Public Works and Government Services Canada

Travaux publics et Services Gouvernmentaux Canada

Spécification

Victoria BC
Pacific Forestry Center
506 Burnside Road

CROSS CONNECTION CONTROL UPGRADE

Requisition No. EZ899-141130/A

Project No. R.061185.001
March 2013

APPROVED BY:

Regional Manager A&E — Date 2013/05/08

Construction Safety Coordinator — Date 13/05/28

TENDER:

13/08/20

SPECIFICATION SECTION — **Number of Pages**

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1 SUMMARY OF WORK

.1 Work covered by Contract Documents:

.1 Work under this Contract comprises installation of cross connection controls and water pressure reducing station in Mechanical Rooms at Pacific Forestry Center, 506 Burnside Rd, Victoria BC.

.2 Work includes, but is not limited to:

- .1 Supply and install 2 backflow preventers to 2 fire sprinkler systems.
- .2 Supply and install 2 backflow preventers to domestic water system.
- .3 Supply and install domestic water pressure reducing station.
- .4 Supply and install distribution system for the domestic water supply branches.
- .4 Provide all mechanical and electrical work for complete installation.
- .5 Testing, adjusting, balancing and commissioning of the fire sprinkler systems and domestic water system.
- .6 Certification of the fire sprinkler systems.
- .7 Provide seismic restraints to all new, upgrade and retrofit works and equipment.
- .8 Cutting, patching, make good and painting walls, ceilings to match with existing for all the upgrade and retrofit works of this contract.
- .9 Schedule and coordinate all works in phases with Departmental Representative.
- .10 Building fire safety system must be maintained at all time. Provide alternative fire protection as require.
- .11 Building water supply system down time must be kept to minimum. After hours work may be required. Provide alternative water supply as require.

.3 All material and equipment supplied and installed shall be new.

.4 Commissioning work includes mechanical and electrical components and systems.

.2 Contractor's Use of Premises:

.1 Contractor has controlled use of site within the construction area for Work, storage, and access as directed by the Departmental Representative.

.2 Use of areas inside PFC, is controlled by the Departmental Representative.
.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
.4 The replacement work is self contained within the Mechanical rooms at PFC which will be operational during work of this Contract.

2 WORK RESTRICTIONS

.1 Notify Departmental Representative of intended interruption of disconnected services and provide schedule for review. Schedule major disruption of existing services with the time approved by the Departmental Representatives.

.2 Where Work involves breaking into or connecting to existing service lines, give departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Coordinate interruptions affecting existing building if affected by the disruption.

.3 Construct barriers in accordance with Temporary Barriers and Enclosures clause.

.4 Security Requirements: refer to Section 01 14 10 - Security requirements.

.5 Hours of work:
.1 Perform work during normal working hours of the site (0730 to 1600), Monday through Friday except holidays. Work may be performed after normal working hours of Pacific Forestry Center, Monday through Friday, on weekends and holidays, with a minimum forty-eight (48) hours advance notice and approval of the Departmental Representative. Provide schedule for prior approval of Departmental Representative.
.2 Allow for delays due to security protocol when work interferes with Center security operations.

.6 Access into Work Site to be scheduled and pre-arranged with the building supervisor.

3 CONSTRUCTION WORK SCHEDULE

.1 Commence work immediately upon official notification of acceptance of offer and complete the work within six (6) weeks from the date of such notification.

.2 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are of essence of this contract.

.3 Submittals:
- .1 Submit to Departmental Representative within ten (10) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of construction progress.
- .2 Identify each trade or operation.
- .3 Show dates for delivery of items requiring long lead time.
- .4 Departmental Representative will review schedule and return one copy.
- .5 Re-submit two (2) copies of finalized schedule to Departmental Representative within five (5) working days after return of reviewed preliminary copy.

.4 Project Scheduling Reporting:
- .1 Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.5 Project Meetings:
- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.
- .3 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments.

4 SUBMITTAL PROCEDURES

.1 Administrative:
- .1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work.
- .2 Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .3 Do not proceed with work affected by submittal, until review is complete.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.

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

.6 Review submittals prior to submission to Departmental Representative. 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 shall be considered rejected.

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

.8 Verify field measurements and affected adjacent Work are coordinated.

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

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

.11 Keep one reviewed copy of each submission on site.

.2 Shop Drawings:

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

.3 Product Data:

.1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.

.4 Samples:

.1 Submit samples in sizes and quantities specified.

.2 Where colour is criterion, submit full range of colours.

.3 Submit all samples as soon as possible after the contract is awarded, to facilitate production of complete colour scheme by the Departmental Representative.

.5 Mock-ups:

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

.2 Construct in location as specified in specific Section .

.3 Prepare mock-ups for Departmental Representative' review with

reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

.6 Submission Requirements:

.1 Schedule submissions at least ten days before dates reviewed submissions will be needed.

.2 Submit number of copies of product data, shop drawings which Contractor requires for distribution plus four (4) copies which will be retained by Departmental Representative.

.3 Accompany submissions with transmittal letter in duplicate.

.4 Submit either bond copies or one (1) electronic pdf file of each shop drawing and product data as directed by Departmental Representative.

.7 Coordination of Submissions:

.1 Review shop drawings, product data and samples prior to submission.

.2 Coordinate with field construction criteria.

.3 Verify catalogue numbers and similar data.

.4 Coordinate each submittal with requirements of the work of all trades and contract documents.

.5 Responsibility for errors and omissions in submittals is not relieved by Departmental Representative's review of submittals.

.6 Responsibility for deviations in submittals from requirements of Contract documents is not relieved by Departmental Representative's review of submittals, unless Departmental Representative gives written acceptance of specified deviations.

.7 Notify Departmental Representative, in writing at time of submission, of deviations in submittals from requirements of Contract documents.

.8 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and re-submit as directed by Departmental Representative.

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

.10 Shop Drawings Review:

.1 Review of shop drawings by Public Works and Government Services Canada (PWGSC) is for the sole purpose of ascertaining conformance with the general concept.

.2 The Departmental Representative's review does not mean that PWGSC approves the detail design inherent in the shop drawings, responsibility remains with the contractor submitting same, and such review will not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents.

.3 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co-ordination of the work of all subtrades.

5 HEALTH AND SAFETY

.1 Specified in Section 01 35 33 - Health and Safety Requirements.

6 ENVIRONMENTAL PROCEDURES

.1 Fires and burning of rubbish on site not permitted.

.2 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary systems.

.4 Provide temporary drainage and pumping as necessary to keep excavations and site free from water during excavation and grading activities.

.5 Control disposal of run-off of water containing suspended materials or other harmful substances in accordance with local authority requirements. Construct settlement ponds and silt fences as required by the Provincial Environmental authority.

.6 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.7 Under no circumstances dispose of rubbish or waste materials on property.

7 REGULATORY REQUIREMENTS

.1 References and Codes:
- .1 Perform Work in accordance with National Building Code of Canada (NBCC2010) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.

8 QUALITY CONTROL

.1 Inspection:
- .1 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .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 may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

.2 Independent Inspection Agencies:
- .1 Provide independent Inspection/Testing Agencies for purpose of inspecting and/or testing portions of Work as specified in relevant sections. 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 extra cost to Contract. Pay costs for retesting and re-inspection.

.3 Procedures:
- .1 Notify appropriate agency and 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 an orderly sequence so as not to cause delay 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.

.4 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.

.5 Reports:
- .1 Submit (4) four copies or one scanned pdf copy of inspection and test reports to Departmental Representative.

.6 Tests and Mix Designs:
- .1 Furnish test results and mix designs as may be requested.

.7 Mock-ups;
- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative and as specified in specific Section.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

.8 Mill Tests:
- .1 Submit mill test certificates as requested and as required of specification Sections.

.9 Equipment and Systems:
- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to specific Section for definitive requirements.

9 TEMPORARY UTILITIES

.1 Installation and Removal:
- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

.2 Dewatering:
- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

.3 Water Supply:
- .1 Existing water supply system may be used for construction purposes

provided that damaged components are replaced when damaged. Provide own hoses from source.

.4 Temporary Heating and Ventilation:
- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
  - .1 Facilitate progress of Work.
  - .2 Protect Work and products against dampness and cold.
  - .3 Prevent moisture condensation on surfaces.
  - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
- .5 The air system will be in use during work of this contract inside existing building. Protect ducting system by filters inspected daily and replaced as necessary. During dust generating construction work block off all outlets and seal air tight.
  - .1 Before Substantial Completion comply with the following conditions:
    - .1 Remove all temporary duct covers.
    - .2 Replace used air filters with new filters.

.6 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.7 Activate air system under direction of Departmental Representative to provide temporary heat. Protect ducting system by filters inspected daily and replaced as necessary.
- .1 Before Substantial Completion comply with the following

conditions:
.1 Bring plant and systems to as new conditions. (Vacuum clean duct system.)
.2 Replace used air filters with new filters.

.8 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to outside.

.9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

.5 Temporary Power and Light:
.1 Arrange, pay for and maintain temporary electric power supply in accordance with local power authority governing regulations and ordinances.
.2 Electrical power and lighting installed under this contract may be used for construction purposes at no extra cost, provided that guarantees are not affected thereby and electrical components used for temporary power are replaced when damaged.
.3 Replace lighting bulbs/tubes used for more than three months or provide replacement bulbs/tubes and hand over to Departmental Representative.

.6 Temporary Communication Facilities:
.1 Provide and pay for temporary telephone and fax hook up line(s) necessary for own use. Conform to Section 01 14 10 Security Requirements.

.7 Fire Protection:
.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

10 CONSTRUCTION FACILITIES

.1 Installation and Removal:
.1 Provide construction facilities in order to execute work expeditiously.
.2 Remove from site all such work after use.

.2 Scaffolding:
.1 Design, construct and maintain scaffolding in rigid, secure and safe manner, in accordance with WCBBC regulations and Section 01 35 33.
.2 Erect scaffolding independent of walls. Remove promptly when no

longer required.

.3 Hoisting/lifts:
- .1 Provide, operate and maintain hoists/lifts required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- .2 Hoists/lifts: operated by qualified operator.

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

.5 Construction Parking:
- .1 Make good damage to local roads used for access to project site.
- .2 Parking space is available outside double fence and temporary parking of delivery vehicles within construction site as directed by the Departmental Representative.

.6 Contractor's Site Office:
- .1 Provide office as required to accommodate Contractor's operations.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

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

.8 Sanitary Facilities:
- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.9 Construction Signs:
- .1 Format, location and quantity of site signs and notices to be approved by Departmental Representative.
- .2 Signs and notices for safety or instruction to be in English language, or commonly understood graphic symbols.
- .3 Maintain signboards, signs and notices for duration of project. Remove and dispose of signs off site when directed by Departmental Representative.
- .4 Remove signs from site at completion of project or as directed by Departmental Representative.

11 TEMPORARY BARRIERS AND ENCLOSURES

.1 Enclosure of Structure:
- .1 Provide temporary weather tight secure protection for exterior openings until permanently enclosed. Design enclosures to withstand wind pressure. Secure construction areas inside the Center with fenced area to secure materials and temporary buildings.
- .2 Provide temporary dust screens in existing building where dust generating work occurs.

.2 Guardrails and Excavations:
- .1 Provide secure, rigid guard rails and barricades around deep excavations, open edges of floors and roofs in accordance with WCB requirements.

.3 Access to Site:
- .1 Maintain existing access roads and designated parking area in broom clean condition.

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

12 COMMON PRODUCT REQUIREMENTS

.1 Reference Standards:
- .1 If there is a question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .2 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .3 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.2 Quality:
- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 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.

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

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

.5 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

.3 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.

.4 Transportation:

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

.2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

.5 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 may 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.

.6 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.

.7 Co-ordination:

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

.8 Concealment:

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

.9 Remedial Work:

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate 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.

.10 Location of Fixtures:

.1 Inform Departmental Representative of conflicting installation. Install as directed.
.2 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

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

.12 Fastenings - Equipment:
.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
.3 Bolts may not project more than one diameter beyond nuts.
.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

.13 Protection of Work in Progress:
.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

.14 Existing Utilities:
.1 Where work involves breaking into or connecting to existing services, carry out work at times directed by Departmental Representative and governing authorities, with minimum of disturbance to pedestrian and vehicular traffic. Maintain vehicular access on roadways at all times.
.2 Before commencing work, establish location and extent of service lines in areas of work and notify Departmental Representative of findings.
.3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
.4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.5 Record locations of maintained and re-routed services lines.

13 EXAMINATION AND PREPARATION

.1 Existing Services:
- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

.2 Location of Equipment and Fixtures:
- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

14 EXECUTION REQUIREMENTS

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

.2 Execution:
- .1 Execute cutting, fitting, and patching, including excavation and backfilling, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
.9 Restore work with new products in accordance with requirements of Contract Documents.
.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.
.12 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.
.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

15 CLEANING

.1 Project Cleanliness:
.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
.3 Provide on-site containers for collection of waste materials and debris.
.4 Provide and use clearly marked separate bins for recycling. Refer to-Construction/Demolition Waste Management And Disposal.
.5 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
.6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
.7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
.9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.2 Final Cleaning:
.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
.4 Remove waste products from site.
.5 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
.6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
.7 Clean lighting reflectors, lenses, and other lighting surfaces.
.8 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
.9 Wax, seal, vacuum clean, shampoo or prepare floor finishes, as recommended by manufacturer.
.10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
.11 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
.12 Remove dirt and other disfiguration from exterior surfaces.
.13 Sweep and wash clean paved areas used during work of this contract.
.14 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
.15 Clean roofs, downspouts, and drainage systems.
.16 Remove snow and ice from access to building.

16 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

.1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste. Separate non-salvageable materials from salvaged items. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes. Transport and deliver non-salvageable items to licensed disposal facility.

.2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.

.3 Collect, handle, store on-site and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility and/or users of material for recycling.

.4 Locate waste and salvage bins on site as directed by Departmental Representative.

17 CLOSEOUT PROCEDURES

.1 Inspection and Declaration:
- .1 Contractor's Inspection: Conduct an inspection of Work with all subcontractors, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .2 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .3 Request Departmental Representative's Inspection.

.2 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
- .4 Certificates required by HRSDC Fire Protection Engineering, Utility companies have been submitted.
- .5 Operation of systems have been demonstrated to Department's personnel.
- .6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

18 CLOSEOUT SUBMITTALS

.1 Record Drawings:
- .1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur. At completion supply:
  - .1 Four (4) copies of CD's in AutoCad file format (version: 2011) with all as-built information on the CD's.
  - .2 Four (4) sets of printed as-built drawings following review.
  - .3 Submit one copy of check plots to Departmental Representative prior to final printing/copying of as-built drawings.
  - .4 Convert reviewed as-built Autocad drawings to PDF format for inclusion to electronic interactive O&M manual.
  - .5 Departmental Representative will supply copies of the original AutoCad files.

.6 Retain original logo and title block on the as-built drawings. Contractor may place on the upper right-hand title block area a small company logo, the text "AS-BUILT" and the date.

.2 Costs for transferring as-built information from marked up working set of drawings to electronic format using ACAD and plotting service is included in the Contract.

.2 Maintenance manual:

.1 On completion of project submit to Departmental Representative four (4) CD R/ disk copies and four paper (in loose leaf type binder) of Operations and Maintenance Manual, made up as follows:

.1 Provide maintenance manual, with as-built drawings, in O&M manual on CDs using pdf, or other approved format for descriptive writing, page size images and page size drawings. Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

.2 Refer to Specifications for Interactive Operating & Maintenance (IOM) System following this section for O&M requirements

.3 Organize files into CSI Masterformat numbering system or other approved descriptive titles.

