastic coated.
- .10 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP58.

## **2.4 INSULATION PROTECTION SHIELDS**

- .1 Insulated cold piping:
  - .1 64 kg/m<sup>3</sup> density insulation plus insulation protection shield to: MSS SP58, galvanized sheet carbon steel. Length designed for maximum 3 m span.

## **2.5 EQUIPMENT ANCHOR BOLTS AND TEMPLATES**

- .1 Provide templates to ensure accurate location of anchor bolts.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 INSTALLATION**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Clamps on riser piping:
  - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
  - .2 Bolt-tightening torques to industry standards.
  - .3 Steel pipes: install below coupling or shear lugs welded to pipe.
  - .4 Cast iron pipes: install below joint.
- .3 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .5 Use approved constant support type hangers where:
  - .1 Vertical movement of pipework is 13 mm or more,
  - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.

### **3.3 HANGER SPACING**

- .1 Plumbing piping: to National Plumbing Code (2010).

- .2 Copper piping: up to NPS 1/2: every 1.5 m.
- .3 Within 300 mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m

- .4 Pipework greater than NPS 12: to MSS SP58.

### 3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### 3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### 3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
  - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
  - .1 Hammer jaw firmly against underside of beam.

### 3.7 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**3.8 CLEANING**

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

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for Plumbing systems.
- .2    TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

**1.2                QUALIFICATIONS OF TAB PERSONNEL**

- .1    Submit names of personnel to perform TAB to NCC Representative within 90 days of award of contract.
- .2    Provide documentation confirming qualifications, successful experience.
- .3    Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .4    Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .5    Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .6    Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .7    TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  - .1    For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
  - .2    Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

**1.3                PURPOSE OF TAB**

- .1    Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- .2    Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3    Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

#### **1.4 EXCEPTIONS**

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

#### **1.5 CO-ORDINATION**

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

#### **1.6 START-UP**

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

#### **1.7 OPERATION OF SYSTEMS DURING TAB**

- .1 Operate systems for length of time required for TAB and as required by NCC Representative for verification of TAB reports.

#### **1.8 START OF TAB**

- .1 Notify NCC Representative 7 days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
- .3 Application of weatherstripping, sealing, and caulking.
- .4 Pressure, leakage, other tests specified elsewhere Division 23.
- .5 Provisions for TAB installed and operational.
- .6 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical systems affecting TAB including but not limited to:
  - .1 Liquid systems:
    - .1 Flushed, filled, vented.
    - .2 Strainers in place, baskets clean.
    - .3 Isolating and balancing valves installed, open.
    - .4 Water meter, balanced and reader in
    - .5 Backflow preventer as per CSA B64.10.1

#### **1.9 ACCURACY TOLERANCES**

- .1 Measured values accurate to within plus or minus 2 % of actual values.

#### **1.10 INSTRUMENTS**

- .1 Prior to TAB, submit to NCC Representative list of instruments used together with serial numbers.

- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system.
- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to NCC Representative.

**1.11 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit, prior to commencement of TAB:
- .2 Proposed methodology and procedures for performing TAB if different from referenced standard.

**1.12 TAB REPORT**

- .1 Format in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
  - .1 Project record drawings.
  - .2 System schematics.
- .3 Submit 2 copies of TAB Report to NCC Representative for verification and approval, in both official languages in D-ring binders, complete with index tabs.

**1.13 VERIFICATION**

- .1 Reported results subject to verification by NCC Representative.
- .2 Provide personnel and instrumentation to verify up to 30 % of reported results.
- .3 Number and location of verified results as directed by NCC Representative.
- .4 Pay costs to repeat TAB as required to satisfaction of NCC Representative.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Thermal insulation for piping and piping accessories in commercial type applications.

**1.2 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 74 11 - Cleaning

**1.3 REFERENCES**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ASHRAE Standard 90.1-2013, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM B209M-14, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
  - .2 ASTM C335/C335Mmm-10e1, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C411-11, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C449-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C533-13, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6 ASTM C547-12, Mineral Fiber Pipe Insulation.
  - .7 ASTM C795-08(2013), Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8 ASTM C921-10, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

- .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .6 Manufacturer's Trade Associations
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701-11, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings
  - .4 CAN/ULC-S702.2-10, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

#### **1.4 DEFINITIONS**

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

#### **1.6 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

**Part 2 Products**

**2.1 FIRE AND SMOKE RATING**

- .1 In accordance with CAN/ULC-S102.
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

**2.2 INSULATION**

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code A-6: flexible unicellular tubular elastomer.
  - .1 Insulation: with vapour retarder jacket.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Certified by manufacturer: free of potential stress corrosion cracking corrodants.

