Fisheries and Oceans Canada | Pêches et Océans Canada

SPECIFICATIONS

FALSE CREEK HARBOUR

WATERMAIN REPLACEMENT

2022

FISHERIES AND OCESANS CANADA
SMALL CRAFT HARBOURS – PACIFIC REGION

200 – 401 Burrard Street
Vancouver, British Columbia
V6C 3S4

END OFSECTION

PART 1 GENERAL

1.1 SITE LOCATION

.1 Work under this contract is located at False Creek Small Craft Harbour, in Vancouver, British Columbia, at the East end of West 1st avenue.

1.2 WORK SCHEDULE

.1 All work including site clean-up and demobilization must be completed by June 20, 2022. Refer to Section 01 13 00 - General Requirements.

1.3 DEFINITIONS

.1 Throughout contract documents, the words “Owner,” “Harbour Authority,” “Engineer,” or “Department,” shall be defined as follows:

.1 Owner
Small Craft Harbours, Department of Fisheries and Oceans Canada,
200-401 Burrard Street Vancouver BC V6C 3S4

.2 Harbour Authority (HA)
False Creek Harbour Authority, 1505 West 1st Avenue, Vancouver, BC, V6J 1E8.

.3 Engineer / Departmental Representative
An employee of the Owner or Consultant assigned by the Owner as the Engineer for this project, or the Engineer’s representative assigned by the Engineer as his representative for the project.

.4 Contractor
The party accepted by the Owner with whom a formal contract is entered to complete the work for this project.

.5 Department
The Department of Fisheries and Oceans Canada.

1.4 WORK INCLUDED

.1 In general, the nature of work consists of light to heavy Watermain Replacement
.2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
.1 Installation of a new watermain system, not including watermain on the docks.
.2 Removal of the existing watermain.
.3 A list of Owner supplied materials is provided in Section 01 12 00.
.4 All labour, equipment and materials shall conform to Technical Specifications herein.

.5 Description of Items

.1 Replacement of the watermain

The lump sum cost of replacement of watermain includes all labour, equipment and materials to complete the following:

.1 Mobilization / Demobilzation

1. Move all crew, equipment and materials on and off False Creek Small Craft Harbour.
2. Allow the Owner to inspect ALL Contractor supplied materials after delivery to the harbour. Provide the Owner with minimum one (1) week notice when materials will be ready for inspection.
3. Move materials, including Owner supplied materials, around the site as required to complete the work.
4. Cover all crew costs such as food and accommodations.
5. Provide site clean-up daily throughout construction.
6. Supply and install appropriate barriers to construction to restrict public access to the park during construction

.2 Supply and Installation of the new watermain

1. Trench and remove the paving and asphalt as per section 31 23 33 01 and section 02 41 13 14
2. Supply and installation approximately 340m of new PVC watermain. Refer to sections 03 03 00, section 31 05 00, section 33 11 16 11 as well as drawing 56191-001.
3. Supply and installation of 10 new valves and 3 new yard hydrants. Refer to Section sections 31 05 00 and drawing 56191-001.

.3 Removal of existing Watermain

1. Remove and dispose of existing approximately 340m of cast iron watermain. Refer to drawing 56191-001..
2. Backfill, and repave to it’s original state. Refer to section 31 23 33 01, section 32 11 23 and section 23 12 16.01.

END OF SECTION

PART 1 GENERAL

1.1 CODES, BYLAWS, STANDARDS

.1 Comply with applicable local bylaws, and all False Creek Small Craft Harbour's site rules and regulations enforced at the location concerned.

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

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

.4 Contractor shall apply and obtain any permits required by authorities having jurisdiction.

1.2 CONTRACT METHOD

.1 Construct work under lump sum contract.

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.

.3 If there is any inconsistency or conflict between the provisions of the Contract Documents the:

.1 The Contract Documents shall govern and take precedence in the following order with the Agreement taking precedence over all other Contract Documents:

.1 Agreement

.2 Addenda

.3 Supplementary Specifications

.4 Specifications

.5 Drawings

.6 Supplementary Detailed Drawings

.7 Standard Detailed Drawings

.8 Executed Form of Tender

.9 Instructions to Tenderers

.10 All other Contract Documents

.2 Drawings at a larger scale shall govern over Drawings at a smaller scale.:

.3 Figured dimensions on a drawing shall govern over scaled measurements on the same Drawing; and.

.4 Documents of later date shall always govern a similar type of document of an earlier date.

1.4 OTHER CONTRACTS

.1 Further Contracts may be awarded while this contract is in progress.

.2 Cooperate with other Contractors on site in carrying out their respective works and carry out instructions from Departmental Representative.

.3 Coordinate work with that of other Contractors.

1.5 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 one 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.

1.6 TIME OF COMPLETION

.1 Commence work immediately upon official notification of acceptance of offer and complete the project by June 30, 2022.

1.7 HOURS OF WORK

.1 Restrictive as follows:

.1 Schedule deconstruction, removal and construction work during normal weekday working hours of the facility. Normal weekday working hours are 0700 hours to 1800 hours Monday through Friday, excluding statutory holidays. Extended hours are available upon request. The contractor is to provide seven days' notice for extension of hours on a case-by-case basis.

.2 Submit written request to Departmental Representative for authorization prior to working outside of normal working hours including weekends or holidays.

.3 Work must be completed prior to May 28 or commence after May 29, 2022.

1.8 WORK SCHEDULE

.1 Carry on work as indicated and as follows:

.1 Within 14 working days after Contract award, provide a Master Project Schedule, in the form of a bar chart, showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Schedule to indicate the following:

.1 Submission of shop drawings, product data, MSDS sheets and sample test reports.

.2 Commencement and completion of work of each section of the specifications or trade for each stage of work 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 the approval of the Departmental Representative.

1.9 COST BREAKDOWN

.1 Before submitting the first progress claim, submit a breakdown of the contract lump sum price in detail as directed by the Departmental Representative. After approval, the cost breakdown will form the basis of progress payments.

1.10 DOCUMENTS REQUIRED

.1 Maintain one copy each of the following at the job site:

.1 Contract drawings.

.2 Contract specifications.

.3 Addenda to Contract documents.

.4 Copy of approved work schedule.

.5 Reviewed shop drawings.

.6 Change orders.

.7 Other modifications to Contract.

.8 Field test reports.

.9 Reviewed samples.

.10 Manufacturer’s installation and application instructions.

.11 One set of record drawings and specifications for "as-built" purposes.

.12 Contractor’s Health and Safety Plan and other Safety Related Documents.

.13 National Building Code of Canada 2015.

.14 Current construction standards of workmanship listed in technical specifications.

.15 WHMIS documents.

.16 Site Instructions.

.17 Request for Information (RFI).

.18 Contractor’s Environmental Management Plan (including spill management plan).

.19 Other documents as specified.

1.11 OWNER OCCUPANCY

.1 During the entire construction period, the owner will occupy adjacent areas for execution of normal operations.

.2 Note that internments will likely occur during the project and the contractor is expected to:

.1 Make the required site area available to False Creek Small Craft Harbour.

.2 Provide save access to the site

.3 Provide and required temporary restoration and relocate construction works as needed

1.12 CONTRACTOR'S USE OF SITE

.1 The facility shall be assumed to be fully operational for the duration of the contract.

.2 The Contractor will assume the role of Prime Contractor as per Section 118 of the Workers Compensation Act.

.3 The use of Contractor's work site is exclusive and complete for the execution of contract work.

.4 The Contractor shall:

.1 Assume responsibility for assigned premises for performance of the work.

.2 Coordinate all work activities on the Contractor's work site, including the work of other contractors engaged by Departmental Representative.