.4 Label disk "Operation and Maintenance Data", project name, date, names of Contractor, subcontractors, consultants and subconsultants.

.5 Include scanned guarantees, diagrams and drawings.

.6 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labeled tabs (navigational buttons).

.7 Drawings, diagrams and manufacturer's literature must be legible.

.8 Refer to Mechanical and Electrical Divisions for specific details for Mechanical and Electrical data.

.9 Maintenance requirements –routine procedures:

.1 Inspection of diaphragms, seals & sealing surfaces for damage or debris.

.2 Check & record pressure differentials across valve assembly.

.3 Test unit after servicing to measure proper operation.

.1 Maintenance Materials, Special Tools and Spare Parts:

.1 Specific requirements for maintenance materials, tools and spare parts are specified in individual sections.

.2 Deliver maintenance materials, special tools and spare parts to Departmental Representative and store in designated area as directed by Departmental Representative.

.3 Prepare lists of maintenance materials, special tools and spare parts for inclusion in Manual specified in Clause 18.2.
.4 Maintenance materials:
.1 Deliver wrapped, identify on carton or package, colour, room number, system or area as applicable where item is used.
.5 Special tools:
.1 Assemble as specified;
.2 Include identifications and instructions on intended use of tools.
.6 Spare parts:
.1 Assemble parts as specified;
.2 Include part number, identification of equipment or system for which parts are applicable;
.3 Installation instructions;
.4 Name and address of nearest supplier.

.2 Warranties and Bonds:
.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing in maintenance manual.
.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Interim Completion is determined.
.5 Verify that documents are in proper form, contain full information, and are notarized.
.6 Retain warranties and bonds until time specified for submittal.

19 DEMONSTRATION AND TRAINING

.1 Demonstration and Training:
.1 Demonstrate operation and maintenance of equipment and systems to maintenance personnel following interim Completion and prior to date of final certificate of completion
.2 Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

END OF SECTION

1. General
   .1 In carrying out the work of this Contract, cooperate with the Departmental Representative in matters affecting security of the site.

   .2 Work activity is subject to observation and inspection by the Departmental Representative to ensure that security of the site is maintained.

   .3 The Departmental Representative may, for security reasons, restrict access or remove the Contractor's work force from the site at any time. Claims for delay or additional costs will not be accepted.

   .4 All persons performing work on site under this Contract must be security cleared to federal government requirements and the requirements as specified herein before access to the site is allowed. Allow sufficient time, make arrangements, and pay costs for meeting these requirements.

   .5 Be responsible for all persons, vehicles, equipment, and material brought into the site.

   .6 Notify the Departmental Representative when Work is to be performed after normal working hours or on weekends and holidays.

2. Restricted or Secure Areas

   .1 Any area which is restricted by sign or otherwise identified by Departmental Representatives is a secure or restricted area. Provide the Departmental Representative with sufficient notice of intent to access these areas.

   .2 Access to restricted and secure areas will be authorized by Departmental Representatives only provided federal government security requirements are met.

   .3 Arrange and pay for the execution of Work in restricted or secure areas identified as part of this Contract.

1. Personnel Security Clearances
   .1 Be responsible for sponsoring and obtaining personnel security clearances. A personnel security clearance to the "Basic Reliability Level" is mandatory for all persons requiring access to the site to perform work under this Contract.

   .2 Allow sufficient time for the Departmental Representative to carry out the personnel security clearance requirements as specified. Do not delay the performance of the Work. Claims for delay or additional costs will not be accepted.

.3 Pay all costs incurred for obtaining personnel security clearances. Costs are not normally levied by the Department for performing the "Basic Reliability Level" security checks.

.4 For each request for a personnel security clearance:

.1 Submit in writing to the Departmental Representative, the name, birth date, birth place, current address, and Social Insurance Number. The Departmental Representative.

.2 Arrange for the Departmental Representative to conduct a personal identity and criminal record check.

.3 Within 48 hours of receipt of each personnel security clearance request, the Departmental Representative will return the results to the Contractor and the Departmental Representative.

.4 After a "Basic Reliability Level" clearance is granted and prior to each entry to the site, the Departmental Representative will provide the Contractor with a temporary access tag upon the request of the Contractor.

.5 The Departmental Representative retains the right, at any time, to refuse granting any person a personnel clearance to the "Basic Reliability Level". Claims for delay or additional costs will not be accepted if personnel security clearance to the "Basic Reliability Level" is not granted.

.6 At the request of the Departmental Representative for the purposes of administration only, identify all costs incurred as a result of the personnel security requirements, including all related costs incorporated into the tendered price. Provide updates of costs as requested by the Departmental Representative.

2. Security Escorts, Interim Measure

.1 Requests for security escorts may be considered by the Departmental Representative:

.1 As an interim measure and at the sole discretion of the Departmental Representative , to accompany Contractor's forces while personnel security clearances are being processed.

.2 If required, submit requests for security escorts in writing to the Departmental Representative. Only security escort firms approved by the Departmental Representative will be considered.

.3 The Departmental Representative retains the right to refuse granting the use of security escorts as an interim measure by the Contractor.

.4 When the use of security escorts is granted, arrange and pay for security escorts.

.5 Do not delay the execution of the Work while the request for security escorts is in process.

.6 At the request of the Departmental Representative for the purposes of administration only, identify all security escort costs, including all related costs incorporated into the tendered price. Provide updates of costs as requested by the Departmental Representative.

3. Access Tags, Keys and Access Cards

.1 Prior to entry to site and at the request of the Contractor, the Departmental Representative will provide temporary access tags to each person cleared to the "Basic Reliability Level". These access tags remain the property of the Departmental Representative . Return access tags immediately upon request of the Departmental Representative or prior to leaving the site.

.2 Display access tags at all times while on site. Persons without access tags will be refused access to the site. Do not delay the execution of the Work. No claims for delays or additional costs will be accepted as a result of Contractor's forces' inability to display access tags.

.3 Be responsible for the safekeeping of access tags. Report lost access tags immediately to the Commissionaire's desk located on site. Arrange and pay for replacement access tags if requested by the Departmental Representative .

.4 Keys and/or access cards may be issued directly to the Contractor upon the request of the Departmental Representative to facilitate the access to restricted or secure areas identified as part of the Work. Access to these areas of Work are normally provided on an as-required basis.

.5 Access cards or keys remain the property of the Departmental Representative and must be returned immediately upon the request of the Departmental Representative or prior to leaving the site.

.6 Be responsible for the safekeeping of access cards and keys. Report lost access cards and keys immediately to Commissionaires located on site and the Departmental Representative. Arrange and pay for replacement access cards and keys.

.7 Ensure areas accessible through the use of keys or access cards are secured during and at the end of the Work in these areas.

.8 Failure to return a key may result in the re-keying of a number of locks by a bonded locksmith . Loss of access cards may require reprogramming or changes to the card access system. Be responsible for all costs resulting from the loss of keys or access cards.

.9 Inspections or audits of ID cards, keys, and access cards may be undertaken by the Departmental Representative at any time. Cooperate with any requests for inspections or audits.

1. Parking on Site
   .1 Obtain the approval of the Departmental Representative for vehicle parking on site. Notify Departmental Representative of any off-hours parking. Parking on federal property may be approved only if, in the opinion of the Departmental Representative it is warranted by the nature of the work and does not present a security risk. Park as directed on federal property. No charges will be levied for approved parking on federal property.

   .2 Ensure unattended vehicles parked on federal government property have windows closed, doors, trunks and gas caps locked, and keys removed from the vehicle.

   .3 All vehicles entering or leaving federal property may be subject to search. Cooperate fully with requests for vehicle searches.

2. Tools, Equipment, and Material
   .1 Tools, equipment and material brought into or stored on site may be subject to search. Cooperate fully with requests for searches.

   .2 Remove tools, equipment, and material which may represent a security risk. Replacement tools, equipment and material must be acceptable to the Departmental Representative.

1. Security and Protection of the Work
   .1 Keep confidential all information provided by or on behalf of Canada in connection with the Work, including any information that is confidential or proprietary to third parties, and all information conceived, developed or produced by the Contractor as part of the Work where copyright or any other intellectual property rights in such information (except a licence) vests in Canada under the Contract. Do not disclose any such information without the written permission of the Departmental Representative. Information provided to the Contractor by or on behalf of Canada shall be used solely for the purpose of the Contact and shall remain the property of Canada or the third party as the case may be. Unless the Contract expressly provides, deliver to Canada all such information, together with every copy, draft, working paper, and note thereof that contains such information, upon completion or termination of the Contract or at such earlier time as the Departmental Representative may require.

   .2 When the Contract, the Work, or any information is referred to as "Top Secret", "Secret", "Confidential", or "Protected" by Canada, take all measures reasonably necessary for the safeguarding of the material so identified, including those set out in the PWGSC Security Manual and its supplements, and any other instructions issued by the Minister or the Departmental Representative.

.3 When the Contract, the Work, or any information is identified as "Top Secret", "Secret", "Confidential", or "Protected" by Canada, the Minister or the Departmental Representative is entitled to inspect the Contractor's premises and the premises of a Subcontractor at any tier for security purposes at any time during the term of the Contract. Comply with, and ensure that any such subcontractor complies with, all written instructions issued by the Minister or the Departmental Representatives dealing with the material so identified, including any requirement that employees of the Contractor or of any such subcontractor execute and deliver declarations relating to reliability screening, security clearances, and other procedures.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Government of Canada:

.1 Canada Labour Code - Part II.

.2 Canada Occupational Health and Safety Regulations.

.2 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.3 Canadian Standards Association (CSA):

.1 CSA S269.1, Falsework for Construction Purposes.

.2 CSA S269.2, Access Scaffolding for Construction Purposes.

.3 CSA-S350, Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations.

.2 FCC No. 302, Standard for Welding and Cutting.

.5 National Building Code of Canada (NBC):

.1 Part 8, Safety Measures at Construction and Demolition Sites

.6 Province of British Columbia Building Code 2006:

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.7 Province of British Columbia

.1 Workers Compensation Act Part 3 – Occupational Health and Safety.

.2 Occupational Health and Safety Regulation.

1.2 RELATED SECTIONS

.1 General Instructions: Section 01 01 50 for, Submittal procedures, Section Temporary utilities, Construction facilities and Temporary barriers and enclosures.

.2 Section 02 42 01 De-construction and removal of work.

1.3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant there to, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

.1 PWGSC may terminate the Contract without liability to the PWGSC where the Contractor, in the opinion of the PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 SUBMITTALS

.1 Submit the following:

- .1 Health and Safety Plan.
- .2 Copies of reports or directions issued by federal and provincial health and safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 Emergency procedures.

.2 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative for review upon request.

.3 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.

.4 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for work under this contract.

.2 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.

.3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal provincial and local statutes, regulations and ordinances and with site specific Health and Safety Plan.

1.7 GENERAL CONDITION

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.3 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.8 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.9 FILING OF NOTICE

.1 Complete and submit a Notice of Project as required by provincial authorities.

.2 Submit copy to Departmental Representative.

1.10 PROJECT / SITE CONDITION

.1 Work at site will involve working in areas where supervision may be required. Conform to Security Requirements Section 01 14 10 for procedures.

1.11 HEALTH AND SAFETY PLAN

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety at the site.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety meetings.

.9 Occupational Health and Safety communications and record keeping procedures.

.10 Occupational Health and Safety Committee/Representative procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.12 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

- .1 Designated personnel from own company.
- .2 Regulatory agencies applicable to work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Departmental Representative (site staff).

.2 Include the following provisions in the emergency procedures:

- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
- .2 Evacuate all workers safely.
- .3 Check and confirm the safe evacuation of all workers.
- .4 Notify the fire department or other emergency responders.
- .5 Notify adjacent workplaces or property which may be affected if the risk extends beyond the workplace.
- .6 Notify site supervisor.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

- .1 Work at high angles.
- .2 Work in confined spaces or where there is a risk of entrapment.
- .3 Work with hazardous substances.
- .4 Underground work.
- .5 Work on, over, under and adjacent to water.
- .6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.13 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours".

.3 Provide adequate means of ventilation.

1.14 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.2 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.3 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.15 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.16 OVERLOADING

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.17 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1.

1.18 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CAN/CSA-S269.2 and B.C. Occupational Health and Safety Regulations.

1.19 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with provincial authorities.

1.20 POWDER ACTUATED DEVICES

.1 Use powder-actuated devices in accordance with ANSI A10.3-06 only after receipt of written permission from the Departmental Representative.

1.21 FIRE SAFETY HOT WORK

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.22 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.23 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:

- .1 Obstructed.
- .2 Shut off.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.24 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.25 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:

- .1 Health and Safety Plan.
- .2 Emergency procedures.
- .3 Material Safety Data Sheets (MSDS).
- .4 Sequence of work.
- .5 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .6 Notice of Project.
- .7 Floor plans or site plans.
- .8 Notice as to where as copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .9 Workplace Hazardous Materials Information System (WHMIS) documents.
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or exterior of the principle construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.26 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.27 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

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

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The Contractor will be responsible for any costs arising from such a "stop work order".

END OF SECTION

1 RELATED SECTIONS

.1 Section 01 01 50 - General Instructions

.2 Division 21 – Fire Suppression

.3 Division 23 - Mechanical

2 DEFINITIONS

.1 Acronyms:
- .1 Cx - Commissioning.
- .2 EMCS - Energy Monitoring and Control Systems.
- .3 O&M - Operation and Maintenance.
- .4 PI - Product Information.
- .5 PV - Performance Verification.
- .6 TAB - Testing, Adjusting and Balancing.

3 QUALITY ASSURANCE

.1 Testing organization: current member in good standing of AABC certified to perform specified services.

.2 Comply with applicable procedures and standards of the certification sponsoring association.

.3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

4 REFERENCES

.1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution - Hydronics Systems.

5 SUBMITTALS

.1 Submit test reports in accordance with Section 01 01 50 - General Instructions; Submittal Clause.

.2 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.

.3 Prior to start of Work, designate who has managerial responsibilities for coordination of entire testing and adjusting of electronic equipment.

.4 Submit documentation to confirm organization compliance with quality assurance provision.

.5 Submit 3 preliminary specimen copies of each of report forms proposed for use.

.6 Ten (10) days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.

.7 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

6 PROCEDURES - GENERAL

.1 Comply with procedural standards of certifying association under whose standard services will be performed.

.2 Notify Departmental Representative 3 days prior to beginning of operations.

.3 Accurately record data for each step.

.4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

7 CONTRACTOR'S RESPONSIBILITY

.1 Prepare each system for testing and balancing.

.2 Cooperate with testing organization and provide access to equipment and systems.

.3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.

.4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.

.5 Contractor's responsibility To provide shop drawings review and schedule "C" or letter of assurance.

8 PREPARTATION

.1 Provide instruments required for testing and adjusting operations.

.2 Make instruments available to Departmental Representative to facilitate spot checks during testing.

.3 Test fire system for proper operation and programming.

9 TESTING

.1 The contractor shall hydrostatically test the systems as per specification and NFPA requirements to meet all certifications. The test shall be witnessed by the Departmental Representative and/or Commissioning Agent.

.2 Provide a copy of the test report to NFPA 13 and 14 requirement.

.3 Test all equipment and piping installed.

.4 Test backflow preventers to BCWWA requirement.

