Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENT

.1 Work of this Contract at Stony Mountain Institution, Stony Mountain, Manitoba includes the replacement of approximately 300 m of watermain and 60 m of sanitary sewer, complete with hydrants, valves, fittings, manholes and restoration.

.2 Relocate and reinstall adjacent existing site elements if and as necessary and approved by the Departmental Representative to perform the work, and upon completion of each day's work return everything back to its original location.

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

.4 Provide temporary barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by SMI and which will be operative during such work .

.5 Existing operations must remain in service without interruption during construction period.

.6 Make good any damage to existing finishes, fittings, and/or gate and/or fence components caused by work under the contract. Ensure all work is in full compliance with project requirements.

.7 Plan, design, and coordinate the works utilizing engineering consultants; prepare design, shop drawings, and as-built drawings .

1.2 PERFOMRMANCE OF THE WORK AND COMPLETION

.1 Work under this Contract is to be performed in a timely manner. Commence planning and preparatory work immediately upon receipt of official notification of acceptance of Contract and complete the Work within time stipulated in the Contract.

.2 Hydro and water will be available at the site for use by the Contractor. Contractor shall coordinate connections with Departmental Representative.

.3 A temporary Contractor yard and equipment parking area will be accommodated on the site at the direction of the Departmental Representative. Exact location to be determined.

.4 Construction layout and survey shall be the responsibility of the Contractor.

.5 Contractor shall provide As-built markups to Department Representative no later than 2 weeks after Total Performance

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 and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 SPECIAL REQUIREMENTS

.1 Perform Work in accordance with CSC Stony Mountain Institution Technical Requirements and Institutional Requirements for Contractors. Documents included in Appendix.

.2 Perform Work during normal working hours from 07:30 to 16:30 hours Monday to Friday.

.3 Deliver materials from 07:30 to 16:00 hours unless otherwise approved by Departmental Representative.

.4 Allow for delays due to security protocol when Work:
- .1 Interferes with Institution security operations and,
- .2 Entering and exiting the Institution.

.5 Access into Institution:
- .1 Ingress and egress of Contractor’s vehicles and personnel at site are limited to the Institution’s check point.

.6 Construction Escort
- .1 Departmental Representative will provide construction escort as required.
- .2 Notify Departmental Representative 24 hours in advance of escort requirement.

.7 Ensure Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.8 Keep within Limits of Work and ingress and egress access.

.9 Keep within Limits of Site.

3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not allowed.

END OF SECTION

Part 1 General

1.1 INTRODUCTION

.1 To carry out an efficient operation of a penitentiary, it is absolutely necessary for civilian personnel, who are employed on the penitentiary property, to observe established rules and procedures.

1.2 ESTABLISHMENT OF REQUIREMENTS

.1 Prior to commencing work, the Contractor shall meet with the Warden or his designate to discuss the nature and extent of all activities involved, and to establish mutually acceptable requirements to ensure that both the project and institution operation may proceed without undue disruption or hindrance except where unavoidable.

1.3 WORKING CONDITIONS

.1 Subject to Institutional Security requirements, the Warden or designate shall permit the contractor as much freedom of action and movement as is reasonably possible, and the Contractor in turn shall be expected to cooperate with institutional personnel in ensuring that security requirements are observed by construction workers.

1.4 OBSERVATION AND INSPECTION

.1 Construction activity and all related movement of personnel & vehicles shall be subject to observation & inspection by institutional staff to ensure that security requirements are met, and understanding of the need for this action is established and maintained throughout.

1.5 PERSONNEL SECURITY

.1 The names of all construction personnel to be employed on the site shall be submitted in writing via SMI form #85 (Security Clearance Request) which may be obtained from Security Intelligence Officer (SID),Correctional Supervisor In Charge of Construction and/or Public Works Supervisor.

.2 All contractors and their employees, including subcontractors and their employees, involved in the contract, must report to the SIO or CS I/C of Construction prior to the first day of employment for the purpose of obtaining a "pass" (photo identification card) and receiving a security briefing. This will only be done after a Security Clearance Request form is completed and approved by the Warden.

.3 Warden or designate may require close-up facial photographs to be taken of construction personnel, and may have such photographs displayed at appropriate locations in the institution for identification purposes.

.4 When the contractors and employees are required to work on the prison property, they will enter and exit the premises via the Service Entrance (Sally Port) if authorized by the CS IIC Construction or designated due to job requirements.

.5 Warden or designate has the right to refuse permission to enter institutional property to any person whom he has reason to believe may be a security risk.

1.6 PARKING

.1 Warden or designate shall assign the parking area or areas to be used by the construction personnel and indiscriminate parking in other locations shall not be permitted.

.2 All unattended vehicles must have windows closed, doors and trunks locked, and keys removed.

.3 Vehicles must not contain any type of weapons, ammunition or spirits (empty, partial or full).

1.7 SHIPPING AND ACCESS TO THE SITE

.1 Contractor shall verify with the Warden or designate the hours during which vehicles will be allowed to enter or leave the institution. Vehicles or personnel will not be admitted to the institution after normal working hours or on weekends/holidays without prior arrangement with the Warden or his designate. Normal construction Work hours are 07:30 to 16:30 hours Monday thru Friday.

.2 Note: Service Entrance is closed between 11:00 to 13:00 hours unless arrangements are made in advance.

.3 Contractor shall have all project material and equipment addressed in his name to avoid confusion with the institutions own shipments.

.4 Contractor shall, when overtime work is necessary, inform the Warden or his designate at least 24 hours in advance so that extra staff may be arranged to maintain the institution's observation inspection of construction activity.