.3 Provide security of Contractor's work site and all Contractor's and Subcontractor's equipment and material. Secure Contractor's work site at the end of each work day.

.4 Ensure the site is not unreasonably encumbered with material or equipment.

.5 Do not enter any area of the property to which access is restricted by sign is a secured or restricted area and shall not be entered.

.6 Do not obstruct access to property outside of the Contractor's work site. Maintain overhead clearances, keep roadways and walkways clear, and maintain routes for emergency response vehicles.

1.13 EXISTING SERVICES

.1 Notify Departmental Representative of intended interruption of services and obtain required permission. Where work involves breaking into or connecting to existing services, contractor shall submit a request to the Departmental Representative a minimum of 48 hours prior to the event. The contractor will not proceed until approval has been granted. The Departmental Representative will make all reasonable efforts to accommodate the request; however, the Owner will not accept delay charges should the request not be accepted.

.2 Minimize duration of interruptions, and where required, provide temporary services to maintain critical systems.

.3 Contractor to identify that all unknown services encountered to the Departmental Representative who will provide direction on how to proceed.

.4 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in a manner approved by authorities having jurisdiction.

1.14 WORK BY OTHERS

.1 Co-ordinate work with that of other Contractors. If any part of the Work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of work.

1.15 EXAMINATION

.1 Examine site and be familiar and conversant with existing conditions likely to affect work.

.2 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.3 At completion of operations the condition of existing work must be equal to or better than that which existed before new work started.

.4 Protect existing work to prevent injury or damage to portions of existing work which remain.

1.16 CUTTING AND PATCHING

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items so shown or specified.

.3 Except as noted on drawings, do not cut, bore, or sleeve load-bearing members.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval.

.6 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 meters in ambient light.

1.17 SETTING OUT OF WORK

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

1.18 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.

1.19 QUALITY OF WORK

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

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

1.20 MEETINGS

.1 Attend contract start-up meeting, progress meetings and all other meetings described herein including site meetings as directed by the Departmental Representative.

1.21 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 where required, illustrating potential interference between work of various trades and distribute to affected parties.

.3 Work cooperation:

.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.

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

.4 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.

.6 Maintain efficient and continuous supervision.

1.22 APPROVAL OF SHOP DRAWINGS AND PRODUCT DATA

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

.2 Allow sufficient time for the following:

.1 Review of product data.

.2 Review of shop drawings.

.3 Review of re-submission.

.4 Ordering of approved material and/or products - refer to technical Specifications.

1.23 TESTING AND INSPECTIONS

.1 Particular requirements for inspection and testing to be carried out by testing service approved by the Departmental Representative and paid for by the Contractor.

.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 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 corrected work.

.4 Contractor shall notify Departmental Representative in advance of planned testing.

.5 Contractor shall pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.

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

1.24 AS-BUILT DOCUMENTS

.1 Refer to Section 01 78 30 - Closeout Submittals.

1.25 CLEANING

.1 Conduct daily 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.

1.26 DUST CONTROL

.1 Provide control measures as specified in Section 01 35 43 - Environmental Procedures.

1.27 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 35 43 - Environmental Procedures.

1.28 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 3 sets of Contract documents for use by the Contractor at no additional cost. Should more than 3 sets of documents be required, the Departmental Representative will provide them at additional cost.

1.29 SYSTEM OF MEASUREMENT

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

1.30 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.

1.31 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.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART 1 GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present information in SI Metric units.

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

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

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

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

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

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

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

.11 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

1.2 PROGRESS PHOTOGRAPHS AND FINAL PHOTOGRAPHS

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

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

.4 Quantity: Provide sufficient number of photographs to adequately describe the work activities carried out during the reporting period. A minimum of two photographs taken from two viewpoints are to be provided for each clean-up/construction activity.

.5 Submit final photographs with as-built documents.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Government of CANADA.

.1 Canada Labour Code - Part II

.2 Canada Occupational Health and Safety Regulations.

.2 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 Structure

.4 CSA Z1006-10 – Management of Work In Confined Space

.4 National Fire Code of Canada 2010 (as amended)

.1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.

.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

1.2 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.

1.3 COMPLIANCE WITH REGULATIONS

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

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

1.4 SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 33 00.

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

.3 Submit the following:

.1 Site Specific 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 Copy of Contractors' Construction Safety Manual

.6 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's Site Specific Safety Plan and Emergency Procedures, and provide comments to the Contractor within 5 (five) 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 Site Specific 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.

1.5 RESPONSIBILITY

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

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

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

1.6 HEALTH AND SAFETY COORDINATOR

.1 The contractor shall appoint a Health and Safety Coordinator who shall:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

.3 Be on site during execution of work.

1.7 GENERAL CONDITIONS

.1 Provide safety barricades and lights 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 sites.

.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 work sites against entry.

1.8 UTILITY CLEARANCES

.1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work

.2 The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site may involve contact with:

.1 Federal employees,

.2 Operational staff,

.3 Unpredictable weather conditions,

.4 Threat of tsunami and earthquake, and

.5 Confined space and restricted access space.

.6 Work with hazardous substances.

1.10 REGULATORY REQUIREMENTS

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

.2 In event of conflict between any provision of (.1) above, the authorities having 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.

1.11 WORK PERMITS

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

1.12 FILING OF NOTICE

.1 The Prime Contractor shall submit a Notice of Project to the Provincial authorities.

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

1.13 SITE SPECIFIC SAFETY PLAN

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

.2 Develop, implement, and enforce the Site Specific 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 communication 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

.3 the work.

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

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

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

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

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

.3 Develop the Site Specific Safety 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 Site Specific Safety Plan as required, and re-submit to the Departmental Representative for review.

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

1.14 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 as required.

.2 Include the following provisions in the emergency procedures:

.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.

.2 Evacuate all workers safely.

.3 Check and confirm the safe evacuation of all workers.

.4 Notify the fire department or other emergency responders.

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

.6 Notify Departmental Representative and PWGSC site staff.

.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 At least once each year, emergency drills must be held to ensure awareness and effectiveness of emergency exit routes and procedures, and a record of the drills must be kept.

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

1.15 HAZARDOUS PRODUCTS

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

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

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents 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 NMS Sections as indicated in Section 000110 Specification Index.

1.16 OFF SITE CONTINGENCY AND EMERGENCY RESPONSE PLAN

.1 Prior to commencing Work involving handling of hazardous materials, develop off site Contingency and Emergency Response Plan.

.2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

.3 Notification of fire departments 4.17 – Worksafe BC Regulations Part 4 Buildings, Structures, Equipment, and Site Conditions

.1 An employer having at a workplace hazardous products covered by WHMIS, explosives, pesticides, radioactive material, consumer products or hazardous wastes in quantities which may endanger firefighters, must ensure the local fire department is notified of the nature and location of the hazardous materials or substances and methods to be used in their safe handling.

.2 Subsection (1) does not apply to a workplace

(a) where materials are kept on site for less than 15 days if the employer ensures an alternative effective means for notification of fire departments is in place in the event of fire or other emergency, or (b) which is not within the service area of a fire department. Amended by B.C. Reg. 30/2015, effective August 4, 2015.

1.17 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

.1 Work shall be performed in compliance with Part 8 - Personal Protective Clothing and Equipment, and Part 5 – Chemical Agents and Biological Agents, (as applicable) Worksafe B.C. OHS Regulations

1.18 ASBESTOS HAZARD

.1 Modifications to spray- or trowel-applied asbestos surfaces can be hazardous to health.

.2 Removal and handling of asbestos will be performed as per Worksafe B.C. Regulations Part 6 Substance Specific Requirements Asbestos and all applicable regulations.