.5 Test and adjust water pressure reducing valves to manufacturer's recommendations.

10 FINAL REPORTS

.4 Reports to be completed by organization having managerial responsibility.

.5 Ensure each form bears signature of recorder and his supervisor.

.3 Provide a copy of the test report.

11 COMPLETION OF COMMSSIONING

.6 Upon completion of Cx leave systems in specified operating and program mode.

.7 Complete Cx prior to issuance of Substantial Completion.

.8 Cx deliverables have been submitted and accepted by Departmental Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 01 50 – General Instructions.

1.2 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.3 QUALITY ASSURANCE

.1 Qualifications:
  .1 Contractor to have technical expertise in safe dismantling and removal of fire sprinkler, domestic water system and related equipment.

.2 Regulatory Requirements:
  .1 Comply with federal, provincial and municipal requirements pertaining to fire protection, occupational health and safety in effect at time that this work is performed.
  .2 In event of conflict among these requirements and this specification, most stringent will apply. Report discrepancies to Departmental Representative.

1.4 HOURS OF WORK

.1 Dismantling and removal operations to be carried out during silent hours when building is unoccupied.

1.5 SITE CONDITIONS

.1 Existing Conditions:
  .1 Fire system and domestic water system are still in operation.
  .2 Services utilities are still connected.

1.6 DELIVERY, STORAGE, AND HANDLING

  .1 Waste Management and Disposal:
  .1 Before commencing work notify PWGSC of:
    .1 Location of hazardous materials disposal site;
    .2 Method to be used for disposal of hazardous materials;
    .3 Method of transporting removed hazardous materials from site to disposal site;
    .4 Type of vehicles that will be used to transport hazardous materials.
  .2 Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 01 50 – General Instructions.

2 PRODUCTS

2.1 NOT USED

3 EXECUTION

3.1 GENERAL PURPOSE

.1 Conduct removal of with pre-arranged schedule.

.2 There shall be minimum interruption to the fire protection system. The building must be protected at all time.

.3 There shall be minimum interruption to the water supply system to the building.

3.2 BRIEFING OF PERSONNEL

.1 Brief personnel as to extent of work and potential hazards.

.2 Carefully, completely and accurately answer questions.

3.3 PROJECT CONTROL

.1 Ensure safety of workers through careful supervision and direction by supervisors experienced and qualified in this work.

3.4 PERSONAL PROTECTIVE EQUIPMENT

.1 Provide Personnel protective equipment in removal and disposal during construction.

3.5 EMERGENCY RESPONSE PLANS

.1 Prior to commencement of work, notify appropriate authority of proposed work and hazards involved.

.2 Have adequate number of fire extinguishers present in various locations of work site.

.3 Extinguish fires that may occur using water.

.4 Ensure emergency escape routes are of adequate size and kept clear.

.5 Provide equipped and clearly marked emergency first aid equipment in easily accessible locations.

.6 Comply with requirements of local Fire Department.

END OF SECTION

Part 1 General

1.1 Related Work

.1 Section 23 05 05 Installation of Pipework

1.2 Removal Work

.1 Removal and dispose of materials, except where noted otherwise, in accordance with WCB Industrial Health and Safety Regulations and Provincial authority.

.1 Cut openings in exterior wall and carefully remove interior gypsum board finish, steel stud framing, insulation, exterior sheathing, metal siding and linear metal soffit to accommodate the new duct work and damper assembly installation.

.2 Disconnect electrical power lines in wall construction to be modified and relocate wiring, conduit serving other areas of building, within 3 m of existing location as indicated or as directed by the Departmental Representative.

.3 Inform Departmental Representative in advance of any service shutdown prior to commencing work.

.4 Remove and relocate encountered electrical and mechanical lines in accordance with plumbing and electrical code requirements and to provincial authority.

.5 Take precautions to support structures compromised by removal work and leave temporary supports in place until new work is in place.

.6 Patch and repair walls, floors, and ceiling areas damaged by demolition/removal work except where new finishes will cover these areas as indicated on drawings and throughout this specification.

1.3 Metal Fabrication

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Do welding work in accordance with CSA W59 unless specified otherwise.

.3 Steel sections and plates: to CAN/CSA-G40.21, Grade 300W.

.4 Welding materials: to CSA W59.

.5 Bolts and anchor bolts: to ASTM A307; Provide all required anchoring devices including anchor clips, bar and strap anchors, expansion bolts and shields, and other devices designed to support and secure work. All exposed fasteners with heads spot welded.

.6 Shop coat primer: quick dry primer for interior elements and exterior primer compatible with paint finish specified in this Section.

.7 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.8 Use welded connections for all work, unless approved otherwise by Departmental Representative.

.9 Where possible, fit and shop assemble work, ready for erection.

.10 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush, with sharp edges and corners rounded to 3 mm radius. Where continuous welding may cause distortion of fabrication use stitch welds and plastic filler, grind and sand smooth.

.11 Do structural steel work in accordance with CAN/CSA-S16.1 except where specified otherwise.

.1 For non-standard connections, submit sketches and design calculations stamped and signed by qualified Professional Engineer registered in Province of British Columbia.

.2 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16.1-M94.

3 Erect structural steel as indicated and in accordance with and reviewed shop drawings.

.12 Remove scale rust, grease and other surface coating and apply one shop coat of primer to all ferrous metal items after fabrication and touch up damaged coating after installation.

1.4 Gypsum Board

.1 Standard board: to ASTM C36 Type "X" 16 mm thickness, 1220 mm wide x maximum practical length, ends square cut, edges tapered.

.2 Metal furring runners, hangers, tie wires, inserts, anchors: to ASTM C 840, painted.

.3 Screws: to ASTM C 954.

.4 Casing beads, corner beads fill type: 0.5 mm base thickness commercial grade sheet steel with Z275 zinc finish to ASTM A525, perforated flanges; one piece length per location.

.5 Joint compound: to ASTM C 840, asbestos free.

.6 Repair damaged gypsum board using single layer type X gypsum board (fire rated to match existing) to studs and furring using screw fasteners. Maximum spacing of screws 200 mm oc. at perimeter and 300 mm oc at intermediate locations. Cut out holes for access panels.

.7 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm oc or using contact adhesive for full length.

.8 Finish sand face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

1.5 Painting

.1 Prepare all new and existing surfaces, apply primer/undercoat and two finish coats, as indicated, in accordance with paint manufacturer's instructions as follows:
.1 Products: Acrylic water borne low sheen enamel: Acceptable Product - Cloverdale # 72211 & 72221. or equal.
.2 Interior Walls/Ceiling: Existing painted surfaces: sand and apply spot priming and two finish coats. Use compatible primer and two finish coats as noted above.
.3 Application: in accordance with manufacturer's written instructions. Paint colour to match existing as close as possible.

.2 Ensure compatibility between primers and finish coats and where incompatibility exists provide means to ensure compatibility.

.3 Submit colour samples of all paint specified for colour selection by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 The related sections are all sections in Division 21, 22, and 23.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 01 50 – General Instructions.

.2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:

- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.5 In addition to transmittal letter referred to in Section 01 01 50- General Instructions: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.6 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 01 50- General Instructions.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 Operation data to include:
  - .1 Control schematics for systems including environmental controls.
  - .2 Description of systems and their controls.
  - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
  - .4 Operation instruction for systems and component.
  - .5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports.

.6 Approvals:

.1 Submit 3 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.9 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW

MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings (both AutoCAD files in a CD and 2 set of hard copies) with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 01 50- General Instructions.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 01 50 – General Instructions as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 01 50- General Instructions.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 EQUIPMENT IDENTIFICATION

.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 Motor: voltage, Hz, phase, power factor, duty, frame size.

.2 PIPING SYSTEMS GOVERNED BY CODES

.1 Identification:
.1 Natural gas: to CSA/CGA B149.1 authority having jurisdiction.
.2 Propane gas: to CSA/CGA B149.1 authority having jurisdiction.
.3 Sprinklers: to NFPA 13.
.4 Standpipe and hose systems: to NFPA 14.

.3 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 Pictograms:
.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:
.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 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.

.5 Extent of background colour marking:
.1 To full circumference of pipe or insulation.
.2 Length to accommodate pictogram, full length of legend and arrows.

.6 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] [vinyl] 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.

.7 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 Marking	Background colour	Legend
Raw water	Green	RAW WATER
City water	Green	CITY WATER
Treated water	Green	TREATED WATER
Brine	Green	BRINE
Make-up water	Yellow	MAKE-UP WTR
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Waste water	Green	WASTE WATER
Storm water	Green	STORM
Plumbing vent	Green	SAN. VENT
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 - General Instructions.

Part 2 Products

2.1 Not Used

.1 Not used.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 13 99 00 – Building Renovation Work

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct tests in accordance with Section 01 01 50 - General Instructions and submit report as described in 01 01 50 - General Instructions.

3.4 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Departmental Representative will record these demonstrations on video tape for future reference.

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 35 33 - Health and Safety Requirements
. .2 Section 01 01 50 - General Instructions

1.2 REFERENCES

.1 National Fire Prevention Association (NFPA)

.1 NFPA 13-2010, Standard for the Installation of Sprinkler Systems.
.2 NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

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

.1 Material Safety Data Sheets (MSDS).

.3 Underwriter's Laboratories of Canada (ULC)
.1 CAN4 S543-M984, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

.4 Fire Commissioner of Canada FC 403, "Standard for Sprinkler Systems".

Part 1.3 DESIGN PERFORMANCE REQUIREMENTS

.1 Refer to page 5 of this section 22 13 13 (Schematic layout of new DCBP's on existing fire sprinkler system)Determine volume and pressure of incoming water supply from water flow test data.

.2 Provide wetpipe pipe and dry type sprinkler system.

.3 Interface system with building fire and smoke alarm system.

.4 Provide sprinkler systems in areas indicated on drawings.

.5 Install system in accordance with NFPA 13.

.6 Pipe sizes which are not indicated on drawings to be determined by hydraulic calculation.

Part 1.4 SUBMITTALS

.1 Submit shop drawings, product data, hydraulic calculations to authority having jurisdiction for approval.

.2 Submit operation and maintenance data for equipment and components for incorporation into manual.

.3 Test reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit manufacturer's installation instructions.

1.5 ENGINEERING DESIGN CRITERIA

.1 Refer to page 5 of this section 22 13 13 (Schematic layout of new DCBP's on existing fire sprinkler.

1.6 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems with documented experience approved by manufacturer.

Part 2 Product

2.1 MATERIALS

.1 Materials: to ANSI/NFPA 13 and local authorities having jurisdiction.

2.2 ABOVE GROUND PIPING SYSTEMS

.1 Provide fittings for changes in direction of piping and for connections.
.1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

.2 Perform welding in shop; field welding will not be permitted.

2.3 PIPE, FITTINGS AND VALVES

.1 Pipe:
- .1 Ferrous: to NFPA 13.
- .2 Copper tube: to NFPA 13.

.2 Fittings and joints to NFPA 13:
- .1 Ferrous: screwed, welded, flanged or roll grooved.
- .2 Copper tube: screwed, soldered, brazed.
- .3 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
- .4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.
- .5 Rubber gasketted grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
- .6 Fittings: ULC approved for use in wet pipe sprinkler systems.
- .7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
- .8 Side outlet tees using rubber gasketted fittings are not permitted.
- .9 Sprinkler pipe and fittings: metal.

2.4 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire protection.

.2 Escutcheon: semi-recessed, chrome plated, and escutcheon plate of same material. Provide head guard in exposed areas.

.3 Model and type to match existing, with the approval of the accepting authority. Temperature rated for specific area hazard.

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 PREPARATION

.1 Arrange for permits, inspections and tests.

3.3 INSTALLATION

.1 Do not use plug-in cord type supervisory devices for valve supervision.
.2 Provide sprinkler risers with adequate posts or guards to protect from physical damage.
.3 Provide piping to drain points so that entire system can be drained.
.4 Run piping parallel to building structure.
.5 Provide sprinklers above and below false ceilings combustible concealed spaces.

3.4 FIELD QUALITY CONTROL

.1 Verification requirements include:
  .1 Materials and resources.
  .2 Storage and collection of recyclables.
  .3 Construction waste management.
  .4 Resource reuse.
  .5 Recycled content.

  .6 Local/regional materials.
  .7 Low-emitting materials.

2.2 Site Test, Inspection:
  .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
  .2 Test, inspect, and approve piping before covering or concealing.
  .3 Field test the fire system in accordance with NFPA 20. Testing shall include:
    .1 Verification of proper installation, flow test, system initiation, adjustment, and fine tuning.
    .2 Verification of the sequence of operations and alarm system.
    .3 Provide as-built drawing and description with shop drawings to include in the O+M manual.

3.5 VERIFICATION

.1 Operate equipment and verify that performance requirements specified in this section has ben achieved.

.2 Perform periodic site inspection visits by manufacturer's representative to verify that installation complies with manufacturer's instructions:

  .1 After delivery and storage of products.

.2 When preparatory work upon which product installation depends is complete.
.3 twice during installation progress at 25% and 60% complete.
.4 After installation and cleaning is complete.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for plumbing specialties and accessories.
.2 Sustainable requirements for construction and verification.

.2 Related Sections:

.1 Section 01 01 50 – General Instructions.
.2 Section 01 35 33 - Health and Safety Requirements.
.3 Section 01 91 00 - Commissioning.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM A126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
.2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.

1.3 American Society for Testing Materials (ASTM)

.1 ASTM A-126 – Gray Iron Castings for Valves, Flanges, and Pipe Fittings

.2 ASTM A-183 – Carbon Steel Track Bolts and Nuts

.3 ASTM A-449 – Quenched and Tempered Steel Bolts and Studs

.4 ASTM A-536 – Ductile Iron Castings

.5 ASTM B-633 – Electrodeposited Coatings of Zinc on Iron and Steel

.6 ASTM D2000 – Standard Classification System for Rubber Products in Automotive Applications

1.4 American National Standards Institute (ANSI):

.1 ANSI A21.10 - Ductile and Gray Iron Fittings

1.5 American Water Works Association

.1 AWWA C-110 – Ductile and Gray Iron Fittings

.2 AWWA C-153 – Ductile Iron Compact Fittings 3 In. Through 24 In. and 54 In. Through 65 In., for Water Service.

.3 AWWA C-606 – Grooved and Shouldered Joints.

.4 Canadian Standards Association (CSA International).

.1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.

.2 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.

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

.1 Material Safety Data Sheets (MSDS).

.6 National Fire Protection Association

.1 NFPA-13 – Installation of Sprinkler Systems

1.6 MATERIAL CERTIFICATION

.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type K: to ASTM B88M.

.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 1/2 and smaller : wrought copper to ANSI/ASME B16.22, cast copper to ANSI/ASME B16.18; with 301stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

.3 All valves, couplings and piping on the upstream side of the PRV's to be rated for normal working pressure of 200 psi(1378 kpa). All valves and couplings downstream of the PRV's to be rated for normal working pressure of 150 psi (1034 kpa).

.4 Submit manufacture's test data and certification including shop drawings two (2) weeks prior commencing work.

1.7 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 - General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.

.2 Indicate dimensions, construction details and materials for specified items.

.3 Shop Drawings:

.1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details and accessories.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturers' Field Reports: manufacturers' field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 01 50 - General Instructions, include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.8 QUALITY ASSURANCE

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting one week prior to beginning on-site installations.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 All components (including couplings, fittings, valves and accessories) to be supplied by one manufacturer and all Fire Protection System shall be UL listed and/or FM Global approved. Grooving tools shall be of the manufacturer as the grooved components.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 - General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 PIPE and FITTINGS

.1 Victaulic AWWA grooved piping system.