.5 Warden or his designate may prohibit or restrict access to any part of the institution. He may require that, in certain areas or at certain times, no civilian is allowed unless accompanied by an officer of the Correctional Service of Canada.

.6 Private vehicles will not be allowed within the institution's security wall or fence without special permission of the Warden or his designate. All vehicles entering the institution's security wall or fence must comply with institution's security requirements (i.e. lockable gas caps or wheel covers, no wheel hub caps, lockable doors and windows, tools in a lockable container and locked when not in use).

.7 Trucks delivering materials, equipment and tools to the job will be allowed access when the contents are certified by the Contractor or representative as being strictly necessary for the execution of the work. Security requirements such as wheel covers, lockable fuel caps, lockable doors and windows are still required unless special provisions are made thru the CSIIC Construction. Trucks or vehicles, after being unloaded, are to be parked in the designated area outside the security wall or fence.

.8 All vehicles are subject to search and will be refused access if, in the opinion of the Warden or his designate, they contain any article that may jeopardize the security of the institution. Examples: weapons, alcohol, cell phones, drugs or narcotics.

1.8 TOOLS & EQUIPMENT

.1 To Commissioner's Directive 573 Control of Items Critical to the Security" Safety of the Institution under section I0 and Institutional Standing Order 573.

.2 Contractor shall maintain an inventory of all tools and equipment, including the number of cartridges for power-driven tools brought on site, and a record of every shot fired. (Empty cartridges to taken out after completion of work and counted with live cartridges. Total cartridges taken in must add up to those taken out, counting those that have been fired.) A copy of these tool lists shall be kept in the Security Construction Trailer when manned or with the officer in charge of the service entrance.

.3 Contractor shall keep all tools and equipment under constant supervision and not leave them unattended, paying particular attention to power-driven tools, files, saw blades, rod saw, wire, rope, extension cords and ladders.

.4 Contractor shall store all tools and equipment in places and under conditions approved by the Warden or his designate and locks all toolboxes when not in use. He shall report immediately all missing or lost tools or equipment to the Warden or his designate and complete Missing Tool Report form. This form is available to the General Contractor.

.5 Contractor shall provide permanent identification (engraving) to all tools indicating that they are the personal property of the employee/tradesperson or employing company. Negligence in this regard may result in confiscation of tools.

1.9 TELEPHONES & INSTALLATIONS

.1 Contractor shall obtain approval from the Warden or his designate for the installation of telephones that shall be located so that they are not accessible to inmates.

.2 Cell phones are NOT allowed inside the security wall or fence.

1.10 TWO-WAY RADIO COMMUNICATIONS

.1 Warden or designate must approve all two-way radio communication devices.

.2 All radio devices requested for use on job site must be checked with institutional ADGA technicians to ensure no interference with institution equipment.

.3 All radio devices brought into SMI are not to be accessible to inmates.

1.11 ALCOHOL & NARCOTICS

.1 Stony Mountain Institution has a Zero tolerance for alcohol beverages and narcotics on site. These items are not permitted on institutional property. Discovery of such items on site, and identification of the person or persons responsible for them, shall be reported immediately to the Warden or his designate. Any persons employed in the project that appear to be intoxicated or under the influence of any drug or narcotic, or who behaves in an unusual manner, shall be subject to immediate removal from institutional property.

1.12 CONTROL OF CONTRABAND - GENERAL

.1 Contractor is responsible for ensuring that all persons employed directly or indirectly upon the project are familiar with Correctional and Conditional Release Act section 45 Summary Convictions as follows;

.1 CCRA Summary Conviction Offences 45**.** Every person commits a summary conviction offence who;

(a) is in possession of contraband beyond the visitor control point in a penitentiary;

(b) is in possession of anything referred to in paragraph (b) or (c) of the definition "contraband" in section 2 before the visitor control point at a penitentiary;

(c) delivers contraband to, or receives contraband from, an inmate;

(d) without prior authorization, delivers jewellery to, or receives jewellery from, an inmate; or

Search:

Where the Warden or his designate suspects, on reasonable grounds, that an employee of the contractor is in possession of contraband, he may order that person to be searched, under, Correctional Conditional Release Regulations Section 42.1 Contraband, Sections 43-46, 54.1-2, 55.1 Search and Seizure and Section 57 Seizure, Commissioner's Directives 566-8 section 9-16 “.

1.13 KEY CONTROL

.1 To Commissioner's Directive 573 Control of Items Critical to the Security" Safety of the Institution under section 3 C & E and Institutional Standing Order 573

.2 The general contractor shall maintain control of all new keys as follows:

.1 Upon receipt of keys from the security hardware supplier/installer;

.1 Provide a receipt to the security hardware supplier, listing all keys and quantity of each, by key code.

.2 Provide a copy of the receipt to the appropriate Correctional Service of Canada representative at the site (Security Maintenance Officer Wm. Phelan).

.3 Locks are to be handed over to SMO Officer William Phelan ext: 5808 for the purpose of repining of lock to CSC standards. Once locks have been repined, locks will be returned to General Contractor for installation.

.4 Keys for locks will be made available to the Security Construction Gate to maintain CSC regulation control.

.3 Upon putting operational keys into use:

.1 Keys will be issued thru the Security personnel at the East Security Construction Trailer as per CSC standards and to ensure that keys are issued to responsible personnel only and the keys are turned in at the end of the day's work. No keys are to be retained by an employee for any period longer than that for which the key is required.

.2 The issue and receipt of all keys is recorded, showing the date, time, key code number, issued to, including the name of the recipient and employer. The time of return should be signed in by the key control officer (Gate Security) and witnessed by CSC site representative at the end of each working day.

