Public Works and Government Services Canada

Travaux Publics et Services Gouvernment aux Canada

Specification

PENTICTON AIRPORT
PENTICTON, BC
External Water Supply Connection

EZ899-180445

Requisition No.

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APPROVED BY:

Regional Manager AES — Date: 2017-11-29

Construction Safety Coordinator — Date: 2017-11-29

TENDER:

Project Manager — Date: 29-Nov-17

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Appendix A

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Appendix B

S-W14: City of Penticton – Frostproof 19mm and 25mm Meter Vault

1.1 CODES

.1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date.

1.2 DESCRIPTION OF WORK

.1 Work under this Contract covers a new external water supply connection to the Penticton Airport located in Penticton, B.C. The Penticton Airport is owned and operated by Transport Canada. The existing water system consists of a supply well, a reservoir, a booster station and distribution system.

.2 The airport property is surrounded by the Penticton Indian Reserve #1. There is development on First Nation lands west of the airport with a private water supply system and an ongoing project to extend the watermain to the First Nation lands on the east side of the airport.

.3 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents.

- .1 A connection to the new watermain adjacent to the Airport with a 250mm service tee and associated valves.
- .2 Install a new 250mm PVC watermain from the new connection to the existing line at the rear of the pumping station.
- .3 Install a new PRV station in an underground pre-cast concrete chamber.
- .4 Demolish and decommission al equipment and re-purpose the pumping station building
- .5 Install water meters on the tenant's buildings.

.4 All works to be coordinated and scheduled as per Departmental Representative's schedule and coordination. Existing facility must remain operational at all times.

.5 Access to the site, workers and public safety will need to be included in the construction contract.

.6 Testing and commissioning of the rehabilitation works to be part of the construction contract

.7 "Green Requirements:

- .1 Use only environmentally responsible green materials/products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality – subject of Departmental Representative's approval of submitted MSDS Product Data.
- .2 Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.
- .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.

1.3 CONTRACT DOCUMENTS

.1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work. Plan have been prepared with the intent that contractor will ensure/clarify the scope prior to start up and bring to the Departmental Representative's attention any error, corrections and extra work required to complete particular work.

1.4 DIVISION OF SPECIFICATIONS

.1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

.2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.

.3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.5 TIME OF COMPLETION

.1 The final Contract Completion is stipulated to be 20 weeks after contract award.

1.6 HOURS OF WORK

.1 Restrictive as follows:

- .1 The work is restricted between 0700-1800 hours.
- .2 Schedule deconstruction, removal and construction work in a manner that existing operation is not impacted. Obtain current mooring schedule from the Owner's Representative and schedule work according to the schedule.
- .3 Notify and get approval from the Departmental Representative of all after hours work, including weekends and holidays.

1.7 WORK SCHEDULE

.1 Carry on work as per indicated "PHASES" and as follows:

- .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:
  - .1 Submission of shop drawings, product data, MSDS sheets and samples.
  - .2 Commencement and completion of work of each section of the specifications or trade for each phase as outlined.
  - .3 Final completion date within the time period required by the Contract documents.
- .2 Do not change approved Schedule – without notifying Departmental Representative.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.8 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the Contract Unit Price in detail as directed by the Departmental Representative and aggregating Contract price.

1.9 CODES, BYLAWS, STANDARDS

.1 Perform work in accordance with the indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.

.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.10 REGULATORY REQUIREMENTS

.1 Obtain and pay for Permits, Certificates, Licenses required by regulatory municipal, provincial or federal authorities to complete the work.

.2 Provide inspection authorities with plans and information required for issue of acceptance certificates.

.3 Furnish inspection certificates in evidence that the work installed conforms the requirements of the authority having jurisdiction.

1.11 CONTRACTOR'S USE OF SITE

.1 Use of site:

.1 Contractor must coordinate with Department Representative for the use of the Site and maintain the access to the Site.

.2 Assume responsibility for assigned premises for performance of this work.

.3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative, if any.

.2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.

.3 Do not unreasonably encumber site with material or equipment.

.4 Use only indicated access for moving workers and material.

.1 Accept liability for damage, safety of existing installations and overloading of existing installations.

1.12 EXAMINATION

.1 Examine site and be familiar and conversant with existing conditions likely to affect work. Make inquiries or investigations necessary to become thoroughly acquainted with site, soil, surface, stream and road access conditions, and the nature and extent of the work. Contractor to satisfy himself as to the condition prevailing.

.2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.

1.13 EXISTING SERVICES

.1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the authorities having jurisdiction.

1.14 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 his approval for actual locations.

.4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative.

1.15 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.16 ACCEPTANCE OF SUBSTRATES

.1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.17 QUALITY OF WORK

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the NMS Construction Standards.

.3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.18 WORKS COORDINATION

.1 Coordinate work of subtrades

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

.1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.

.2 Develop coordination drawings when required, illustrating potential interference between works of various trades and distribute to affected parties.

.1 Pay particular close attention to overhead work above ceilings and within or near to building structural elements.

.2 Identify on coordination drawings, building elements, service lines, rough-in points and indicate location services entrance to site.

.3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.

.4 Publish minutes of each meeting.

.5 Plan and coordinate work in such a way to minimize quantity of service line offsets.

.6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.4 Work coordination:

.1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.3 Ensure disputes between subcontractors are resolved.

.5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.

1.19 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.

.2 **Allow sufficient time for the following**:

.1 Review of product data.

.2 Approval of shop drawings.

.3 Review of re-submission.

1.20 RELICS AND ANTIQUITIES

.1 Relics and antiquities and items of historical or scientific interest shall remain property of the Department. Protect such articles and request directives from Departmental Representative.

.2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/construction, and await Departmental Representative's written instructions before proceeding with work in this area.

.3 If significant historical or archaeological artifacts, or human remains are discovered, stop work, report it immediately to the Departmental Representative.

1.21 SECURITY CLEARANCES

.1 Contractor shall be fully responsible for securing the premises and its contents throughout the construction period.

1.22 PROJECT MEETINGS

.1 Meet with Departmental Representative within five (5) working days of Award of Contract date, to establish scope of Work and approach to project construction operations.

1.23 TESTING AND INSPECTION

.1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified in other sections.

.2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems:

.1 Chlorination related water testing

.2 Pressure testing of installed system

.3 Mill tests and certificates of compliance.

.4 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.

.3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of correct work.

.4 Contractor shall furnish labour and facilities to:

.1 Notify Departmental Representative in advance of planned testing.

.5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.

.7 The Departmental Representative may require, and pay for, additional inspection and testing services not included in Paragraph 1.24.2.

.8 Provide Departmental Representative with 1 copy of testing laboratory reports as soon as they are available.

1.24 AS-BUILT DOCUMENTS

.1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.

.2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.

1.25 CLEANING

.1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

.2 **Ensure cleanup of the work areas each day after completion of work.**

.3 In preparation for interim and final inspections:

.1 Examine all sight-exposed interior and exterior surfaces and concealed spaces.

.2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces, including glass and other polished surfaces.

1.26 DUST CONTROL

.1 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work and public.

1.27 PUBLIC WAY CONSTRUCTION

.1 Design, erect and maintain hoarding and covered pedestrian walkways to support all loads including wind loads and provide protection, complete with signs and electrical lighting as required by authority having jurisdiction.

.2 Provide one lockable truck entrance gate as directed and conforming to applicable traffic restrictions on adjacent street. Equip gates with locks and keys. Paint public side of site enclosure in colour selected by Departmental Representative.

1.28 ENVIRONMENTAL PROTECTION

.1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.

.2 Do not dispose of chlorinated water, waste or volatile materials into water courses, storm or sanitary sewers.

.3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

1.29 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.30 ADDITIONAL DRAWINGS

.1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.

.2 Upon request, Departmental Representative may furnish up to a maximum of 5 sets of Contract documents for use by the Contractor at no additional cost. Should more than 5 sets of documents be required the Departmental Representative will provide them at additional cost.

1.31 BUILDING SMOKING ENVIRONMENT

.1 Smoking within the buildings is not permitted.

1.32 SYSTEM OF MEASUREMENT

.1 The metric system of measurement (SI) will be employed on this Contract.

1.33 FAMILIARIZATION WITH SITE

.1 Before submitting tender, visit site – as indicated in tender documents and become familiar with all **conditions likely to affect the cost of the work**.

1.34 SUBMISSION OF TENDER

.1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions.

END OF SECTION

Part 1 General

1.1 PURPOSE

.1 To ensure that both the construction project and the facility operations may proceed without undue disruption or hindrance and that the security of the facility is maintained at all times.

1.2 DEFINITIONS

.1 "Contraband" means:

.1 an intoxicant, including alcoholic beverages, drugs and narcotics;

.2 a weapon, or a component thereof;

.3 an explosive material or compound, or a component thereof, and;

.4 any item not described in paragraphs (.1) to (.3) that could jeopardize the security or the safety of workers or facility persons, when that item is possessed without prior authorization.

.2 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.3 "TC" means Transport Canada.

.4 "PA" means Penticton Airport.

.5 "Construction employees" mean persons working for the General Contractor, the sub-Contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

.6 "Departmental Representative" means the Public Works and Government Services Canada representative defined in General Conditions.

.7 "Perimeter" means the fenced & parking compound limits of the PA facility site.

.8 "Construction limits" means the area, as indicated in the contract documents, that the Contractor will be allowed to work. Limits to be confirmed at the construction start-up meeting.

1.3 PRELIMINARY PROCEEDINGS

.1 At construction start-up meeting:

.1 Discuss the nature and extent of all activities involved in the Project.

.2 Establish mutually acceptable security procedures in accordance with this instruction and the facility's particular requirements.

.2 The Contractor's responsibilities:

.1 Ensure that all construction employees are aware of the security requirements;

.2 Co-operate with the facility's personnel in ensuring that security requirements are observed by all construction employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Entry to facility's property will be refused to any person there may be reason to believe may be a health or security risk.

.2 Any person employed on the construction site will be subject to immediate dismissal from property if they:

.1 appear to be under the influence of alcohol, drugs or narcotics;

.2 behave in an unusual or disorderly manner;

.3 are in possession of 'contraband'.

1.5 VEHICLES

.1 All unattended vehicles on property must have windows closed, doors and trunks locked and keys removed. The keys must be securely in the possession of the owner or an employee of the company that owns the vehicle in the event the vehicle is required to be moved.

.2 The Departmental Representative may limit at any time the number and type of vehicles allowed on the premises.

.3 Drivers of delivery vehicles for material required by the project will be allowed on the premises to coordinate the delivery with the Contractor. Upon delivery they will be required to move their vehicles.

.4 Where Departmental Representative allows construction trailers to be left inside the construction area of the site perimeter, the trailer doors must be locked at all times. All windows must be securely locked when left unoccupied.

1.6 PARKING

.1 The parking area(s) to be used by construction employees will be designated by the Departmental Representative. Parking in other locations will be prohibited and vehicles may be subject to removal.

1.7 SHIPMENTS

.1 To avoid confusion with the facility's own shipments, address all shipments of project material, equipment and tools in the Contractors name and have a representative on site to receive any deliveries or shipments. PWGSC and TC staff will **NOT** accept receipt of deliveries or shipments of any material, equipment or tools.

1.8 TELEPHONES

.1 The installation of telephones, facsimile machines and computers with internet connections maybe permitted within the facility with the approval of the Departmental Representative.

.2 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, telephones used as 2-way radios are permitted within the construction area.

.3 The Departmental Representative may limit the use of 2-way radios, where a disruption to facility operation could occur.

1.9 WORK HOURS

.1 Conform to Section 01 11 55.

.2 A minimum of (72) hours advance notice will be required to obtain permission for work on weekends. In case of emergencies or other special circumstances, this advance notice may be waived by the Departmental Representative.

1.10 OVERTIME WORK

.1 Provide (72) hours advance notice to Departmental Representative for all work to be performed after normal working hours of the facility. Notify the Departmental Representative immediately if emergency work is required, such as to complete remediation's or make the construction site safe and secure.

1.11 ESCORT (COMMISSIONAIRE)

.1 General

.1 The Contractor may require a qualified escort (Commissionaire) during certain times of the work. The Contractor is responsible for providing an estimate of the services (in hours) to be included in their tender submission.

.2 The Commissionaire service and all other associated costs for the Commissionaire are to be carried by the Contractor in the tender.

.2 Allowance

.1 The Contractor shall allow the following rates for the commissionaire services:

.1 At the current hourly rates for Commissionaire services up to eight (8) hours per day.

.2 At the current hourly overtime rate for Commissionaire services in excess of eight (8) hours per day.

.3 The Contractor shall review the Contract Documents and submit within the tender, an allowance of what they regard as the required time needed for the Commissionaire services.

.4 Retain Commissionaire services and coordinate rates directly with the Commissionaires agent by contacting the service directly at: operationscentre@commissionaires.bc.ca

.3 Schedule

.1 The Contractor shall provide to the Departmental Representative a minimum of 48 hour notice in advance of when the commissionaire services will be required.

.4 Payment

.1 The cost for the commissionaire will be assessed towards the contract by change order.

1.12 TOOLS AND EQUIPMENT

.1 Where requested maintain a complete list of all tools and equipment to be used during the construction project.

.2 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.3 Store all tools and equipment in approved locations.

.4 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the Contractor. Secure and lock scaffolding when not erected and when erected secure in a manner agreed upon with the Departmental Representative.

1.13 SMOKING RESTRICTIONS

.1 Smoking is not permitted inside the facility or outdoors within the perimeter of the facility.

.2 Persons in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist may be directed to leave the site.

.3 Smoking is permitted outside the perimeter of the facility in an area designated by the Departmental Representative.

1.14 CONTRABAND

.1 Weapons, explosive materials, alcoholic beverages, drugs and narcotics are prohibited on the site.

.2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Departmental Representative.

.3 Contractors should be vigilant with both their employees and the employees of their subcontractors, vendors and suppliers that the discovery of contraband may result in immediate dismissal of the identified individual(s).

1.15 ACCESS TO AND REMOVAL OF FACILITY PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the facility after normal working hours, unless arranged and approved by the Departmental Representative.

1.16 STOPPAGE OF WORK

.1 The Departmental Representative may request at any time that the Contractor, his employees, subcontractors and their employees stop work or leave the site immediately due to any situation occurring within the facility. The Contractor's site supervisor shall note the name of the facility personnel making the request and the time of the request and follow all given directions.

.2 The Contractor shall advise the Departmental Representative within (24) hours of this delay to the progress of the work.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 All Divisions.

1.2 DESCRIPTION

.1 Mobilization and Demobilization consists of the necessary Work and operations including, but not limited to, the movement to and from the project site of personnel, equipment, supplies, and incidentals to the Site, the establishment of offices, camps, and other facilities necessary to undertake the Work and all other Work Items and operations which must be initiated and finished as part of completion of the Work.

1.3 MEASUREMENT PROCEDURES

.1 Payment will be made under **"Lump Sum Price Item 1 - Mobilization and Demobilization"**.

.2 The Lump Sum Price for mobilization and demobilization includes any or all of the related expenses incurred for mobilization, demobilization and any re-mobilization not covered under the Work Items which must be initiated and finished as part of the Work. The Lump Sum Price for mobilization will be paid in increments as the Work progresses.

Part 2 Products

.1 Not Used.

Part 3 Execution

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 All Divisions.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this specifications document.

1.3 MEASUREMENT PROCEDURES

.1 Cost of providing Construction Progress Schedules will be considered incidental to the work and no additional payment will be made.

1.4 DEFINITIONS

.1 **Activity**: An element of Work performed during course of Project. An activity normally has an expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 **Bar Chart (GANTT chart)**: A graphic display of schedule-related information. In typical bar chart, activities or other project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 **Baseline**: Original approved plan for project, plus or minus approved scope changes.