All material used on the potable water system shall be:

.1 Ductile iron piping (Victaulic) for size larger than 75mm (3").

.2 Copper connection grooved piping system (Victaulic) for size 75mm(3") and smaller.

.3 Copper Type K piping.

.2 Grooved piping system (Victaulic) for fire protection services.

.1 Steel piping sch. #40

.2 All fire protection system to NFPA #13 requirement.

2.2 MECHANICAL COUPLINGS

.1 Couplings shall be furnished complete with all gaskets, bolts and nuts, followers and middle rings and shall be mechanically restrained to avoid pullout.

.2 Couplings shall have normal working pressures as indicated on drawings.

.3 Couplings shall allow pipe train to be disassembled by providing a limited space between the two pipes being joined.

2.3 FLANGES

.1 Flanges face to match valves and fittings. Flanges shall conform to ANSI B16.5 and B16.1 in drilling dimension.

.2 All cast iron flanges shall be to ANSI/AWWA C110

2.4 JOINTS

.3 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.4 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.5 Solder: 95/5 tin copper alloy.

.6 Teflon tape: for threaded joints.

2.4 BOLTS, STUDS, GASKETS AND TIE RODS

.1 Flanges assembly bolts and studs connection stainless steel shall be stainless steel conforming to Grade 8 ASTM A193. All bolts to use Loctite C5-A copper grade anti-seize compound.

.2 Flanges assembly nuts connecting stainless steel shall be stainless steel conforming to Grade8 ASTM A194.

.3 Flanges assembly bolts, studs, nuts and washers connecting stainless steel shall be provided with a flange isolation kit as indicated on the drawings.

.4 Tie Rods shall be continuously threaded to ASTM A354 and fabricated in accordance with B1.1 (screw tread, coarse thread series). All tie rods shall be cadmium plated in accordance with ASTM B766.

.5 Flange gaskets for flat face shall be full face type. Flange gaskets for raised face shall be ring type. Gaskets to conform to AWWA C228 Table 1. For working pressure up to 157 PSI, gasket material shall be black or red natural rubber full face type and 3mm thick, For working pressure above 175 PSI, gasket material shall be compressed non-asbestos blend of synthetic fibres, fillers, and elastomeric binders suitable for potable water ring type, 3mm thick.

2.5 BACK FLOW PREVENTERS

.1 Preventers: to CSA-B64 Series, application as indicated, reduced pressure principle type, double check valve assembly, back flow preventer with intermediate atmospheric vent or vacuum breaker. REFER TO SEC. 22 51 17

.2 Acceptable product:

.1 Domestic water system: Wilkins 375A complete manufacture assembly with air gap.

.2 Fire sprinkler system: Wilkins 350A complete manufacture assembly. With low pressure drop characteristic to 4 psi.

.3 Or equal with low pressure drop charaterictic.

2.6 PIPE SUPPORTS

.1 All pipe supports shall be as shown on drawings.

.2 Pipe supports to have 3 mm neoprene liner preventing contact between pipe support and metal flange.

2.7 PRESSURE RELIEF VALVE

.1 Body and Cover: Cast Bronze to ASTM B62.

.2 Pressure rating: Cast Bronze 400 psi max.

.3 Adjustable ranges: 20-200 psi.

.4 Temperature range: water to 180F max.

.5 Acceptable products: Watts, Cla-Val, or equal.

2.8 GATE VALVES

.1 Gate valves shall be rated for a normal working pressure as shown on the drawings to ANSI/AWWA C509, with flanges drilled to ANSI B16.1.

.2 Valves shall be standard cast iron body, bronze mounted, resilient wedge design.

.3 Valves shall be coated internally and externally in accordance with AWWA C550-90 and certified NSF 61.

.4 Valves shall be right hand opening and have a 31mm square operating nut for buried application and hand wheel for interior installation unless otherwise noted on the drawings

.5 NPS 2 and under, soldered:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.6 NPS 2 and under, screwed:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.7 NPS 2 1/2 and over, in mechanical rooms, flanged:

.1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.

.8 NPS 2 1/2 and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.9 BALL VALVES

.1 Ball valves shall be rated for a normal working pressure shown on the drawings.

.2 Ball valves to be full port, stainless steel, locking handle, with PTFE seat.

.3 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.

.4 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

2.10 BUTTERFLY VALVE

.1 NPS 2-1/2 and over, wafer:

.1 To MSS-SP-67, Class 200.

.2 Cast iron body, ductile iron chrome plated disc, stainless steel stem, EPT liner.

.3 Lever operated, NPS8 and over, gear operated.

.2 NPS 2-1/2 and over, grooved ends:

.1 Class 300 psig CWP, bubble tight shut-off, bronze body EPDM coated ductile iron disc with integrally cast stem.

.2 Operator:

.1 NPS 4 and under: lever handle.

.2 NPS 6 and over: gear operated.

2.11 AIR RELEASE VALVES

.1 Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

.2 Air release valves shall be rated for a normal working pressure as shown on the drawings and employ direct acting kinetic principle in conformance with ANSI/AWWA C512.

.3 Valves to be fabricated of cast iron body and cover with bronze trim, stainless steel float with shock proof synthetic seat.

.4 Ends to be screwed.

.5 25mm Automatic Air Release Valves, NSF 61 certified c/w 180 degree vent pipe, 25mm SS valve, 25mm SS inlet, 12mm SS outlet piped to floor drain. As indicated on contract documents.

.6 Acceptable product: APCO, Watts, or equal

2.12 STRAINERS

.1 Body and cover: Ductile iron ANSI B16.42; fusion bonded epoxy coating standard

.2 Strainer: 316 Stainless steel

.3 Strainer mesh size: standard 10 mesh / 2000 micron / opening 0.078 inch

.4 Flange ANSI class 300, drilled in accordance with ASME B16.5.

.5 Acceptable product: Cla-val X43H, H style strainer, low pressure drop.

.6 Or equal.

2.13 PRESSURE REDUCING VALVES

.1 PRV's shall be capable of reducing the pressure from 160psi to 60psi.

.2 PRV's shall have speed controls.

.3 PRV's shall be globe (angle) style

.4 PRV's shall include complete pilot control assembly.

.5 Approved products:

1. 50mm/38mm CLA-VAL PRV model 49-01
2. Or equal.

2.14 PRESSURE GAUGES

.1 Pressure gages shall be rated for a normal working pressure as shown on the drawings.

.2 Pressure gauges to be 100mm complete with isolation valve and pressure sensor.

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 data sheet.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's latest recommendations. Follow the instructions listed in the latest Victaulic I-300 assembly manual.

.2 Pipe ends shall be clean and free from indentations and projections in the area from pipe end to groove.

.3 The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.

.4 Install in accordance with National Plumbing Code of Canada, Provincial Codes, and local authority having jurisdiction.

.5 Install in accordance with manufacturer's instructions and as specified.

.6 Gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified.

3.3 DELIVERY HANDLING AND STORAGE

.1 During loading, transporting and unloading, care shall be exercised to prevent damage to the pipe and fittings. All damaged materials shall be replaced at the contractor's expense. The material shall be stored clear of the ground surface to prevent dirt from entering or otherwise contaminating the pipe joints.

.2 The pipe interior shall be inspected prior to assembly and any foreign matter shall be removed. The open end of the pipe in the trench shall be suitably covered to prevent entrance of trench water or other foreign matter.

.3 Fabricated pipe sections being stored or shipped have wooden plugs or plastic caps securely installed in each in order to prevent the pipe ends from being deformed out of round.

.4 Flanged ends of each fabricated piece shall be protected with wooden fabricated blanks.

.5 Fabricated pipe sections shall be stored in a manner that will prevent them from being damaged or contaminated with carbon steel during storage.

3.4 FLANGED JOINTS

.1 Flanged joints shall be made up square, with uniform pressure upon the gaskets, and shall be perfectly square and watertight. Any flange face shall be in one plane and perpendicular to the axis of the pipe to which it is jointed. No lateral force shall be imposed on any bolt used in joining two flanges together.

.2 Flanged gaskets shall be cloth reinforced and extend from the throat opening to at least the minimum diameter of the bolt circle with the stainless steel bolts isolated per details on the contract drawings.

.3 Flange bolts shall be tightened progressively by the cross-over method and not in rotation around the joint.

.4 When a flanged joint has been made up, it shall be possible for any bolt to be freely removed and reinstalled tightly. There shall be no axial stress imposed on pipe runs adjacent to flanges due to the tightening of the flange bolts to produce a watertight joint.

3.5 BACK FLOW PREVENTORS

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

.2 Pipe discharge to terminate over nearest drain.

.3 Refer to Sec. 22 51 17 Back Flow Preventer

3.6 MECHANICAL JOINTS

.1 A flexible joint shall be provided at all locations shown on the drawings

.2 Install flexible joints in accordance with manufacturer's instructions.

3.7 VALVES AND FITTINGS

.1 Installation shall be in accordance with provisions, regulations and codes of the Province of British Columbia.

.2 Installation of piping, fittings and valves shall be in accordance with the manufacturer's recommendations.

3.8 HYDROSTATIC AND LEAK TESTING

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

.2 Notify Departmental Representative at least 24 hours in advance of all proposed tests. Perform tests in presence of Departmental Representative.

.3 All piping, valves and fittings shall be put together and bench tested prior to final installation and removal of existing pipes. Provide temporary trust blocking and joint restraints.

.4 Insure that all air is expelled by slowly filling system with potable water.

.5 Apply a leakage test pressure as directed by Departmental Representative to all components for a period of two (2) hours.

.6 Locate and repair defects if any leakage is observed.

.7 Repeat test until no leakage is observed.

3.9 STRAINERS

.1 Install with sufficient room to remove basket.

3.10 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations shall be to ANSI/AWWA C651 and witnessed by Departmental Representative. Notify Departmental

Representative at least three (3) days in advance of proposed date when disinfecting operations with commence.

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

.3 Provide connections and pumps for flushing as required.

.4 Open and close valves to ensure thorough flushing.

.5 Operate valves and appurtenances while main contains chlorine solution.

.6 Flush line to remove chlorine after 24 hours.

.7 Dispose of all chlorinated water in accordance with fisheries and other regulations

3.11 START-UP

.1 General:

.1 In accordance with Section 01 91 00 - Commissioning: General Requirements, supplemented as specified herein.

.2 Timing: start-up only after:

.1 Pressure tests have been completed.
.2 Disinfection procedures have been completed.
.3 Certificate of static completion has been issued.
.4 Water treatment systems operational.

.3 Provide continuous supervision during start-up.

3.12 FIELD TESTING AND ADJUSTING

.1 Prior to acceptance, an operational test of the PRV and control systems shall be performed by the Contractor to verify the installed equipment meets the purpose and intent of the specifications. Test shall demonstrate that the equipment is not electrically, mechanically, structurally or otherwise defective; is in safe and satisfactory operation condition; and conforms with the specified operation characteristics. Tests shall include checks for excessive vibration, leaks in all the piping and seals, correct operation of control systems and equipment, proper alignment, excessive noise levels, and power consumption.

.2 Process mechanical pipework and fittings to be pressure tested to a pressure directed by the Departmental Representative, and held for a

period of two (2) hours. The pressure test will be deemed acceptable when no visible or audible leaks are detected.

.3 Retesting

1. if any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be re-conducted.

.4 Manufacturer's Services

1. Provide services of a manufactures representative who is experienced in the installation, adjustment, and operation of the equipment specified.

2. The representative shall supervise the installation, adjustment and testing of the equipment.

3.13 WARRANTY

.1 The Contractor shall warranty the piping, valves, fittings supplied and installed by the contractor against any defects in workmanship and materials for a period of one (1) year from the date of substantial completion. In the event of any such defect should appear, it should be reported in writing to the manufactures during the warranty period.

3.14 TESTING AND ADJUSTING

.1 General:

.1 In accordance with Section 01 91 00 - Commissioning: General Requirements, supplemented as specified.

.2 Timing:

.1 After start-up deficiencies rectified.
.2 After certificate of completion has been issued by authority having jurisdiction.

.3 Vacuum breakers, backflow preventers, backwater valves:

.1 Test tightness, accessibility for O&M of cover and of valve.
.2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
.3 Verify visibility of discharge from open ports.
.4 Verify operation of vacuum breakers.

.4 Pressure regulators, PRV assemblies:

.1 Adjust settings to suit locations, flow rates, pressure conditions.

.5 Strainers:

.1 Clean out repeatedly until clear.

.2 Verify accessibility of cleanout plug and basket.

.3 Verify that cleanout plug does not leak.

.6 Hose bibs:

.1 Check, test and adjust according to manufacturer recommendations.

.7 Commissioning Reports:

.1 In accordance with Section 01 91 00 - Commissioning: Reports, supplemented as specified.

.8 Training:

.1 In accordance with Section 01 91 00 - Commissioning: Training of O&M Personnel, supplemented as specified.

.2 Demonstrate full compliance with Design Criteria.

END OF SECTION

1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).
- .1 ANSI/ASME B16.1-1998, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

.2 American Society for Testing and Materials (ASTM).
- .1 ASTM A49-95, Specification for Heat-Treated Carbon Steel Joint Bars.
- .2 ASTM A126-[95e1], Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- .3 ASTM B61-93, Specification for Steam or Valve Bronze Castings.
- .4 ASTM B62-93, Specification for Composition Bronze or Ounce Metal Castings.
- .5 ASTM B85-99, Specification for Aluminium-Alloy Die Castings.
- .6 ASTM B209-99, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
- .1 SP-70-1992, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .2 SP-71-1993, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .3 SP-82-1992, Valve Pressure Testing Methods.
- .4 SP-85-1997, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

.4 Underwriters Laboratories of Canada (ULC)
- .1 ULC C-267-B-1962.

.5 American Water Works Association (AWWA)

.6 British Columbia Section-American Water Works Association

.7 University of South California, Foundation for Cross Connection control and Hydraulic

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 – General Instructions.

.2 Submit data for valve assembly specified in this section.

1.3 CLOSEOUT SUBMITTALS

.1 Submit maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with local authority.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.5 EXTRA MATERIALS

.1 Supply with parts, material and tools with the assembly supplied by the manufacture.

2 Products

2.1 BACK FLOW PREVENTOR ASSEMBLY

.1 Except for speciality valves, to be of single manufacturer.

.2 Standard specifications, ½" to 2":

Physical Properties:
.1 Max. Working Pressure – 175 PSI (1200Kpa)
.2 Hydrostatic Test Pressure – 350 PSI (2100Kpa)
.3 Temperature Range – 32F to 140 F (0C to 60C)
.4 End Connections – Threaded ANSI B2.1 Class 125

Materials
.5 Valve Body – Bronze
.6 Elastomers – Silicone
.7 Springs – Stainless Steel

Agency Compliance
.8 ANSI/AWWA Conformance (C510-92)
.9 ASSE Listed (Std. 1015)

.3 Standard specifications, 2" to 10":

Physical Properties:
.1 Max. Working Pressure – 175 PSI (1200Kpa)
.2 Hydrostatic Test Pressure – 350 PSI (2100Kpa)
.3 Temperature Range – 32F to 140 F (0C to 60C)

.4 End Connections – Threaded ANSI B2.1 Class 125
Materials
.5 Main Valve Body – Ductile Iron, Grade 65-45-12
.6 Coating – Fusion epoxy coated, internal and external AWWA C550-90
.7 Shut off valves – Butterfly, NRS and OS&Y, resilient wedge gate valves, AWWA C509
.8 Trim – Bronze
.9 Elastomers Discs – EPDM
.10 Springs – Stainless Steel

Agency Compliance
.11 ANSI/AWWA Conformance (C510-89)
.12 ASSE Listed (Std. 1013)
.13 CAN/CSA (B64.4)
.14 UL, less gate valve
.15 FM, less gate valve

.4 All products to have CRN registration numbers.

2.2 AIR GAPS

.1 Supply with manufactured air gaps to match the Back Flow Preventer Assembly.

2.3 STRAINERS

.1 "Y" Strainer 1/8" to 4" NPT

.1 Cast bronze (85-5-5-5) body.
.2 304 Stainless Steel screen.
.3 Operating Pressure to 175 PSIG W.O.G.
.4 Removal self-aligning screen.

Flange Model Strainer
.5 High tensile ASTM A126 Class B cast iron body coated with FDA Approved epoxy.
.6 18-8 Stainless Steel screen.
.7 Operating pressure to 175 PSI.
.8 Removable self-aligning screen.

.2 "Y" Strainer 2 ½ " – 10" NPT

.1 Cast iron body, ASTM A126B.
.2 304 Stainless Steel screen.
.3 Cast iron Cover, ASTM A126B.

.4 Operating Pressure to 175 PSIG W.O.G.
.5 Gasket, PTFE/Graphite.
.6 Plated Steel Cover bolts
.7 Drain plug, Cast iron, ASTM A126B.
.8 Removal self-aligning screen.
.9 Coating: Epoxy

3 Execution

3.1 INSTALLATION

.1 Installation of Backflow preventors
Specific method of installation will depend on location of unit, type of back flow preventer and site condition.

.2 General installation requirements:

.1 An assembly installed more than five (5) feet above floor or ground level must have a permanent platform under it for the tester or maintenance person to stand on. The platform must comply with all applicable safety standards and codes in effect.

.2 When installed in an enclosure, adequate space consideration must be given for proper testing, maintenance and operation of the device.
- .1 Adequate clearance all around the assembly.
- .2 Adequate hatch in the cover, or completely cover removal.
- .3 Provision must be made for crane access for removing and installing larger assemblies.
- .4 Large vault must also be provided with ladders.
- .5 Consult with manufacture for clearances required.

.3 Any assembly or device with an air inlet or relief valve port must be installed outside any enclosure or hooded area containing fumes that are corrosive, toxic, or poisonous. Any assembly or device with an air vent or relief valve port must not be installed in a pit or trench below ground level, or in other areas where they may be flooded. Semi-buried pits may be acceptable (consult project manager) if the air vent or relief valve is installed above the ground or maximum flood level with an approved air gap between the relief valve and a daylight drain. The daylight drain from above grade or semi-buried vault must:
- .1 Be able to be bore sight to a discharge point installed above the ground or maximum flood level, whichever is higher.
- .2 Be able to handle the volume of water that potentially could be discharged from the relief valve port.

.4 Whenever access to a vault is required, follow and comply with provincial and local safety requirements regarding confined space entry. (OHSR 9.1-9.51)

.5 Assembly shall not be installed where the temperature and pressure is maintained above the assembly's rated capacities.

.6 Size the assembly hydraulically to avoid excessive pressure loss.

.7 The backflow preventer must be installed on the up-stream (or, behind the pressure regulator), inside the premises, where pressure does not exceed manufacture's recommendation.

.8 There shall be no bypass line connected in between the backflow preventer.

.9 Strainer and check valve may be required. Refer to specific unit requirement.

.10 All pipe sizes and backflow preventors sizes must be equal or greater than the existing layout and flow requirement. Exact sizes to be verified by the contractor.

.11 Assembly 2 1/2 inches and larger shall have support blocks to prevent damage to the assembly or piping, to manufacture recommendation.

.12 Thoroughly flush the lines before installing the assembly to eliminate debris from the lines.

.13 Where an assembly or device with an air vent or relief valve port is located inside a building, it must be installed in a location where both the occasional spitting from the relief valve port or air vent, and the possible constant discharge during a fouled check situation (e.g. RPBA), will not be objectionable.

.14 All backflow preventors assemblies must be installed with resilient seated shutoff valves.

.15 Backflow prevention assemblies to be protected from accidental physical damage as required.

.16 As required by the local Engineer and fire department, uninterrupted service may be required during installation of backflow prevention assembly.

.17 Electrical grounding across the backflow preventor assembly in accordance to electrical code.

.18 Adequate thrust restraint must be in place during removal and, or installation of backflow preventor assembly.

.19 Seismic restraint system shall meet the requirements of the NBC, BC Building Code and local Codes and authorities having jurisdiction.

.20 Hazardous materials must be handled in accordance with (OHSR).

.21 Confine space entry to comply in accordance with (OHSR).

.22 Work place safety to comply in accordance with (OHSR).

.23 Finding of hazardous material such as "asbestos", must departmental representative immediately. All safety procedures must follow.

.24 Contractor must be registered with WCB.

.3 Installation Requirements for "Reduced Pressure Backflow Assembly (RPBA)"

1 An RPBA shall only be installed in the orientation for which they are approved (e.g. horizontal configuration).
2 Sufficient drainage must be provided to prevent assembly from being submerged.
3 An approved air gap drain assembly is required, and piped to the nearest drain.
4 Minimum clearance for DVCA installation must be maintained in accordance with AWWA guide line.

.4 Installation Requirements for "Double Check Valve Assembly (DVCA)"

1 An DCVA shall only be installed in the horizontal configuration, unless the DVCA has being evaluated and approved by the Authority having jurisdiction.
2 Sufficient drainage must be provided to prevent assembly from being submerged.
3 The DVCA must be installed with test cocks facing up or to one side.
4 "Y" pattern DCVA, when installed in a box below ground level, must not have the test cocks facing downward.
5 Minimum clearance for DVCA installation must be maintained in accordance with AWWA guide line.

.5 Installation Requirements for "Pressure Vacuum Breaker Assembly (PVBA)"

.1 **N/A**

.6 Installation Requirements for "Spill-Resistant Vacuum Breaker Assembly (SVBA)"

.1 N/A

.7 Installation Requirements for "Atmospheric Vacuum Breaker Device (AVB)"

.1 N/A

.8 Testing and Certification

.1 Testing of the backflow preventers with certified equipment for proper operation.

.2 Provide certification and tag to indicated that the backflow preventer has passed the test.

.3 Submit and register the backflow preventer with the authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 01 50 – General Instructions

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA B139-04, Installation Code for Oil Burning Equipment.

.2 Green Seal Environmental Standards (GSES)

.1 Standard GS-11-2008, 2nd Edition, Environmental Standard for Paints and Coatings.

.3 National Fire Code of Canada (NFCC 2005)

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Sustainability Standards Certification:

.1 Low-Emitting Materials: provide listing of sealants, coatings used in building, comply with VOC and chemical component limits or restriction requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 01 50 – General Instructions 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.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates, paddling and packaging materials in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 MATERIAL

.1 Paint: zinc-rich to CAN/CGSB-1.181.

.1 Primers, Paints, Coating: in accordance with manufacturer's recommendations for surface conditions.

.2 Primer: maximum VOC limit 250 g/L to Standard GS-11 to SCAQMD Rule 1113.

.3 Paints: maximum VOC limit 150 g/L to Standard GS-11 to SCAQMD Rule 1113.

.2 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.1 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.3 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.4 Adhesives: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.5 Fire Stopping: in accordance with NFPA 13.

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 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada CSA B139.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer CSA B139 as indicated without interrupting operation of other system, equipment, components.

3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.

.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

.1 Install manual air vents at high points in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

3.6 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.7 PIPEWORK INSTALLATION

.1 Install pipework to CSA B139.

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

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

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible and as indicated.

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

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

.14 Provide for thermal expansion as indicated.

.15 Valves:

.1 Install in accessible locations.
.2 Remove interior parts before soldering.
.3 Install with stems above horizontal position unless indicated.
.4 Valves accessible for maintenance without removing adjacent piping.
.5 Install globe valves in bypass around control valves.
.6 Use gate, ball or butterfly valves at branch take-offs for isolating purposes except where specified.
.7 Install butterfly valves on chilled water and related condenser water systems only.
.8 Install butterfly valves between weld neck flanges to ensure full compression of liner.

.9 Install plug cocks or ball valves for glycol service.

.10 Use chain operators on valves NPS 2 1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.

.16 Check Valves:

.1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.2 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

3.8 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 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

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

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere:

.1 Provide space for firestopping.

.2 Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.9 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.

.1 Chrome or nickel plated brass or type 302 stainless steel..

.3 Sizes: outside diameter to cover opening or sleeve.

.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 PREPARATION FOR FIRE STOPPING

.1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation.

.2 Uninsulated unheated pipes not subject to movement: no special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.11 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system prior re-connection.

.2 Before start-up, clean interior of piping systems.

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

3.12 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

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

.2 Pipework: test to 1.5 times operating pressure

.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 or conceal work only after approval and certification of tests by Departmental Representative.

3.13 EXISTING SYSTEMS

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

.2 Request written approval by Departmental Representative.

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

3.14 CLEANING

.1 Clean in accordance with Section 01 01 50 - General Instructions.

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

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.

.2 Sustainable requirements for construction and verification.

1.2 REFERENCES

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

.1 ANSI/ASME B31.1-07, Power Piping.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A125-1996(R2007), Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

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

.3 Factory Mutual (FM)

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

.1 Material Safety Data Sheets (MSDS).

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

.1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 ANSI/MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.6 Underwriter's Laboratories of Canada (ULC)

1.3 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 MSS SP58.ASME B31.1 or

.3 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

.2 Performance Requirements:

.1 Design supports, platforms, catwalks, hangers, to withstand seismic events as specified Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 01 50 - General Instructions.

.2 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.

.3 Submit shop drawings and product data for following items:

.1 Bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

.4 Quality assurance submittals: submit following in accordance with Section 01 01 50 - General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

.5 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 01 50 - General Instructions.

1.5 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 - General Instructions.

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

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 - General Instructions.

Part 2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.

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

2.2 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: galvanized after manufacture.

.2 Use electro-plating galvanizing process.

.3 Ensure steel hangers in contact with copper piping are copper plated.

.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 ULC listed.

.3 Upper attachment structural: suspension from upper flange of I-Beam:

.1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, ULC listed and FM approved.

.4 Upper attachment to concrete:

.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed and FM approved to MSS SP69.

.5 Hanger rods: threaded rod material to MSS SP58:

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.3 Do not use 22 mm or 28 mm rod.

.6 Pipe attachments: material to MSS SP58:

.1 Attachments for steel piping: carbon steel black or galvanized.

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

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports.

.7 Adjustable clevis: material to MSS SP69 ULC listed and FM approved, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

.8 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: black or galvanized.

.2 Finishes for copper, glass, brass or aluminum pipework: black, with formed portion plastic coated.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, ULC listed and FM approved.

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

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.4 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel. Submit calculations with shop drawings.

2.5 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

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

2.6 HOUSE-KEEPING PADS

.1 Provide 100 mm high concrete housekeeping pads for base-mounted equipment; size pads 50 mm larger than equipment; chamfer pad edges.

2.7 OTHER EQUIPMENT SUPPORTS

.1 Fabricate equipment supports from structural grade steel meeting structural requirements.

.2 Submit structural calculations with shop drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install in accordance with:

.1 manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

.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.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

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

3.3 HANGER SPACING

.1 Plumbing piping: to Canadian Plumbing Code, Provincial Code and authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Within 300 mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	

.6 Pipework greater than NPS 12: to MSS SP69.

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

3.7 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 01 50 for Quality Control and submit report as described in 01 01 50 – Submittal Procedures.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in 01 01 50 – Submittal Procedures.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in 01 01 50 – Quality Control.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Vibration isolation materials and components, seismic control measures and their installation.

1.2 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 National Fire Protection Association (NFPA)

.1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.

.3 National Building Code of Canada (NBC) - 2010

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 01 50 - General Instructions.

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 - General Instructions. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 01 50 - General Instructions.

.2 Submit shop drawings in accordance with Section 01 01 50 - General Instructions.

.1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of BC, Canada.

.2 Provide separate shop drawings for each isolated system complete with performance and product data.

.3 Provide detailed drawings of seismic control measures for equipment and piping.

.3 Quality assurance submittals: submit following in accordance with Section 01 01 50 - General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

.3 Manufacturer's Field Reports: manufacturer's field reports specified.

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 - General Instructions.

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

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 - General Instructions.

Part 2 Products

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation as indicated.

2.2 ELASTOMERIC PADS

.1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.

2.3 ELASTOMERIC MOUNTS

.1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60; threaded insert and two bolt-down holes; ribbed top and bottom surfaces.

2.4 SPRINGS

.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.

.3 Cadmium plate for outdoor installations.

.4 Colour code springs.

2.5 SPRING MOUNT

.1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.

.2 Type M2 - stable open spring: support on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad.

.3 Type M3 - stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.

.4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.

.5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.

2.6 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.

2.7 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES

.1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty duck and neoprene isolation material.

2.8 SEISMIC CONTROL MEASURES

.1 General:

- .1 Seismic control systems to work in every direction.
- .2 Fasteners and attachment points to resist same maximum load as seismic restraint.
- .3 Drilled or power driven anchors and fasteners not permitted.
- .4 No equipment, equipment supports or mounts to fail before failure of structure.
- .5 Supports of cast iron or threaded pipe not permitted.
- .6 Seismic control measures not to interfere with integrity of firestopping.

.2 Static equipment:

- .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
- .2 Suspended equipment:
  - .1 Use one or more of following methods depending upon site conditions and as indicated:
    - .1 Install tight to structure.
    - .2 Cross brace in every direction.
    - .3 Brace back to structure.
    - .4 Cable restraint system.
- .3 Seismic restraints:
  - .1 Cushioning action gentle and steady.
  - .2 Never reach metal-like stiffness.

.3 Vibration isolated equipment:

- .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
- .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.
- .3 As indicated.

.4 Piping systems:

- .1 Fire protection systems: to NFPA 13.
- .2 Piping systems: hangers longer than 300 mm; brace at each hanger.
- .3 Compatible with requirements for anchoring and guiding of piping systems.

.5 Bracing methods:

.1 Approved by Departmental Representative.

.2 Structural angles or channels.

.3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

.6 Service and utilities entrance into building: to meet code requirements.

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 Seismic control measures to meet requirements of NBC.

.2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:

.1 Up to NPS4: first 3 points of support.

.2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.

.5 Where isolation is bolted to floor use vibration isolation rubber washers.

.6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.3 FIELD QUALITY CONTROL

.1 Inspection and Certification:

.1 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations (including sound curves).

.2 Submit complete report of test results including sound curves.

3.4 CLEANING

.1 Proceed in accordance with Section 01 01 50 - General Instructions.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for mechanical systems.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Departmental Representative within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

- .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.
- .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.
- .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

- .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

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

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Departmental Representative in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless

specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

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

1.9 START OF TAB

.1 Notify Departmental Representative7 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

.3 Installation of ceilings, doors, windows, other construction affecting TAB.

.4 Application of weatherstripping, sealing, and caulking.

.5 Pressure, leakage, other tests specified elsewhere Division 23.

.6 Provisions for TAB installed and operational.

.7 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

- .1 Proper thermal overload protection in place for electrical equipment.
- .2 Air systems:
  - .1 Filters in place, clean.
  - .2 Duct systems clean.
  - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
  - .4 Correct fan rotation.
  - .5 Fire, smoke, volume control dampers installed and open.
  - .6 Coil fins combed, clean.
  - .7 Access doors, installed, closed.
  - .8 Outlets installed, volume control dampers open.
- .3 Liquid systems:
  - .1 Flushed, filled, vented.
  - .2 Correct pump rotation.
  - .3 Strainers in place, baskets clean.
  - .4 Isolating and balancing valves installed, open.
  - .5 Calibrated balancing valves installed, at factory settings.
  - .6 Chemical treatment systems complete, operational.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
- .1 Other HVAC systems: plus 5 %, minus 5 %.
- .2 Hydronic systems: plus or minus 10 %. To manufacturer recommendations.

1.11 ACCURACY TOLERANCES

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

1.12 INSTRUMENTS

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

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.13 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
- .1 Details of instruments used.
- .2 Details of TAB procedures employed.
- .3 Calculations procedures.
- .4 Summaries.

1.15 TAB REPORT

.1 Format in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:
- .1 Project record drawings.
- .2 System schematics.

.3 Submit 6 copies of TAB Report to Departmental Representative for verification

and approval, in English in D-ring binders, complete with index tabs.

1.16 VERIFICATION

.1 Reported results subject to verification by Departmental Representative.

.2 Provide personnel and instrumentation to verify up to 30 % of reported results.

.3 Number and location of verified results as directed by Departmental Representative.

.4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.17 SETTINGS

.1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.18 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

1.19 HYDRONIC SYSTEMS

.1 Standard: TAB to most stringent of this section or TAB standards of AABC NEBB, SMACNA, ASHRAE.

.2 Do TAB of systems, equipment, components, controls specified Division 23

.3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB qualified to standards of AABC or NEBB.

.4 Quality assurance: perform TAB under direction of supervisor qualified by to standards of AABC or NEBB.

.5 Measurements: to include as appropriate for systems, equipment, components, controls: flow rate, pressure drop (or loss), temperatures, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of chiller, air condenser, chill water circulating pumps, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.7 Locations of systems measurements to include as appropriate: chiller, air condenser, chiller water system and chill water pumps.

1.20 OTHER TAB REQUIREMENTS

.1 General requirements applicable to work specified this paragraph:
- .1 Qualifications of TAB personnel: as for HVAC systems specified this section.
- .2 Quality assurance: as for HVAC systems specified this section.

.2 Refrigeration systems forming part of HVAC systems:

- .1 Provide leak test to new refrigeration piping system.

2 PRODUCTS

2.1 NOT USED

.1 Not used.

3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

General

1.1 GENERAL

.1 Reference to "Electrical Division" shall mean all related Electrical Sections and components including Division 26.

.2 The word "Provide" shall mean "Supply and Install" the product and services specified. "As indicated" means that the item(s) specified are shown on the drawings.

.3 Provide materials, equipment and devices of specified design, performance and quality; and, current models with published certified ratings for which replacement part are readily available. Provide project management and on-site supervision to undertake administration, meet schedule, ensure timely performance, ensure coordination and establish orderly completion and the delivery of a fully commissioned installation.

.4 The sketches and specifications complement each other and what is called for by one is binding as if called for by both. If there is any doubt as to meaning or true intent due to a discrepancy between the electrical sketches and specifications, obtain written ruling from the Departmental Representative prior to tender closing. **Failing this, the most expensive alternative is to be allowed for.**

.5 Review mechanical and fire protection drawings and specifications for the extent of electrical work required to make mechanical and fire protection systems complete and include this work in the tender sum.

.6 All work shall be in accordance with the PROJECT Drawings and Specifications and their intents, complete with all necessary components, including those not normally shown or specified but required for a complete installation.

.7 It is imperative that the contractor visit the site prior to bid submittal and become familiar with the work to be undertaken.

1.2 SCOPE OF WORK

.1 Scope of work for this project includes modifications to the head-end of existing sprinkler systems for both Wing 'A' and Wing 'B' of the Pacific Forestry Centre building located at 506 Burnside Road, Victoria, B.C. Electrical Contractor (EC) is to coordinate with Sprinkler Contractor (SC) and make necessary changes to the existing building Fire Alarm System to accommodate modifications to the sprinkler system by SC.

2. The following includes a brief itemized work required by EC:

.1 Wing 'A' – Main Sprinkler Room 098:
  .1 Removal of wiring to existing fire alarm devices associated with existing sprinkler head end that are removed.
  .2 Supply, installation and wiring of new fire alarm devices for Gate Valve, Double Check Valve Assembly (DCVA) and Main Flow Switch.

.2 Wing 'B' – Main Sprinkler Room 035:
  .1 Removal of wiring to existing fire alarm devices associated with the exiting sprinkler head-end that are removed.
  .2 Supply, installation and wiring of new fire alarm devices for Double Check Valve Assembly (DCVA).
  .3 Removal and re-installation of wiring to the existing Main Flow Switch that is relocated by SC.
  .4 Removal of wiring associated with the existing jockey pump that is removed by SC. Power to the pump originates from a panelboard approximately 10 m away from the pump. Remove existing wiring all the way to the panelboard. Provide updated type-written panel schedule.

.3 All new FA devices to be addressable and match existing Edwards EST2 System devices. Provide new fire alarm zone module in main FACP, if required, to accommodate addition of new FA devices.

.4 Arrange and pay for G.E. Security (Chubb/Edwards) services for all necessary programming to include new sprinkler system devices in the existing fire alarm system and correct annunciation of the signals caused by new devices at the Main Fire Alarm Control Panel in Room 052 located on Ground Floor in Wing 'A' and at two remote Fire Alarm Graphic LED Annunciators that are located on ground floor of Wing 'B' (front annunciator) and on first floor of Wing 'A' (rear annunciator).

.5 Arrange and pay for tests and verification by G.E. Security (Chubb/Edwards). Test and verify operation of all new devices and applicable existing devices in the addressable alarm initiation loop affected by the work of this project. Submit verification report.

.6 Refer to Appendix 'A' in the back of specifications for floor plans showing the location of fire alarm control panel, Graphic LED annunciators and sprinkler rooms.

.7 Refer to Appendix 'B' in the back of specifications for pictures of existing main FACP and remote FA annunciators and the sprinkler head ends in rooms 035 and 098

1.3 CODES AND STANDARDS

.1 Do complete installation in accordance with Canadian Electrical Code, CSA C22.1-2012.

.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender at time of tender submission.

.3 Perform work in accordance with CSA Z426 - Workplace Electrical Safety and Worksafe BC.

1.4 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications and on drawings are those defined by IEEE SP1122.

1.5 PERMITS, FEES

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

.2 Pay associated fees.

.3 Obtain and pay for an electrical permit to cover all electrical, communications and fire alarm work.

.4 Submit a copy of electrical permit to the Departmental Representative prior to commencement of work on site.

.5 Departmental Representative will provide drawings and specifications required by Electrical Inspection Department at no cost.

.6 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.

.7 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Departmental Representative.

1.6 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with Division 01 requirements. The submission shall be reviewed, signed and processed as described in Division 01.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, single line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other sections.

.4 Content

.1 Shop drawings submitted title sheet.
.2 Data shall be specific and technical.
.3 Clearly identify the equipment or material that is supplied on the shop drawings. Unmarked shop drawings will be rejected.
.4 The project and equipment designations shall be identified on each document.

.5 Provide number of copies indicated in Section Division 01 with a minimum of 2 copies to be retained by the Departmental Representative.

.6 Keep one (1) copy of shop drawings and product data, on site, available for reference.

1.7 QUALITY ASSURANCE

.1 Qualifications: all electrical work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial and/or Territorial ACT respecting manpower vocational training and qualifications.

.2 Site Meetings: in accordance with Division 01 – Project Meetings.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 – Health and Safety Requirements.

1.8 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 01 50.

.2 Include in operations and maintenance data:
.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
.3 Names and addresses of local suppliers for items included in maintenance manuals.
.4 Copy of reviewed shop drawings.
.5 Final electrical inspection report.
.6 Final fire alarm verification report.
.7 Copy of updated type written panel directories for panelboards affected by the work is this contract.

.8 Warranty certificates applicable.
.9 One CD containing PDF files of all the material included in the manual.

1.9 CARE, OPERATION AND START-UP

.1 Instruct the Departmental representative and operating personnel in the operation, care and maintenance of equipment.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.10 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83 (R1996).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.11 MATERIALS AND EQUIPMENT

.1 Equipment and material to be new and CSA certified, and manufactured to standard quoted.

.2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Department.

1.12 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:
.1 Lamicoid 3 mm thick plastic engraving sheet, white face and black core, self adhesive unless specified otherwise.

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line 3 mm high letters
Size 2	12 x 70 mm	1 line 5 mm high letters
Size 3	12 x 70 mm	2 lines 3 mm high letters

Size 4 20 x 90 mm 1 line 8 mm high letters
Size 5 20 x 90 mm 2 lines 5 mm high letters
Size 6 25 x 100 mm 1 line 12 mm high letters
Size 7 25 x 100 mm 2 lines 6 mm high letters

.3 Wording on nameplates and labels to be approved by departmental representative prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be English.

.6 Nameplates for junction boxes to indicate system and/or voltage characteristics.

.7 Nameplates for pull boxes to indicate system and type of cable.

.8 Provide P-touch type labels on the cover of all fire alarm devices c/w description of fire alarm device and zoning.

1.13 WIRING IDENTIFICATIONS

.1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding for 120/208V and 347/600V wiring throughout.

.3 Identify Telecommunications cabling as indicated.

1.14 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.15 MANUFACTURERS AND CSA LABELS

.1 Visible and legible after equipment is installed.

1.16 WIRES AND CABLES (0 – 1000V)

.1 Conductors: stranded for 10 AWG and larger, minimum size 12 AWG.

.2 Copper conductors with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

.3 Install wiring in conduit systems; EMT from panelboard to motor location and liquid-tight flexible metal conduit for final connection to the motor.

.4 Provide a green insulated bond conductor in all conduits sized in accordance with CSA C22.1-2012, Canadian Electrical Code, Part 1.

.5 Label both ends of wiring indicating panelboard circuit number with permanent, indelible wire markers.

1.17 CONDUITS, FASTENING AND FITTINGS

.1 Conduits
- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .2 Liquid-tight flexible metal conduit: to CSA C22.2 No. 56.

.2 Conduit Fastenings
- .1 One hole steel straps to secure surface conduits 53 mm and smaller. Two hole steel straps for conduits larger than 53 mm.
- .2 Channel type supports for two or more conduits at 1 m on centre.
- .3 Threaded rods, 6 mm diameter, to support suspended channels.
- .4 Beam clamps to secure conduits to exposed steel work.

.3 Conduit Fittings

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 EMT couplings and connectors shall be malleable steel, set screw type. Connectors shall have insulated throats. Cast fittings are not acceptable.

.4 Installation
- .1 Unless otherwise indicated, all wiring is to be in EMT conduit.
- .2 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.
- .3 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .4 Dry conduits out before installing wire.
- .5 Provide a green insulated bond conductor in all conduits and ducts.
- .6 Run parallel or perpendicular to building lines.

1.18 HANGER AND SUPPORTS FOR ELECTRICAL SYSTEMS

.1 Support Channel: U shape, size 41 x 41 mm, 2.5 mm thick to support disconnect switches, cables or conduits.

.2 Installation

.1 The contractor shall ensure that all electrical equipment, cables and conduits are seismically restrained in accordance with the requirements of "Seismic Restraint Standards Manual" published by the Electrical Contractors Association of British Columbia.

.2 Support equipment, conduits or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.3 Provide metal brackets, frame, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.4 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.5 Do not use lashing wire or perforated straps to support or secure raceways or cables.

.6 Do not use supports or equipment installed by other trades for conduit or cable support except with permission of other trades and approval of Departmental Representative.

1.19 OUTLET BOXES, CONDUIT BOXES AND FITTINGS

.1 Size boxes in accordance with CSA C22.1.

.2 Cast aluminium, one or two-gang FS or FD or octagonal boxes with factory threaded hubs and mounting feet for all surface mounted installations.

.3 Use only bushing and connectors with nylon insulated throats.

1.20 DISCONNECT SWITCHES

.1 Fusible, non fusible, horsepower rated disconnect switch in CSA Enclosure, size as indicated and/or to suit the mechanical equipment.

1.21 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

1.22 FIRESTOPPING

.1 Where cables or conduits pass through floors and fire rated walls, pack space full with a ULC approved firestopping system.

1.23 CLEANING

.1 Do final cleaning in accordance with Section 01 01 50.

.2 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.

1.24 RECORD DRAWINGS

.1 Refer to Section 01 01 50 – Summary of Work.

.2 Indicate conduit and cable runs, junction boxes and circuit numbers.

1.25 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

.1 Refer to Section 01 01 50 – Summary of Work.

.2 Refer to Section 01 35 33 - Waste Management and Disposal.

Products

2.1 Not Used.

Execution

3.1 Not Used.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 01 01 50 - General Instructions.

.2 Section 26 05 00 - Common Work Results - Electrical

1.2 REFERENCES

.1 NBC - 2010, National Building Code of Canada.

.2 Government of Canada - Treasury Board (TB) Standards:
- .1 Standard for Fire Alarm Systems - Chapter 3-4, latest edition.
- .2 Fire Protection Standard for Correctional Institutions - Chapter 3-6, latest edition. Reference clause 5.1.

.3 Underwriter's Laboratories of Canda (ULC)
- .1 CAN/ULC-S524-latest edition, Standard for the Installation of Fire Alarm Systems.
- .2 CAN/ULC-S536-latest edition, Standard for the Inspection and Testing of Fire Alarm Systems.
- .3 CAN/ULC-S537-latest edition, Standard for the Verification of Fire Alarm Systems.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 System:
- .1 To TB OSH Chapter 3-04, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Subject to HRSDC Office of Fire Protection and Engineering Services approval.
- .3 Subject to HRSDC Office of Fire Protection and Engineering Services inspection for final acceptance.

.2 System Components:
- .1 Listed by ULC and comply with applicable provisions of NBC and meet requirements of authority having jurisdiction.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 01 50.

1.5 OPERATION AND MAINTENANCE DATA

.1 Provide verification report for incorporation into O & M Manual specified in Section 01 01 50.

2 Products

2.1 FIRE ALARM CONTROL PANEL AND ANNUNCIATORS - EXISTING

.1 Existing Fire Alarm System is G. E. Security (Chubb/Edwards) Addressable EST-2 system. Main control panel is located in Room 052 on Ground Floor in Wing 'A'. There are two Graphic LED Annunciators; one on ground floor of Wing 'B' (front annunciator) and another on first floor of wing 'A' (rear annunciator).

2.2 ADDRESSABLE FIRE ALARM SPRINKLER MODULES

.1 New SIGA-CT1 or SIGA-CT2 input modules to match existing G. E. Security (Chubb/Edwards) addressable input modules.

2.3 WIRING

.1 In accordance with manufacturer's specifications, ULC listed for fire alarm, red jacket.

.2 All new wiring is to be installed in a loop system, i.e. data in to the first new device from an existing device, in/out to wire all new devices and back to the existing device from which the wiring has been removed to complete the loop. No T-tapping.

2.4 NEW FIRE ALARM SUPERVISORY AND ALARM ZONES

.1 Supervisory zones:
- .1 'A' wing – Main sprinkler gate valve
- .2 'A' wing – Main sprinkler double check valve
- .3 'B' wing – Main sprinkler gate valve
- .4 'B' wing – Main sprinkler double check valve

.2 Alarm zones:
- .1 'A' wing – Main sprinkler flow switch
- .2 'B' wing – Main sprinkler flow switch

3 Execution

3.1 INSTALLATION

.1 Install all new devices in accordance with CAN/ULC-S524

.2 Provide necessary raceways, cable and wiring to make interconnection as required by system manufacturer.

.3 Ensure that wiring is free of opens, shorts or ground before system testing and handing over.

.4 Provide all required system programming as necessary during the construction as well as in the final stages of the project.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Works Results - Electrical and CAN/ULC-S537.

.2 Tests and verification shall be performed by G. E. Security (Chubb/Edwards).

.3 Fire alarm system testing:

.1 Test all new devices. Test existing devices as required by CAN/ULC-S524.

.2 Test each device and circuit to ensure manual stations, smoke detectors, flow and tamper switches etc. transmit alarm and supervisory signals to control panel and remote annunciators and actuate alarm, supervisory and ancillary devices.

.3 Check the main building fire alarm control panel and remote annunciators to ensure all devices are shown correctly.

.4 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of trouble signals.

.5 Upon completion of the test, and prior to interim inspection, the contractor shall submit a detailed verification report for approval. The report shall identify each component tested and list any deficiencies noted in the installation. Verification report to have a column for:

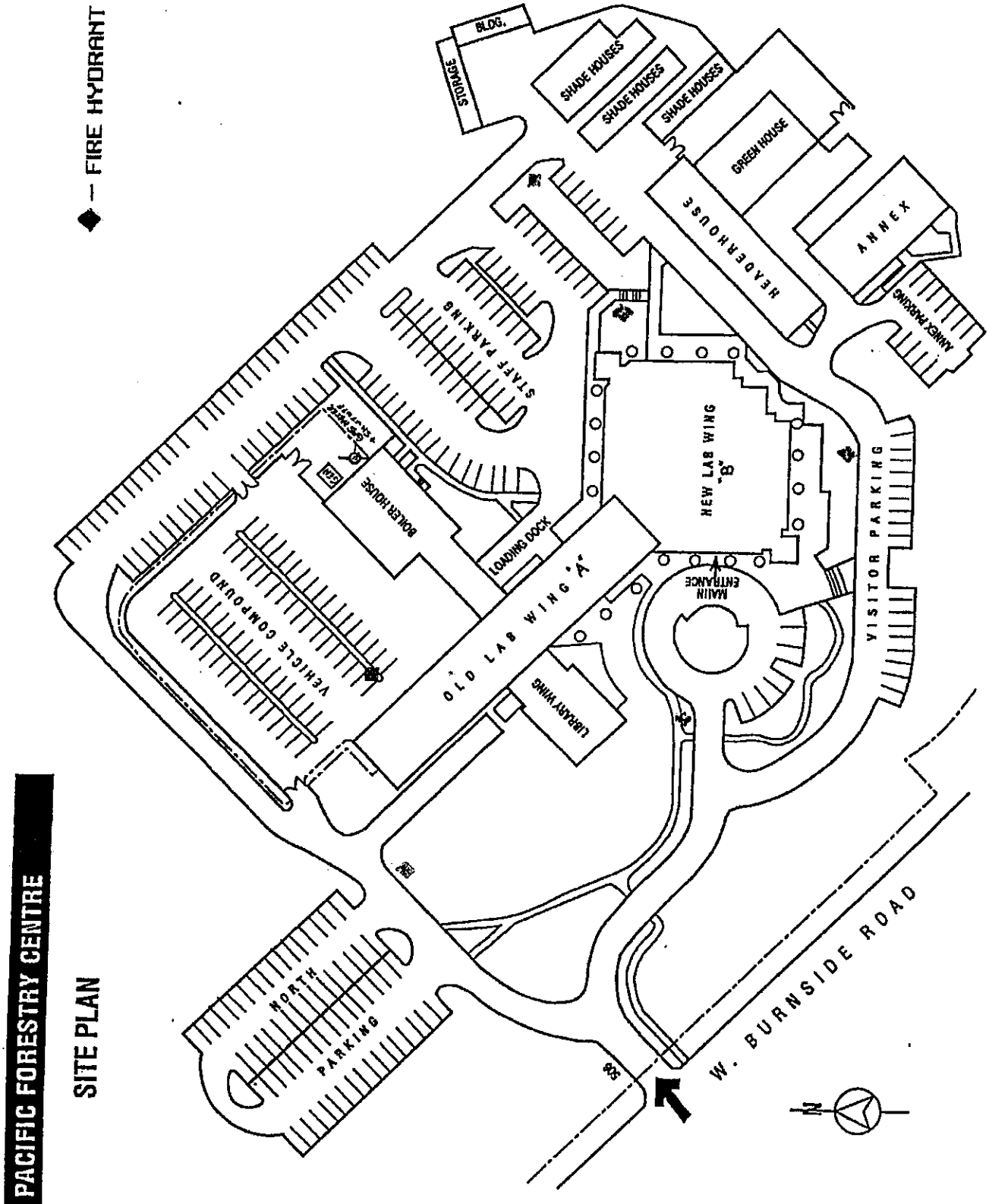
.1 the device, module, cable, control unit function, etc.
.2 the test
.3 pass/fail
.4 initials of the tester
.5 time & date of test

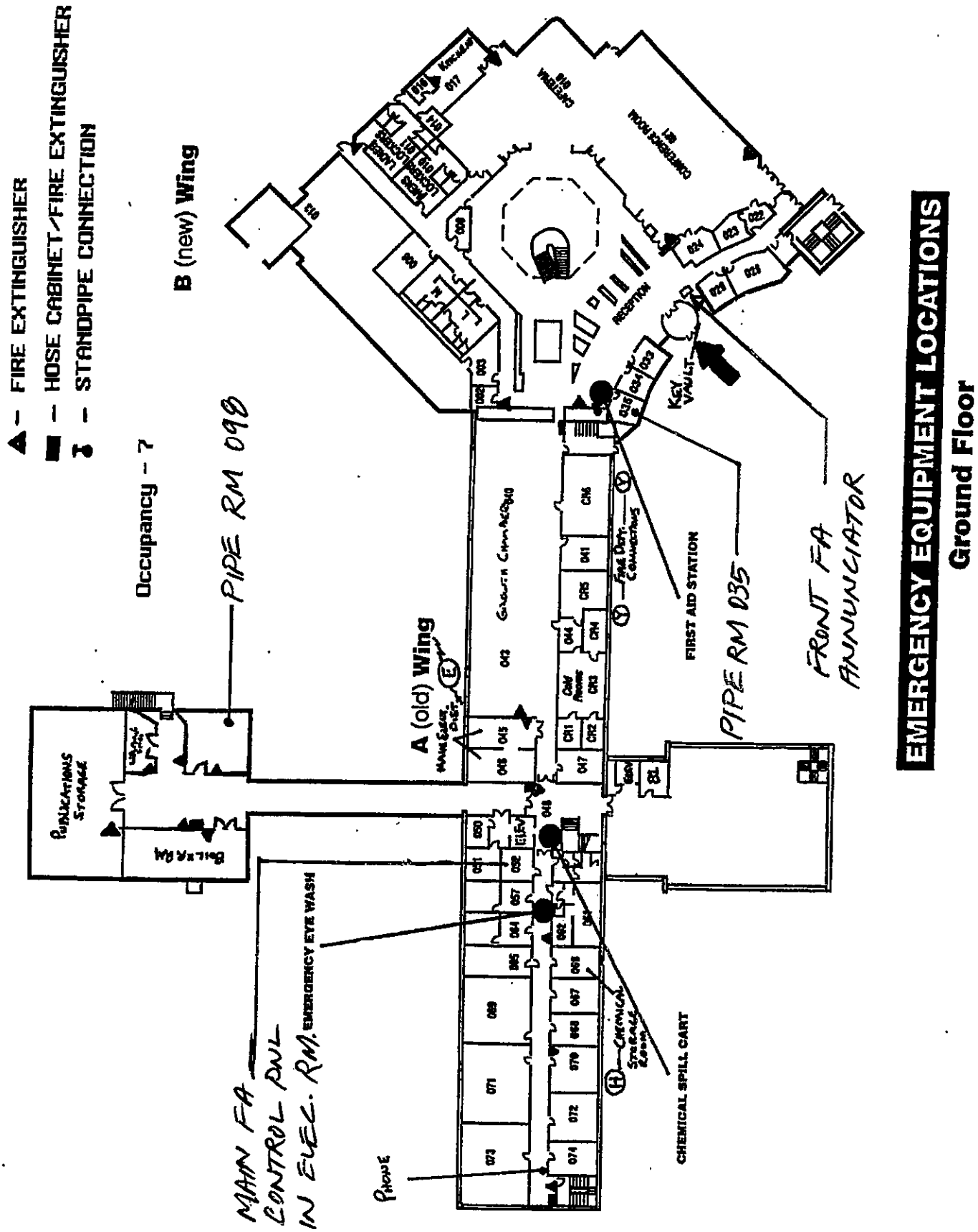
.4 Hand over verification report and certificate to Departmental Representative. Include a copy of the verification report in O & M Manual.

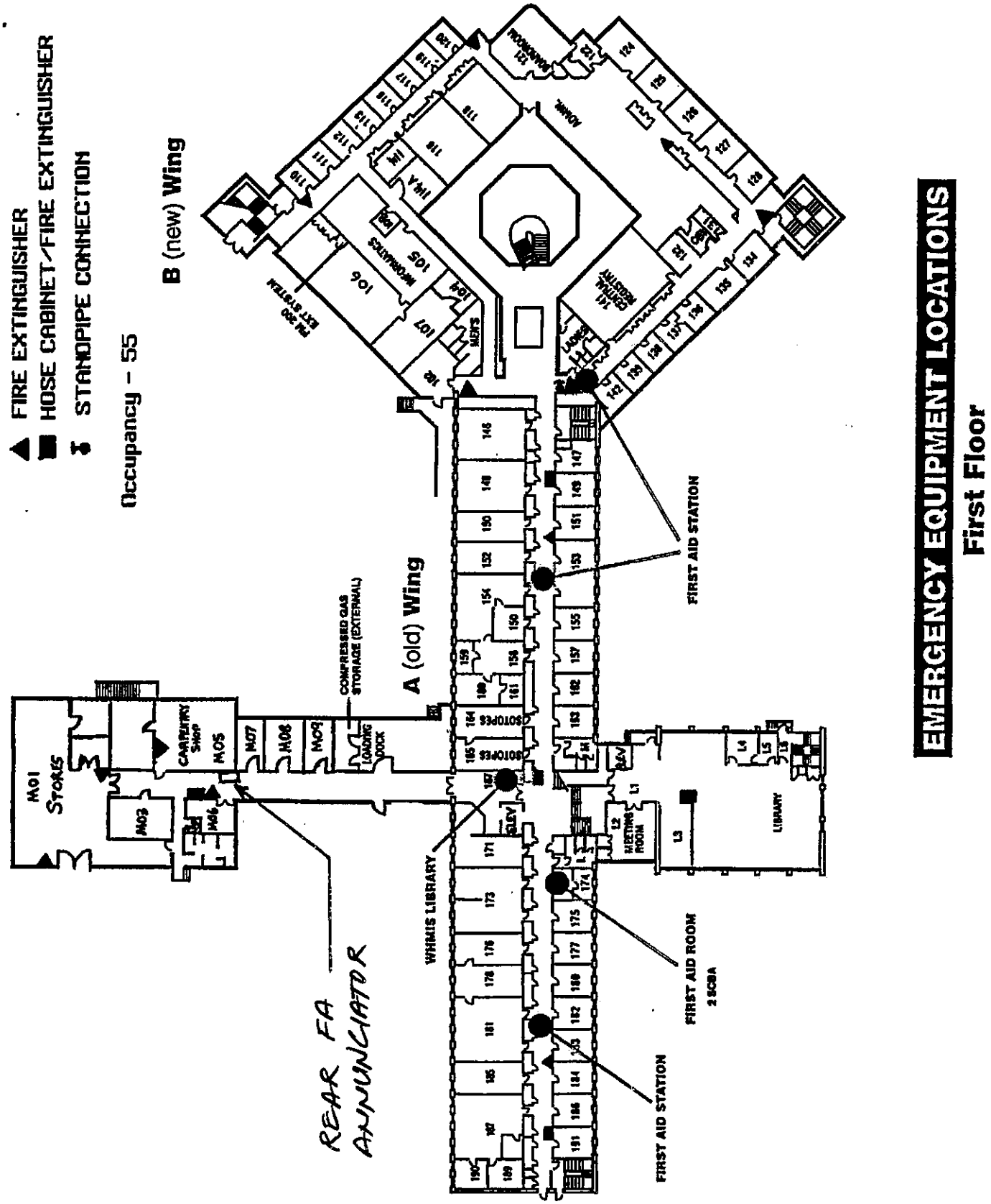
3.3 TRAINING

.1 Arrange and pay for on-site demonstrations by G. E. Security (Chubb/Edwards) to train building operational personnel in use and maintenance of fire alarm system. Ensure a record of such training that includes info related to the time of training and the participants is prepared and forwarded to the Departmental Representative.

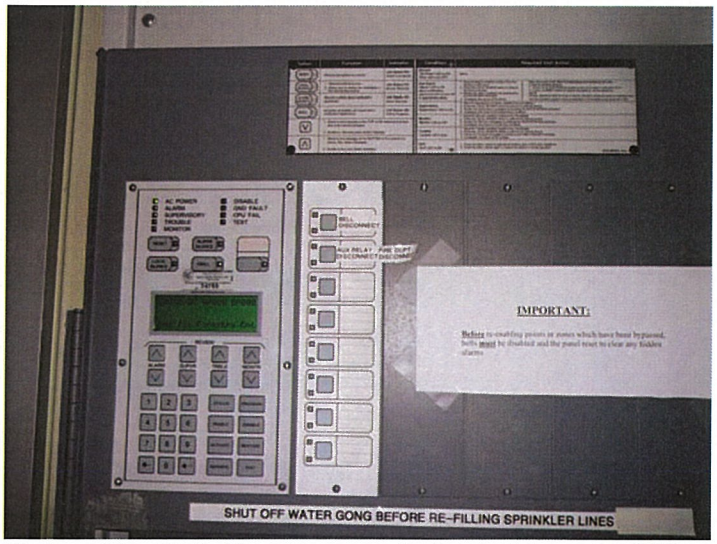
END OF SECTION


◆ – FIRE HYDRANT
BLDG.
STORAGE
SHADE HOUSES
SHADE HOUSES
SHADE HOUSES
GREEN HOUSE
HEADERHOUSE
ANNEX
ANNEX PARKING
STAFF PARKING
NEW LAB WING "B"
VISITOR PARKING
BOILER HOUSE
LOADING DOCK
OLD LAB WING "A"
MAIN ENTRANCE
LIBRARY WING
VEHICLE COMPOUND
NORTH PARKING
W. BURNSIDE ROAD
N
PACIFIC FORESTRY CENTRE
SITE PLAN


▲ – FIRE EXTINGUISHER
■ – HOSE CABINET / FIRE EXTINGUISHER
🚒 – STANDPIPE CONNECTION
EMERGENCY EQUIPMENT LOCATIONS
Ground Floor
B (new) Wing
A (old) Wing
Occupancy – 7
PIPE RM 098
PIPE RM 035
FRONT FA ANNUNCIATOR
MAIN FA CONTROL PNL IN ELEC. RM.
EMERGENCY EYE WASH
FIRST AID STATION
CHEMICAL SPILL CART
PHONE
KEY VAULT
RECEPTION
EMERGENCY ROOM
CHEMICAL STORAGE ROOM
PUBLICATIONS STORAGE
SHIPPING

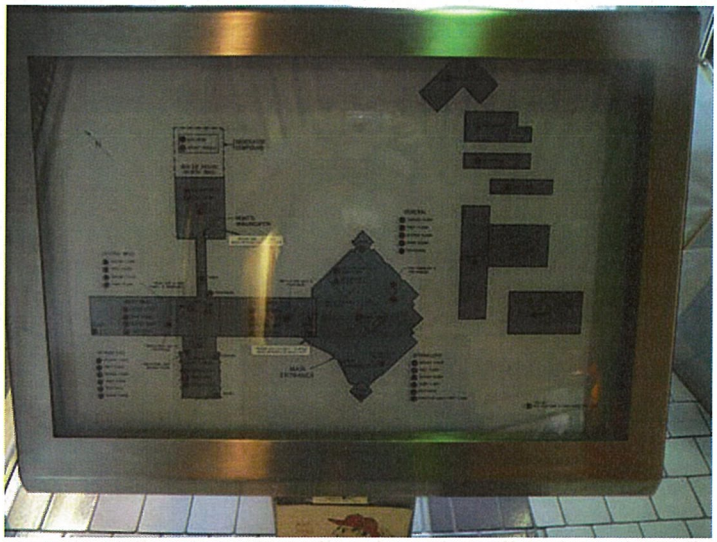


END OF APPENDIX 'A'



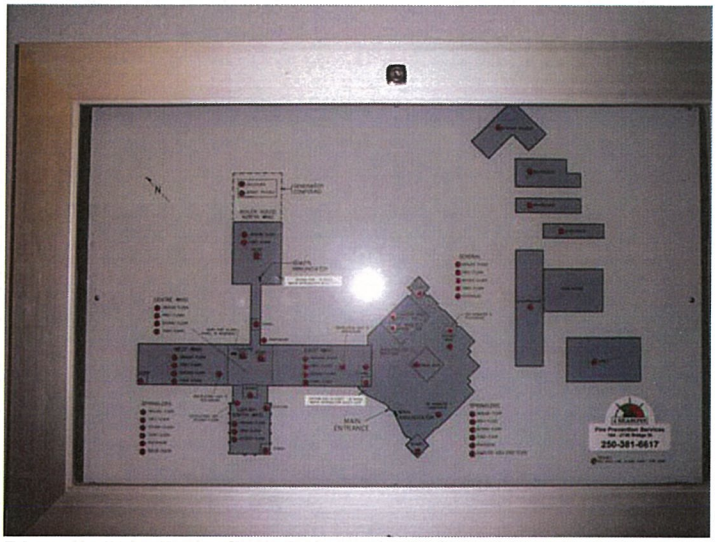
Picture #1 – Main fire alarm control panel in room 052 on Wing 'A'

- **Include new sprinkler system devices in the existing FA system, test and verify for correct operation and annunciation at the control panel.**



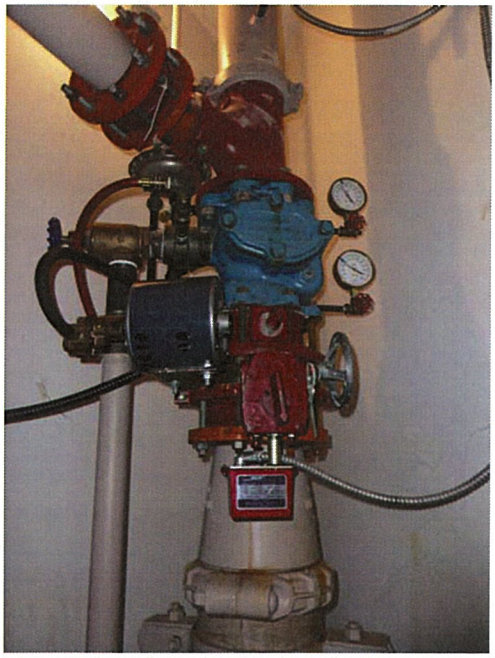
Picture #2 – Front fire alarm annunciator on ground floor of Wing 'B'

- **Include new sprinkler system devices in the existing FA system, test and verify for correct annunciation.**



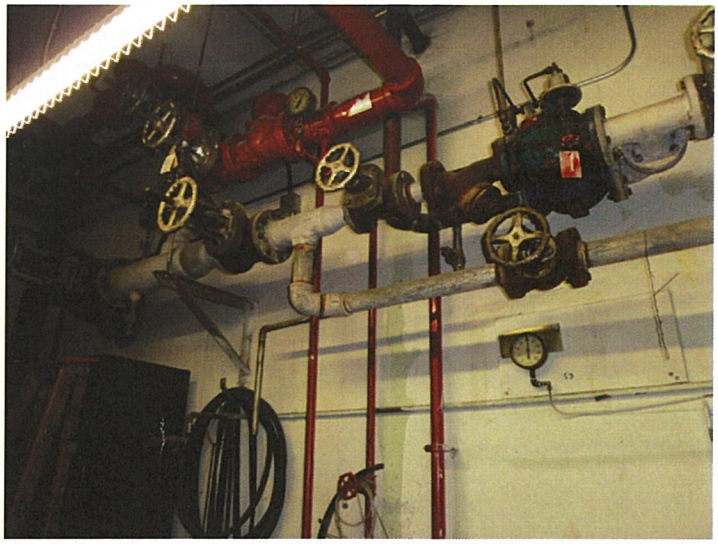
Picture #3 – Rear fire alarm annunciator on first floor of Wing 'A'

- **Include new sprinkler system devices in the existing FA system, test and verify for correct annunciation.**



Picture #4 – Existing Wing 'B' sprinkler head-end in room 035

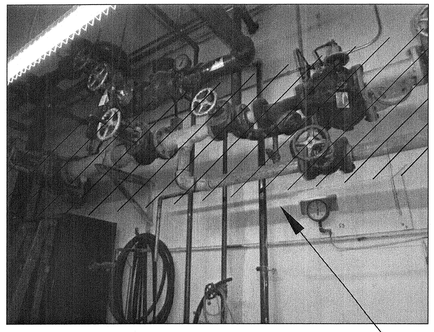
- **Remove FA wiring and device associated with existing main valve that is removed.**
- **Remove wiring to existing jockey pump.**
- **Provide new FA wiring and devices for new gate valve and DCVA.**
- **Remove and re-install wiring to relocated Wing 'B' main sprinkler flow switch.**
- **Test and verify all new FA devices.**

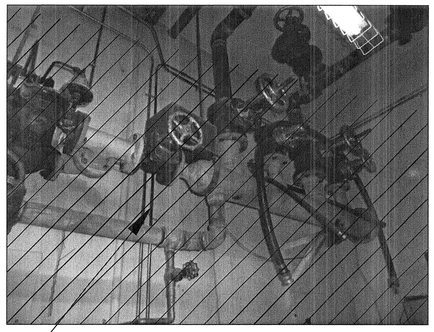


Picture #5 – Existing Wing 'A' sprinkler head-end in room 098

- **Remove FA wiring and device associated with existing main valve that is removed.**
- **Provide new FA wiring and devices for new gate valve, DCVA and flow switch.**
- **Test and verify all new FA devices.**

END OF APPENDIX 'B'



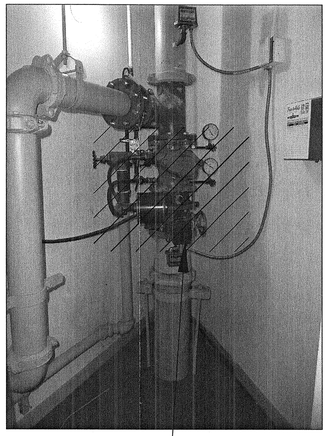


REMOVE EQUIPMENT AND PIPING INDICATED BY HATCHING. MODIFY TO SUIT NEW LAYOUT.

PIPE ROOM 098 – EXISTING LAYOUT

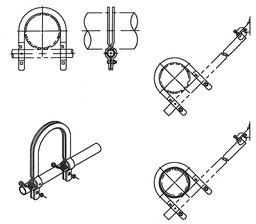
NOTES:

1. REMOVE AND DISPOSE OF ALL EQUIPMENT AND ASSOCIATED PIPING AS SPECIFIED.
2. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL PIPE SIZES. EXACT PIPE LENGTH IS DEPENDENT ON THE DIMENSIONING OF EQUIPMENT.
3. INSTALLATION OF ALL EQUIPMENT TO MANUFACTURER RECOMMENDATIONS.
4. ALL FIRE SPRINKLER SYSTEM EQUIPMENT AND INSTALLATION TO COMPLY WITH NFPA REQUIREMENTS.
5. ALL POTABLE WATER SYSTEM EQUIPMENT AND INSTALLATION TO COMPLY WITH AWWA/ANSI/NSF/BC PLUMBING CODE REQUIREMENTS.
6. BACKFLOW PREVENTERS TO COMPLY WITH AWWA/CSA/UL/FM/NSF 61.
7. FIRE SAFETY SYSTEM MUST BE MAINTAINED AT ALL TIME.
8. PROVIDE MINIMUM INTERUPTION TO WATER SUPPLY TO THE BUILDING. PROVIDE WITH SCHEDULE SHUT DOWN FOR APPROVAL.
9. AFTER HOUR WORK MAY BE REQUIRED.
10. FLUSHING AND DISINFECTING THE SYSTEM IS REQUIRED AS PER SPECIFICATIONS. WATER TEST MUST BE CARRIED OUT. SUBMIT CERTIFIED COPY OF TEST RESULTS. SAFETY PROCEDURE MUST BE IN PLACE.
11. CUTTING, PATCHING, MAKE GOOD AND PAINTING WALLS, CEILINGS TO MATCH WITH EXISTING FOR ALL THE UPGRADE AND RETROFIT WORKS OF THIS CONTRACT.
12. CAP ALL DECOMMISSIONED PIPING.
13. ALL COPPER PIPING TO BE TYPE "K".

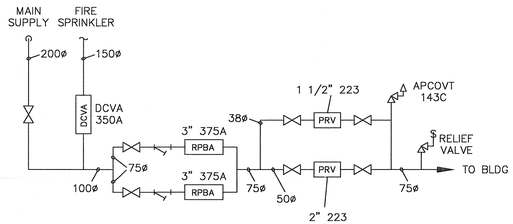


REMOVE EQUIPMENT INDICATED BY HATCHING AND MODIFY PIPING TO SUIT NEW LAYOUT

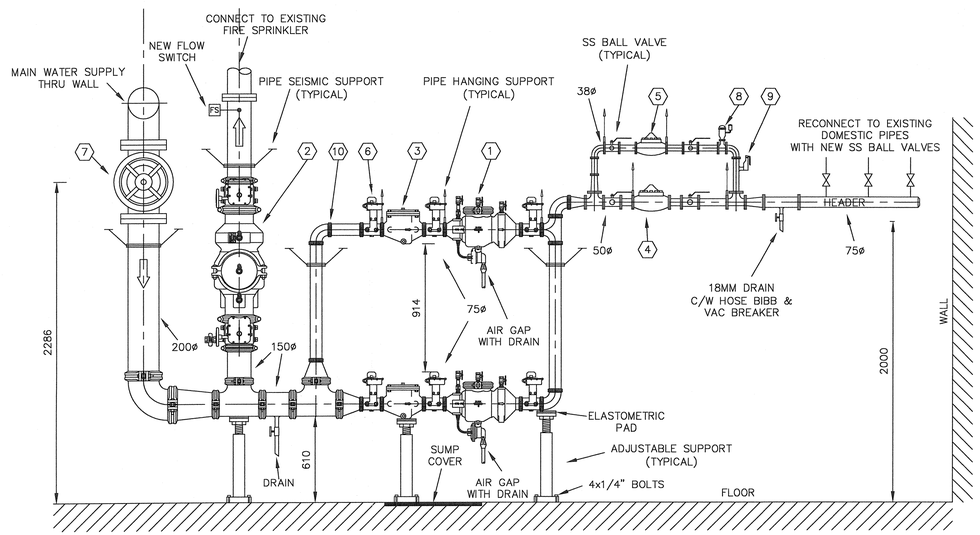
PIPE ROOM 035 – EXISTING LAYOUT



PIPE SEISMIC SUPPORT
NTS



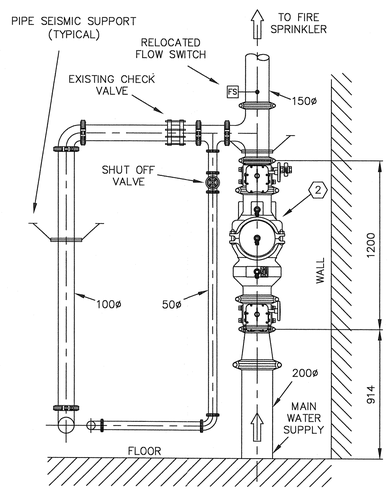
PIPE ROOM 098 – NEW SCHEMATIC
NTS



PIPE ROOM 098 – NEW LAYOUT
SCALE: 1 : 20

EQUIPMENT SCHEDULE

	DESCRIPTION	MAKE	MODEL	SIZE
1	RPBA	WILKINS	375A	75MM
2	DCVA	WILKINS	350A	150MM
3	STRAINER	CLA–VAL	X43H	75MM
4	PRESSURE REDUCING VALVE	CLA–VAL	49–01	50MM
5	PRESSURE REDUCING VALVE	CLA–VAL	49–01	38MM
6	BUTTERFLY VALVE	WILKINS	49G	
7	GATE VALVE FLANGED	WILKINS	480 OSY	200MM
8	AIR RELEASE VALVE C/W ISOLATING VALVE	APCO	50.1	25MM
9	RELIEF VALVE 20 – 150 PSI	CLA–VAL	55F1	19MM
10	COUPLING/FITTINGS	VICTAULIC	DUCTILE IRON	



PIPE ROOM 035 – NEW LAYOUT
SCALE: 1 : 20

PWGSC – A1 – 841X594

0 10 20 30 40 50 60 70 80 90 100mm

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région de Pacifique

PROFESSIONAL ENGINEER – PROVINCE OF BRITISH COLUMBIA – P.J. GERARD

2013.08.13

Revision	Description/Description	Date
2	ISSUED FOR TENDER	02/15 2013
1	REVIEW 90%	01/15 2013

Client/client

PACIFIC FORESTRY CENTRE
506 BURNSIDE RD.
VICTORIA, B.C.

Project title/Titre du projet

CROSS CONNECTION CONTROL UPGRADE

FIRE PROTECTION SYSTEM & POTABLE WATER SYSTEM

Consultant Signature Only

Designed by/Concept par
FRANCIS MA

Drawn by/Dessine par
ACE

PWGSC Project Manager/Administrateur de Projets TPSGC
STEVE WINDL

Regional Manager, Architectural and Engineering Services
Gestionnaire régionale, Services d'architectural et de génie, TPSGC

Drawing title/Titre du dessin

MECHANICAL

NEW BACKFLOW PREVENTERS AND PRV FOR PIPING ROOM 098 & 035

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
R.061185.001	M1	2