.3 Report, in writing, any untoward circumstances, such as loss, disfigurement, misuse, or mishandling, etc., to the security hardware supplier or CSC/SMO, identifying keys by code and/or number, so that appropriate action may be taken to effect replacement or abandonment of that particular code as circumstances may warrant. Send a copy of these reports to the CSC site representative.

.4 Misuse or improper control of CSC keys can result in that employee being denied access to keys or removal from CSC property.

.5 No inmates are allowed to handle or be given access to CSC keys.

Upon completion of the contract and takeover of the buildings:

.1 Provide a list of all keys, by number and/or key code, with space for the signature of recipients (both Public Works & Government Services Canada representative and CSC representative) and the date of receipt.

.2 Provide certification to Public Works & Government Services Canada that all reasonable caution and care has been exercised in accordance with these instructions, and include a copy for CSC.

.3 Once locks have been installed on new installation, all keys pertaining to that lock and code shall immediately be turned over to the CSC/SMO.

.4 All locks removed during demolition must immediately be turned over to CSC/SMO.

.5 No inmates are allowed to handle or be given access to CSC keys.

1.14 WORK AREAS

.1 Contractors and their employees shall be confined to their work area. All other buildings and grounds shall be considered "Out of Bounds".

.2 Contractors and their employees shall not contact or attempt to contact or deal in any way with inmates.

1.15 CONFINED SPACE ENTRY

.1 Confined Space Entry Regulations are now in effect. Personnel entering confined space areas must have passed the required Confined Space Training Course to enter Class "A" or "B" areas at SMI or Rockwood Institution.

.1 Confined Spaces Area "A" are typically areas below grade within the duct areas of the Stony Mountain Institution and some areas within Rockwood Institution and farm annex. Confined Space Area "A" requires the issue of a permit from the SMI Works Department prior to entry of area or issue of keys. This includes all necessary equipment and safety personnel.

.2 Confined Spaces Area "B" are all areas above grade within a confined space area such as attics, mechanical rooms and ducts. This does not require a permit from Works Department, but does require that you sign a waiver form. This form is for you to indicate that you have had the Confined Space Training. To enter Confined Spaces you are required to have all necessary equipment. The waiver form must be completed prior to entry or before the issuance of any keys.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Departmental 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 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 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 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba.

.3 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.

.4 Allow 5 days for review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative] are not intended to change Contract Price. If adjustments affect value of Work, state such in writing prior to proceeding with Work.

.6 Make changes in shop drawings as required, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 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.

.8 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.

.9 After Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic] copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 If upon review no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

.1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic and hard copy of colour digital photography in jpg format, standard resolution as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: as directed by Departmental Representative.

1.5 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status].

.2 Submit transcription of insurance immediately after award of Contract.

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 Manitoba
- .1 The Workers Compensation Act RSM 1987 -Updated 2013.

1.2 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Sustainable Requirements: Construction and Hazardous Materials.

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 2 days after receipt of comments from Departmental Representative.

.8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.4 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.5 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Regulatory Requirements.

1.6 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 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.7 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 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.

1.8 COMPLIANCE

.1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Manitoba Reg..

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator and or Safety Officer and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.10 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
- .1 Have working knowledge of occupational safety and health regulations.
- .2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.11 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 Departmental Representative.

1.12 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

.1 Blasting or other similar work is not permitted.

1.14 POWER ACTUATED DEVICES

.1 Use of powder actuated devices is not permissible.

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 N/A

1.2 INSPECTION

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

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

.3 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.3 INSPECTION AGENCIES

.1 Independent Certified Inspection/Testing Agencies will be engaged by the Contractor for purpose of inspecting and/or testing portions of Work as detailed in these specifications. Cost of such services will be borne by the Contractor

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

.1 Notify appropriate agency Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

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

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

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 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.3 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.4 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

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

1.5 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.6 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.7 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.8 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1, Power Piping

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 National Fire Code of Canada (NFCC 2005)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 00 - General Requirements.

.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.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with 01 00 00 - General Requirements and 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 NOT USED

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 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.

3.3 PIPEWORK INSTALLATION

.1 Install pipework to ASME B31.1.

.2 Screwed fittings jointed with lead-free dope.

.3 Protect openings against entry of foreign material.

.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 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.7 Install to permit separate thermal insulation of each pipe.

.8 Group piping wherever possible.

.9 Ream pipes, remove scale and other foreign material before assembly.

.10 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.11 Provide for thermal expansion as indicated and where required.

.12 Valves:

- .1 Install in accessible locations.
- .2 Valves accessible for maintenance without removing adjacent piping.
- .3 Use gate valves at branch take-offs for isolating purposes except where specified.

3.4 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.4 Installation:

- .1 Concrete, masonry walls: terminate flush with finished surface.
- .2 Floors: terminate 50 mm above finished floor.
- .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
- .4 Seal annular space between sleeve and cored opening with grout.
- .5 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

3.5 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.6 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: hydrotest to 1-1/2 times maximum system operating pressure or 160 kPa, whichever is greater.

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Conduct tests in presence of Departmental Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.7 Insulate work only after approval and certification of tests by Departmental Representative.

3.7 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Departmental Representative.

.2 Request written approval by Departmental Representative 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

3.8 CLEANING

.1 Clean in accordance with Section 01 00 00 - General Requirements.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping.

.2 American Welding Society (AWS)

.1 AWS C1.1M/C1.1-[2000(R2006)], Recommended Practices for Resistance Welding.

.2 AWS Z49.1-[2005], Safety in Welding, Cutting and Allied Process.

.3 AWS W1-[2000], Welding Inspection Handbook..

.3 Canadian Standards Association (CSA International)

.1 CSA W48-[06], Filler Metals and Allied Materials for Metal Arc Welding.

.2 CSA B51-[03(R2007)], Boiler, Pressure Vessel and Pressure Piping Code.