1.19 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.

.3 Develop, implement and enforce a communication plan with Departmental representative and facility maintenance staff for all electrical work and lockout procedures.

1.20 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

.2 electrical circuit or facility.

.3 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.

.4 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.

1.21 OVERLOADING

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

1.22 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with Worksafe B.C. Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space.

Restricted Access

.2 Contractor shall perform a hazard assessment and develop an appropriate restricted access entry and emergency rescue plan in accordance with Worksafe B.C. regulations.

1.23 CONFINED SPACE AND RESTRICTED SPACE OUTSIDE OF DEFINED WORK SITE

.1 Carry out work in confined spaces in compliance with Worksafe B.C. Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space. Coordinate all confined space entry work with PWGSC Departmental Representative through the contractor's confined space entry permit system.

.2 Contractor shall perform a hazard assessment and develop an appropriate restricted access entry and emergency rescue plan in accordance with Worksafe B.C. regulations. Coordinate all restricted access space entry work with the Departmental Representative prior to entry.

.3 The Contractor is required to provide a reasonable amount of time to the Departmental Representative for making arrangements for entry and/or access to Confined Space or Restricted Access spaces located outside the designated work site.

1.24 FIRE SAFETY AND HOT WORK

.1 Coordinate all hot work with Departmental Representative through the contractors' hot work permit system.

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

.3 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.

1.25 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.

1.26 FIRE PROTECTION AND ALARM SYSTEM

.1 Fire protection and alarm systems shall not be:

.1 Obstructed.

.2 Shut off.

.3 Left inactive at the end of a working day or shift.

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

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

1.27 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.

1.28 POSTED DOCUMENTS

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

.1 Site Specific 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 Health and Safety Coordinator, 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.

1.29 MEETINGS

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

1.30 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".

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART 1– GENERAL

1.1 REFERENCES

.1 Species at Risk

.1 Protect all Species at Risk, including all federal, provincial, and municipal laws and regulation.

.2 Modify Work procedures, including stopping Work, as instructed by Departmental Representative to protect Species at Risk.

.2 Migratory Birds Convention Act

.1 Pay specific attention to the most current version of the Act.

1.2 RELATED SECTIONS

.1 Excavating, Trenching, and Backfilling (Section 31 23 33.01)

1.3 DEFINITION

.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 humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Environmental Protection Plan: is prepared by Contractor and describes in writing all the environmental protection and mitigation measures that will be applied throughout the life of the Project by the Contractor to avoid or minimize the potential effects on the environment associated with the Project.

1.4 SUBMITTALS

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

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Environmental protection plan to include:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting contaminated materials and hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 The specifics of the Environmental Protection Plan to include incident reporting, a communication plan and reporting forms used by the Contractor and persons responsible for ensuring adherence to the Environmental Protection Plan.

.6 Erosion and Sediment Control Plan which identifies 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.

.7 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance (Reference Section 1.8.4)

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

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.10 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste water management plan that identifies methods and procedures for management and/or 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.

.12 The contractor shall contain dust, debris and tailings from drilling/coring activities using wetting and HEPA vacuum.

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

.14 Historical, Archaeological, Cultural Resources, Biological Resources and Valued Habitat Protection identifying methods, means and sequences for preventing, monitoring, and controlling protection of historical, archaeological, cultural resources, biological resources and valued habitat. Include procedures if previously unknown historical, archaeological, cultural and biological resources are discovered during Work. Includes Species at Risk.

.15 The procedures for stopping the work and implementing changes to the construction methods should the Contractor not be achieving the environmental requirements as outlined in these specifications.

.16 The procedures for stopping work should the Contractor encounter archaeological resources or human remains.

1.5 SITE ACCESS AND PARKING

.1 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers' vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.

1.6 FIRES

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Accomplish maximum control of construction waste to preserve environment and prevent pollution and environmental damage

.1 All disposal, recycling and waste manifests shall be provided to the Departmental Representative.

.2 Ensure proper disposal procedures in accordance with all applicable regulations.

.3 Contractor to provide all disposal certificates, receipts, and other applicable documentation for removal and disposal of existing hazardous materials in accordance with requirements

.2 Identify opportunities for waste reduction, reuse, and recycling of materials.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials

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

.6 Collect handle, store on-site, and transport off-site, salvaged materials in separated condition.

.7 Store materials to be reused, salvaged, and salvaged in locations as directed by the Departmental Representative.

.8 Unless otherwise specified, materials for removal become Contractors property.

.9 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.10 Do not bury rubbish and waste materials on site.

.11 Do not dispose of wastes into water courses, storm, or sanitary sewers.

.12 Place materials defined as hazardous or toxic in designated containers.

.13 Divert unused aggregate materials from landfill to facility for reuse as approved by Department Representative.

.14 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Department Representative.

.15 Fold up metal banding, flatten and place in designated area for recycling.

.16 Do not dispose of unused paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.

.17 Divert unused asphalt from landfill to facility capable of recycling materials.

.18 Conduct daily cleaning operations as work progresses.

.19 Conduct Final cleaning when work is complete, prior to final inspection.

1.8 WORK ADJACENT TO WATERWAY

.1 Do not dump waste material or debris in waterways.

1.9 POLLUTION CONTROL

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

.2 Control emissions from equipment and plant to local authorities' emission requirements.

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

.4 A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative, and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Hazardous products shall be stored no closer than 100 meters from any surface water.

.5 The Contractor shall provide spill kits, to the satisfaction of the Departmental Representative, at re-fuelling, lubrication and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The Contractor and site staff shall be informed of the location of the spill response kit (s) and be trained in its use.

.6 Timely and effective actions shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative shall be notified immediately of any spill as well as the provincial authorities. Basic instructions and phone numbers shall be part of the Contractor's EPP.

1.10 HISTORICAL/ARCHAELOGICAL CONTROL

.1 The Owner will retain a third party archaeological monitor for the project.

.2 Contractor will be provided a Chance Find Management Procedure and must ensure all crew members are familiar with it. Contractor must notify the archaeological monitor and the Owner if potential historical archaeological, cultural resources and biological resources are discovered during construction.

1.11 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed non-compliance 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.

.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.

1.12 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Measures to be implemented to prevent, control or mitigate spills or release of deleterious substances:

.1 Contractor shall take due care to ensure no deleterious materials enter watercourses or any surface drainage pathways located in the project area.

.2 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the contractor will immediately implement their Spill Response Protocol.

.3 The Contractor is responsible for all costs associated with a spill or release as a result of their actions. This will include but not limited costs of spill response

equipment and materials, associated sampling, analysis and any required restoration of the impacted area.

.4 Response equipment to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur on site.

.5 All construction equipment brought onto the site will be clean and properly maintained.

.6 Any equipment maintenance must occur in a designated area and must be conducted away from any surface water drains or collection points.

.7 Any equipment remaining on site overnight shall have appropriately placed drip pans.

.8 Waste generated will be prevented from entering the environment.

.2 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the marine environment.

1.13 CLEANING

.1 Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

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

.3 No washing out of concrete trucks is permitted on site.

.4 Complete daily cleaning activities of all roadways and parking lot areas affected by work and by construction equipment traffic.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART 1– GENERAL

1.1 INSPECTION

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

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Work Site.

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

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

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Contractor shall engage and pay for Independent Inspection/Testing Agencies for the purposes of Quality Control to ensure that Work meets the requirements of the Contract Documents. Contractor shall submit the document of Independent Inspection/Testing Agencies to Departmental Representative for approval.