**2.3 INDOOR VAPOUR RETARDER FINISH**

- .1 Vinyl emulsion type acrylic, compatible with insulation.

**2.4 OUTDOOR VAPOUR RETARDER FINISH**

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: fibrous glass, untreated 305 g/m<sup>2</sup>.

**2.5 JACKETS**

- .1 Canvas:
  - .1 220 and 120 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
  - .2 Lagging adhesive: compatible with insulation.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 PRE-INSTALLATION REQUIREMENT**

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

### **3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

### **3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES**

- .1 Application: at, valves, primary flow measuring elements, flanges and unions at equipment.
- .2 Insulation:
  - .1 Insulation, fastenings and finishes: same as system.

### **3.5 INSTALLATION OF ELASTOMERIC INSULATION**

- .1 Insulation to remain dry. Overlaps to manufacturer's instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

### **3.6 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 Thickness of insulation as listed in following table.
  - .1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)				
			to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8
Domestic CWS with vapour retarder	5-10	A-3	25	25	25	25	

- .3 Finishes:
- .1 Exposed indoors: canvas jacket.
  - .2 Exposed in mechanical rooms: canvas jacket.
  - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
  - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
  - .5 Finish attachments: SS screws, at 150 mm on centre. Seals: wing.
  - .6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

### 3.7 **CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Definitions:
  - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
  - .2 CSA Group
    - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
  - .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
    - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Certificates:
  - .1 Provide CSA certified equipment and material.
  - .2 Permits and fees: in accordance with General Conditions of contract.
  - .3 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to NCC Representative.

**1.3 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

**Part 2 Products**

**2.1 DESIGN REQUIREMENTS**

- .1 Language operating requirements: provide identification nameplates and labels for control items in English and French.
- .2 Use one nameplate for both languages.

**2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS**

- .1 Verify existing conditions on site and coordinate equipment removal responsibilities related to motors, equipment and controls, as indicated.

**2.3 WARNING SIGNS**

- .1 Warning Signs: in accordance with requirements of NCC Representative.

- .2 Porcelain enamel signs, minimum size 175 x 250 mm.

**Part 3 Execution**

**3.1 GENERAL**

- .1 Dispose of removed materials off site except unless specifically noted otherwise.
- .2 Where existing materials are to be reused, the Contractor for this Division is responsible for their removal, storage, cleaning and reinstallation.
- .3 Where existing materials are to be turned over to the Owner, the Contractor for this Division is responsible for their removal and delivery to the Owner on site.
- .4 Where existing materials are to be demolished, the Contractor for this Division is responsible to ensure that they have been isolated from the power supply prior to demolition.
- .5 Where existing materials are to be retained in place, it is the responsibility of the Contractor for this Division to identify the materials and equipment to remain prior to commencement of demolition.

**3.2 MAINTAINING SERVICES**

- .1 It is the responsibility of this Contractor to maintain electrical services and systems at all times to areas beyond the construction area, which were disrupted by works within the construction area.
- .2 Reinstate as soon as possible any existing circuits disrupted during construction not intended to be removed as part of this contract.

**3.3 NAMEPLATES AND LABELS**

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.
- .2 All circuits removed in existing panels shall remain as spare.
- .3 Update panel schedules and panel labelling with new typewritten schedules to reflect changes.

**3.4 CONDUIT AND CABLE DEMOLITION**

- .1 Contractor for this Division shall be responsible for all removals of electrical equipment, as shown on the construction documents.
- .2 Civil trade to remove all equipment on exterior portion of building only after all electrical equipment has been safely disconnected and isolated.
  - .1 Electrical contractor shall coordinate all removals of equipment with other trades to ensure safe removals of devices and equipment.

**3.5 PANEL AND ENCLOSURE DEMOLITION**

- .1 Contractor for this Division shall remove and dispose of all equipment identified under this contract and in accordance with all other construction documents.

- .2 Contractor shall disconnect, remove and return equipment to owner where identified on construction drawings.
  - .1 Where equipment is to be returned to the owner, the contractor is responsible for maintaining the physical and operational integrity of such equipment. Contractor shall be responsible for replacing equipment to be returned to owner where damaged during removal.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**