.3 CSA-W117.2-[2006], Safety in Welding, Cutting and Allied Processes.

.4 CSA W178.1-[2008], Certification of Welding Inspection Organizations.

.5 CSA W178.2-[2008], Certification of Welding Inspectors.

1.2 QUALITY ASSURANCE

.1 Qualifications:

.1 Welders:

.1 Welding qualifications in accordance with CSA B51.

.2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.

.3 Submit welder's qualifications to Departmental Representative.

.4 Each welder to possess identification symbol issued by authority having jurisdiction.

.2 Inspectors:

.1 Inspectors qualified to CSA W178.2.

.3 Certifications:

.1 Registration of welding procedures in accordance with CSA B51.

.2 Copy of welding procedures available for inspection.

.3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

Part 2 Products

2.1 ELECTRODES

.1 Electrodes: in accordance with CSA W48 Series.

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 QUALITY OF WORK

.1 Welding: in accordance with ANSI/ASME B31.1, using procedures conforming to applicable requirements of provincial authority having jurisdiction.

3.3 INSTALLATION REQUIREMENTS

.1 Identify each weld with welder's identification symbol.

.2 Backing rings are not permitted.

.3 Fittings:

.1 NPS 2 and smaller: install welding type sockets.

.2 Branch connections: install welding tees or forged branch outlet fittings.

3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS

.1 Review weld quality requirements and defect limits of applicable codes and standards before work is started.

.2 Formulate Inspection and Test Plan.

.3 Do not conceal welds until they have been inspected, tested and approved by inspector.

.4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 SPECIALIST EXAMINATIONS AND TESTS

.1 General:

.1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2.

.2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.

.2 Hydrostatically test welds to ANSI/ASME B31.1.

.3 Visual examinations: include entire circumference of weld externally and wherever possible internally.

.4 Radiographic tests for pressure piping systems.

.1 Spot radiography:

.1 Conduct spot radiographic tests of 10% of welds, selected at random by from welds which would be most difficult to repair in event of failure after system is operational.

3.6 DEFECTS CAUSING REJECTION

.1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.

3.7 REPAIR OF WELDS WHICH FAILED TESTS

.1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

3.8 CLEANING

.1 Clean in accordance with Section 01 00 00 – General Requirements.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1, Power Piping.

.2 ASTM International

.1 ASTM A125-1996(2007), Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-07, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-2009, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation

.4 Underwriter's Laboratories of Canada (ULC)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 00 - General Requirements.

.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.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 00 00 - General Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 00 00 - General Requirements and 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 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 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.

.5 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 ASME B31.1 and MSS SP58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.3 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: galvanized after manufacture.

.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 and carbon steel retaining clip.

.1 Rod: 9 mm UL listed.

.2 Cold piping NPS 2 1/2 or greater, hot piping: 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 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.

.4 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.

.5 Pipe attachments: material to MSS SP58:

.1 Attachments for steel piping: carbon steel, galvanized.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports to accommodate thermal insulation and to avoid penetrating the vapour retarder.

.6 Adjustable clevis: material to MSS SP58, UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.7 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP58.

.8 U-bolts: carbon steel to MSS SP58 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: galvanized.

.2 Finishes for copper pipework: galvanized, with formed portion plastic coated.

.9 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP58.

2.4 RISER CLAMPS

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, UL listed.

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.5 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/m^3 density insulation plus insulation protection shield to: MSS SP58, galvanized sheet carbon steel. Length designed for maximum 3 m span.

.2 Insulated hot piping:

.1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP58.

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 manufacturer's instructions and recommendations.

.2 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.3 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.

3.3 HANGER SPACING

.1 In accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.

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
4	3.7 m	3.6 m
5	4.3 m	
6	4.3 m	
8	4.3 m	

.2 Within 300 mm of each elbow.

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 CLEANING

.1 Clean in accordance with Section 01 00 00 - General Requirements.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3-92, Identification of Piping Systems.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 00 00 - General Requirements.

.2 Product data to include paint colour chips, other products specified in this section.

.3 Samples:

.1 Submit samples in accordance with Section 01 00 00 - General Requirements.

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 00 00 - General Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: manufacturer's name, model, size, serial number, capacity.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm thick laminated plastic or white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: use size # 5.

.2 Equipment in Mechanical Rooms: use size # 9.

.5 Identification for PWGSC Preventive Maintenance Support System (PMSS):

.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

.2 Equipment in Mechanical Room:

.1 Main identifier: size #9.

.2 Source and Destination identifiers: size #6.

.3 Terminal cabinets, control panels: size #5.

.3 Equipment elsewhere: sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.3 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.4 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive plastic-coated cloth with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.5 Colours and Legends:

.1 Where not listed, obtain direction from Departmental Representative.

.2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Domestic cold water supply	Green	DOM. CWS

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 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC or CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PWGSC PMSS.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification easily and accurately readable from usual operating areas and from access points.

.1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 CLEANING

.1 Proceed in accordance with Section 01 00 00 - General Requirements.

.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 American Society for Testing and Materials International (ASTM)

- .1 ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
- .2 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .5 ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.
- .6 ASTM C547-2003, Mineral Fiber Pipe Insulation.
- .7 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
- .8 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.2 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) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.3 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.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Trade Associations

- .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.6 Underwriters' Laboratories of Canada (ULC)

- .1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

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-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702.

.2 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, plain 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 JACKETS

.1 Canvas:

.1 220 gm/m^2 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 manufacturers 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 and flanges.

.2 Design: to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: PVC.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers 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 Piping:

.1 Cold Insulation – Plumbing

.1	Up to 2”	25 mm (1”)
.2	2½” and over	25 mm (1”)

.3 Finishes:

.1 Exposed indoors: PVC jacket.