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

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

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

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

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

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

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

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Department

Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

1.6 REPORTS

.1 Submit 2 copies of inspection and test reports to Department Representative.

.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART 1 GENERAL

1.1 GENERAL

.1 Section 01 55 00 addresses general requirements for temporary vehicle movement, site access and parking not incorporated into the final or permanent work, as well as traffic control during construction. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

.2 During progress of the Work, make adequate provision to accommodate normal traffic along onsite roads immediately adjacent to or crossing the Works so as to minimize inconvenience to site operations.

.3 Give minimum 48 h notice or as otherwise required by Departmental Representative to local police, fire departments, emergency services, and site operations staff prior to beginning construction on roadways and comply in all respects with their requirements.

.4 Inform Departmental Representative and tenants where access is affected at least 24 hours in advance of proposed road and/or sidewalk closures.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Contractor to submit traffic control plan to Departmental Representative for review and approval prior to construction.

1.3 EXISTING SITE CONDITIONS AND ENVIRONMENTAL PROTECTION

.1 The contractor shall be held responsible for any damage caused to existing streets or services by construction equipment and/or trucks hauling materials to the site. This shall include daily cleaning or sweeping all existing roads or dirt and debris caused by construction activity.

.2 A truck wash may be required at the discretion of the Departmental Representative.

.3 All work areas, roadways, and site accesses to be restored to as-found or better condition once work is complete.

.4 Mats will be used when operating tracked equipment on all paved areas, with the exception of areas stipulated for re-pavement.

1.4 TEMPORARY HOARDING

.1 Provide temporary hoarding as shown on the drawings.

.2 Hoarding to be 2.4m high interlocking steel fence, secured at both ends.

.3 Hoarding line to be outside existing paved areas to maintain access for Airport equipment. During parking lot prep. work and paving, the hoarding line may be temporarily relocated east.

1.5 TEMPORARY ACCESS ROADS

.1 Provide and maintain temporary access roads at locations approved by the Departmental Representative.

1.6 TEMPORARY PARKING AREAS

.1 Provide and maintain temporary parking areas as shown in the construction documents.

1.7 CONTRACTOR LAYDOWN AREA

.1 The Contractor may use the area specified on drawing FC-3 for a laydown area including equipment and material storage, site offices, first aid facilities, washrooms, and other required site facilities.

.2 The existing ground surface is to be protected and restored to as-found or better condition once construction is complete.

.3 Fencing, signage, and security are to be provided by the Contractor. Any vandalism is to be removed or repaired within 24-hours.

.4 The Contractor is responsible for any theft or incidental damage in the laydown area.

1.8 TRAFFIC CONTROL AND SIGNAGE

.1 Comply with requirements of the "Traffic Control Manual for Work on Roadways", published by the British Columbia Ministry of Transportation, for regulation of vehicle and pedestrian traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment.

.2 Regulate traffic in general accordance with Port Hardy Airport requirements for uninterrupted access to all parts of this site except where specified otherwise and in compliance with specific requirements stipulated herein.

.3 Provide and maintain access to corridors specified on Contract Drawings.

.4 Provide and maintain reasonable road and pedestrian access to all temporary facilities, cargo requirements, and emergency access.

.5 Keep travelled way well graded, free of pot holes and of sufficient width that required number of lanes of traffic may pass.

.6 When working on travelled way:

.1 Place equipment in such position as to present a minimum of interference and hazard to the travelling public.

.2 Keep equipment units as close together as working conditions will permit and preferably on same side of travelled way.

.3 Provide lighting as required based on seasonal variations and hours of work.

.4 Do not leave equipment on travelled way overnight.

.7 Traffic Control Informational and Warning Devices

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which may require road user response.

.2 Supply and erect signs, delineators, barricades and other miscellaneous warning devices in accordance with Departmental Representative requirements.

.3 Place signs and other devices in additional locations as appropriate or as directed by the Departmental Representative.

.4 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

.8 Control of Traffic Using Flaggers

.1 Provide flag persons, trained and properly equipped for the following situations:

.1 When it is necessary to institute one-way traffic system through construction area or other blockage where the typical traffic control plant is not in use.

.2 When workers or equipment are employed on travelled way.

.3 Where temporary protection is required while other traffic control devices are being erected or taken down.

.4 For emergency protection when other traffic control devices are not readily available.

.5 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.9 Provide and maintain suitable detours or temporary hard surfaced access routes for pedestrian traffic, complete with suitable warning and advisory signs.

.10 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART1 GENERAL

1.1 SUBMISSION

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

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

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

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

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1.2 CONTENTS, EACH VOLUME

.1 Table of Contents – provide the following:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.

.4 Schedule of products, indexed to content of volume.

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

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

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

1.3 TESTING, REVIEW, AND ACCEPTANCE

.1 The contractor is to facilitate and make possible the following inspections including demonstration that the system installed meets the project requirements. All tests and inspections to be witnessed by False Creek Small Craft Harbour Staff and the Departmental Representative.

.1 Irrigation mainline and laterals:

.1 Review of pipe & wiring bedding, backfill and compaction process

.2 Confirmation of swing joints on popup fittings and filters on drip zones

.3 Confirmation that all materials, piping, valves and fittings meet the project specifications.

.4 Pressure test of mainline piping to available line pressure. The piping is to hold line pressure for a minimum of 5 minutes.

.2 False Creek Small Craft Harbour staff training

.1 Following the final inspection, the contractor is to demonstrate the operation of the complete watermain system to False Creek Small Craft Harbour staff and the Departmental Representative.

1.4 AS-BUILT DOCUMENTS

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

.1 Field changes of dimension and detail.

.2 Changes made by change orders.

.3 Details not on original Contract drawings.

.4 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 Record of backflow prevention device certification.

.3 On site “Red Line” As-Built documents to be reviewed with Departmental Representative at project meetings to ensure up-to-date and accurate As-Built documents at the end of the project.

.4 Mark on 1 set of drawings, specifications and shop drawings at completion of project and, before final inspection.

.5 Submit to the Departmental Representative.

1.5 TEST RESULTS & 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 principals.

.3 Obtain Test Result and 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.

1.6 COMPLETION

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

.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 as required.

.2 Work is complete and ready for final inspection.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART1 GENERAL

1.1 GENERAL

.1 Methods for removal of existing asphalt pavement.

1.2 PROTECTION

.1 Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

1.3 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as established by in field.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Provide for suppression of dust generated by removal process.

1.4 SWEEPING

Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION

PART1 GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.2 Section 33 11 16 – Watermains.

1.2 REFERENCES

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

.1 ASTM C 260, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C 309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C 330, Standard Specification for Lightweight Aggregates for Structural Concrete.

.4 ASTM C 494/C 494M, Standard Specification for Chemical Admixtures for Concrete.

.5 ASTM C 1017/C 1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.6 ASTM D 412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.7 ASTM D 624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.8 ASTM D 1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.9 ASTM D 1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Damp-proofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA International):

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283, Qualification Code for Concrete Testing Laboratories.

.3 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001, Cementitious Materials for Use in Concrete.

1.3 DESIGN REQUIREMENTS

.1 Alternative 1 – Performance: in accordance with CSA-A23.1/A23.2, and as described in MIXES of PART 2 – PRODUCTS.

1.4 QUALITY ASSURANCE

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

.2 Contractor to pay for an independent testing agency to complete concrete tests.

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

1.5 DELIVERY, HANDLING AND STORAGE

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 The Departmental Representative has full authority to refuse concrete that has exceeded maximum acceptable hauling time of 120minutes without approval of concrete producer.

.3 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

.4 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Departmental Representative.

.5 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.6 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial and National regulations.

PART2 PRODUCTS

2.1 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CSA-A23.1.

.3 Aggregates: to CAN/CSA-A23.1/A23.2.

.4 Admixtures:

.1 Air entraining admixture: to ASTM C 260.

.5 Grout:

.1 Cell-CreteTM or approved equivalent.

2.2 MIXES

1. Alternative 1 – Performance Method for specifying concrete: to meet Departmental Representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 – VERIFICATION.

.2 Provide concrete mix to meet following hard state requirements:

.1 Durability and class of exposure: C-1.

.2 Minimum compressive strength at 28 days age: 35 MPa.

.3 Surface texture: steel trowel finish.

PART3 EXECUTION

3.1 PREPARATION

1. Obtain Departmental Representative's approval before placing concrete.

   .1 Provide 48-hours' notice prior to placing of concrete.

2. Place concrete reinforcing in accordance with Section 03 20 00 – Concrete Reinforcing.

3. During concreting operations:

   .1 Development of cold joints not allowed.

   .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

4. Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.

5. Protect previous Work from staining.

6. Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance in accordance with CSA-A23.1/A23.2 straightedge method.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct following test in accordance with Section 01 01 50 – Quality Control and submit report as described in PART 1 – SUBMITTALS.

   .1 Slump tests.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review in accordance with CSA-A23.1/A23.2.

   .1 Ensure testing laboratory is certified in accordance with CSA A283.

.3 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.

.4 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.5 VERIFICATION

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 – Products, by Departmental Representative and provide verification of compliance as described in PART 1 – QUALITY ASSURANCE.

END OF SECTION

PART1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 Excavating, Trenching and Backfilling

.2 Section 32 11 23 Aggregate Base Courses

.3 Section 32 12 16.01 Asphalt Paving – Short Form

.4 Section 33 11 16 Site Water Utility Distribution Piping

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit name of professional engineer retained by the Contractor for geotechnical testing for review and approval by Departmental Representative.

.2 Submit name of testing laboratory retained by Contractor for materials testing for review and approval by Departmental Representative.

.3 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide sample test report.

.4 Submit geotechnical quality assurance information and test results within 1 week of undertaking.

1.3 GEOTECHNICAL QUALITY ASSURANCE

.1 Retain and pay for the services of a qualified independent geotechnical testing agency under the supervision of a registered professional engineer, and pay the cost of testing services for quality control including, but not limited to, the following:

.1 Sieve analysis of sands and aggregates to be supplied

.2 Standard proctor density curves for backfill materials

.3 Standard proctor density curves for approved borrow materials

.4 Compaction control tests for backfill and embankment material including the following:

.1 Trench bedding (service) - once per road crossing

.2 Trench backfill (service) - once per road crossing

.3 Trench bedding (mainline) - once per every 75m of trench at 1.0m vertical lifts with min. one between manholes.

.4 Trench backfill (mainline) - once per every 75m of trench at 1.0m vertical lifts with min. one between manholes.

.5 Concrete mix design and testing

.6 Concrete strength tests (minimum three specimen cylinders in accordance with CSA a23.1) for the following:

Sidewalk - once per 150 lineal metres (minimum one per day during concrete placing)

.7 Asphalt mix design and testing

.8 Asphalt tests for the following:

.1 Aggregate gradation tests - one per each 300 tonnes of production (minimum once per day during asphalt placement)

.2 Marshall test - three briquettes for every 300 tonnes of production (minimum once per day during asphalt placement)

.3 Compaction - one core for each 500m².

.2 Site excavated material is not suitable for use as backfill.

1.4 SURVEY

.1 The Contractor is to retain a qualified surveyor to complete:

.1 A pre-construction survey of any site features not already surveyed

.2 All site layout, both vertical and horizontal, for pipes, manholes, underground features, curbs, sidewalks, roads, ditches, and surface features.

.3 All as-constructed locations of utilities and surface features.

.2 A copy of the as-constructed survey and drawing markups are to be compiled and provided to the Departmental Representative within 10 days of construction completion.

PART2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 Submittal Procedures.

.2 Section 01 35 29.06 Health and Safety Requirements.

.3 Section 01 35 43 Environmental Procedures.

.4 Section 01 45 00 Quality Control.

1.2 REFERENCES

.1 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia.

.2 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 D422-632002, 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.

.3 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.

.4 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.

.5 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.

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock: solid material in excess of 1.00m3, and which cannot be removed by means of heavy duty mechanical excavating equipment available on site. Frozen material not classified as rock

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension. Source documentation is to be provided.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 – 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 MEASUREMENT AND PAYMENT

.1 With the exception of pay items listed hereunder, payment for all work performed in this Section will be included in the Contractor's Lump Sum Contract prices.

.2 Additional payment for trench excavation by hand will only be made in addition to the work items involving trench work where excavation by machinery is not practicable and only under prior approval by Departmental Representative. Payment will be based on before and after excavation cross-section areas at sufficient equal intervals over the length of over-excavation.

.3 Payment for over-excavation including backfilling will only be made for over-excavation authorized by Departmental Representative. Payment will be based on before and after excavation cross-section areas at sufficient equal intervals over the length of over-excavation.

.4 Payment for removal and disposal of disused pipes and headwalls encountered during trench excavation to specific disposal site will be in addition to trench work with no deduction of payment from such trench work. No payment will be made under this item for removal and disposal carried out as part of the operation for removal and disposal for excavated materials from trench work.

.5 All costs incurred as a result of unauthorized excavation beyond neat lines or limits of excavation shown on Contract Drawings including remedial backfill will be at Contractor's cost.

1.5 EXCAVATION AND DISPOSAL

.1 Contractor to submit to Departmental Representative for review and approval, location of proposed disposal facility prior to disposal of any material.

.2 Extreme care is to be taken when side-casting or stockpiling material on-site. Any proposed on-site stockpiles are to be reviewed with the Departmental Representative prior to placement of material.

.1 Cover any stockpiles susceptible to erosion with polyethylene

.3 Native backfill is suitable for landscape areas.

.4 Notify the Departmental Representative immediately if soil contamination is suspected.

1.6 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Preconstruction Submittals:

.1 Contractor to submit records of underground utility pre-locates of existing utilities in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

.1 Any damaged sections of pavement/concrete to be repaired by the contractor at the Contractor's expense.

.3 Quality Control: in accordance with Section 01 45 00 - Quality Control:

.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.

.2 Submit to Departmental Representative testing inspection results report as described in PART 3 of this Section.

1.7 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability for professionals retained by Contractor.

.2 Submit design and supporting data for excavations at least 2 weeks prior to beginning Work. Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of British Columbia, Canada.

.3 Keep design and supporting data on site.

.4 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.

.5 Health and Safety Requirements:

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

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 35 43 Environmental Procedures.

.2 Divert materials from landfill to local facility for reuse.

1.9 EXISTING CONDITIONS

.1 Buried services:

.1 Before commencing work verify location of buried services on and adjacent to work area.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work.

.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

.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 Departmental Representative to establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

.6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.

.8 Record location of maintained, re-routed and abandoned underground lines on project record drawings.

.9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular Base and Granular Sub-Base material: properties in accordance with the following requirements:

.1 Crushed or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing		
	Granular Sub-Base (75mm crushed gravel)	Granular Base (19mm crushed gravel)	Sand
75 mm	100	-	-
50 mm	-	-	-
37.5 mm	60-100	-	-
25 mm	-	-	-
19 mm	35-80	100	-
12.5 mm	-	75-100	100
9.5 mm	26-60	60-90	-
4.75 mm	20-40	40-70	45-100
2.36 mm	15-30-	27-55	30-90
2.00 mm	-	-	-
1.18 mm	10-20	16-42	-
0.600 mm	5-15	8-30	10-50
0.425 mm	-	-	-
0.300 mm	3-10	5-20	3-20
0.180 mm	-	-	-
0.150 mm	-	-	-
0.075 mm	0-5	2-8	0-8

.2 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; 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.

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 sediment and erosion control drawings, specific to site, in accordance with Section 01 35 43.

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

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

3.2 SITE PREPARATION

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

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

3.3 PREPARATION/PROTECTION

.1 Protect existing features in accordance with applicable local regulations.

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

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

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

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

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds, grasses and removed from site.

.2 Strip topsoil to depths as indicated.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in location as directed by Departmental Representative.

.1 Stockpile height not to exceed 2 m and should be protected from erosion with polyethylene sheeting.

.2 Separate stockpiles are required for each type of material encountered.

.4 Dispose of unused topsoil as directed by Departmental Representative.

3.5 STOCKPILING

.1 Stockpile fill materials in area designated by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Contractor is responsible for the protection and temporary support of all project excavations, with special attention to work adjacent to crane rails and existing structures.

.2 Contractor to retain and pay for services of professional engineer registered in the Province of British Columbia for design and review of temporary works related to underpinning and bracing of existing structure and excavations.

.3 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 33 . 06 - Health and Safety Requirements and WorkSafe BC.

.1 Where conditions are unstable, Contractor to retain and pay costs for geotechnical engineer to review condition and provide recommendations

.4 Construct temporary Works to depths, heights and locations as indicated by Contractor’s geotechnical engineer.

.5 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.

.6 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.7 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

3.7 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for Departmental Representative review 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, to approved runoff areas or containment facilities and 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.

3.8 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations. Excavate to lines, grades, elevations and dimensions as indicated.

.2 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation offsite.

.3 Excavation must not interfere with bearing capacity of adjacent foundations and slabs. Contractor to notify Departmental Representative immediately where undermining of slabs of foundations occurs. Contractor responsible for devising and executing a remediation plan for filling all voids associated with undermining of slabs and foundations.

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

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw, as directed by the project Arborist.

.2 Provide 24 hours notice to Departmental Representative of need for Arborist on site.

.5 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. No

more than 5 m of trench may be exposed at end of day's operation and must be securely covered. Road plates are to be used to cover exposed excavations in areas of vehicular travel.

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

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 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 with granular base material to not less than 95% Modified Proctor 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.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated. Bedding to match gradation under Section 2.1.3 above.

.2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

.1 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.

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

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

.4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:

.1 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.2 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.150 m.

.3 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.

.6 Place unshrinkable fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage system in backfill as indicated.

3.11 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 35 43 Environmental Procedures, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil as indicated.

.3 Reinstate lawns to elevation which existed before excavation.

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

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

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

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

END OF SECTION

PART1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 Cast-In-Place Concrete

.2 Section 31 23 33.01 Excavating, Trenching and Backfilling

.3 Section 32 12 16.01 Asphalt Paving – Short Form

1.2 REFERENCES

.1 ASTM International

.1 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN- m/m^3).

.5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.6 ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.7 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.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.

.4 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia. Contractor to maintain a copy on-site at all times.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit proposed source and sieve analysis of all aggregate materials 2 weeks prior to commencing work.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Granular base and sub-base to MMCD (Master Municipal Contract Documents 2009, British Columbia), Section 31 05 17.

PART 3 EXECUTION

3.1 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Refer to Section 01 35 43 – Environmental Procedures for additional information.

.2 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, sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 PLACEMENT AND INSTALLATION

.1 Place granular base after sub-base and subgrade surface is inspected and approved in writing by Departmental Representative.

.2 Placing:

.1 Construct granular base to depth and grade in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Begin spreading base material on crown line or on high side of one-way slope.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Compacting:

1. Compact to density not less than 95% Modified Proctor Density.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.

.5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.4 Proof rolling:

.1 For proof rolling use standard roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.

.3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.4 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade with common material and compact.

.3 Replace sub-base material and compact.

.4 Replace base material and compact in accordance with this Section.

.5 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

.6 At the discretion of the Departmental Representative, nuclear densometer testing may be utilized for compaction testing rather than proof rolling. Location and frequency of densometer tests to be approved by the Departmental Representative.

3.3 TESTING

.1 Refer to Section 01 45 00 – Quality Control and Section 31 05 00 - Common Works Results – Earthworks, Exterior Improvements, and Utilities for geotechnical testing requirements.

.2 Contractor shall notify Departmental Representative in advance of planned testing.

.3 Contractor to pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.

.4 Provide Departmental Representative with 2 copies of testing and commissioning reports as soon as they are available.

3.4 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.5 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

PART1 GENERAL

1.1 RELATED SECTIONS

.1 Section 32 11 23 Aggregate Base Courses

1.2 REFERENCES

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

.1 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3 (2,700 kN-m/m3)).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.5 – M91, Low Flash Petroleum Spirits Thinner.

.2 CAN/CSGB-1.74, Alkyd Traffic Paint.

.3 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia. Contractor to maintain a copy on-site at all times.

1.3 SAMPLES AND SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit asphalt mix design to Departmental Representative for review at least 1 week prior to commencing work.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Divert unused aggregate materials from landfill to facility for reuse as approved by Department Representative.

.3 Dispose of unused paint and paint thinner materials at official hazardous material collections site as approved by Department Representative.

.4 Do not dispose of unused paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.

.5 Divert unused asphalt from landfill to facility capable of recycling materials.

PART2 PRODUCTS

2.1 MATERIALS

.1 Prime coat: N/A

.2 Tack coat: CAN/CGCB – 16.2, Grade SS-1

.3 Asphalt cement: CGSB – 16.3-M 90, Grade 80-100

.4 Asphalt concrete: MMCD Upper Course #1 and 2

.5 Traffic paint: yellow and white to CAN/CGSB-1.74.

.6 Paint thinner: to CAN/CGSB-1.5.

PART3 EXECUTION

3.1 FOUNDATIONS

.1 Roadway foundations to be constructed in conformance to MMCD Section 31 24 13 – Roadway Excavation, Embankment and Compaction.

.2 Foundations for roadways and parking lots comprise:

.1 compacted granular subbase, thickness as shown in Contract Drawings.

.2 compacted granular base, thickness as shown in Contract Drawings.

.3 Compaction: compact each lift of granular material to 95% Modified Proctor density. Maximum lift thickness: 150 mm.

3.2 PAVEMENT THICKNESS

.1 Pavement thickness for roadways and parking lots is to be as specified in the Contract Drawings .

3.3 PAVEMENT CONSTRUCTION

.1 Construction of asphalt concrete to MMCD 32 12 16 – Hot-Mix Asphalt Concrete Paving.

.2 Surface preparation to MMCD 32 12 16 – Hot-Mix Asphalt Concrete Paving

.3 Cold milling to MMCD 32 01 16.7 – Cold Milling

3.4 TESTING

.1 Refer to Section 01 45 00 – Quality Control and Section 31 05 00 - Common Works Results – Earthworks, Exterior Improvements, and Utilities for geotechnical testing requirements.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for watermains, hydrants, valves, valve boxes, and valve chambers, including service connections.

1.2 RELATED SECTIONS

.1 Section 01 01 50 – General Instructions.

.2 Section 01 78 00 – Closeout Submittals.

.3 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.4 Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCES

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA):

.1 ANSI/AWWA B300, Hypochlorites.

.2 ANSI/AWWA C153/A21.53-11, Ductile-Iron Compact Fittings for Water Service.

.3 ANSI/AWWA C500-09, Metal-Seated Gate Valves for Water Supply Service

.4 ANSI/AWWA C651-14, Disinfecting Watermains.

.5 ANSI/AWWA C800-12, Underground Service Line Valves and Fittings.

.6 ANSI/AWWA C900-16, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 inch through 60 inch (100mm – 1200mm).

.2 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia. Contractor to maintain a copy on-site at all times.

.3 American Society for Testing and Materials International, (ASTM).

.4 American Water Works Association (AWWA)/Manual of Practice:

.1 AWWA M17-2006, Installation, Field Testing, and Maintenance of Fire Hydrants.

.5 Canadian General Standards Board (CGSB).

.6 Canadian Standards Association (CSA International).

1.4. SUBMITTALS

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

.2 Submit complete construction schedule for watermains. Include method for installation of watermain.

.3 Submit samples in accordance with Section 01 01 50 – General Instructions.

.4 Contractor to provide to the Departmental Representative for approval 1 week prior to start of laying pipe the results of a sieve analysis of the proposed bedding materials.

.5 Submit manufacturer's pipe certification.

.6 Pipe certification to be on pipe.

1.5. CLOSEOUT SUBMITTALS

.1 Provide 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, maintenance and operating instructions in accordance with Section 01 78 00 – Closeout Submittals.

.1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

1.6. WASTE MANAGEMENT AND DISPOSAL

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

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Handle and dispose of hazardous materials in accordance with the Canadian Environmental Protection Act (CEPA), Transportation of Dangerous Good Act (TDGA), Regional and Municipal regulations.

.4 Ensure emptied containers are sealed and stored safely.

.5 Divert unused materials from landfill to metal recycling facility.

.6 Divert unused concrete materials from landfill to local facility.

.7 Divert unused aggregate materials from landfill to facility for reuse.

.8 Dispose of unused disinfection material at official hazardous material collections site.

.9 Do not dispose of unused disinfection material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.

.10 Fold up metal banding, flatten and place in designated area for recycling.

1.7. SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services.

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

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

.4 Do not interrupt water service for more than 3 consecutive hours and confine this period between 10:00 and 16:00 hours local time unless otherwise authorized.

.5 Notify fire department of any planned or accidental interruption of water supply to hydrants.

.6 Provide "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 PIPE, JOINTS AND FITTINGS

.1 COBRA LOCK ™ Polyvinyl chloride pressure pipe to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end.

.1 CSA-B137.3, PVC series 160,.

.2 All fittings on PVC mains to be Ductile Iron (AWWA C110) CEMENT MORTAR LINED TO AWWA C104 c/w TYTON JOINTS TO AWWA C111 c/w with closed

lugs and joint restraints, or mechanical joints (MJ) c/w Megalug at mechanical joint restraint.

.3 Megalug clamps and rods required across any couplings. insulating kits across insulating coupling on d.i. w/m as required.

.4 All branch connections shall be complete with cap & 50mm IPT temp. blowoff as per MMCD STD. DWG & typical detail this sheet.

.5 Fittlngs shall be grey iron suitable for 1380kpa working pressure.

.6 Gate valves shall be cast iron suitable for 1380kpa working pressure.

2.2 VALVE BOXES

.1 Valves to open counterclockwise.

.2 Gate valves: to ANSI/AWWA C500, standard iron body, bronze mounted valves with non-rising stems, suitable for 1 Pa with mechanical, flanged, push-on, grooved type joints.

.3 Air and vacuum release valves: heavy duty combination air release valves employing direct acting kinetic principle.

.1 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for 2 MPa working pressure.

.2 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.

.3 Valve complete with surge check unit.

.4 Ends to be flanged to ANSI/AWWA.

2.3 TRACER WIRE

.1 Direct Burial #12 AWG Solid (.0808” diameter), steel core hard drawn extra high strength tracer wire, 1150# average tensile break load, 45 mil high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30-volt rating.

.2 Tracer Box shall include:

.1 Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements.

.2 Lid material shall be of cast iron or ductile iron. Tensile strength or ductility of such material shall be equal or superior to hi-tensile cast iron ASTM A126-B requirements.

.3 Lid-locking bolt material shall be made of aluminum material equal or superior to ASTM B253.

.4 Lid-locking mechanism material shall be made of plastic to meet or exceed ASTM A126-B requirements.

.5 Box shall be designed to be easily detected by magnetic and electronic locators even when box is covered by a minimum of 100mm of soil, sod and / or paving material.

.6 A magnet shall be securely attached at the top of the upper tube of the box for locating purposes.

2.4 VALVE CHAMBERS

.1 Concrete and reinforcing steel to Section 03 30 00 – Cast-in-Place Concrete and Section 03 20 00 – Concrete Reinforcing.

.2 Precast concrete sections to ASTM C478M. Cast ladder rungs integral with unit; field installation not permitted.

.3 Valve chamber frames and covers:

.1 Design and dimensions as indicated.

.2 Cover to be marked "WATER"/"EAU".

.4 Ladder rungs for valve chambers: 20mm diameter deformed rail steel bars to CAN/CSA-G30.18, hot-dipped galvanized after fabrication to CAN/CSA-G164. Rungs to be safety pattern.

2.5 SERVICE CONNECTIONS

.1 Copper tubing: to ASTM B 88M type K, annealed.

.2 Polyethylene pressure pipe:

.1 To CSA-B137.1, type PE, series 160, ASTM F714, Type PE, series DR 11.

.2 90mm to 1600mm: to CGSB 41-GP-25M, type PE, series 250.

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

.4 Polyethylene pipe joints: thermal butt fusion welded.

.5 Brass corporation stops: compression type having threads to ANSI/AWWA C800.

.6 Brass inverted key-type curb stops: compression type with drains.

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

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

.7 Polyethylene tapping tees or multi-saddle tees: for Polyethylene pipe. Tees to be socket fused to pipe.

.8 Service connections for PVC pipe:

.1 Service connections less than 100mm: Corporation stop, tapped to main using AWWA threads, complete with stainless service saddle. Service saddle to consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.2 Service connections 100mm and over: Use tee fitting or tapping valve and sleeve.

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

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

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

.10 Tee connections: for services above NPS 1. Tee connections to be fabricated of same material and to same standards as specified pipe fittings and to have ends matching pipe to which they are joined.

.11 Water service connection to be as per the MMCD standard drawing W2B unless otherwise noted.

2.6 YARD HYDRANTS

.1 Yard Hydrants: Terminal City self-draining stand pipe, factory assembled unit:

.1 Hydrants to open threads to local standard, Provide metal caps and chains.

.2 Yard Hydrant to be manufactured with bronze operating and draining components.

.3 The stuffing box and draining mechanism to have “O” ring rubber gaskets for sealing purposes.

.4 Polyurethane anti-score seating material is used for the valve disc facing.

.5 Provide key operated gate valve located 1m from hydrant.

.6 Depth of bury 1.2m.

.2 Hydrant paint: exterior enamel to CAN/CGSB-1.88, MPI #96.

.3 All fire hydrants shall be as per MMCD standard DWG W4 and are to be TERMINAL CITY TYPE C71P.

2.7 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 Table:

Sieve Designation	% Passing	
	Type 1*	Type 2*
25.0mm	100	100
19.0mm	90-100	90-100
12.5 mm	65-85	70-100
9.5 mm	50-75	-
4.75 mm	25-50	40-70
2.36 mm	10-35-	25-52
1.18 mm	6-26	15-38
0.600 mm	3-17	6-27
0.300 mm	-	3-20
0.075 mm	0-5	0-8

*Type 1: Standard Gradation
*Type 2: To be used only in dry trench conditions and with prior approval of Departmental Representative.

2.8 BACKFILL MATERIAL

.1 In accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

2.9 PIPE DISINFECTION

.1 Contractor must submit a copy of final pipe disinfection procedure per ANSI/AWWA 651 for review and comments/acceptance by the Departmental Representative. Water samples, to confirm successful disinfection procedures, to be collected by consultant and submitted to an accredited laboratory for analysis. Results must be reviewed by Departmental Representative prior to commissioning.

PART 3 EXECUTION

3.1 PREPARATION

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

.1 Inspect materials for defects to approval of the Departmental Representative.

.2 Remove defective materials from site as directed by Departmental Representative.

3.2 TRENCHING

.1 Do trenching work in accordance with Section 31 23 33.01 – Excavating Trenching and Backfilling, and as per MMCD standard drawings.

.2 Trench depth to provide cover over pipe of not less than 1.0m from finished grade and no more than 1.5m, or as indicated.

.3 Trench alignment and depth require Departmental Representative approval prior to placing bedding material and pipe.

3.3 CONCRETE BEDDING AND ENCASEMENT .

.1 Do concrete work in accordance with Section 03 30 00 – Cast-in-Place Concrete.

.2 Place concrete to details as indicated.

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

3.4 GRANULAR BEDDING

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

.2 Do not place material in frozen condition.

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

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

.5 Compact each layer full width of bed to at least 95% maximum density to ASTM D 698.

.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.

3.5 PIPE INSTALLATION

.1 Lay pipes to manufacturer's standard instructions and specifications. Do not use blocks except as specified.

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

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

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

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

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

.2 Take up and replace defective pipe.

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

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

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

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

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

.9 Position and join pipes with equipment and methods approved by Departmental Representative.

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

.11 Align pipes before jointing.

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

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

.1 Remove disturbed or contaminated gaskets.

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

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

.15 Minimize deflection after joint has been made.

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

.17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by the Departmental Representative.

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

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

.20 Install tracer wire along entire length of watermain with Test boxes located at maximum 1000m separation.

.21 Do not lay pipe on frozen bedding.

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

.23 Backfill remainder of trench.

3.6 VALVE INSTALLATION

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

3.7 VALVE CHAMBERS

.1 Use precast units as approved by the Departmental Representative.

.2 Construct units as indicated, plumb and centered over valve nut, true to alignment and grade, and not resting on pipe.

.3 Clean surplus mortar and joint compounds from interior surface of valve chamber as work progresses.

.4 Plug lifting holes with precast concrete plugs set in cement mortar.

.5 Place frame and cover on top section to elevation indicated. If adjustment is required use concrete ring.

.6 Clean valve chambers of debris and foreign materials; remove fins and sharp projections.

3.8 SERVICE CONNECTIONS

.1 Terminate building water service 1m outside building wall or as indicated opposite point of connection to main.

.1 Locate point of connection in advance and advise Departmental Representative.

.2 Cap or seal end of pipe and place temporary marker to locate pipe end.

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

.3 Construct service connections at right angles to watermain unless otherwise directed.

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

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

.9 Install multiple corporation stops, 30 degrees apart around circumference of pipe and minimum of 300mm apart along pipe.

.10 Tap main at 2:00 o'clock or 10:00 o'clock position only; not closer to joint nor closer to adjacent service connections than recommended by manufacturer, or 1m, whichever is greater.

.11 Leave corporation stop valves fully open.

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

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

.14 Install curb stop with corporation box on services NPS 2 or less in diameter.

.1 Equip larger services with gate valve and cast-iron box.

.2 Set box plumb over stop and adjust top flush with final grade elevation.

.3 Leave curb stop valves fully closed.

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

.1 Each marker to consist of 38 x 89mm stake extending from pipe end at pipe level to 600mm above grade.

.2 Paint exposed portion of stake red with designation "WATER SERVICE LINE" in black.

.16 Tie-ins to existing watermains to be performed by the contractor and witnessed by the engineer's inspector. 48 hours notice is required.

3.9 YARD HYDRANTS

.1 Install yard hydrants at locations as indicated.

.2 Set hydrants plumb, with hose outlets parallel with edge of pavement with outlet facing roadway.

.3 Place concrete thrust blocks as indicated and specified ensuring that drain holes are unobstructed.

.4 To provide proper draining for each hydrant, excavate pit measuring not less than 1 x 1 x 0.5m deep and backfill with coarse gravel or crushed stone to level 150mm above drain holes.

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

3.10 THRUST BLOCKS AND RESTRAINED JOINTS

.1 For thrust blocks: do concrete Work in accordance with Section 03 30 00 – Cast-in-Place Concrete.

.2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated or as directed by Departmental Representative.

.3 Keep joints and couplings free of concrete.

.4 Do not backfill over concrete within 24-hours after placing.

.5 All joints to be restrained, pipe joints to be Corba Lock to CSA B137.3 or approved equal.

3.11 CATHODIC PROTECTION

1. Cathodic protection in accordance with MMCD specification section 26-42-13.
2. All test stations shall be mounted behind the curb face.
3. The watermain fittings' coating and lining shall be in accordance with mmcd specification. applicable coating standards: ansi/awwa c217-99 (petrolatum tape)
4. All fittings & flanges shall have continuity bonds as per typical detail.
5. The pipe bedding material for wrapped pipe fittings to be clean, washed Sechelt fill sand or equivalent, with less than 10ppm of chloride and sulphate ions.
6. All caps shall have 4.1kg anodes installed and continuity bonds installed.

7. Install anodes on all D.I. fittings, D.I. pipe, and hydrants. All fitting shall be connected with two bond cables. Wrap in petrolatum paste and tape.
8. Bond all connected DI fittings together.
9. Provide 2 continuity bond connections per fitting.
10. Anodes are 14.5kg or 4.1kg magnesium anode.
11. All below ground D.I. pipe and fittings to be coated with primer and petrolatum tape.

3.12 HYDROSTATIC AND LEAKAGE TESTING

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

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

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

.1 Perform tests in presence of Departmental Representative.

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

.5 Test pipeline in sections not exceeding 365m in length, unless otherwise authorized by the Departmental Representative.

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

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

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

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

.10 Open valves.

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

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

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

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

.13 Apply hydrostatic test pressure of 1035 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1-hour.

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

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

.16 Repeat hydrostatic test until defects have been corrected.

.17 Define leakage as amount of water supplied in order to maintain test pressure for 2-hours.

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

.19 Repeat test until leakage is within specified allowance for full length of watermain.

3.13 PIPE SURROUND

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

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

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

.4 Do not place material in frozen condition.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D 698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 95% maximum density to ASTM D 698.

3.14 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 roadways and pathways, compact backfill to at least 95% maximum density to ASTM D 698.

3.15 PAINTING OF HYDRANTS

.1 After installation, paint hydrants red.

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

3.16 FLUSHING AND DISINFECTING

.1 Flushing and disinfecting operations: witnessed by Departmental Representative.

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

.2 Flush watermains 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. The contractor shall supply all water for flushing and testing.

.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 Department Representative approval, introduce strong solution of chlorine as approved by Departmental Representative into watermain and ensure that it is distributed throughout entire system.

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

.8 Chlorine application to be close to point of filling watermain and to occur at same time.

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

.10 Flush line to remove chlorine solution after 24-hours.

.11 Measure chlorine residuals at extreme end of pipeline being tested.

.12 Perform bacteriological tests on watermain, 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.

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

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

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

3.17 SURFACE RESTORATION

.1 After installing and backfilling over watermains, restore surface to original condition as approved by the Department Representative.

END OF SECTION