.4 **Construction Work Week**: Monday to Sunday, inclusive, will provide seven day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 **Duration**: Number of work periods (not including holidays or other nonworking periods) required to complete an activity or other project element, usually expressed as work days or work weeks.

.6 **Master Plan**: A summary-level schedule that identifies major activities and key milestones.

.7 **Milestone**: A significant event in project, usually completion of major deliverable.

.8 **Project Schedule**: The planned dates for performing activities and the planned dates for meeting milestones. A dynamic, detailed record of tasks or activities that must be accomplished to satisfy project objectives. Monitoring and control

process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 **Project Planning, Monitoring and Control System**: Overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.5 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately twenty (20) working days, to allow for progress reporting.

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

1.6 SUBMITTALS

.1 Submit to Departmental Representative within ten (10) working days of Award of Contract, Bar Chart (GANTT) as Master Plan for planning, monitoring and reporting of project progress.

.2 Submit Project Schedule to Departmental Representative within ten (10) working days of receipt of acceptance of Master Plan.

1.7 PROJECT MILESTONES

.1 Refer to Other Contract Documents.

1.8 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as per the Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within five (5) working days.

.3 Revise impractical schedule and resubmit within five (5) working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.9 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.

.2 Permits.

.3 Submission of:

.1 Project Schedule.

.2 List of Sub-Contractors, supplies and Departmental Representative.

.3 Prime Contractor/co-ordination with other Contractors Plan.

.4 Contractor Chain of Command including Sub-Contractors and Departmental Representatives.

.5 Work Plan.

.6 Environmental Protection Plan.

.7 Traffic Management Plan.

.8 Campsite Plan.

.9 Site access/Detour Plan.

.10 Emergency Response Protocol.

.11 Site Specific Health and Safety Plan, incl. MSDS sheets.

.12 On site Contingency and Emergency Response Plan.

.13 Survey Plan.

.14 Quality Control Plan.

.15 Shop Drawings.

.4 Mobilization.

.5 Material Delivery.

.6 Work for all Items including:

.1 Demolition

.2 Quality Control.

.3 Interim inspection.

.4 Site clean-up and demobilization.

1.10 PROJECT SCHEDULE 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.

1.11 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.

Part 2 Products

.1 Not used.

Part 3 Execution

.1 Not used.

END OF SECTION

1.1 GENERAL

.1 This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.

.2 Present shop drawings, product data and samples in SI Metric units.

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

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

.5 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations.

.6 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations.

.7 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative.

.8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.

.9 **Do not proceed with work until relevant submissions are reviewed and approved by the Departmental Representative.**

1.2 SUBMISSION REQUIREMENTS

.1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.

.2 Allow 5 [five] working days for Departmental Representative's review of each submission, unless noted otherwise.

.3 Accompany submissions with transmittal letter, in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.4 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract documents.

.5 Details of appropriate portions of work as applicable.

.1 Fabrication.

.2 Layout, showing dimensions (including identified field dimensions: and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

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

1.3 SHOP DRAWINGS

.1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portion of work which are specific to project requirements.

.2 Maximum sheet size: 850 x 1050 mm.

.3 Submit electronic copy in PDF format and two copies of larger size files in CD format as requested by the Departmental Representative.

.4 Cross-reference shop drawing information to applicable portions of the Contract documents.

1.4 SHOP DRAWINGS REVIEW

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

.2 This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.

.3 This review shall 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.

.4 Without restricting the generality of the foregoing, the Contractor is responsible for:

.1 Dimensions to be confirmed and correlated at the job site.

.2 Information that pertains solely to fabrication processes or to techniques of construction and installation.

.3 Coordination of the work of all sub-trades.

1.5 PRODUCT DATA

.1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.

.2 Delete information not applicable to project.

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

.4 Cross-reference product data information to applicable portions of Contract documents.

.5 Submit 6 copies of product data.

1.6 SAMPLES

.1 Samples: examples of materials, equipment, quality, finishes and workmanship.

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

.3 **Reviewed and accepted samples will become the standard of workmanship and material against which installed work will be verified.**

1.7 PROGRESS SCHEDULE

.1 Submit work schedule and cost breakdown as required in Section 01 11 55.

1.8 TEST RESULTS AND INSPECTION REPORTS

.1 Submit in duplicate test results and inspection reports.

END OF SECTION

1.1 PREFERENCES

.1 Government of Canada.

.1 Canada Labour Code – Part II

.2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):

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

.3 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes

.3 CSA S350-M1980 (R2003) 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 American National Standards Institute (ANSI):

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

.6 Province of British Columbia::

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

.2 Occupational Health and Safety Regulation

.7 Yukon Territory

.1 Occupational Health and Safety Act, R.S.Y.

1.2 RELATED SECTIONS

.1 Refer to the following current NMS sections as required:

.1	Construction Progress Schedules	Section 01 32 18
.2	Shop Drawings, Product Data and Samples	Section 01 33 00

.3	Environmental Procedures	Section 01 35 43
.4	Temporary Facilities	Section 01 51 00
.5	Temporary barriers and enclosures:	Section 01 56 00

1.3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, 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 Departmental Representative may terminate the Contract without liability to Departmental Representative where the Contractor, in the opinion of Departmental Representative, 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 to Departmental Representative submittals listed for review.

.2 Work effected by submittal shall not proceed until review is complete.

.3 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.

.4 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

7 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 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.

.6 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 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Assume responsibility as the Prime Contractor for Work under this Contract.

1.7 GENERAL CONDITIONS

.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.

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

.2 Secure site at night time or provide security guard as deemed necessary to protect site against entry.

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 provisions 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 WORK PERMITS

.1 Obtain specialty permits related to project before start of work.

1.10 FILING OF NOTICE

.1 Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

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/organization chart for project.

.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 Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping 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.

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 Departmental or other emergency responders.

.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.

.6 Notify Departmental Representative.

.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 products intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

.3 Provide adequate means of ventilation in accordance with Section 01 51 00.

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.

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

.2 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 S269.1-1975 (R2003).

1.18 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and B.C. Occupational Health and Safety Regulations.

1.19 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with Provincial regulations. Special attention to the works on CRIB 1 to 8 that might be considered confined spaces.

1.20 POWDER-ACTUATED DEVICES

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

1.21 FIRE SAFETY AND 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 Departmental, the building owner and the tenants, resulting from false alarms.

1.24 UNFORESEEN 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 Sequence of work.

.3 Emergency procedures.

.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

.5 Notice of Project.

.6 Floor plans or site plans.

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

.8 Workplace Hazardous Materials Information System (WHMIS) documents.

.9 Material Safety Data Sheets (MSDS).

.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 the exterior of the principal 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 General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 41 13.

1.2 REFERENCES

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

.2 Reference Standards:

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2008 Stipulated Price Contract.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-[92], Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) [2012].

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Sustainable Design Submittals:

.4 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.5 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.6 Address topics at level of detail commensurate with environmental issue and required construction task[s].

.7 Include in Environmental Protection Plan:

.1 Name[s] of person[s] responsible for ensuring adherence to Environmental Protection Plan.

.2 Name[s] and qualifications of person[s] responsible for manifesting hazardous waste to be removed from site.

.3 Name[s] and qualifications of person[s] responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations [and EPA 832/R-92-005, Chapter 3].

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.4 FIRES

.1 Fires and burning of rubbish on site is not permitted unless specifically approved by Departmental Representative.

1.5 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations[, EPA 832/R-92-005, Chapter 3] [US EPA General Construction Permit].

.2 Provide temporary drainage and pumping required to keep excavations and site free from water.

.3 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials and chlorine.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of [2] m minimum.

.2 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.3 Minimize stripping of topsoil and vegetation.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where directed by Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.9 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CLEANING

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

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

.3 Ensure public waterways, storm and sanitary sewers remain free of chlorinated water, waste and volatile materials disposal.

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

.5 Waste Management: separate waste materials for recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUBMITTAL

.1 Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

.2 Erosion – and Sedimentation – Control Plan.

.3 Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1.2 ACCESS AND DELIVERY

.1 Only the designated entrance may be used for access to the facility.

.1 Maintain for duration of Contract.

.2 Make good damage resulting from Contractor's use.

.2 All contractors are required to use only the main entrance.

.3 Any other use of the facility will be granted to the Contractor through the Departmental Representative.

.1 Unauthorized disposal is not permitted.

.4 Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

.5 Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

.6 Haul Routes:

.1 Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

.2 Confine construction traffic to designated haul routes.

.3 Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

.7 Traffic Signs and Signals:

.1 Provide signs approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

.2 Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

.3 Relocate as Work progresses, to maintain effective traffic control.

1.3 STORAGE FACILITIES

.1 Storage space will be limited to the area of construction.

1.4 POWER

.1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools, and any other power requirements necessary for completion of the Work.

.2 Provide and maintain temporary lighting necessary for the performance of the Work under this contract. Illumination levels shall be in accordance with WorkSafe BC requirements.

1.5 WATER SUPPLY

.1 Water supply is available at the site. Contractor to arrange if needed for personal or construction use previous approval by Departmental Representative. The Contractor shall furnish all necessary pipe or hose extensions to conduct the water to the points of use and shall exercise due care not to waste water.

1.6 SANITARY FACILITIES

.1 No washroom facilities are available onsite. Contractor to arrange portable unit if needed. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the PWGSC, or on adjacent property.

1.7 HEATING

.1 No source of heating exists onsite. Contractor to arrange if needed. If temporary heat is required for the protection of the Work, the Contractor shall provide and install suitable heating apparatus, shall provide adequate and proper fuel, and shall maintain heat as required.

.2 Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged thereby. The Contractor may, at his own risk and expense, use it for providing heat for protection of the Work. Contractor shall provide and pay for all fuel and care necessary.

1.8 SCAFFOLDING

.1 If needed, construct and maintain scaffolding in rigid, secure and safe manner.

.2 Erect independent scaffolding. Remove promptly when no longer required.

1.9 REMOVAL OF TEMPORARY FACILITIES

.1 Remove temporary facilities from site when directed by the Departmental Representative.

1.10 SIGNS AND NOTICES

.1 Signs and notices for safety and instruction shall be in both official languages and graphic symbols conforming to CAN/CSA-Z321.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or when directed by Departmental Representative.

1.11 USE CHARGES

.1 General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Departmental Representative, testing agencies, and authorities having jurisdiction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections 01 51 00.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.2 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)

.1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.

.3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 HOARDING

.1 Erect temporary site enclosures using [38 x 89] mm construction grade lumber framing at [600] mm centres and [1200 x 2400 x 13] mm exterior grade fir plywood to CSA O121.

.2 Apply plywood panels vertically flush and butt jointed.

.3 Provide one lockable truck entrance gate as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.4 Erect temporary site enclosure using new [1.2] m high snow fence wired to rolled steel "T" bar fence posts spaced at [2.4] m on centre. Provide [one] lockable truck gate. Maintain fence in good repair.

.5 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 GUARD RAILS AND BARRICADES

.1 Not Used

1.6 WEATHER ENCLOSURES

.1 Provide weather tight closures to equipment that require as per manufacturer's recommendations.

1.7 ACCESS TO SITE

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

1.8 PUBLIC TRAFFIC FLOW

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

1.9 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse/recycling.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

.1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.

.2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified.

.3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.

.5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.

.1 Prevent electrolytic action between dissimilar metals.

.2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.

.6 Fastenings which cause spalling or cracking are not acceptable.

.7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.8 Use heavy hexagon heads, semi-finished unless otherwise specified.

.9 Bolts may not project more than 1 diameter beyond nuts.

.10 Types of washers as follows:

.1 Plain type washers: use on equipment and sheet metal.

.2 Soft gasket lock type washers: use where vibrations occur.

.3 Resilient washers: use with stainless steel.

.11 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

.12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.

.13 Store products in accordance with suppliers' instructions.

.14 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction:

.1 Use primer or enamel to match original.

.2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

.1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided.

.2 Defective products will be rejected regardless of previous inspections.

.1 Inspection does not relieve responsibility, but is precaution against oversight or error.

.2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.

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

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

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

1.3 AVAILABILITY OF PRODUCTS

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.

.3 In event of failure to notify Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time.

1.4 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in the specifications, install or erect products in accordance with the manufacturer's instructions.

.1 Do not rely on labels or enclosures provided with products.

.2 Obtain written instructions directly from the manufacturer.

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

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

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

.1 Products are specified by **"Prescriptive" specifications**: select any product meeting or exceeding specifications.

.2 Products specified under **"Acceptable Products"** (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".

.5 When products are specified by a referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 **Proposals for substitution may only be submitted after Contract award.** Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

.1 products selected by tenderer from those specified are not available;

.2 delivery date of products selected from those specified would unduly delay completion of Contract, or

.3 alternative product to that specified, which is brought to the attention of considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.

.4 **Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.**

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-94, Stipulated Price Contract.

.2 DOCUMENT 14 – 2000, Design-Build Stipulated Price Contract (CCA, CSC, RAIC).

.3 DOCUMENT 15 - 2000, Design-Builder/Consultant Contract (CCA, CSC, RAIC).

1.2 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

1.3 SURVEY REFERENCE POINTS

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

.2 Make no changes or relocations without prior written notice to Departmental Representative.

.3 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

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

1.4 SURVEY REQUIREMENTS

.1 Establish permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

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

.3 Establish pipe invert elevations.

.4 Establish lines and levels for mechanical work.

.5 Confirm piping lengths required.

1.5 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.

1.6 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.

1.7 RECORDS

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

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

1.8 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

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

1.9 SUBSURFACE CONDITIONS

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Specifications document.

1.2 RELATED SECTION

.1 Section 01 25 20 – Mobilization and Demobilization

.2 Section 01 32 18 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Section 01 33 00 – Shop Drawings, Product Data and Samples

.4 Section 01 35 43 – Environmental Procedures

.5 Section 01 78 00 – Closeout Procedures

1.3 MEASUREMENT PROCEDURES

.1 This work shall be considered incidental to contract and will not be measured for payment.

1.4 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.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.

.3 Clear snow and ice from access to work areas during active construction periods and when access to environmental protection facilities required outside active construction times.

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

.5 Provide on-site bear proof containers for collection of waste materials and debris.

.6 Remove waste material and debris from site at end of each working day.

.7 Dispose of waste materials and debris off site.

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

.9 Provide adequate ventilation during use of volatile or noxious substances.

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

1.5 FINAL CLEANING

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

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

.3 Remove waste products and debris including that caused by Owner or other Contractors.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

.6 Inspect finishes, and ensure specified workmanship and operation.

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

.9 Clean drainage systems.

Part 2 Products

.1 Not Used.

Part 3 Execution

.1 Not Used.

END OF SECTION

1.1 RELATED WORK

.1 Refer to every technical section for waste management and disposal.

1.2 DEFINITIONS

.1 Waste Audit (WA): relates to projected waste generation. Involves controlled separation of waste.

.2 Waste Reduction Workplan (WRW): a written report which addresses opportunities for reduction, re-use or recycling of materials.

.3 Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.

1.3 MATERIALS SOURCE SEPARATION

.1 Before project start-up, prepare Materials Source Separation Program. Provide separate containers for re-usable and/or recyclable materials of the following:

.1 Metals.

.2 Wood.

.3 Plastics

.4 Other materials as indicated in technical sections.

.2 Implement Materials Source Separation Program for waste generated on project in compliance with approved methods and as approved by Departmental Representative.

.3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.4 Locate separated materials in areas which minimize material damage.

1.4 DIVERSION OF MATERIALS

.1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the Departmental Representative and consistent with applicable fire regulations.

.1 Mark containers.

.2 Provide instruction on disposal practices.

1.5 STORAGE, HANDLING AND APPLICATION

.1 Do work in compliance with Waste Reduction Workplan.

.2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.

.3 Materials in separated condition: collect, handle, store on site, and transport off-site to an approved and authorized recycling facility.

.4 Materials must be immediately separated into required categories for re-use or recycling.

.5 Unless specified otherwise, materials for removal become the Contractor's property.

.6 On-site sale of salvaged/recyclable material is not permitted.

.7 **Provide Departmental Representative with receipts** indicating quantity of material delivered to landfill.

.8 **Provide Departmental Representative with receipts** indicating quantity and type of materials sent for recycling.

END OF SECTION

1.1 SUBMISSION

.1 Prepare instructions and data by personnel experienced in maintenance and operation of described products.

.2 Revise content of documents as required before final submittal.

.3 Ensure spare parts, maintenance materials and special tools provided are new, neither damaged nor defective, and of same quality and manufacture as products provided in work.

.4 If requested, furnish evidence as to type, source and quality of products provided.

.5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.2 FORMAT

.1 Organize data in the form of an instructional and electronic manual.

.2 Binders: vinyl, hard covered, 3 "D" ring, loose leaf 219x279 mm with spine and face pockets.

.3 Cover: identify each binder with typed or printed title "Project Record Documents"; list title of project and identify subject matter of contents.

.4 Arrange content by systems under section numbers and sequence of Table of Contents.

.5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.6 Text: manufacturer's printed data, or typewritten data.

.7 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.3 CONTENTS, EACH VOLUME

.1 Table of contents – provide the following:

.1 Title of project.

Date of submission.

.2 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product data: mark each sheet to clearly identify products and component parts, and data applicable to installation. Delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.4 AS-BUILT DOCUMENTS

.1 **Contract drawings** and shop drawings: legibly mark each item to record actual construction, including:

.1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.2 Field changes of dimension and detail.

.3 Changes made by change orders.

.4 Details not on original Contract drawings.

.5 References to related shop drawings and modifications.

.2 **Contract Specifications**: legibly mark each item to record actual "Workmanship of Construction", including;

.1 Manufacturer, trade name, and catalogue number of each "Product/Material" actually installed, particularly optional items and substitute items.

.2 Changes made by addenda and change orders.

.3 As-built information:

.1 Record changes in red ink.

.2 Mark on 1 set of drawings, specifications and shop drawings at completion of project and, before final inspection, neatly transfer notations to second set.

.3 Provide 1 set of CDs in AutoCAD, Revit and PDF file format with all as-built information on the CDs.

.4 Submit all sets for the Departmental Representative.

1.5 EQUIPMENT AND SYSTEMS

.1 Operating procedures – include the following:

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

.2 Regulation, control, stopping, shutdown, and emergency instructions.

.3 Summer, winter, and any special operating instructions.

.2 Maintenance requirements – list routine procedures:

.1 _____

.2 _____

.3 _____

.4 _____

.3 Provide servicing and lubrication schedule, and list of lubricants required.

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

.5 Include sequence of operation by controls manufacturer.

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

.7 Provide installed control diagrams by controls manufacturer.

.8 Provide Contractor's coordination drawings with installed colour coded piping diagrams.

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

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

.11 Additional requirements: as specified in individual specification Sections.

1.6 MANUFACTURER'S DOCUMENTATION REPORTS

.1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and system, instruct Departmental Representative's indicated facility's personnel, and provide detailed written report that demonstration and instructions have been completed.

.2 Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.7 WARRANTIES, BONDS, TEST REPORTS, INSPECTION REPORTS

.1 Separate each Document with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier and manufacturer with name, address, and telephone number of responsible principal.

.3 Obtain Warranties, Bonds, Test Results, Inspection Reports executed in duplicate by subcontractors, suppliers, manufacturers, and inspection agencies within 10 days after completion of the applicable item of work.

.4 Except for items put into use with the Departmental Representative's permission, leave date of beginning of time of warranty until the date of substantial performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

1.8 COMPLETION

.1 Submit a written certificate that the following have been performed:

.1 Work has been completed and inspected for compliance with the 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 the utility companies have been submitted.

.5 Operation of systems has been demonstrated to the personnel indicated by the Departmental Representative.

.6 Work is complete and ready for final inspection.

END OF SECTION

1.1 SECTION INCLUDES

.1 Includes general requirements for commissioning facilities and facility systems.

1.2 DEFINITIONS

.1 Acronyms:

.1 AFD – Alternate Forms of Delivery, service provider.

.2 Cx – Commissioning.

.3 O&M – Operation and Maintenance.

.4 PI – Product Information.

.5 PV – Performance Verification.

.6 TAB – Testing, Adjusting and Balancing.

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

1.3 QUALITY ASSURANCE

.1 Testing organization or Personnel: Organization or personnel is qualified 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.

1.4 REFERENCES

.1 Not Used

1.5 SUBMITTALS

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

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

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

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

.5 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.

1.6 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.

1.7 CONTRACTOR'S RESPONSIBILITIES

.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.

1.8 PREPARATION

.1 Provide instruments required for testing, adjusting, and balancing operations.

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

.3 Retain possession of instruments and remove at completion of services.

.4 Verify systems installation is complete and in continuous operation.

.5 Verify equipment are in full operation.

1.9 FINAL REPORTS

.1 Organization having managerial responsibility shall make reports.

.2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.

.3 Identify each instrument used, and latest date of calibration of each.

1.10 COMPLETION OF COMMISSIONING

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

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section includes:

.1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Special procedures as specified in relevant technical sections.

.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Operation and Maintenance Manual (O & M) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the O & M at completion of work.

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

.3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.5 SAMPLES OF COMMISSIONING FORMS

.1 Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.

.2 Revise items on Commissioning forms to suit project requirements.

.3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

.1 When additional forms are required, but are not available from Departmental Representative develop appropriate verification forms and submit to Departmental Representative for approval prior to use.

.1 Additional commissioning forms to be in same format as provided by Departmental Representative

1.7 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.

.2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.

.3 Confirm operation as per design criteria and intent.

.4 Identify variances between design and operation and reasons for variances.

.5 Verify operation in specified normal and emergency modes and under specified load conditions.

.6 Record analytical and substantiating data.

.7 Verify reported results.

.8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.

.9 Submit immediately after tests are performed.

.10 Reported results in true measured SI unit values.

.11 Provide Departmental Representative with originals of completed forms.

.12 Maintain copy on site during start-up, testing and commissioning period.

.13 Forms to be both hard copy and electronic format with typed written results.

1.8 LANGUAGE

.1 To suit the language profile of the awarded contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies demolition and removal of the pump house, reservoir, utilities, piping, valves, structures, chambers, and debris.

1.2 REFERENCES

.1 Canadian Council of Ministers of the Environment (CCME)

.1 PN 1326-[July 2005], Environmental Code of Practice for aboveground and underground tank systems containing petroleum products and allied petroleum products.

.2 Canadian Standards Association (CSA International)

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

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.1 Convene pre-demolition meeting one week prior to beginning work of this Section to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other subtrades.

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

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.3 Hold project meetings every week.

.4 Ensure key personnel, site supervisor, project manager attend.

.5 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative when unforeseen delays occur.

.3 Removal of equipment and decommission of pump house and reservoir will proceed only after the new watermain connection is installed, tested and disinfected and the Airport facilities are supplied by the new water system.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Work Execution Plan:

.1 Provide description of the method and schedule of various tasks required to complete the work in a manner that unhindered access and use of the facility is guaranteed at all times. Work Execution Plan to be submitted and approved by the Departmental Representative prior to beginning of Work.

.4 Waste Reduction Workplan:

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 19 and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of haulers, waste facilities, waste receiving organizations.

.5 Certificates:

.1 Submit copies of certified weigh bills, bills of lading, receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on weekly basis upon request of Departmental Representative.

.2 Written authorization from Departmental Representative is required to deviate from haulers, facilities, receiving organizations listed in Waste Reduction Work plan.

.6 Before proceeding with demolition of walls and where required by authority having jurisdiction submit for review by Departmental Representative shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the Province of British Columbia in Canada showing proposed method.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with applicable Federal, Provincial regulations.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection.

.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative.

.2 Remove and store materials to be salvaged, in manner to prevent damage.

.3 Store and protect in accordance with requirements for maximum preservation of material.

.4 Handle salvaged materials as new materials.

.2 Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.

.3 Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.

1.7 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Perform work in accordance with Section 01 35 43 – Environmental Procedures.

.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.6 Protect trees, plants and foliage on site and adjacent properties where indicated.

.7 Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

.2 Existing Conditions.

.1 Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain; any damaged items shall be repaired or replaced as approved by the Departmental Representative.

.2 The contractor shall be liable for damage to improvements and utilities at the worksite. Utilities may exist and not be shown on the construction plans. The site shall be carefully scrutinized for evidence of utilities.

.3 The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Resident Engineer's approval.

.4 Remove contaminated or hazardous materials as defined by authorities having jurisdiction or as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance.

Part 2 Products

2.1 EQUIPMENT

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

Part 3 Execution

3.1 PREPARATION

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect and Cap Designated Mechanical Services.

.1 Underground Services: remove and dispose of as indicated as directed by Departmental Representative.

.5 Survey Markers and Monuments:

.1 Not Applicable

3.2 PUMP HOUSE DECOMMISION

.1 All equipment, piping, surface mounted fixtures and conduits to be removed

.2 Existing lighting and heaters to remain and protected during demolition

.3 Existing electrical service and lighting panel to remain. All electrical wiring and panels needed to maintain power and heating lighting to remain

3.3 RESERVOIR DECOMMISION

.1 Reservoir will be dewatered and dried before decommission

.2 Remove all existing equipment, electricals and control

.3 Remove hatch and seal de void with steel plate

3.4

3.5

3.6 REMOVAL OF HAZARDOUS WASTES

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.7 REMOVAL OPERATIONS

.1 Remove items as indicated upon receiving approval from Departmental Representative.

.2 Do not disturb items designated to remain in place.

.3 Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Departmental Representative. When Utility lines are encountered that are not indicated on the drawings, the Departmental Representative shall be notified prior to further work in that area.

.4 Removal of pavements, curbs and gutters:

.1 Not Applicable

.5 Structure Removal, Pipes:

.1 This item shall consist of removing the existing pipes on the construction drawings. This includes the complete removal of the pipes.

.2 Approximate locations of pipes to be removed are shown on the construction drawings. Actual locations shall be determined during construction operations.

.3 Salvage of the materials will be acceptable upon approval of the Departmental representative.

.4 Materials not suitable to be buried or salvaged shall be disposed of at an offsite disposal area of the Contractor's own choosing and at the Contractor's own expense in accordance with provincial and local regulations.

.5 Plastic and steel pipes must be removed from the site and properly disposed of.

.6 Stockpile topsoil for final grading and landscaping:

.1 Not Applicable

.7 Salvage:

.1 Dismantle items containing materials for salvage and stockpile salvaged materials.

.8 Disposal of Material:

.1 Dispose of materials not designated for salvage at authorized facilities approved in Waste Reduction Workplan.

.9 Backfill:

.1 Not Applicable

3.8 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.9 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Transport material designated for alternate disposal using approved haulers, facilities, receiving organizations listed in Waste Reduction Workplan and in accordance with applicable regulations.

.1 Written authorization from Departmental Representative is required to deviate from haulers facilities receiving organizations listed in Waste Reduction Workplan.

.4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.

.2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.10 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work match condition of adjacent, undisturbed areas.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.11 CLEANING

.1 Progress Cleaning:

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

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

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

.3 Waste Management: separate waste materials for reuse recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.12 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

.2 Chemical pollution:

.1 The contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to temporarily collect and contain chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer washwater, or asphalt, produced as a by-product of the construction activities. Pollutants shall be disposed in accordance with appropriate provincial and federal regulations. At the completion of the construction work, sumps shall be removed and the area shall be graded in accordance with the final grading plan. Sump removal shall be conducted without causing pollution.

.3 Air pollution:

.1 The burning of brush or slash and the disposal of other materials shall adhere to state and local regulations.

.2 All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust. All dust control methods shall ensure safe construction operations at all times. If chemical dust suppressants are applied, the material shall be a commercially available product specifically designed for dust suppression and the application shall follow manufacturer's requirements and recommendations. A copy of the product data sheet and manufacturer's recommended application procedures shall be provided to the contracting representative at least 5 working days before the first application.

.4 Maintenance, removal, and restoration

.1 All pollution control measures and temporary works shall be adequately maintained in a functional condition for the duration of the construction period. All temporary measures shall be removed and the site shall be graded to achieve the final grade as specified in the construction plans.

END OF SECTION

1. GENERAL

1.1 Description

.1 This Section specifies the supply, installation and testing of process valves used for isolation, PRV, and bypass.

1.2 Definitions

.1 Detailed Valve Specification Sheets:

.1 Detailed valve specification sheets are provided in Section 23 31 15 for each type of valve identified in the drawings.

.2 Where there is a conflict between valves described in this Section and other valves described in Contract Documents, conform to the more stringent requirements.

1.3 Submittals

.1 Shop Drawings: Submit the following information in accordance with Section 01 33 00:

.1 Catalog cuts and/or shop Drawings for each type of valve indicating the valve number, materials of construction, dimensions, head loss characteristics through the valve, operating torque and valve end configuration.

.2 An amended Detailed Valve Specification Sheet for all valves. Indicate with check marks where the valve supplied meets the requirements specified and with written amendments where the product differs from the specification.

.2 Operating and Maintenance data for incorporation in Operation and Maintenance Manual, as specified in Section 01 33 00. Include complete description of operation together with detailed Drawings, a complete list of replacement and repair parts, and parts Manufacturer's identifying numbers.

.3 Affidavits and registration numbers described below in Quality Assurance.

1.4 Quality Assurance

.1 Provide affidavits of compliance, as required by AWWA C500 for gate valves.

.2 For pressure reducing valves, provide affidavits of compliance with ASTM A536-65/45/12.

.3 Valves are to be marked in accordance with MSS SP-25.

1.5 Shipment, Protection and Storage

.1 Deliver valves to site in accordance loading methods which do not damage casings or coatings.

.2 Clearly tag valves stating size, type, coatings and mating parts.

.3 Store on-site until ready for incorporation in the Work using methods recommended by the manufacturer to prevent damage, undue stresses, or weathering.

2. PRODUCTS

2.1 General

.1 Provide valves of the same type, size range and service from a single manufacturer.

.2 Provide new, unused valves for the Work.

.3 Valve materials to be free from defects or flaws, with true alignment and bores.

.4 Unless otherwise indicated, valves shall be the same size as the pipe run in which they are to be installed.

.5 Clearly mark valve bodies in raised lettering to indicate the valve type, rating, and where applicable, the direction of flow. Conform to MSS SP25.

.6 Provide padlockable lockout feature on all sizes of the following valve types.

.7 Valves to open counter-clockwise.

2.2 Valve Ends

.1 In pipe runs less than 75 mm diameter provide valves with female threaded ends, unless indicated otherwise. Threads to conform to ANSI B1.20.1.

.2 Valves in pipe runs equal to or greater than 75 mm diameter to be flanged unless indicated otherwise.

.3 For cast iron body valves, drill flanges to Class 300 pattern conforming to ANSI B16.1. For steel body valves, flanges to be Class 150 pattern or Class 300 pattern conforming to ANSI B16.5.

.4 Do not use grooved joint valve ends.

.5 Use flanged joints for buried and exterior valves. The flanges are to be compatible with the pipe and jointing technique used.

.6 Lug style wafer body valves shall have tapped holes, suitable for the bolt spacing of the pipe flanges placed on either side.

.7 Wafer body valves shall have positioning holes, suitable for the bolt spacing of the pipe flanges placed on either side.

.8 Use wafer body butterfly valves only for control applications, and only if other valve(s) are provided for blocking and isolation. Use lug style or flanged wafer body butterfly valves if the function is blocking and isolation, including control valves where separate block and isolation valves are not provided.

.9 For gate valves, end flanges shall be integral with the gate valve body and be faced and drilled in accordance with ANSI B16.5, Class 300 flanges.

2.3 Valve Boxes

.1 Provide valve boxes for all buried valves as per the Drawings and standard details.

2.4 Insulation

.1 Insulate valves as specified on drawings.

.2 Preform insulation in a shape suitable for the valve, of the same material specified for piping.

.3 Recovering to be as specified for piping, with transition sections for the joints between the valve insulation and the pipe insulation.

.4 Insulation to be removable and reusable without destroying insulation or recovering.

2.5 Pressure (Self) Regulating Valves

.1 Pressure (self) regulation (PRV) valves shall be supplied, installed and calibrated under this Division.

2.6 Protective Coatings

.1 Unless otherwise specified, provide valves epoxy coated.

3. EXECUTION

3.1 Preparation

.1 The valve and piping arrangement indicated in the Drawings is based on typical dimensions for valves of the specified type. Make the necessary modifications in the piping to allow for discrepancies between the valve dimensions shown and those supplied for the Work.

.2 Prior to the installation of the valves, field measure and check all equipment locations, pipe alignments, and structural installation. Ensure that the valve location and orientation provides suitable access to manual operators and that sufficient space and accessibility is available for pneumatic and electric actuators.

.3 Where conflicts are identified, inform the Department Representative and initiate the necessary piping modifications at no cost to the Owner.

3.2 Valve Installation

.1 In horizontal pipe runs other than in locations where space does not permit, mount all valves except for butterfly valves and trunnion ball valves with a vertical operating shaft with the actuator at the top. Avoid installing install a valve with the operator shaft pointing down.

.2 Mount butterfly valves and trunnion ball valves with the shaft in a horizontal orientation unless impractical.

.3 Mount valves in a position for easy access to the operators and maintenance personnel.

.4 When joining valves to pipe or fittings, do not over torque bolts to correct for misalignment.

.5 Support valves in position using temporary supports until valves are fixed in place.

.6 Permanently support valves to prevent transmission of loads to adjacent pipework and/or equipment.

.7 Where valves are installed in PVC pipework greater than 100 mm diameter, support valves independently and brace against operating loads and torque to prevent transmission of stresses to the adjacent pipework.

.8 Generally pipe supports and hangers are not shown unless for indication purposes only.

.9 Install gate valves in the closed position.

.10 Install valves which are bubble tight in one direction to seal in a direction opposite to normal flow unless otherwise noted or directed by the Department Representative.

.11 Unless otherwise specified, install single seated ball valves and knife gate valves with the seat downstream. Install at tank connections with seat away from tank. Install on pump discharge and suction lines with seat adjacent to the pump.

.12 Install all valves in accordance with the manufacturer's recommendations.

.13 Protect valves installed below grade with a shrink sleeve or polyethylene sheath attached to the pipe with tapewrap.

.14 Insert wafer and lug wafer butterfly valves between the flanges in the closed position, align and bolt finger-tight. Then open the valve fully before torking the bolts. Test that the disk does not catch the edge of the flange on closing and opening.

3.3 Valve Testing

.1 Ensure that the position indicated by the lever or actuator matches the actual position of the valve.

.2 Operate valves under simulated and/or real process conditions to ensure they operate as intended.

.3 Pressure test the valves in conjunction with the pipes in which the valves are installed.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00.

.2 Section 01 74 19.

.3 Section 01 78 00.

1.2 REFERENCES

.1 Aluminum Association (AA)

.1 AAI DAF45, Designation System for Aluminum Finishes.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 41-GP-6M, Sheets, Thermosetting Polyester Plastics, Glass Fibre Reinforced.

.3 Canadian Standards Association (CSA)

.1 CSA W47.2, Certification of Companies for Fusion Welding of Aluminum.

.2 CSA W59.2, Welded Aluminum Construction (Metal Arc Welding).

.4 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual.

1.3 SUBMITTALS

.1 Submit representative sample of each type of sign, sign image and mounting method, including, but not limited to graphic, cast letters, sign box installation method, channel letters and wall plates fixed mounting installation method.

.2 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods, schedule of signs.

.3 Submit drawn-to-scale details for individually fabricated or incised lettering indicating word and letter spacing.

.4 Submit representative sample of each type sign, sign image and mounting method.

.5 Submit manufacturer's printed product literature panel signage or components, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.6 Submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.4 MAINTENANCE DATA

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

1.5 QUALITY ASSURANCE

.1 Welding Certification in accordance with CSA W47.2.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Aluminum extrusions: to AA 6063-T5 or AA 6006-T5.

.2 Sheet aluminum: utility quality.

.3 Prefinished sheet aluminum: plain utility sheet with manufacturer applied baked enamel finish 0.25 mm thick on face and 0.0076 mm thick on back.

.4 Casting aluminum: CSA HA Series - HA.9-SG7ON-T6.

.5 Acrylic sheet: polymethylmethacrylate (PMMA) cast sheet suitable for intended use in sign fabrication, colours as indicated.

.6 Engraving sheet: lamicoid 3.2 mm thick plastic sheet, white core.

.7 Self-stick foam tape: 1.6 mm thick, 352.4 kg/m3 density polyurethane open-cell foam tape for sign purposes, with synthetic self-stick adhesive on both sides. Width: to suit sign sizes.

.8 Adhesives, paints, sealants and solvents for acrylic sheet: type recommended by sheet manufacturer for applicable condition.

.9 Acrylic top-coat: clear, non-yellowing, exterior grade, satin finish, acrylic polyester resin protective coating, compatible with acrylic surface of type recommended by sheet manufacturer.

.10 Bituminous paint: to CAN/CGSB-1.108, type 2.

2.2 SIGN GRAPHICS

.1 Sign graphics to be well defined, arranged for balanced appearance, and properly word and letter spaced.

.2 Cut and spray process: mask surfaces, accurately cut-out image, then spray apply uniform coating to obtain opaque finish.

.3 Silk screen process: apply multi-colour photographic produced silk screen printed images to back side of transparent sign faces; face side of opaque sign faces.

.4 Engraving: apply sign images using pantograph mechanical engraving machine to obtain incised letters as detailed or specified.

.5 Self-stick vinyl film: individual letters and numerals and symbols die cut from 0.1 mm thick black integral colour, matte finish, exterior grade PVC film, with self-stick adhesive backing.

.6 Decals: silk screened or printed images on 0.038 mm, clear matte finish, mylar film, with self-stick adhesive backing. Protect image with laminated film overlay of same material as decal base.

2.3 CUT-OUT LETTERS

.1 Cut letters and symbols from coloured acrylic.

.2 Helvetica typeface, upper and lower case; sizes and thicknesses as indicated. Make corners square cut.

2.4 WALL PLATES

.1 Plastic wall plates:

.1 Fabricate from colour acrylic sheet 3.2 mm. Sizes as indicated.

.2 Sign graphics: apply by engraving.

.2 Metal wall plates:

.1 Fabricate from sheet aluminum sign plates, minimum 3.2 mm thick, with colour anodized finish. Sizes as indicated.

.2 Sign graphics: apply by engraving.

.3 Cast Aluminum Letters: (exterior):

.1 Supply and install cast aluminum letters 250 mm high in upper case Helvetica Bold. Lettering to read "name of Building", Finish color to be as selected by Owner's Representative.

.4 Interchangeable mounting: supply wall plates with approved type, semi-concealed, retaining holders that permit quick but vandal-resistant interchange of sign face. No exposed fasteners permitted. Exposed portions to match sign face.

.5 Fixed mounting: prepare wall plates for fixing by surface fasteners with rosette covers. Include back-up plates for fixing to uneven surfaces where required.

.6 Bracket mounting: fabricate brackets for wall projecting or ceiling suspended sign plates as detailed: of clear acrylic 4.8 mm thick.

2.5 DOOR PLATES

.1 Fabricate sign faces of color acrylic sheet. Sizes as indicated.

.2 Sign graphics: apply by engraving, with 25 mm high letters. Signs to be mounted on outside of doors.

.3 Interchangeable mounting: supply door plates with approved type, semi-concealed, retaining holders that permit quick but vandal-resistant interchange of sign face. No exposed fasteners permitted. Exposed portions to match sign face.

.4 Fixed mounting: use self-stick foam tape.

.5 Mounting on transparent surfaces: use self-stick foam tape. Include blank back-up plate for opposite side.

.6 Washroom pictographs: cut-out figures without backgrounds.

2.6 NUMBER PLATES

.1 Fabricate number plates for doors of engraving sheet. Size as indicated.

.2 Engrave 9.5 mm high, single line numerals incised to expose contrasting coloured core.

2.7 GENERAL FABRICATION REQUIREMENTS

.1 Fabricate signs in accordance with details, specifications and shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Accurately fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 Exposed fasteners permitted only where indicated or approved by Owner's Representative and to be inconspicuous and same finish and colour as base material, or as noted.

.6 Polish exposed edges of plastic and metal to smooth, slightly convex profile.

.7 Apply bituminous paint to aluminum in contact with dissimilar metals, concrete or masonry.

.8 Manufacturer's nameplates on sign surface locations visible in completed work not acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Erect and secure signs plumb and level at elevations indicated.

.2 Comply with sign manufacturer's installation instructions and approved shop drawings.

.3 Mechanical attachment:

- .1 To concrete or solid masonry use lag screws and expansion bolts or screws and fibre plugs, as appropriate for stresses involved.
- .2 To hollow masonry use toggle bolts or equivalent.
- .3 To steel use bolts with nut and lock washers, self-tapping screws, welding, as appropriate for stresses and metal thicknesses.
- .4 To wood use screws.
- .5 Secure into framing members behind stud walls or above ceilings.
- .6 Mechanical fasteners on exterior to be non-staining, non-ferrous type.
- .7 Fabricate special fasteners as required for installation conditions.
- .8 Mechanical fasteners and methods of attachment subject to Owner's Representative approval. Obtain Owner's Representative approval before fixing to structural steel.

.4 Adhesive attachment:

- .1 Use self-stick adhesive foam tape to manufacturer's instructions to adequately fix sign and prevent "rocking". Keep tape maximum 1.6 mm from edges.

3.2 CLEANING

.1 Leave signs clean. Remove debris from interior of sign boxes.

.2 Touch up any damaged finishes.

3.3 COMMISSIONING

.1 Instruct Owner on care and cleaning.

END OF SECTION

Part 1 General

1.1 DESCRIPTION:

.1 This section includes materials and installation of markers, labels, and signs for pipes, ducts, and valves; for mechanical equipment; for hazardous materials warnings.

Section includes:

.1 Underground type plastic line markers.

.2 Warning signs and labels.

.3 Pipe labels.

.4 Stencils.

.5 Valve tags.

.6 Warning tags.

.7 Piping system color coding schedule.

Identification furnished as part of equipment is specified as part of equipment assembly in other sections and shall comply with requirements of this section.

1.2 REFERENCES:

.1 American Society of Mechanical Engineers (ASME):

.1 A13.1: Scheme for the Identification of Piping Systems

.2 American Society of Testing and Materials (ASTM):

.1 D709: Standard Specification for Laminated Thermosetting Materials

1.3 SUBMITTALS:

.1 Submit the following shop drawings in accordance with Section 01 33 00.

.1 Product Data: For each type of product indicated.

.2 Samples: For color, letter style, and graphic representation required for each identification material and device.

.3 Shop Drawings:

.1 Submit valve schedule for each piping system, typewritten and produced on 8 1/2 inches by 11 inches bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves intended for emergency shut off and similar special uses, by special flags in schedule margin. In addition to mounted copies, furnish extra copies for maintenance manuals.

1.4 QUALITY ASSURANCE:

.1 Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 yrs.

.2 Regulatory Requirements:

.1 ANSI Standards: Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 MAINTENANCE:

.1 Extra Materials:

.1 Furnish minimum 5 percent extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in extra stock along with required stock of stenciling paints and applicators.

1.6 COORDINATION:

.1 Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

.2 Coordinate installation of identifying devices with locations of access panels and doors.

.3 Install identifying devices before installing acoustical ceilings and similar concealment.

Part 2 - PRODUCTS

2.1 MECHANICAL IDENTIFICATION MATERIALS:

.1 Provide manufacturer's recommended products as specified for each application.

.2 Where more than single type is specified for application, selection is installer's option, but provide single selection for each product category.

.3 Bands, markers, and identification materials used in process locations shall be rated for exterior application and suitable for withstanding occasional wash down.

2.2 EQUIPMENT LABELS:

.1 Metal Labels for Equipment:

.1 Material and Thickness: Stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.

.2 Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

.3 Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

.4 Fasteners: Stainless-steel rivets or self-tapping screws.

.5 Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

.2 Plastic Labels for Equipment:

.1 Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1.6 mm (1/16 inch) thick, and having predrilled holes for attachment hardware.

.2 Background Color and Letter Color: As identified in Schedule 10 14 10.

.3 Maximum Temperature: Able to withstand temperatures up to 71 degrees C.

.4 Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

.3 Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

.4 Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2 inch by 11 inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

.5 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

.6 Label and band colors in accordance with ASME A13.1, Pipe Identification Schedule 10 14 13-2 and following:

.1 Lettering and arrows as identified in Schedule 10 14 13-2, or as follows:

.1 Black on yellow background for inherently hazardous materials.

.2 White on blue (gaseous) or green (liquid) for low hazard materials.

.3 White on red background for fire quenching materials.

.2 Banding: Colors and band spacing are presented in Schedule 10 14 13-2.

2.3 PAINTED DUCTWORK IDENTIFICATION:

.1 Stencils: Standard fiberboard stencils prepared for required applications with letter sizes generally complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1 1/4 inches high letters for ductwork and not less than 3/4 inch high letters for access door signs and similar operational instructions.

.2 Stencil Paint: Standard exterior type stenciling enamel, black except as otherwise indicated; either brushing grade or pressurized spray can form and grade.

.3 Nomenclature: Include following:

.1 Direction of air flow (arrow).

.2 Duct service (supply, return, exhaust, etc.).

.3 Hazardous Exhausts: List duct origin (chlorine room, fume hood, wet well, etc.).

2.4 PLASTIC DUCTWORK MARKERS:

.1 Provide manufacturer's standard laminated plastic, color coded, adhesive duct markers. Conform to the color code as follows:

.1 Black letters on white background for non-hazardous areas.

.2 For hazardous exhausts, use black letters on yellow background.

.2 Nomenclature: Include following:

.1 Direction of air flow (arrow).

.2 Duct service (supply, return, exhaust, etc.).

.3 Hazardous Exhausts: List duct origin (chlorine room, fume hood, wet well, etc.).

2.5 UNDERGROUND TYPE PLASTIC LINE MARKERS:

.1 Permanent, bright colored, continuous printed plastic tape, intended for direct burial service; not less than 6 inches wide by 4 mils thick. Provide tape with printing most accurately indicating type of service of buried pipe.

.2 Provide multi ply tape consisting of solid aluminum foil core between 2 layers of plastic tape.

2.6 WARNING SIGNS AND LABELS:

.1 Engraving stock melamine plastic laminate complying with ASTM D709 in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, white with black core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting necessary because of substrate.

.2 Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) thick, and having predrilled holes for attachment hardware.

.3 Letter Color: As identified in Schedule 10 14 13-2.

.4 Background Color: As identified in Schedule 10 14 13-2.

.5 Maximum Temperature: Able to withstand temperatures up to 160 degrees F (71 degrees C).

.6 Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

.7 Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

.8 Fasteners: Stainless-steel.

.9 Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

.10 Label Content: Include caution and warning information, plus emergency notification instructions.

2.7 PIPE LABELS:

.1 General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

.2 Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

.3 Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

.4 Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

.1 Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

.2 Lettering Size: At least 1-1/2 inches (38 mm) high.

2.8 STENCILS:

.1 Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.

.1 Stencil Material: Aluminum.

.2 Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.

.3 Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.9 2.10 VALVE TAGS:

.1 Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

.1 Tag Material: Stainless steel, 0.025-inch (0.64 mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.

.2 Valve Schedules: For each piping system, on 8-1/2 inch by 11 inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

.1 Valve-tag schedule shall be included in operation and maintenance data.

2.10 WARNING TAGS:

.1 Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

.1 Size: 3 by 5-1/4 inches (75 by 133 mm) minimum

.2 Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."

.3 Color: Yellow background with black lettering.

Part 3 EXECUTION

3.1 PREPARATION:

.1 Coordination: Where identification are to be applied to surfaces requiring insulation, painting or other covering or finish including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 PIPING SYSTEM IDENTIFICATION:

.1 Locate pipe markers with arrows and color bands as follows wherever piping exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), and exterior non concealed locations.

.1 Near each valve and control device.

.2 Near locations where pipes pass through walls or floors, ceilings or enter non accessible enclosures.

.3 At access doors, manholes, and similar access points permitting view of concealed piping.

.4 Near major equipment items and other points of origination and termination.

.5 Spaced intermediately at maximum spacing of 30 feet along each piping run, except reduce spacing to 20 feet in congested areas of piping and equipment.

.2 Locate color bands at each marker and at intermediate spacing not to exceed 10 feet between bands, and at lesser spacing as indicated or as required by local codes.

.3 Locate directional arrows at each marker. Provide 2 arrows at each tee or branch fitting.

.4 Where piping is normally visible from more than 1 side, provide 2 or 3 labels and arrows spaced at 120 degree intervals around pipe in accordance with ASME A13.1.

3.3 UNDERGROUND PIPING IDENTIFICATION:

.1 During backfilling/top soil placement of each exterior underground piping systems, install continuous underground type plastic line marker located directly over buried line at 6 to 8 inches below finished grade. Where multiple small lines buried in common trench and do not exceed overall width of 16 inches, install single line marker. For tile fields and similar installations, mark only edge pipe lines of field.

3.4 PROCESS VALVE IDENTIFICATION:

.1 Install engraved plastic marker or fiberglass tag at each process valve, gate, or flow control device as identified by P&ID tag numbers on Drawings.

3.5 MECHANICAL EQUIPMENT IDENTIFICATION:

.1 Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, if not otherwise specified for each item or device. Provide signs for each unit having equipment tag number on Drawings or in Specifications.

.2 Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.6 EQUIPMENT LABEL INSTALLATION:

.1 Install or permanently fasten labels on each major item of mechanical equipment.

.2 Locate equipment labels where accessible and visible.

3.7 PIPE LABEL INSTALLATION:

.1 Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.

.1 Identification Paint: Use for contrasting background.

.2 Stencil Paint: Use for pipe marking.

.2 Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

.1 Near each valve and control device.

.2 Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

.3 Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

.4 At access doors, manholes, and similar access points that permit view of concealed piping.

.5 Near major equipment items and other points of origination and termination.

.6 Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.

.7 On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.8 VALVE-TAG INSTALLATION:

.1 Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units

3.9 WARNING-TAG INSTALLATION:

.1 Write required message on, and attach warning tags to, equipment and other items where required.

3.10 ADJUSTING AND CLEANING:

.1 Adjusting: Relocate any mechanical identification device visually blocked.

.2 Cleaning: Clean face of identification devices and glass frames of valve schedules.

3.11 FIELD QUALITY ASSURANCE:

.1 Final Survey and Repairs:

.1 1 year after date of substantial completion, Contractor shall perform walk through survey of mechanical identification systems and shall remove and replace any bands, labels, tags or markers that are loose, discolored, or defective.

.2 Replacement materials shall be provided by Contractor, not drawn from Owner's extra material.

3.12 CONTRACT CLOSEOUT:

.1 Provide in accordance with Section 01 78 00.

END OF SECTION

1. GENERAL

1.1 Work Included

.1 The valve and water meter specification sheets on the following pages detail the valves which are to be supplied, installed, and tested as part of the Work.

2. PRODUCTS

2.1 Specification

.1 Page 1 to 5 following.

GENERAL:						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			DOWNSTREAM PRESSURE (kPag)	TEMP. (°C)	MAXIMUM CONTINUOUS FLAT DIAPHRAGM (L/S)	TEMP. (°C)
200mm Globe Ductile Iron flanged Pressure Reducing Valve (PRV) with Single Point Insertion Flow Mag Mete		Domestic & Fire Water Supply	483 (70psi)	0-40	196	40

TYPICAL SERVICE:
Pressure Reducing Valve with low flow by-pass and single point insertion mag meter. This hydraulically operated valve introduces or releases water from the control chamber above the diaphragm to effectively maintain accurate water control.

VALVE COMPONENTS		VALVE DESCRIPTION	
ITEM	MATERIAL	REFERENCE DOCUMENT	
Body	65-45-12 Ductile Iron	SIZE	200 mm
Seat Ring	316 Stainless Steel	TYPE	Globe
Disc Retainer	B16 Brass/B62 Bronze/A536 Ductile Iron	BODY/VALVE ENDS	
Stem	316 Stainless Steel	PATTERN	
Stem Nut	B16 Brass	OPERATOR	
Spring	316 Stainless Steel	ACTUATOR	
Diaphragm	EPDM	LINING	

Coating	NSF61 Approved Fusion Bonded Epoxy Thickness 8-10 mils	**COATING**	
Fasteners	18-8 Stainless Steel		

NOTES:

1. All pressure containing components shall be constructed of ASTM A536-65/45/12 ductile iron
2. Flanges to be ANSI Class 300 Standards
3. Protective fusion bonded epoxy coating shall conform ANSI/AWWA C116/A21.16
4. Approval by cross-connection and hydraulic research at Uni. Of Southern California

GENERAL:

TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			DOWNSTREAM PRESSURE (kPag)	TEMP. (°C)	MAXIMUM CONTINUOUS FLAT DIAPHRAGM (L/S)	TEMP. (°C)
50mm Globe Ductile Iron threaded Pressure Reducing Valve (PRV)		Domestic & Fire Water Supply	483 (70psi)	0-40	196	40

TYPICAL SERVICE:

Pressure Reducing Valve with low flow by-pass. The manually operated bypass would maintain the domestic water supply to the airport while the main PRV is off-line for repairs or maintenance.

VALVE COMPONENTS		VALVE DESCRIPTION	
ITEM	**MATERIAL**	**REFERENCE DOCUMENT**	
Body	65-45-12 Ductile Iron	**SIZE**	50 mm
Seat Ring	316 Stainless Steel	**TYPE**	Globe
Disc Retainer	B16 Brass/B62 Bronze/A536 Ductile Iron	**BODY/VALVE ENDS**	
Stem	316 Stainless Steel	**PATTERN**	
Stem Nut	B16 Brass	**OPERATOR**	
Spring	316 Stainless Steel	**ACTUATOR**	
Diaphragm	EPDM	**LINING**	
Coating	NSF61 Approved Fusion Bonded Epoxy Thickness 8-10 mils	**COATING**	
Fasteners	18-8 Stainless Steel		

NOTES:
1. All pressure containing components shall be constructed of ASTM A536-65/45/12 ductile iron
2. Flanges to be ANSI Class 300 Standards
3. Protective fusion bonded epoxy coating shall conform ANSI/AWWA C116/A21.16
4. Approval by cross-connection and hydraulic research at Uni. Of Southern California

GENERAL:

TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Resilient Wedge Gate Valve		Domestic & Fire Water Supply	1240 (180psi)	0-40	2069 (300 psi)	40

TYPICAL SERVICE:

On/Off valve on straight through line.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	REFERENCE DOCUMENT	ANSI/NSF 61 & 372
Body	Ductile Iron	SIZE RANGE	50– 250
Disc		RATING	ANSI B16.1, Class 125
Disc Trim		BODY/VALVE ENDS	As per drawings
Seats		PATTERN	
Shaft		OPERATOR	
Trim		ACTUATOR	
		LINING	Epoxy Coated interior and exterior surfaces
		COATING	Epoxy Coated ANSI/AWWA C550

NOTES:

GENERAL:

TYPE OF WATER METER	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS	NORMAL OPERATING FLOW RANGE

			MAXIMUM OPERATING PRESSURE	5/8": 0.25 TO 4.5 m3/h 3/4": 0.45 to 7.0 m3/h 1": 0.7 to 11.00 m3/h
Low lead Meters		Displacement Type Magnetic Drive Cold Water Meters	150 psi	

TYPICAL SERVICE:	
Measurement of cold water where flow is in one direction only, in residential, commercial and industrial services	
SPECIFICATIONS	
Material	Meter Housing: Engineered polymer Housing Bottom Plates: Engineered polymer Measuring chamber: Engineered polymer Disc Spindle: Stainless steel
Meter Connections	Threads conforming ANSI B1,20.1 or ISO R228
Measuring element	Oscillating piston
Register	Straight Reader, hermetically sealed, magnetic drive
Standards	NSF Standard 61, Annex F and G and comply with ANSFI/AWWA Standard C710
Compatibility	AMR/AMI compatible
Endpoint	Orion Cellular Endpoint compatible with Badger Meter Recordall
NOTES:	
Water meter to be compatible with existing PIB and to match units approved by PIP. Pre-approved untit: Badger Recordball meter with a Orion Cellular Endpoint	

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM D4791-[10], Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-NC[2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.

.3 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.

.4 LEED Canada-EB: O M[2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Shop Drawings, Product Data and Sample.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit 25 kg samples.

.2 Allow continual sampling by Departmental Representative during production.

.3 Provide Departmental Representative with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow Department Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Department Representative to permit full cross section sampling.

.5 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by Departmental Representative.

.6 Supply new or clean sample bags or containers according appropriate to aggregate materials.

.7 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

.8 Provide water, electric power and propane to Department Representative laboratory trailer at production site.

.4 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

Part 2 Products

2.1 MATERIALS

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

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed 5 times least dimension.

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

.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.2 Reclaimed asphalt pavement.

.3 Reclaimed concrete material.

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

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

.4 Reclaimed asphalt pavement.

.5 Reclaimed concrete material.

2.2 SOURCE QUALITY CONTROL

.1 Inform Department Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Department Representative 4 weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with topsoil stripping only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Topsoil stripping:

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of brush, weeds, grasses and removed from site.

.3 Strip topsoil to depths as directed by Departmental Representative. Avoid mixing topsoil with subsoil.

.4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.

.5 Dispose of topsoil as directed by Departmental Representative.

.2 Aggregate source preparation:

.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as approved by authority having jurisdiction.

.2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.

.3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.5 Trim off and dress slopes of waste material piles and leave site in neat condition.

.6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

.3 Processing:

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.5 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative.

.6 Stockpiling:

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than [300] mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom [300] mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Department Representative within [48] hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Maximum 1.5 m for coarse aggregate and base course materials.

.2 Maximum 1.5 m for fine aggregate and sub-base materials.

.3 Maximum 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.3 CLEANING

.1 Progress Cleaning:

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

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

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 Waste Management: separate waste materials for reuse or recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.6 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

- .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
- .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).
- .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water

- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

- .1 Rock : solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.
- .2 Common Material: materials of whatever nature, which are not included under the definition of solid rock, including dense tills, hardpan, frozen materials, and partially cemented materials which can be ripped and excavated with heavy construction equipment.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Quality Control: in accordance with technical section.

.3 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

.2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, location plan of relocated and abandoned services, as required.

.4 Samples:

.1 Submit samples in accordance with Section 01 33 00.

.2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill, unshrinkable fill materials and provide access for sampling.

.3 Submit 70 kg samples of type of fill, unshrinkable fill specified including representative samples of excavated material.

.4 Ship samples prepaid to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

.5 At least 4 weeks prior to beginning Work, inform Departmental Representative source of fly ash and submit samples to Departmental Representative.

.1 Do not change source of Fly Ash without written approval of Departmental Representative.

1.4 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Submit design and supporting data at least 2 weeks prior to beginning Work.

.3 Design and supporting data submitted to bear stamp and signature of qualified Professional Engineer registered or licensed in Province of British Columbia, Canada.

.4 Handle soil only when it is dry and not wet or frozen.

.5 Keep design and supporting data on site.

.6 Engage services of qualified Professional Engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.7 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative. Grade area only when soil is dry to lessen soil compaction.

.8 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.

.9 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 33.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse or recycling.

.2 Divert excess aggregate materials from landfill to local quarry recycling facility for reuse as directed by Departmental Representative.

1.6 EXISTING CONDITIONS

.1 Buried services:

.1 Before commencing work verify and or establish location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services, fill & cap with liner and/or other material to ensure intended operation of the facility is feasible.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

.6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.

.7 Maintain and protect from damage, water, sewer, gas, electric, fuel, telephone and other utilities and structures encountered.

.8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.

.9 Record location of maintained, re-routed and abandoned underground lines.

.10 Confirm locations of recent excavations adjacent to area of excavation.

.11 Prior to start up, identify the site material requirements for work specified. The cut and fill calculations must be performed by the Contractor. Adjust excavation as required.

.2 Existing surface features:

.1 Conduct, with Departmental Representative, condition survey of existing fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Where required for excavation, cut roots or branches.

.4 Excavation, pits, the entire sub-grade and area in the vicinity of the work shall be kept free of water, positive surface drainage shall be maintained away from the excavation at all times. Provide and operate pumps or other suitable equipment, and provide and maintain a temporary drainage system within the excavation. Discharge from pumps or other dewatering equipment shall be located and controlled such that loss, damage, nuisance, or injury to the work does not result. Additional excavation made necessary by water in the excavation shall be at no additional cost to the client.

Part 2 Products

2.1 MATERIALS

.1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing	
Type 1	Type 2	
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

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

.3 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum cement content of 25 kg/m^3 with 40 by volume fly ash replacement: to CSA-A3001, Type GU.

.3 Minimum strength of 0.07MPa at 24 h.

.4 Concrete aggregates: to CSA-A23.1/A23.2.

.5 Cement: Type GU.

.6 Slump: 160 to 200 mm.

.4 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

.4 Grade soil stablishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage. Landscaping shall be approved by Departmental Representative. Dispose of unused topsoil and other excess material in an acceptable manner at no cost to the client.

3.2 SITE PREPARATION

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

3.3 PREPARATION/PROTECTION

.1 Size, depth, and location of existing utilities as indicated are for guidance only; completeness and accuracy are not guaranteed.

.1 Prior to commencing any excavation work, notify applicable utility authorities, establish location and state of use of buried services. Clearly mark such locations to prevent disturbance during work.

.2 Confirm locations of buried utilities by careful test excavations and according to applicable utility guidelines.

.3 Maintain and protect from damage, water, sewer, gas, electric, telephone, and other utilities encountered.

.4 Obtain direction of owner of utility and Departmental Representative before moving or otherwise disturbing utility. Repair any damage to utilities in accordance to the direction of the Utility Owner at no cost to the Departmental Representative.

.5 Remove abandoned utility service lines encountered from areas of construction. Cap, plug, or seal such lines and identify at grade with markers.

.6 Accurately locate and record abandoned and active utility lines re-routed or extended on record drawings.

.7 Be responsible to arrange and pay for site inspector or other personnel from the respective utility as required by the respective utility during crossing operations.

.2 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations. Protect existing trees and other plants, lawns, fencing, poles, wires, sidewalks, curbs, bench marks and monuments, paving, and other surface features located within right-of-way or adjoining properties from damage while work is in progress and repair damage resulting from work as an incidental. Excavations are not to encroach on normal 45° bearing support under any foundation.

.3 Keep excavations clean, free of standing water, and loose soil. Protect open excavation against flooding and damage from surface water run-off.

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

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

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

3.4 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as directed by Departmental Representative.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.6 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for Departmental Representative review and approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.7 EXCAVATION

.1 Remove concreted, demolished foundations and rubble and other obstructions encountered during excavation.

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

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

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

.4 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

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

.6 Restrict vehicle operations directly adjacent to open trenches.

.7 Dispose of surplus and unsuitable excavated material in approved location off site.

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

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

.10 Notify Departmental Representative when bottom of excavation is reached.

.11 Obtain Departmental Representative approval of completed excavation.

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

.13 Correct unauthorized over-excavation as follows:

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

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

.14 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.8 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 and ASTM D1557.

.1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.

.2 Place unshrinkable fill in areas as indicated.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services.

.2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

.1 Vibratory compaction equipment: Sheepsfoot roller or Jumping Jack.

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

.1 Departmental Representative has inspected and approved installations.

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

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

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

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

.5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.6 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:

.2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.7 Place unshrinkable recycled fill in areas as indicated.

.8 Consolidate and level unshrinkable fill with internal vibrators.

.9 Install drainage filter system in backfill as directed by Departmental Representative.

.10 Backfill and compact all over-excavated areas under structure bearing surfaces and footings with type I fill and compact to 100 standard Proctor density at no cost to the Departmental Representative.

.11 Compact Backfill areas in suitable layers to attain the same density as specified for embankments.

3.11 RESTORATION

.1 Upon completion of Work, remove waste material.

.2 Replace topsoil as directed by Departmental Representative.

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

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

.5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

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

.7 For setting and establishing finish elevations and lines, secure the services of a registered surveyor acceptable to the Departmental Representative. Carefully preserve all data and all monuments set by him. If displaced or list, immediately replace to the acceptance of the Departmental Representative, at no additional cost to the client.

END OF SECTION

Approved: 2012-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections.01 33 00 – 31 23 33 – 01 78 00 – 01 61 00 – 01 74 19

1.2 MEASUREMENT PROCEDURES

.1 Measure trenching and backfilling, other than granular bedding and surround in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Measure water main [including trenching and backfilling], in metres of each size of pipe installed.

.1 Horizontal measurement will be made over surface, through valves and fittings, after work has been completed.

.2 Measure lateral connections from water main to hydrants as water main and include curb valve and adjustable valve box.

.3 Measure water meter installation including trenching and backfilling and restorations, in unit installed.

.4 Measure valves in units installed including excavation and backfilling , valves and valve boxes and thrust blocks.

.5 Measure PRV valve chamber including excavation and backfilling, in units installed.

.6 Measure granular bedding and surround material in cubic metres.

.7 Measure concrete for bedding, encasement of pipes, supports and thrust blocks in cubic metres.

1.3 REFERENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

.1 ANSI/AWWA B300-[10], Standard for Hypochlorites.

.2 ANSI/AWWA B301-[10], Standard for Liquid Chlorine.

.3 ANSI/AWWA B303-[10], Standard for Sodium Chlorite.

.4 ANSI/AWWA C104/A21.4-[08], Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

.5 ANSI/AWWA C105/A21.5-[10], Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.

.6 ANSI/AWWA C111/A21.11-[07], American National Standard for Rubber-Gasket Joints for Ductile-Iron and Fittings.

.7 ANSI/AWWA C110/A21.10-[08], American National Standard for Ductile-Iron and Gray Iron Fittings for Water.

.8 ANSI/AWWA C150/A21.50-[08], Standard for Thickness Design of Ductile-Iron Pipe.

.9 ANSI/AWWA C151/A21.51-[09], Standard for Ductile-Iron Pipe, Centrifugally Cast.

.10 ANSI/AWWA C153/A21.53-[11], Standard for Ductile-Iron Compact Fittings.

.11 ANSI/AWWA C200-[05], Standard for Steel Water Pipe - 6 Inch (150 mm) and Larger.

.12 ANSI/AWWA C203-[08], Standard for Coal Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.

.13 ANSI/AWWA C205-[07], Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 Inch (100 mm) and Larger - Shop Applied.

.14 ANSI/AWWA C206-[11], Standard for Field Welding of Steel Water Pipe.

.15 ANSI/AWWA C207-[07], Standard for Steel Pipe Flanges for Waterworks Service, 4 Inch through 144 Inch (100 mm through 3,600 mm).

.16 ANSI/AWWA C208-[07], Standard for Dimensions for Fabricated Steel Water Pipe Fittings.

.17 ANSI/AWWA C300-[11], Standard for Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.

.18 ANSI/AWWA C301-[07], Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.

.19 ANSI/AWWA C303-[08], Standard for Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.

.20 ANSI/AWWA C500-[09], Standard for Metal-Seated Gate Valves for Water Supply Service.

.21 ANSI/AWWA C504-[10], Standard for Rubber-Seated Butterfly Valves.

.22 ANSI/AWWA C600-[10], Standard for Installation of Ductile-Iron Water Mains, and Their Appurtenances.

.23 ANSI/AWWA C602-[11], Standard for Cement-Mortar Lining of Water Pipelines - 4 Inch (100 mm) and Larger.

.24 ANSI/AWWA C651-[05], Standard for Disinfecting Water Mains.

.25 ANSI/AWWA C800-[05], Standard for Underground Service Line Valves and Fittings.

.26 ANSI/AWWA C900-[07], Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Transmission and Distribution.

.2 ASTM International

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

.2 ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A307-[10], Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.4 ASTM B88M-[05(2011)], Standard Specification for Seamless Copper Water Tube [Metric].

.5 ASTM C117-[04], Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.6 ASTM C136-[06], Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.7 ASTM C478M-[11], Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric].

.8 ASTM D698-[07e1], Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.9 ASTM D2310-[06], Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.10 ASTM D2657-[07], Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

.11 ASTM D2992-[06], Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fitting.

.12 ASTM D2996-[01(2007)e1], Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.13 ASTM F714-[10], Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

.14 ASTM C618-[08a], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

.3 American Water Works Association (AWWA)/Manual of Practice

.1 AWWA M9-[2008], Concrete Pressure Pipe.

.2 AWWA M11-[2004], Steel Pipe - A Guide for Design and Installation.

.3 AWWA M17-[2006], Installation, Field Testing, and Maintenance of Fire Hydrants.

.4 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum [2007]).

.2 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.

.3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.

.4 LEED Canada-EB: O M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

.3 CAN/CGSB-34.1-[94], Pipe, Asbestos Cement, Pressure.

.4 CGSB 41-GP-25M-[77], Pipe, Polyethylene, for the Transport of Liquids.

.6 CSA International

.1 CAN/CSA-A257 Series-[09], Standards for Concrete Pipe (Consists of A257.0, A257.1, A257.2, A257.3 and A257.4).

.2 CAN/CSA-A3000-[08], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 CAN/CSA-B137 Series-[09], Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).

.1 CAN/CSA-B137.1-[09], Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.

.2 CAN/CSA-B137.3-[09], Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.

.4 CSA G30.18-[09], Carbon and Steel Bars for Concrete Reinforcement.

.7 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - [current edition].

.8 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S520-[07], Standard for Fire Hydrants.

.2 CAN/ULC-S543-[09], Standard for Internal-Lug, Quick Connect Couplings for Fire Hose.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for distribution piping materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Pipe certification to be on pipe.

.3 Shop Drawings:

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

.4 Samples:

.1 Inform Departmental Representative of proposed source of bedding materials and provide access for sampling at least [4] weeks prior to commencing work.

.2 Submit for testing [4] weeks minimum prior to beginning work, samples of materials proposed for use as follows:

.1 Backfill material.

.3 Submit manufacturer's test data and certification that pipe materials meet requirements of this section 2 weeks minimum prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.

1.5 CLOSEOUT SUBMITTALS

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

.2 Submit record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details.

.1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and water meters.

.3 Operation and Maintenance Data: submit operation and maintenance data for pipe, valves, valve boxes, valve chambers and water meters for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials and in accordance with manufacturer's recommendations.

.2 Store and protect water distribution piping from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services.

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

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

.4 Do not interrupt water service for more than 3 hours and confine this period between 10:00 16:00 hours local time unless otherwise authorized.

.5 Notify fire department of planned or accidental interruption of water supply to hydrants.

.6 Provide and post "Out of Service" sign on hydrant not in use.

.7 Advise local police department of anticipated interference with movement of traffic.

Part 2 Products

2.1 DOMESTIC WATER SUPPLY EXTENSION, PIPE AND FITTINGS.

.1 Domestic Water Supply extension to be PVC Blue Brute (or similar approved), DR18 Pressure Rating 235 psi. All pipes shall be certified CSA B137.3, AWWA C900. Material shall be made from PVC compound to ASTM D1784 cell class 12454B.

.2 Gaskets to be in accordance with ASTM F477 and to be permanently inserted and fastened at the factory.

.3 Pipe to have insertion depth markings for spigot

.4 Fittings: - PVC injection moulded fittings to AWWA C900 and of the same materials as the pipe. PVC fabricated fittings to be fabricated with DR 18, AWWA C 900 pipe with fibreglass-reinforced-polyester over wrap.

2.2 RESTRAINT FOR PVC PIPE (AWWA C900)

.1 Restraint for PVC pipe (AWWA C900) at PVC fittings shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. The restraint devices shall be coated using MEGA-BOND™. (For complete specifications on MEGA-BOND visit www.ebaa.com.) A split ring shall be utilized on the PVC fitting bell. A serrated ring shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating equivalent to the pipe. The restraint shall be the Series 2500, as manufactured by EBAA Iron, Inc., or approved equal.

2.3 DUCTILE IRON PIPE

.1 Distribution pipes inside the PRV chamber to be Ductile Iron pipes and shall conform AWWA C151. All ductile iron pipes shall be Pressure Class 350.

.2 Mechanical-joint glands shall be ductile iron.

.3 The exterior surface of all pipes shall be coated with 25μm thick asphaltic coating.

.4 The interior surfaces of all pipes shall be cement mortar lined.

2.4 DUCTILE IRON FITTINGS

.1 Ductile iron fittings, including any special fittings, shall conform in all respects to AWWA C110.

.2 Fittings include products such as bends, tees, crosses, base bends, base tees, reducers, mechanical offsets, sleeves including split sleeves, caps and plugs and all similar products for use in conjunction with ductile iron pipe and/or other fittings.

.3 In addition to standard fittings with mechanical joints and flange joints, fittings with mechanical joints incorporating wedge action retainer glands (e.g. Megalug or Uni Flange restraint products), may be called for.

.4 Fittings shall be provided complete with all accessories including glands, lubricants, gaskets, bolts, nuts and washers necessary to complete the joint.

.5 Fittings shall be cast from ductile iron only. Fittings cast from gray-iron will only be considered if they are not available in ductile-iron. Prior approval to supply gray-iron fittings shall be obtained from the Contract Administrator.

.6 The exterior surfaces of all fittings shall be coated with a 25μm thick petroleum asphaltic coating.

.7 The interior surfaces of all fittings shall be cement mortar lined. Cement mortar linings are not required on caps, plugs or sleeves.

2.5 PRECAST CHAMBER

.1 Unit designed to withstand HS20 live loading

.2 Unit to have a 635mm dia. opening

.3 Chamber supplied with lifting inserts as required.

.4 Chamber supplied with ladder rungs

.5 Each core is to have additional reinforcement placed around the core equal to or greater than the steel area removed for the core.

.6 All reinforcement has a minimum of 25mm of concrete cover.

.7 Minimum concrete strength: 35MPa.

.8 The exterior surfaces of all pre-cast chamber components shall be coated with two (2) coats of Static Asphalt Protective Coating Type #1

2.6 PROCESS VALVES

.1 As detailed in Sections 23 11 00 and 23 31 15

2.7 WATER METERS

.1 Contractor to install a water meter on each of the tenant's buildings as specified in drawings.

.2 Water meter as detailed in Section 23 31 15

.3 Contractor to locate and confirm size of each building's water service connection.

.4 Final location of each water meter to be confirmed with a Departmental Representative.

.5 Contractor to advice building's tenant with 48 hrs. anticipation before installation.

.6 Water box to be installed away from vehicular traffic.

.7 Contractor to install frost proof water meter box.

.8 Submit record drawings, including, list of equipment required as detailed in Section 01 33 00.

.9 Water meter installation as per Penticton Standard Drawing S-W14.

2.8 PIPE BEDDING AND SURROUND MATERIAL

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

.1 Crushed or screened stone, gravel or sand.

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

.3 Table

Sieve Designation	% Passing	
Stone/Gravel	Gravel/Sand	
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	[100]	-
19 mm	-	-
12.5 mm	[65-90]	[100]
9.5 mm	-	-
4.75 mm	[35-55]	[80-100]
2.00 mm	-	[50- 90]
0.425 mm	[10-25]	[10- 50]
0.180 mm	-	-
0.075 mm	[0- 8]	[0- 10]

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for distribution piping installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

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

.1 Inspect materials for defects to approval of Departmental Representative.

.2 Remove defective materials from site as directed by Departmental Representative.

3.3 TRENCHING

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

.2 Ensure trench depth allows coverage over pipe of 1m minimum from finished grade.

.3 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

3.4 GRANULAR BEDDING

.1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 200 mm below bottom of pipe.

.2 Do not place material in frozen condition.

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

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

.5 Compact each layer full width of bed [95 % maximum density to ASTM D698.

.6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling with compacted bedding material.

3.5 PIPE INSTALLATION

.1 Place pipe on compacted bedding ensuring uniform support under bell and pipe body throughout it full length

.2 Work and compact bedding material under side of pipe to provide proper haunching.

.3 Protect exposed pipe ends with an approved plug to prevent excess amounts of water and foreign material from entering pipe as the Work proceeds.

.4 Pipe joint deflection to be within Manufacturer's recommendations.

.5 Install piping to lines and grades indicated on the plans or as directed by the Department's Representative within a horizontal and vertical tolerance of 100 mm. Pipe shall not be placed uniformly high or low.

.6 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative

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

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

.9 Do not lay pipe on frozen bedding.

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

.11 Backfill remainder of trench.

.12 PVC Pipe Joints

.1 Install gaskets to Manufacturer's recommendations. Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated and replaced before jointing is attempted again.

.2 If cutting PVC bevel edges, per Manufacturer's instructions, for easy insertion into socket.

.3 Apply sufficient pressure in making joints to ensure that joint is completed to Manufacturer's recommendations. Do not use excavating equipment to force pipe section together. Complete each joint before laying next length of pipe.

.4 Minimize deflection after joint has been made. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

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

.6 Recheck any joints assembled above ground after placing in trench to ensure that no movement of joint has taken place and pipes are still fully connected.

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

.8 Do not lay pipe on frozen bedding. Protect hydrants, valves and appurtenances from freezing.

.9 Upon completion of pipe laying and after Department's Representative has reviewed for general conformance work in place, surround and cover pipes with approved material in accordance to MMCD Standard Specifications.

.10 Place layers uniformly and simultaneously on each side of pipe to prevent lateral displacement of pipe.

3.6 INSTALLATION USING TRENCHLESS METHODS

.1 Where required install piping utilizing trenchless methods.

.2 Provide locations and size of shafts to the Department's Representative for review prior to commencing excavation Works. Plan piping installations to join pipe sections at fitting and valve locations whenever possible.

.3 Join pipe sections together before inserting into installation hole. Pull or push the entire length of pipe from end of last pipe into installation hole with bell ends facing away from pulling or pushing direction. Applying tension on piping during installation is not permitted.

.4 Ensure force applied to the section of piping being install does not cause over insertion at gasketed joint beyond the Manufacture's recommended insertion depth.

.5 Remove entire length of pipe installed in hole if a section of pipe must be withdrawn from installation hole.

.6 Place pipe on compacted bedding in shafts to uniformly support pipe along its entire length.

.7 If damage occurs to existing underground structures or surface features due to trenchless installations (i.e. soil heaving, etc.), repair damage as an incidental to the works.

3.7 VALVE INSTALLATION

.1 As indicated in Section 23 11 00

.2 Install valves to Manufacturer's recommendations at locations indicated. Ensure valve box adjustable range is suitable for pipe burial depth.

.3 Support buried valves by means of either concrete or wood blocks, located between valve and solid ground.

.4 Set valve and valve box plumb, centred on valve and set top of box at finished grade or adjust as directed by the Department's Representative. Provide valve extension in valve box.

.5 Install stone catchers 250 to 350 mm below top of valve box covers.

.6 Install valve box lids that are marked "S" for sewer or "W" for water as applicable.

3.8 PRECAST CHAMBER INSTALLATION

.1 Base Preparation

.1 The excavation shall be completed and roughly leveled to the proper elevation.

.2 Timber screeds shall then be set to the elevation of the base of the precast chamber. The screeds shall be leveled to a tolerance of ±6mm.

.3 300mm of 19mm minus drain rock or sand shall be placed, leveled, compacted to 90% Modified Proctor, and struck-off level with the top of the timber screeds.

.4 During this base preparation the precast sump and ducts shall be installed. If not connected immediately, ducts shall stubbed off at least 600mm beyond the manhole wall in the direction indicated by the Departmental Representative.

.2 Placing

.1 Chamber sections shall be placed with great care. The responsibility of off-loading and placing chamber (or sections) into excavations shall be the Contractor's. Care shall be taken to maintain adequate clearances from hoist booms to overhead conductors.

.2 Gaskets – Care shall be taken to place precast sections so that gaskets between sections are totally contained and compressed.

.3 Sumps – A suitable sealing grout shall be placed, at the Departmental representative's direction, between sump and base of chamber.

3.9 HYDROSTATIC AND LEAKAGE TESTING

.1 Do tests in accordance with ANSI/AWWA C605-5.

.2 After the system has been installed and backfilled to the satisfaction of the Department's Representative, pressure test the system. Test piping in sections not exceeding 700 m in length or between successive valves unless otherwise authorized by the Department's Representative.

.3 Provide labour, equipment and materials required to perform hydrostatic leakage tests hereinafter described. Ensure system will pass test prior to requesting Department's Representative to witness test.

.4 Notify Department's Representative at least two (2) working days in advance of all proposed tests. Perform tests in presence of Department's Representative.

.5 Where any section of system is provided with concrete thrust blocks, do not conduct tests until at least five (5) days after placing concrete or two (2) days if high early strength concrete is used.

.6 Open mainline valves.

.7 Expel air from main by slowly filling main with potable water and complete flushing by running water to waste. Install temporary or use existing mainline access points as required for flushing and testing. Obtain Department's Representative's approval for location of mainline access points.

.8 In preparation for the pressure test, after pressurizing the mainline to the test pressure, bleed off the quantity of water equivalent to allowable leakage or 20 L, whichever is less. Bleed location to be remote from the gauge location. Verify that the pressure indicated on the gauge drops the corresponding amount to provide an indication that all air has been bled from the system.

.9 Apply a leakage test pressure of 1,000 kPa, based on the elevation of highest point in main and corrected to elevation of gauge, for a period of two (2) hours.

.10 Leakage is defined as amount of water supplied in order to maintain test pressure for two (2) hours. The pressure shall not drop by more than 2% of test pressure at any time.

.11 Do not exceed allowable leakage as specified below for PVC Piping.

Pipe Diameter (mm)	**Allowable Apparent Leakage L/Hr per 100 Joints Test Pressure 1000 kPa**
150	2.1
200	2.8
250	3.5
300	4.2

3.10 BACKFILL

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

.2 Do not place backfill in frozen condition.

.3 Under paving and walks, compact backfill to at least 95% maximum density to ASTM D698

.1 In other areas, compact to at least [90% corrected maximum dry density] [[90] % maximum density to ASTM D698].

3.11 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations: under direct control of Departmental Representative carried out by specialist contractor.

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

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

.3 Flushing flows as follows:

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

.4 Provide connections and pumps for flushing as required.

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

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

.7 Disinfect water mains to the requirements of local authority.

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

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

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

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

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

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

.1 Take samples daily for minimum of 2 days.

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

.3 Specialist contractor to submit certified copy of test results.

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

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

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

3.12 SURFACE RESTORATION

.1 After installing and backfilling over water mains and new water meters, restore surface to original condition as directed by Departmental Representative.

3.13 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Waste Management: separate waste materials for [reuse] [recycling] in accordance with Section 01 74 19 - Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PROJECT NO. R.073300.101
EXTERNAL WATER SUPPLY CONNECTION
PENTICTON AIRPORT
PENTICTON, BC

APPENDIX A

- INTERIOR -
TESTING SERVICES
- LTD. -

MATERIALS TESTING • SOILS
CONCRETE • ASPHALT • CORING
GEOTECHNICAL ENGINEERING

1 - 1925 KIRSCHNER ROAD
KELOWNA, B.C. V1Y 4N7
PHONE: 860-6540
FAX: 860-5027

Amec Foster Wheeler
Suite 600, 4445 Lougheed Hwy
Burnaby, BC V5C 0E4

August 16, 2016
Job 16.192

Attention: Mr. Henri Giovanetti, P.Eng

Dear Sir,

Re: **Geotechnical Investigation**
External Water Supply
Penticton Airport
Penticton, BC

Interior Testing Services Ltd (ITSL) has carried out a geotechnical investigation for the above noted proposed external water supply. Please find attached a one page site plan with schematic logs, two pages of auger hole logs, and a copy of our two-page "Terms of Engagement" that governs our work on this project.

INTRODUCTION

We understand a water line and pressure reducing valve (PRV) chamber are proposed near the north end of the Penticton Airport near the intersection of Airport Road and Harvard Way. The new water service is intended to provide an external water supply off of the proposed water main on PIB lands located to the west of the airport site.

We understand the water line will be installed at roughly 1.5 to 2 m depth. For the proposed PRV chamber, we anticipate excavation on the order of 2.5 m will be required.

The purpose of our investigation was to identify the soil conditions and groundwater levels along the project alignment. The following report presents our investigation and laboratory results, along with general geotechnical comments and recommendations for excavation work and design of the PRV chamber.

FIELD WORK

On August 4, 2016, a track-mounted drill rig operated by Mud Bay Drilling was used to advance two auger holes within the project area along the proposed water line alignment. A third auger hole was proposed, but was eliminated due to conflicts with an existing the gas line. Auger Hole 2 (AH2) was advanced at the proposed PRV chamber location. The soil profile was continuously logged in the field and occasional, representative samples were recovered and returned to our laboratory for additional analysis.

Adjacent to the auger holes, Dynamic Cone Penetration Tests (DCPT) were advanced to provide additional information of the density of the soil profile with respect to stability of open-cut excavations. DCPT blow counts are comparable to Standard Penetration 'N' values, which are commonly used in geotechnical design.

A standpipe piezometer was installed at the location of AH1 to allow for future monitoring of the stabilized groundwater levels. We note a piezometer was not installed at AH2 because this location is within a restricted area and access for future monitoring may have been impractical.

Locations of the auger holes were referenced to existing landmarks and are shown on the attached site plan (Drawing 16.192-1) adapted from City of Penticton mapping.

RESULTS

Soil Profile & DCPT

The schematic logs of the auger holes are shown on Drawing 16.192-1. Detailed soil descriptions are shown on the attached auger hole logs (Drawings 16.192-2 and 16.192-3), which should be used in preference to the generalized soil descriptions that follow.

The site is characterized by predominantly SAND soils with occasional silty SAND soil mixtures. Moisture contents of the SAND soils from above the water table ranged from roughly 5 to 7%. In order to provide information of the fines contents of the SAND soils below the water table for dewatering considerations, four samples were washed over the ASTM #200 sieve to determine the fines content of the soils. The percentage passing through the sieve indicate the SAND soils to be relatively clean, containing between 3 and 17% fines.

As noted above, DCPTs were advanced adjacent to the auger holes. The results indicate compact to dense conditions throughout the soil profile. Between the ground surface and roughly 2.5 m below grade (approximate depth of the proposed excavation), the DCPT values ranged between 12 and 29 blows/300 mm of rod penetration, with an average on the order of 18 blows/300 mm.

Groundwater Conditions

At the time of our investigation on August 4, 2016, groundwater was observed at roughly 1.5 to 1.7 m below grade. The water level was observed on August 16, 2016 at 1.8 m below surrounding grade in the piezometer installed at AH1, which is estimated to translate to a geodetic elevation of +/- 339 m.

Groundwater levels are expected to vary seasonally and will be affected by drainage and infiltration conditions, and by fluctuations in Skaha Lake.

PRESSURE REDUCING VALVE CHAMBER DESIGN & CONSTRUCTION

With respect to construction of the PVR chamber, an open cut is expected to be feasible for the soil profile identified at the proposed chamber location. Considering an excavation depth of roughly 2.5 m, the cut is expected to be upwards of 1 m below the groundwater table. A tight well-point system in the granular soils should be considered with one stage of de-watering (possibly more) to be effective to the assumed chamber depth of 2.5 m. To avoid sloughing or heave of the clean sands, the well-points should be installed below the bottom of the proposed excavation.

The natural soils appear competent to support the PVR chamber; however given the saturated, potentially loose nature of the SAND bearing soils, a 300 mm thick layer of drain rock is recommended to form the base of the chamber. An allowable bearing pressure of 100 kPa (2000 psf) could be assumed for design purposes if required by your structural engineer. However, given the relatively high groundwater levels, we anticipate buoyant uplift may be a more critical design consideration.

An equivalent fluid pressure, γ_{eq}, of roughly 10.0 kN/m^2/m of wall height can be used in design if required by your structural engineer, considering at-rest lateral pressure conditions for the chamber structure. The lateral earth pressures are estimated based on an assumed friction angle of roughly 30° and saturated unit weight of roughly 20 kN/m^3 for the onsite SAND backfill materials.

Based on the results of our investigation and our experience within the surrounding area, we are anticipating generally sand to silt soils to depth. From these results and our general experience in the area, Site Class E as taken from the 2012 BC Building Code Table 4.1.8.4.A appears to be appropriate for seismic design purposes of the proposed PRV chamber structure.

UTILITY INSTALLATION

Trench Backfill

We recommend trench backfill be placed and compacted in maximum 300 mm lifts to at least 95% Modified Proctor Density (MPD). ITSL should carry out field density tests on every 600 mm or every second lift of backfill placed to confirm that adequate compaction is being achieved.

In general, the SAND soil mixtures encountered above the groundwater level are expected to be re-useable as compacted trench backfill. The SAND soils excavated from below the groundwater table appear to be wet-of-optimal moisture content for re-use as compacted trench backfill. However we note that granular soils generally drain rapidly, so that with well-point dewatering and/or if properly mixed with the drier surface SANDS, it should be possible to reduce the moisture content of the wetter granular soils so that adequate compaction may be achievable. Although not expected, if saturated SILT or sandy SILT, and/or organic soils are encountered, use of imported granular backfill is recommended due to the compressible nature of these soil types.

For utilities installed below the groundwater level, drain rock bedding material should be used for ease of pipe installation.

Groundwater and Dewatering

We anticipate pipe invert depths of roughly 1.5 to 2 m throughout the project area, so that it may be possible to maintain workable conditions within the water line trench by use of sump pumps.

As noted above, well-point dewatering is recommended for excavation at the PVR chamber.

Bearing Support

If soft, saturated soils are encountered during construction, it is recommended that over-excavation and replacement with roughly 300 mm of clean drain rock be carried out to provide a suitable working surface.

To that end, it is anticipated that the proposed utility lines will bear on competent natural soils or drain rock FILL, which appears satisfactory.

Trench Cut Slopes

Based on the natural granular soils encountered during our investigation, we anticipate that for effectively de-watered cut slopes up to roughly 3 m in height, conventional Worksafe BC (WCB)

side slopes of 3 Horizontal to 4 Vertical (0.75H:1V) should be satisfactory. However, given the variability of soil conditions, ITSL should review the proposed cuts up to 3 m at the beginning of construction.

CONCLUSIONS

1. Recommendations for the PRV chamber and utility installation are provided above. For construction of the PRV chamber, an open-cut excavation appears feasible and would likely be cost-effective. De-watering considerations and specific engineering design to resist the hydrostatic uplift and earth pressures are anticipated to be the critical design issues for this project.

2. It is recommended that ITSL be given the opportunity to review the final proposed construction plans and specifications prior to construction.

   Furthermore, field reviews and materials testing services should be provided during construction to confirm conditions are as expected and that adequate compaction of the trench backfill soils is being achieved.

We trust this will assist you. Please call if you have any questions.

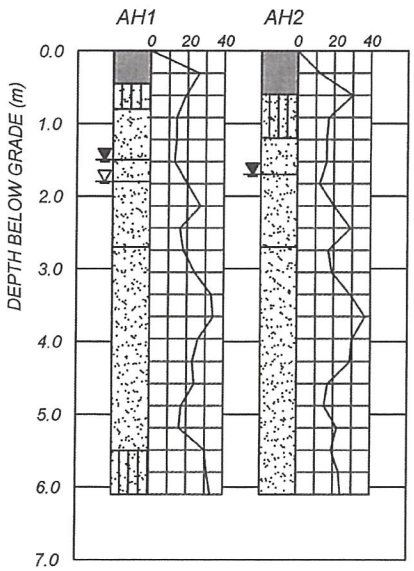
Yours truly,
Interior Testing Services Ltd.

Jennifer Anderson, P.Eng.

Peter Hanenburg, P.Eng.

SCHEMATIC LOGS

SCALE: VERTICAL: 1:100



LEGEND

- AUGER HOLE LOCATION
- WATER LEVEL NOTED DURING DRILLING
- WATER LEVEL NOTED IN PIEZOMETER
- TOPSOIL
- SILT
- SAND

NOTES

1. REFERENCE PLAN ADAPTED FROM CITY OF PENTICTON GIS MAPPING.
2. AUGER HOLE LOCATIONS ARE APPROXIMATE AND MAY VARY FROM THAT SHOWN.
3. FOR DETAILED SOIL DESCRIPTIONS REFER TO AUGER HOLE LOGS.

AMEC FOSTER WHEELER EXTERNAL WATER SUPPLY PENTICTON AIRPORT PENTICTON, BC	SITE PLAN & TEST PIT LOGS	INTERIOR TESTING SERVICES LTD. 1-1925 KIRSCHNER ROAD, KELOWNA, BC V1Y 4N7 PH: 250-860-6540 FAX: 250-860-5027 E-MAIL: info@interiortesting.com DATE OF INVESTIGATION: AUGUST 4, 2016 JOB NUMBER: 16.192 DRAWING NUMBER: 16.192-1

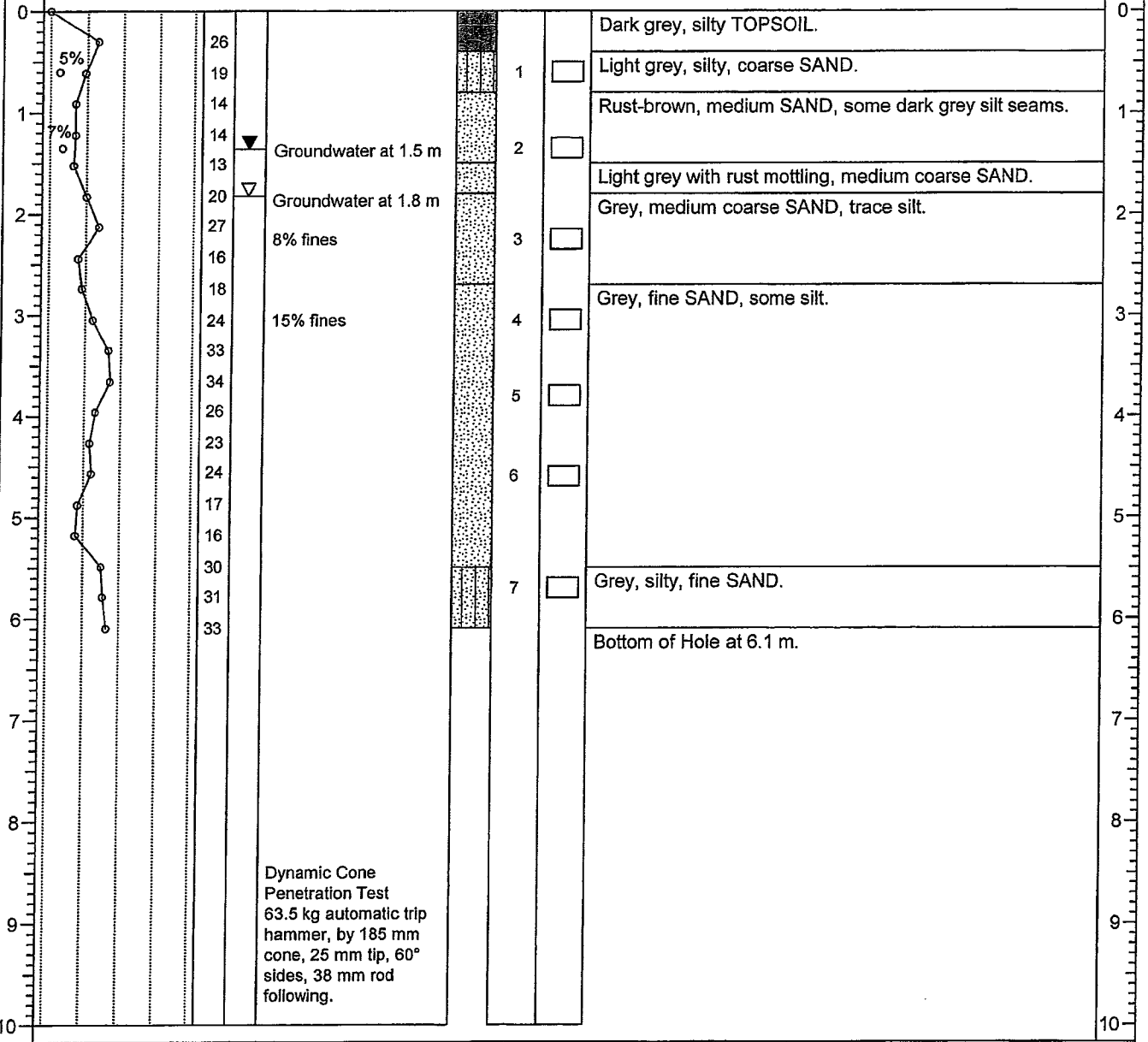
- INTERIOR -
TESTING SERVICES
- LTD. -

LOG OF AUGER HOLE 1

Interior Testing Services Ltd.
1 - 1925 Kirschner Road
Kelowna, BC V1Y 4N7
(250) 860 - 6540
email: info@interiortesting.com

Project	: 16.192	Method	: Solid Stem Auger
	: External Water Supply	Driller	: Mud Bay Drilling
	: Penticton Airport	Logged By	: JA
	: Penticton, BC	Date	: August 4, 2016
Location	: See Dwg. No. 16.192-1		

Legend
- Water Noted During Drilling
- Water Noted in Piezometer
- Disturbed Sample
- Undisturbed Sample
- L.L. Liquid Limit
- P.L. Plastic Limit



08-16-2016 C:\Users\jenit_000\Desktop\Jen jobs\2016\16.192 Penticton Airport\16.192 AH1.bor

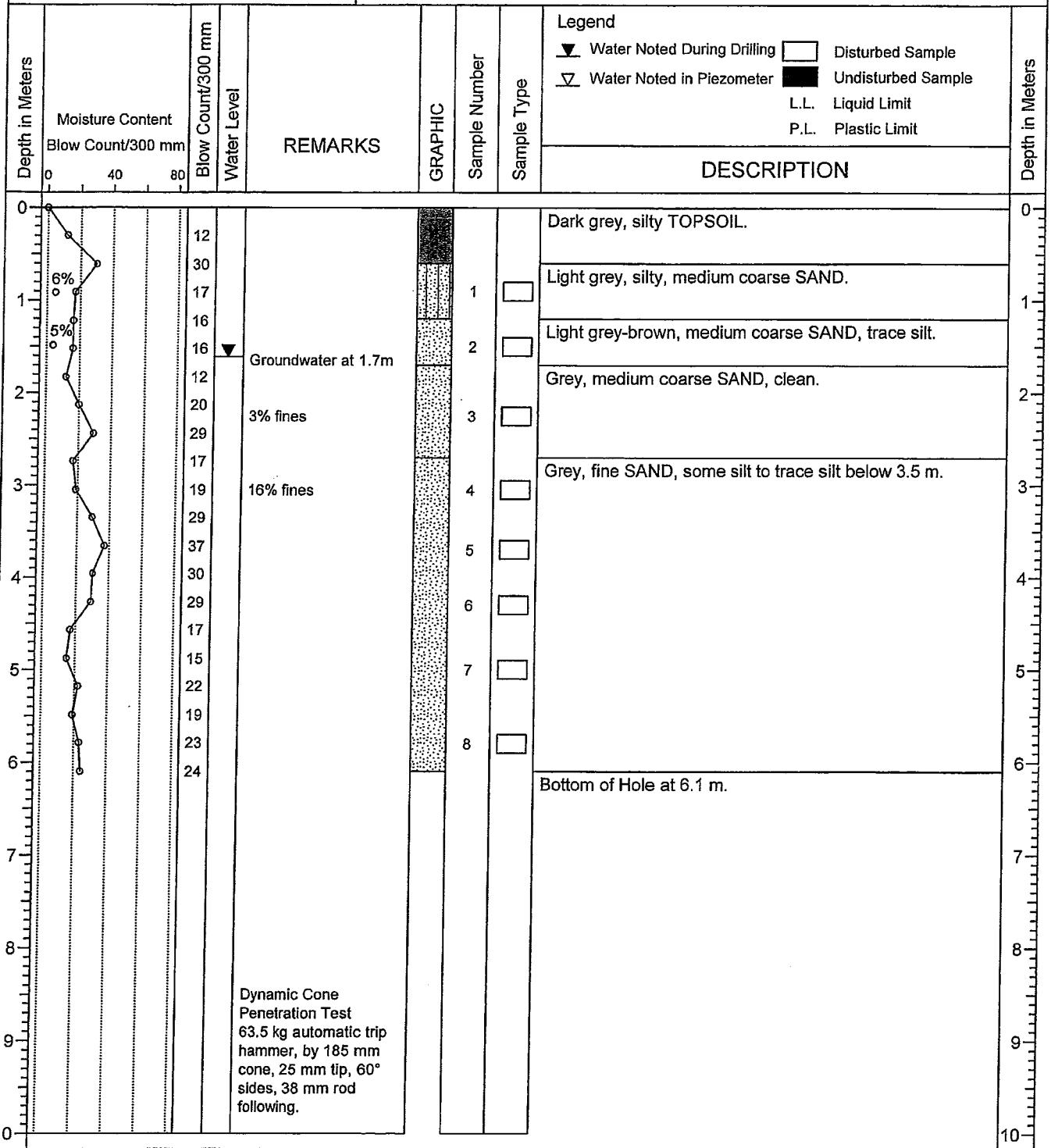
Drawing No. 16.192-2

- INTERIOR -
TESTING SERVICES
- LTD. -

LOG OF AUGER HOLE 2

Interior Testing Services Ltd.
1 - 1925 Kirschner Road
Kelowna, BC V1Y 4N7
(250) 860 - 6540
email: info@interiortesting.com

Project	: 16.192	Method	: Solid Stem Auger
	: External Water Supply	Driller	: Mud Bay Drilling
	: Penticton Airport	Logged By	: JA
	: Penticton, BC	Date	: August 4, 2016
Location	: See Dwg. No. 16.192-1		



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Drawing No. 16.192-3

TERMS OF ENGAGEMENT

GENERAL

Interior Testing Services Ltd. (ITSL) shall render the Services performed for the Client on this Project in accordance with the following Terms of Engagement. ITSL may, at its discretion and at any stage, engage subconsultants to perform all or any part of the Services. Unless specifically agreed in writing, these Terms of Engagement shall constitute the entire Contract between ITSL and the Client.

COMPENSATION

Charges for the Services rendered will be made in accordance with ITSL's Schedule of Fees and Disbursements in effect from time to time as the Services are rendered. All Charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client within thirty (30) days of the date of the invoice without hold back. Interest on overdue accounts is 12% per annum.

REPRESENTATIVES

Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

TERMINATION

Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay ITSL its Charges for the Services performed, including all expenses and other charges incurred by ITSL for this Project.

If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by ITSL under this paragraph, the Client shall forthwith pay to ITSL its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

ENVIRONMENTAL

ITSL's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. ITSL will co-operate with the Client's environmental consultant during the field work phase of the investigation.

PROFESSIONAL RESPONSIBILITY

In performing the Services, ITSL will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed. ITSL makes no warranty, representation or guarantee, either express or implied as to the professional services rendered under this agreement.

LIMITATION OF LIABILITY

ITSL shall not be responsible for:

(a) the failure of a contractor, retained by the Client, to perform the work required in the Project in accordance with the applicable contract documents;
(b) the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
(c) any cross-contamination resulting from subsurface investigations;
(d) any damage to subsurface structures and utilities;
(e) any Project decisions made by the Client if the decisions were made without the advice of ITSL or contrary to or inconsistent with ITSL's advice;
(f) any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
(g) the unauthorized distribution of any confidential document or report prepared by or on behalf of ITSL for the exclusive use of the Client.

The total amount of all claims the Client may have against ITSL under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the lesser of our fees or $50,000.00.

No claim may be brought against ITSL in contract or tort more than two (2) years after the Services were completed or terminated under this engagement.

PERSONAL LIABILITY
For the purposes of the limitation of liability provisions contained in the Agreement of the parties herein, the Client expressly agrees that it has entered into this Agreement with ITSL, both on its own behalf and as agent on behalf of its employees and principals.

The Client expressly agrees that ITSL's employees and principals shall have no personal liability to the Client in respect of a claim, whether in contract, tort and/or any other cause of action in law. Accordingly, the Client expressly agrees that it will bring no proceedings and take no action in any court of law against any of ITSL's employees or principals in their personal capacity.

THIRD PARTY LIABILITY
This report was prepared by ITSL for the account of the Client. The material in it reflects the judgement and opinion of ITSL in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ITSL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report may not be used or relied upon by any other person unless that person is specifically named by us as a beneficiary of the Report. The Client agrees to maintain the confidentiality of the Report and reasonably protect the report from distribution to any other person.

INDEMNITY
The client shall indemnify and hold harmless ITSL from and against any costs, damages, expenses, legal fees and disbursements, expert and investigation costs, claims, liabilities, actions, causes of action and any taxes thereon arising from or related to any claim or threatened claim by any party arising from or related to the performance of the Services.

DOCUMENTS
All of the documents prepared by ITSL or on behalf of ITSL in connection with the Project are instruments of service for the execution of the Project. ITSL retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of ITSL.

FIELD SERVICES
Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of ITSL, to observe whether the work of a contractor retained by the Client is being carried out in general conformity with the intent of the Services.

DISPUTE RESOLUTION
If requested in writing by either the Client or ITSL, the Client and ITSL shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by an arbitrator appointed by agreement of the parties.

CONFIRMATION OF PROFESSIONAL LIABILITY INSURANCE
As required by by-laws of the Association of Professional Engineers and Geoscientists of British Columbia, it is required that our firm advises whether or not Professional Liability Insurance is held. It is also required that a space for you to acknowledge this information be provided.

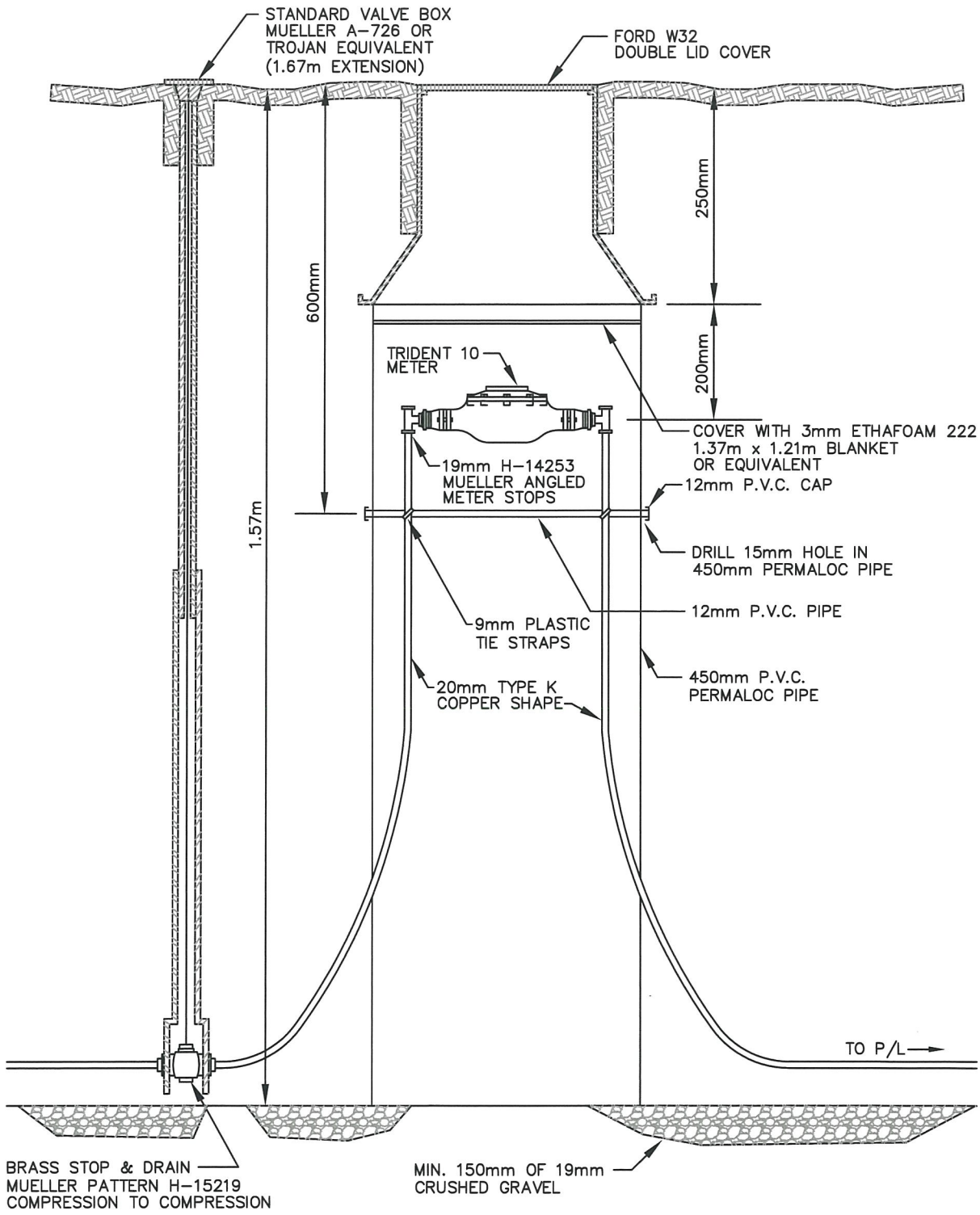
Our professional liability insurance is not project specific for the project and should not be regarded as such. If you require insurance for your project you should purchase a project specific insurance policy directly.

Accordingly, this notice serves to advise you that ITSL carries professional liability insurance. Please sign and return a copy of this form as an indication of acceptance and agreement to the contractual force of these Terms of Engagement.

ACKNOWLEDGEMENT:_____

PROJECT NO. R.073300.101
EXTERNAL WATER SUPPLY CONNECTION
PENTICTON AIRPORT
PENTICTON, BC

APPENDIX B



FROSTPROOF 19mm AND 25mm METER VAULT	APPROVED	DRAWING NUMBER:
	NOVEMBER, 2004	S-W14

2004