.2 Exposed in mechanical rooms: canvas jacket.

3.7 CLEANING

.1 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 American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)

.1 ASME B16.25-07, Buttwelding Ends.

.2 ASME B16.3-06, Malleable Iron Threaded Fittings: Classes 150 and 300.

.3 ANSI/ASME B16.9-07, Factory-Made Wrought Steel Buttwelding Fittings.

.4 ANSI B18.2.1-2010, Square and Hex Bolts and Screws (Inch Series).

.5 ANSI/ASME B18.2.2-2010, Square and Hex Nuts (Inch Series).

.6 ASME B31.1, Power Piping.

.2 ASTM International Inc.

.1 ASTM A47/A47M-99(2009), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 00 - General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for valves, strainers, traps, orifice unions and other piping accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 00 - General Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 00 00 - General Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.5 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:

.1 Provide spare parts as follows:

.1 Gaskets for flanges: one set.

Part 2 Products

2.1 STAINLESS STEEL PIPING:

.1 Piping:

.1 NPS ½ - 1: schedule 80s, a312 tp316L, welded, threaded ends

.2 NPS 1 ½ - 12: Schedule 10S, A312 TP316L, welded, bevelled ends

.2 Pipe Joints:

.1 NPS ½ - 1: Threaded with Teflon tape

.2 NPS 1 ½ - 12: Butt weld or flanged

.3 Fittings:

.1 Threaded Fittings: Class 150, A351 CF8/304

.2 Butt Weld Fittings: Schedule 10S, A403 316L, class WP-W

.3 Butt-weld elbows are long radius (1.5D) unless shown otherwise on the drawings

.4 Flanged Joints:

.1 Flanges: 150# weld-neck or slip-on, flat-faced, A182 316L stainless steel, weld-neck schedule to match pipe.

.2 Gaskets: 150# 1.5 mm thick, compressed non-asbestos.

.3 Bolts and Nuts: ASTM A193 Grade B8M Class 1 stainless steel bolts, ASTM A194 Grade 8M stainless steel heavy hex nuts.

2.2 DUCTILE IRON PIPING:

.1 Piping:

.1 Ductile iron pipe shall be designed in accordance with ANSI/AWWA C150/A21. 50 latest rrevision, for a minimum of 150 psi rated working pressure plus a surge a llowance of 100 psi and a safety factor of 2.0 upon the combination of working pressure and surge allowance. Therefore the minimum design pressure considered is 500 psi.

.2 Pipe shall have a water‑based asphaltic coating on the exterior solely as a means of masking innate surface oxidation of the ductile iron material while concurrently highlighting the required production and inventory markings.

.3 Pipe shall have a cement mortar lining on the interior barrel in accordance with ANSI/AWWA C104/A21.4 latest revision. Application of an NSF‑61 listed water‑based asphaltic sealcoat on the interior lining is discretionary as part of the C104 standard in accordance with the purchasers' directives.

.4 Pressure class:150.

.2 Provide sacrificial anode for each pipe for additional corrosion protection.

2.3 BASES, HANGERS AND SUPPORTS

.1 Conform to Section 23 05 29 - Hangers and Supports supplemented as specified herein.

.2 Provide to details as indicated.

.3 Submit shop drawings for approval before fabrication.

2.4 Pipe Penetration Seal

.1 Rated for sealing ductile iron pipe passing through a concrete wall, suitable for buried application, 138 kPa (20 psi) pressure rating, -40 °C to 121 °C temperature rating.

.2 Acceptable Product: Link Seal

2.5 Plate Anchor Rods and Grout

.1 Carbon steel threaded anchor rod, ASTM A 193, Grade B7,862 MPa minimum specified ultimate strength, 724 MPa minimum specified yield strength, Nuts: ASTM A 194, Grade 2H, Heavy, Washers: ASTM F884, HV and ANSI B18.22.1 Type A Plain.

.2 Acceptable Product: Hilti HAS c/w HIT-HY 200 Epoxy Grout

Part 3 Execution

3.1 PREPARATION

.1 Lay out work in accordance with lines and grades as indicated.

.2 Verify lines, levels, dimensions as indicated against established benchmarks. Report discrepancies to Departmental Representative and obtain written instruction.

.3 When required by Departmental Representative provide drawings showing relative locations of various services.

3.2 WELDING

.1 Perform welding in accordance with Section 23 05 17 - Pipe Welding supplemented as specified herein.

.2 Notwithstanding the requirements of referenced section, the following shall apply:

.1 Welding to be executed by certified pipe welders.

3.3 APPLICATION

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

3.4 INSTALLATION

.1 Install in accordance with NPC and local authority having jurisdiction.

.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.

3.5 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.

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

3.6 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean to Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.7 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.

.2 Coordinate with Section 33 11 16- Site Water Utility Distribution Piping and Section 33 11 16.01 - Incoming Site Water Utility Distribution Piping.

.3 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.8 CLEANING

.1 Clean in accordance with Section 01 00 00 - General Requirements.

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

END OF SECTION

Approved: 2012-06-30

Part 1 General

1.1 DELIVERY, STORAGE AND HANDLING

.1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

Part 2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

- .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .2 Reclaimed asphalt pavement.
- .3 Reclaimed concrete material.

.3 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

- .1 Crushed rock.
- .2 Gravel composed of naturally formed particles of stone.
- .3 Reclaimed asphalt pavement.
- .4 Reclaimed concrete material.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Excavation shall not be measured. It shall be incidental to the installation of the various underground infrastructure components.

1.2 EXISTING CONDITIONS

.1 Buried services:

- .1 Before commencing work verify location of buried services on and adjacent to site.
- .2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .3 Prior to beginning excavation Work, notify applicable Departmental Representative establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
- .4 If there is uncertainty as to the locations of buried utilities, confirm locations with careful soil hydrovac methods as appropriate.
- .5 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .6 Where utility lines or structures exist in area of excavation, exercise caution and protect said utilities and structures from damage.
- .7 Record location of maintained, re-routed and abandoned underground lines.
- .8 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

- .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative

Part 2 Products

2.1 MATERIALS

.1 Type 1 and Type 2 fill:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within the following limits:
- .3 Table:

Sieve Designation	% Passing	
	Type 1 pit run	Type 2 crushed rock
75 mm	100	-
50 mm	-	-
37.5 mm	80-100	-
25 mm	-	-
19 mm	75-100	100
12.5 mm	-	-
9.5 mm	-	-
4.75 mm	40-80	40-70
2.00 mm	-	25-60
0.425 mm	10-35	8-25
0.180 mm	-	-
0.075 mm	5-30	6-17

.2 Type 3 fill: selected material from excavation, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Use of Fill types:

.1	Granular material under pavement	Type 1 or Type 2 fill, either is acceptable
.2	Native material under non-paved surfaces	Type 3 fill

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

.1 Protect existing features.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

3.4 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Remove any obstructions encountered during.

.3 Excavation must not interfere with bearing capacity of adjacent foundations.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 For trench excavation, unless otherwise authorized by Departmental Representativ in writing, do not excavate more than 20 m of trench in advance of installation operations and do not leave open more than 5 m at end of day's operation.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material off site.

.9 Do not obstruct flow of surface drainage or natural watercourses.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative .

.12 Correct over-excavation as follows:

.1 Fill under roads, bearing surfaces and footings Type 2 fill compacted to not less than 100 % of corrected Standard Proctor maximum dry density.

.2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

3.5 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below.

.1 Unpaved areas more than 1 m away from roads, buildings or paved surfaces and features: use Type 3 fill to subgrade level. Compact to 95 % of corrected maximum dry density.

.2 Under paved surfaces or within 1 m of roads, buildings or paved surfaces: use Type 1 or Type 2 material to underside of base course. Compact to 100 % of corrected maximum dry density.

3.6 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as specified in Section 33 11 16 - Site Water Utility Distribution Piping and Section 33 31 13 - Public Sanitary Utility Sewerage Piping

.2 Place bedding and surround material in unfrozen condition.

3.7 BACKFILLING

.1 Contractor shall use hand-operated vibratory compaction equipment sufficient to achieve the required densities specified without causing damage to the pipe.

.2 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved of construction below finish grade.

.2 Inspection, and recording location of underground utilities.

.3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.4 Do not use backfill material which is frozen or contains ice, snow or debris.

.5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to underside of surface finishes (roads or sod). Compact each layer before placing succeeding layer.

3.8 RESTORATION

.1 Upon completion of Work, remove all waste materials and, trim slopes, and correct defects as directed by Departmental Representative .

.2 Replace topsoil where required.

.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 No measurement shall be made of any of the Work. Payment for the Work shall be on a Lump Sum basis.

1.2 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services.

.2 Submit schedule of expected interruptions for approval and adhere to interruption schedule as approved by Departmental Representative.

.3 Notify Departmental Representative minimum of 48 hours in advance of interruption in service.

Part 2 Products

2.1 PIPE, JOINTS AND FITTINGS

.1 Polyvinyl chloride pressure pipe: to AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end.

2.2 VALVES AND VALVE BOXES

.1 Valves to open counter clockwise.

.2 Gate valves: to AWWA C509, direct bury, non-rising stem, resilient seated wedge gate valve rated 1 MPa with push-on joints.

.3 Cast iron valve boxes: three piece sliding type adjustable over minimum of 450 mm complete with valve operating extension rod.

.1 Base to be large round type with minimum diameter of 300 mm.

.2 Top of box to be marked "WATER"/"EAU".

2.3 SERVICE CONNECTIONS

.1 Copper tubing: to ASTM B88M type K, annealed.

.2 Copper tubing joints: compression type suitable for 1 MPa working pressure.

.3 Brass inverted key-type curb stops: red brass to ASTM B62, compression type with drains.

.1 Curb stops to have adjustable bituminous coated cast iron service box with stem to suit depth of bury.

.2 Top of cast iron box marked "WATER"/"EAU".

.4 Service connections for PVC pipe:

.1 Service connections less than 100 mm: corporation stop, tapped to main using AWWA threads, complete with stainless service saddle. Service saddle to

consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.2 Service connections 100 mm and over: use tee fitting.

.5 Bronze type service clamps: for PVC pipe service connections.

.1 Service clamps to be of strap-type, with confined "O" ring seal cemented in place.

.2 Clamps to be tapped with threads to ANSI/AWWA C800.

2.4 HYDRANTS

.1 Post type hydrants: dry barrek with compression shutoff in accordance with CAN/ULC-S520 and AWWA C502, designed for working pressure of 1.0 MPa with two 65 mm threaded hose outlets, one 100 mm threaded pumper connection, 150 mm riser barrel with breakaway flange, 125 mm bottom valve and 150 mm bottom inlet with push-on joint.

.1 Hydrants to open counter clockwise, threads to western Canadian standard. Provide metal caps and chains.

.2 Depth of bury 2.4 m.

.2 Hydrant paint: exterior enamel to MPI #96.

2.5 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material to: Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed or screened stone, gravel or sand.

.2 Gradations to be within limits specified.

.3 Table

Sieve Designation	% Passing	
Stone/Gravel	Gravel/Sand	
200 mm	-	
75 mm	-	
50 mm	-	
38.1 mm	-	
25 mm	100	
19 mm	-	
12.5 mm	90-100	
9.5 mm	-	
4.75 mm		
2.00 mm	25-60	
0.425 mm		
0.180 mm		
0.075 mm	0- 8	

2.6 BACKFILL MATERIAL

.1 Type 2 or Type 3 as indicated in Section 31 23 33.01 - Excavating, Trenching and Backfilling

2.7 PIPE DISINFECTION

.1 Liquid chlorine to disinfect water mains.

.2 Disinfect water mains in accordance with ANSI/AWWA C651.

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 distribution piping installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.

.1 Inspect materials for defects.

.2 Remove defective materials from site

3.3 TRENCHING

.1 Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Trenching shall be on-line. The existing watermain shall be removed as new watermain is installed.

.1 The Contractor shall first install new valves WV-5 and WV-6 so that the existing watermains to which they connect can remain pressurized for the remaindaer of the Work

.2 The Contractor shall then install new valves WV-1 and WV-2 so that the existing watermains to which they connect can remain pressurized for the remainder of the Work

.3 After these four valves have been replaced, remove existing watermain and install new watermain between all four valves on existing alignment

3.4 GRANULAR BEDDING

.1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 150 mm below bottom of pipe.

.2 Do not place material in frozen condition.

.3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.

.4 Shape transverse depressions in bedding as required to suit joints.

.5 Compact each layer full width of bed to 95 % minimum of corrected maximum dry density.

3.5 PIPE INSTALLATION

.1 Lay pipes to manufacturer's standard instructions and specifications.

.1 Do not use blocks except as specified.

.2 Join pipes in accordance with manufacturer's recommendations.

.3 Bevel or taper ends of PVC pipe to match fittings.

.4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.

.5 Lay pipes on prepared bed, true to line and grade.

.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.2 Take up and replace defective pipe.

.3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.

.6 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.

.7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

.8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.

.1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.9 Position and join pipes with equipment and methods suitable for the work

.10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.11 Align pipes before jointing.

.12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.13 Avoid displacing gasket or contaminating with dirt or other foreign material.

.1 Remove disturbed or contaminated gaskets.

.2 Clean, lubricate and replace before jointing is attempted again.

.14 Complete each joint before laying next length of pipe.

.15 Minimize deflection after joint has been made.

.16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.

.17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes

.18 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.

.19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.

.20 Do not lay pipe on frozen bedding.

.21 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.

.22 Backfill remainder of trench.

3.6 VALVE INSTALLATION

.1 Install valves to manufacturer's recommendations at locations as indicated.

3.7 SERVICE CONNECTIONS

.1 Where services are extended to the building, terminate building water service 1 m outside building wall opposite point of connection to main.

- .1 Install coupling necessary for connection to building plumbing.
- .2 If plumbing is already installed, make connection, otherwise cap or seal end of pipe and place temporary marker to locate pipe end.

.2 Do not install service connections until satisfactory completion of hydrostatic and leakage tests of water main.

.3 Construct service connections at right angles to water main unless otherwise directed. Locate curb stops 300 mm inside roadway allowance.

.4 Tapping sleeves shall be Type 304 stainless steel body, nuts, bolts and flanged outlet suitable for pressures up to 1.0 MPa. Flanged outlet in accordance with AWWA C207 Class D, ANSI 150 lb.

.5 Employ only competent workmen equipped with suitable tools to carry out tapping of mains, cutting and flaring of pipes.

.6 Install single and multiple tap service connections on top half of main, between 45 degrees and 90 degrees measured from apex of pipe.

.7 Leave corporation stop valves fully open.

.8 In order to relieve strain on connections, install service pipe in "Goose Neck" form "laid over" into horizontal position.

.9 Install rigid stainless steel liners in small diameter plastic pipes with compression fittings.

.10 Install curb stop with corporation box on services 50 mm or less in diameter.

- .1 Equip larger services with gate valve and cast iron box.
- .2 Set box plumb over stop and adjust top flush with final grade elevation.
- .3 Leave curb stop valves fully closed.

.11 Place temporary location marker at ends of plugged or capped unconnected water lines.

3.8 HYDRANTS

.1 Install hydrants at locations as indicated.

.2 Install hydrants in accordance with AWWA M17.

.3 Install 150 mm gate valve and cast iron valve box on hydrant service leads as indicated.

.4 Set hydrants plumb, with hose outlets parallel with edge of pavement or curb line, with pumper connection facing roadway and with body flange set at elevation of 50 mm above final grade.

.5 Place concrete thrust blocks as indicated and specified.

.6 Place appropriate sign on installed hydrants indicating whether or not they are in service during construction.

3.9 THRUST BLOCKS AND RESTRAINED JOINTS

.1 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated.

.2 Keep joints and couplings free of concrete.

.3 Do not backfill over concrete within 24 hours after placing.

3.10 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with ANSI/AWWA C600.

.2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.

.3 Notify Departmental Representative at least 24 hours in advance of proposed tests.

.1 Perform tests in presence of Departmental Representative.

.4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.

.5 Test pipeline in sections not exceeding 370 m in length, unless otherwise authorized by Departmental Representative.

.6 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed.

.7 Leave hydrants, valves, joints and fittings exposed.

.8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.

.9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.

.10 Open valves.

.11 Expel air from main by slowly filling main with potable water.

.1 Install corporation stops at high points in main where no air-vacuum release valves are installed.

.2 Remove stops after satisfactory completion of test and seal holes with plugs.

.12 Thoroughly examine exposed parts and correct for leakage as necessary.

.13 Apply hydrostatic test pressure of 150 kPa minimum based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1 hour.

.14 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.

.15 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.

.16 Repeat hydrostatic test until defects have been corrected.

.17 Apply leakage test pressure of 1000 kPa minimum after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of 2 hours.

.18 Define leakage as amount of water supplied from external water source.

.19 Do not exceed allowable leakage of 2.1 L/hour/100 joints of pipe, including lateral connections.

.20 Locate and repair defects if leakage is greater than amount specified.

.21 Repeat test until leakage is within specified allowance for full length of water main.

3.11 PIPE SURROUND

.1 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes as indicated.

.2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.3 Place layers uniformly and simultaneously on each side of pipe.

.4 Do not place material in frozen condition.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95 % of corrected maximum dry density.

3.12 BACKFILL

.1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.2 Do not place backfill in frozen condition.

.3 Under paving and walks, compact backfill to at least 100 % corrected maximum dry density.

.1 In other areas, compact to at least 95% corrected maximum dry density.

3.13 HYDRANT FLOW TESTS

.1 Conduct flow tests on every hydrant to determine fire flows prior to painting hydrant caps and ports.

3.14 PAINTING OF HYDRANTS

.1 After installation, paint hydrants red.

.2 After hydrant flow tests, paint caps and ports to meet colour selections approved by authority having jurisdiction.

3.15 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations:.

.1 Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.

.2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.

.3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150

.4 Provide connections and pumps for flushing as required.

.5 Open and close valves, hydrants and service connections to ensure thorough flushing.

.6 When flushing has been completed to Departmental Representative approval, introduce strong solution of chlorine into water main and ensure that it is distributed throughout entire system.

.7 Disinfect watermain.

.8 Rate of chlorine application to be proportional to rate of water entering pipe.

.9 Chlorine application to be close to point of filling water main and to occur at same time.

.10 Operate valves, hydrants and appurtenances while main contains chlorine solution.

.11 Flush line to remove chlorine solution after 24 hours.

.12 Measure chlorine residuals at extreme end of pipe-line being tested.

.13 Perform bacteriological tests on water main, after chlorine solution has been flushed out.

.1 Take samples daily for minimum of 2 days.

.2 Should contamination remain or recur during this period, repeat disinfecting procedure.

.14 Take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.

.15 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours.

.1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.

3.16 SURFACE RESTORATION

.1 After installing and backfilling over water mains, restore surface to original condition

3.17 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment, etc.

END OF SECTION

Part 1 General

1.1 MEASUREMENT AND PAYMENT

.1 Measure supply and installation of sanitary sewer including granular bedding, trenching and backfilling horizontally from manhole face to manhole face in metres of each size pipe installed.

.2 Cost of video inspection shall be included in the price for sanitary sewer

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.3 Notify Departmental Representative 48 hours minimum in advance of any interruption in service.

Part 2 Products

2.1 PLASTIC PIPE

.1 Type Polyvinyl Chloride (PVC): to ASTM D3034 and CSA B182.2.

.1 Standard Dimensional Ratio (SDR): 35.

.2 Gasketed bell and spigot pipe.

.3 Nominal lengths: as supplied by manufacturer, typically 3-4 m.

2.2 SERVICE CONNECTIONS

.1 Plastic pipe: to CSA B182.1, with push-on joints.

2.3 CEMENT MORTAR

.1 Portland cement: to CSA A3000, normal type SR.

.2 Mix mortar 1 part by volume of cement to two parts of clean, sharp sand mixed dry.

.1 Add only sufficient water after mixing to give optimum consistency for placement.

.2 Do not use additives.

2.4 PIPE BEDDING AND SURROUND MATERIALS

.1 Granular material to:

.1 Crushed or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136.

.1 Sieve sizes to CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing Stone/Gravel	% Passing Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	90-100	100
9.5 mm	-	-
4.75 mm	-	50-100
2.00 mm	25-60	30-90
0.425 mm	-	10-50
0.180 mm	-	-
0.075 mm	0-8	0-10

2.5 BACKFILL MATERIAL

.1 Type 2 or Type 3 as indicated in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

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 sewer pipe installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean and dry pipes and fittings before installation.

3.3 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Protect trench from contents of sewer or sewer connection.

3.4 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.

.2 Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth of 150 mm.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% corrected maximum dry density.

3.5 INSTALLATION

.1 Handle pipe using methods recommended by pipe manufacturer.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.2 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.

.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.3 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.4 Joint deflection permitted within limits recommended by pipe manufacturer.

.5 Water to flow through pipe during construction.

.6 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.7 Install plastic pipe and fittings in accordance with CSA B182.11.

.8 Pipe jointing:

.1 Install gaskets in accordance with manufacturer's written recommendations.

.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes before joining.

.4 Maintain pipe joints free from mud, silt, gravel and foreign material.

.5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.

.6 Complete each joint before laying next length of pipe.

.7 Minimize joint deflection after joint has been made to avoid joint damage.

.9 When stoppage of Work occurs, block pipes to prevent creep during down time.

.10 Plug lifting holes with pre-fabricated plugs set in shrinkage compensating grout.

.11 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.12 Make watertight connections to manholes.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.13 Use prefabricated saddles or field connections approved by Departmental Representative, for connecting pipes to existing sewer pipes.

.1 Joints to be structurally sound and watertight.

3.6 PIPE SURROUND

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.

.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.4 Place layers uniformly and simultaneously on each side of pipe.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 95% corrected maximum dry density.

.7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.7 BACKFILL

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.3 Under paving and walks, compact backfill to at least 100% corrected maximum dry density.

.1 In other areas, compact to at least 95%.

3.8 FIELD TESTING

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 Television and photographic inspections:

.1 Carry out inspection of installed sewers by video camera, digital camera or by other related means.

3.9 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION