Public Works and Government Services Canada

Requisition No: EZ108-212520

DRAWINGS & SPECIFICATIONS
For:

EGD Capstans Upgrades
Project No.: R.109207.001
Issued for Tender
2021-03-31

APPROVED BY:

Digitally signed by: Burger, Mark
DN: CN = Burger, Mark C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.10.24 22:09:00 -07'00'

Regional Manager, ___ Date

Chris Patterson
Digitally signed by Chris Patterson
Date: 2021.10.21 11:31:52 -07'00'

Construction Safety Coordinator
Date

TENDER:

Omotoso, Oluseun
Digitally signed by: Omotoso, Oluseun
DN: CN = Omotoso, Oluseun C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.10.21 11:49:09 -07'00'

Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
Room 219 - 800 Burrard Street, Vancouver, B.C., V6Z 0B9

..... Pages

TABLE OF CONTENTS

Division 26 - Electrical

Division 35 - Waterway and Marine Construction

APPENDICES

LIST OF DRAWINGS

END OF TABLE

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. M. MELVIN # 50126 May 5, 2021

For Division 01, 02, 09, 22, 23 & 35 specs only

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA A. DAGAMSEH # 42898 MAY 06 2021

For Division 26 specs only

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA B. J. GALLAGHER # 38926 MAY 05 2021

For Division 03 & 05 specs only

PART 1 – GENERAL

1.1 CODES, BYLAWS, STANDARDS

.1 Comply with applicable local bylaws, and all Esquimalt Graving Dock 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 work permits required by authorities having jurisdiction.

1.2 DESCRIPTION OF WORK

.1 Work of this Contract comprises removal and construction of Capstans #1 South and #2 South, located at the Esquimalt Graving Dock (EGD); and further identified as "the work". Refer to drawings and specifications for complete scope of work:

.1 Removal of existing capstans and associated equipment.

.2 Installation of new electric capstans with VFD.

.3 Electrical power and communications to the new capstans and VFD.

.4 Lighting within the pit with GFI protected service outlet.

.5 Upgrade ventilation to add a fan and heater for forced ventilation.

.6 Upgrade access covers and hatch.

.7 Civil/structural upgrades.

1.3 CONTRACT METHOD

.1 Construct work under lump sum contract.

1.4 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 In the event of any discrepancy or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

.1 Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

.2 Any amendment issued prior to tender closing.

.3 Supplementary Conditions.

.4 General Conditions.

.5 the duly completed Bid and Acceptance Form when accepted.

.6 drawings and specifications.

Later dates shall govern within each of the above categories of documents.

.4 In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the following rules shall apply:

.1 specifications shall govern over drawings.

.2 dimensions shown in figures on drawings shall govern where they differ from dimensions scaled from the same drawings; and

.3 drawings of larger scale govern over those of smaller scale.

1.5 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.

1.6 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.

1.7 TIME OF COMPLETION

.1 Commence work immediately upon official notification of acceptance of offer and complete the project within forty-two (42) weeks after Contract Award. Coordinate disassembly and removal of existing capstans with docking schedule and no earlier than May 20, 2022.

.1 Adjust schedule as required due to minor changes in docking schedule per instructions from Departmental Representative.

.2 Coordinate installation, site commissioning and testing of new capstans with long lead time for capstan manufacture.

.3 New capstans to be fully functional no later than August 5, 2022.

.1 Adjust schedule as required due to minor changes in docking schedule per instructions from Departmental Representative.

1.8 HOURS OF WORK

.1 Restrictive as follows:

.1 Schedule work during normal weekday working hours of the Esquimalt Graving Dock. Normal weekday working hours are 07:00-17:00 Monday through Friday, excluding statutory holidays.

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

1.9 WORK SCHEDULE

.1 Carry on work as indicated and as follows:

.1 Within 5 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 samples.

.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.

1.10 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.

1.11 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.

1.12 OWNER OCCUPANCY

.1 During the entire construction period, the owner (Canada) and tenants will occupy adjacent areas for execution of normal operations.

1.13 CONTRACTOR'S USE OF SITE

.1 The Esquimalt Graving Dock 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 The contractor will assume the role of Prime Contractor as British Columbia Workers Compensation Act reference to Section 118.

.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 workday.

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

.5 Do not enter any area of the Esquimalt Graving Dock 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 PWGSC property outside of the Contractor's work site. Maintain overhead clearances, keep roadways and walkways clear, and maintain routes for emergency response vehicles.

1.14 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, PWGSC 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.

1.15 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.

1.16 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.

.5 Complete ground penetrating radar (GPR) to all excavation areas. Provide written report with findings to Departmental Representative prior to proceeding with any excavation activities

1.17 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.

1.18 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.

1.19 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.

1.20 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.

1.21 MEETINGS

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

1.22 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.

.5 Ensure disputes between subcontractors are resolved.

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

.7 Maintain efficient and continuous supervision.

1.23 APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

.2 Allow sufficient time for the following:

.1 Review of product data.

.2 Approval of shop drawings.

.3 Review of re-submission.

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

1.24 SECURITY CLEARANCES

.1 Personnel employed on this project will be subject to security check. Obtain requisite clearances, as instructed, for each individual required to enter the premises.

.2 Personnel will need to obtain security clearance at start of project and be provided with a security badge which is to be worn and visible at all times while on the site.

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

1.25 TESTING AND INSPECTIONS

.1 Particular requirements for inspection and testing to be carried out by testing service or laboratory 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.

1.26 AS-BUILT DOCUMENTS

.1 Refer to Section 01 78 00 - Closeout Submittals.

1.27 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.

1.28 DUST CONTROL

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

1.29 ENVIRONMENTAL PROTECTION

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

1.30 ADDITIONAL DRAWINGS

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

.2 Upon request, Departmental Representative may furnish up to a maximum of 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.

1.31 SYSTEM OF MEASUREMENT

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

1.32 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.

1.33 SUBMISSION OF TENDER

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

END OF SECTION 01 11 55

Part 1 General

1.1 ADMINISTRATIVE

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

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

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

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

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

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

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

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

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

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 10 days for Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, in, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

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

.10 Submit one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

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

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

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

.2 Testing must have been within 1 year of date of contract award for project.

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

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

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

.14 Submit one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

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

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

.18 Delete information not applicable to project.

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

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

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

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

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

1.3 SAMPLES

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

.2 Deliver samples prepaid to Departmental Representative's office.

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

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

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

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

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

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, fine resolution as directed Departmental Representative.

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

.3 Number of viewpoints: 4 locations.

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

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

.1 Upon completion of: Work, foundation, excavation, framing and services before concealment, and as directed Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

PWGSC Update on Asbestos Use
Effective April 1, 2016, all Public Works and Government Services of Canada (PWGSC) contracts for new construction and major rehabilitation will prohibit use of asbestos-containing materials.

COVID 19
All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites, and also guidelines from the Province of British Columbia (https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/covid-19/covid-19-pho-guidance-construction-sites.pdf)

1.1 REFERENCES

.1 Government of Canada.

.1 Canada Labour Code - Part II (as amended)

.2 Canada Occupational Health and Safety Regulations. (as amended)

.2 National Building Code of Canada (NBC): (as amended)

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

.3 The Canadian Electrical Code (as amended)

.4 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2018 Code of Practice for Access Scaffold.

.2 CSA S269.1-2016 Falsework for Construction Purposes.

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

.4 CSA Z1006-10 Management of Work in Confined Spaces.

.5 CSA Z462-18 Workplace Electrical Safety Standard

.5 National Fire Code of Canada 2015 (as amended)

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

.6 American National Standards Institute (ANSI): (as amended)

.1 ANSI/ASSP A10.3-2013, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:

.1 Workers Compensation Act Part 3-Occupational Health and Safety. (as amended)

.2 Occupational Health and Safety Regulation (as amended)

.8 Workplace Hazardous Materials Information System (WHMIS 2015)

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 00 01 10 – Table of Contents

.2 Refer to Appendix C - Stantec Hazardous Materials Report, dated October 2020.

1.3 WORKERS' COMPENSATION BOARD COVERAGE

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

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

1.4 COMPLIANCE WITH REGULATIONS

.1 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.

1.5 SUBMITTALS

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

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

.3 Submit the following:

.1 Organizations Health and Safety Plan.

.2 Site Specific Safety Plan or Health and Safety Plan (SSSP or HASP)

.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 Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

.5 Emergency Response Procedures.

.4 The Departmental Representative will review the Contractor's Site-Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

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

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

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

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

1.6 RESPONSIBILITY

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

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

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

1.7 HEALTH AND SAFETY COORDINATOR

.1 Assign a competent and qualified 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 Safety Plan (SSSP) or Health and Safety Plan (HASP)

.3 Be on site during execution of work.

.4 Have minimum two (2) years' site-related working experience

.5 Have working knowledge of the applicable occupational safety and health regulations.

1.8 GENERAL CONDITIONS

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

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

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

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

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Multi-employer work site.

.2 Federal employees and general public.

.3 Energized electrical services.

.4 Working from heights.

.5 Hazards - PWGSC Preliminary Hazard Assessment included as an Appendix to Specifications

1.10 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.

1.11 REGULATORY REQUIREMENTS

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

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

1.12 WORK PERMITS

.1 Obtain specialty permit(s) related to project before start of work.

1.13 FILING OF NOTICE

.1 The General Contractor is to file Notice of Project with Provincial authorities prior to commencement of work.

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

1.14 SITE SPECIFIC HEALTH AND SAFETY PLAN

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

.2 Prepare and comply with the Site-Specific Safety Plan (SSSP) or Health and Safety Plan (HASP) based on the required hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

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

.11 COVID 19 Protocols and Procedures

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

.3 List hazardous materials to be brought on site as required by work. SDS required for all products.

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

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

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

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

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

.4 Revise and update Site-Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Site Specific Safety Plan and/or Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan and/or

Health and Safety Plan of responsibility for meeting all requirements of construction and Contract documents and legislated requirements.

1.15 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an emergency response and emergency 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.

.5 A route map with written directions to the nearest hospital or medical clinic.

.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.

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

.1 Work at high angles.

.2 Work in confined spaces or where there is a risk of entrapment.

.3 Work with hazardous substances.

.4 Underground work.

.5 Work on, over, under and adjacent to water.

.6 Workplaces where there are persons who require physical assistance to be moved.

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

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

.6 Contractors must not rely solely upon 911 for emergency rescue in a confined space, working at heights, etc.

1.16 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Safety Data Sheets (SDS) 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 SDS and WHMIS 2015 documents.

.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.

.4 The contractor shall ensure that the product is applied as per manufacturers recommendations.

.5 The contractor shall ensure that only pre-approved products are bought onto the work site in an adequate quantity to complete the work.

1.17 ASBESTOS HAZARD

.1 Carry out any activities involving asbestos in accordance with current applicable Federal and Provincial Regulations.

.2 Removal and handling of asbestos will be in accordance with current applicable Provincial / Federal Regulations.

1.18 REMOVAL OF LEAD-CONTAINING PAINT

.1 All paint containing TCLP lead concentrations above 5 ppm are classified as hazardous.

.2 Carry out demolition and/or remediation activities involving lead-containing paints in accordance with current applicable Provincial / Territorial Regulations.

.3 Work with lead-containing paint shall be completed as per Provincial and Federal regulations.

.4 Dry Scraping/Sanding of any materials containing lead is strictly prohibited.

.5 The use of Methylene Chloride based paint removal products is strictly prohibited.

1.19 ELECTRICAL SAFETY REQUIREMENTS
(Reference: Worksafe BC OHS Regulation Part 19 – Electrical Safety)

.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 arc flash protection, required energizing and de-energizing of new and existing circuits with Departmental Representative.

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

1.20 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 electrical circuit or facility.

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

.3 Keep the documents and lockout tags at the site and list in a logbook 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 SCAFFOLDING

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

1.23 CONFINED SPACES

.1 Carry out work in compliance with current Provincial / Territorial regulations.

1.24 POWDER-ACTUATED DEVICES

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

1.25 FIRE SAFETY AND HOT WORK

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

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

.3 Hot Work permits are a mandatory requirement for any hot work activities.

1.26 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 daily.

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

.3 Portable gas and diesel fuel tanks are not permitted on most federal work sites. Approval from the Departmental Representative is required prior to any gas or diesel tank being brought onto the work site.

1.27 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.

1.28 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 immediately advise the Departmental Representative verbally and in writing.

1.29 POSTED DOCUMENTS

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

.1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP)

.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 2015) documents.

.9 Material Safety Data Sheets (SDS).

.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.11 All Hazardous Material and Substance Reports including Lab Analysis.

.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.

1.30 MEETINGS

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

1.31 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 noncompliance 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".

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

PART 1 – GENERAL

1.1 REFERENCES

.1 Appendix B – Esquimalt Graving Dock Environmental Best Management Practices.

1.2 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.

1.3 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 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 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 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.

.6 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

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

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

.9 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.

.10 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.

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

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

.5 Backfill for electrical trenches:

.1 Excavated material cannot be re-used as backfill.

.2 Supplier information to be submitted to Departmental Representative for review a minimum of 2 weeks prior to backfilling operation.

1.4 FIRES

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

1.5 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.

1.6 WORK ADJACENT TO WATERWAY

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

1.7 POLLUTION CONTROL

.1 Maintain 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.

1.8 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.

1.9 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.

1.10 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.

END OF SECTION 01 35 43

Part 1 General

1.1 REFERENCE STANDARDS

.1 NACE International

.1 NACE International

.1 ANSI/NACE No. 13/SSPC-ACS-1-2016 -SG, Industrial Coating and Lining Application Specialist Qualification and Certification.

1.2 DEFINITIONS

.1 Application Specialist: An individual who performs surface preparation and application of protective coatings and linings to steel and concrete surfaces of complex industrial structures.

1.3 INSPECTION

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

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

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

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

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

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

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

1.5 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.

1.6 PROCEDURES

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

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

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

1.7 REJECTED WORK

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

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

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

1.8 REPORTS

.1 Submit 1 electronic copy in PDF format of inspection and test reports to Departmental Representative.

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

1.9 CERTIFICATES

.1 Submit certifications for Application Specialists to demonstrate compliance to the requirements of ANSI/NACE No.13.

1.10 QUALIFICATIONS

.1 Ensure that 50 % of industrial coating specialists, who perform concrete and steel surfaces preparation and coating applications, are certified by a recognized Applicator Certification Agency, in accordance with NACE 13/SSPC ACS-I, Applicator Certification Standard (ACS).

.2 Maintain a current and valid ACS certification during project period.

.1 Application specialists who perform surface preparation and coating application work on this project must have a current ACS.

.3 Notify Departmental Representative of any change in application specialist certification status.

.1 Any delays to the completion of the Project due to invalid certifications will not be considered, and liquidated damages shall not be waived for any non-performance by Contractor.

1.11 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

1.12 MOCK-UPS

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

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups 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.

.5 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

.6 Mock-ups may remain as part of Work.

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

1.13 MILL TESTS

.1 Submit mill test certificates as requested and required of specification Sections.

1.14 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical and electrical systems.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 CSA Group (CSA)

.1 CSA-A23.1/A23.2-19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121-17, Douglas Fir Plywood.

.3 CAN/CSA-S269.2-M87 (R2003), Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Occupational Environment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.4 HOISTING

.1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.7 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watchpersons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.8 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

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

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

.2 CSA Group (CSA)

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

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, and pits.

.2 Provide as required by governing authorities.

1.4 WEATHER ENCLOSURES

.1 Provide weather tight closures to the pit while in construction.

.2 Design enclosures to withstand wind pressure and snow loading.

1.5 DUST TIGHT SCREENS

.1 Provide dust tight screens to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.6 ACCESS TO SITE

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

1.7 PUBLIC TRAFFIC FLOW

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

1.8 FIRE ROUTES

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

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act (CEPA)

.1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to Departmental Representative, 1 electronic copy in PDF format (word searchable format) form using file sharing website and 1 printed copy as described in Clause 1.4 of operating and maintenance manuals in English. Scanned document resolution to be minimum 600 DPI.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems under Section numbers and sequence of Table of Contents.

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

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

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text, fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on USB.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project:

.1 Date of submission; names.

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

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

.2 For each product or system:

.1 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 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.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

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

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 Referenced Standards to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product installed particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain field test records, inspection certifications, manufacturer's certifications, required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

1.7 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Appendix D EGD Standards for Surveys, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shutdown, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

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

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

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and Section 01 91 13 - General Commissioning Requirements.

.15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative for approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain enough detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

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

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.

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

.5 Co-execute submittals when required.

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

.7 Except for items put into use with departmental representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include VFD’s and motors.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Procedure and status of tagging of equipment covered by extended warranties.

.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.9 Respond in timely manner to oral or written notification of required construction warranty repair work.

.10 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 91 13 - General Commissioning Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative two weeks prior to date final inspection. Departmental Representative will confirm other personnel required in attendance.

.2 Preparation:

- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation.
- .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning Requirements and equipment and systems are fully operational.

.3 Demonstration and Instructions:

- .1 Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.4 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment is sufficient for proper operation.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.4 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct Departmental Representative.

.2 Provide written report that demonstration and instructions have been completed.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements of system functional performance testing, equipment, sub-system, systems, and integrated systems.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA Z320-11 (R2016), Building commissioning

1.3 RELATED SECTIONS

.1 Section 01 79 00 - Demonstration and Training.

1.4 ACRONYMS

.1 CxA – Commissioning Authority

.2 Cx – Commissioning

.3 EGD – Esquimalt Graving Dock

.4 GC – General Contractor

.5 O&M – Operation and Maintenance

.6 PWGSC – Public Works and Government Services Canada

.7 TAB – Testing, Adjusting, and Balancing

1.5 DEFINITIONS

.1 **Commissioning (aka Commissioning Process)** — A systematic verification, documentation and training process applied to all activities during construction, static verification, start up and functional performance testing, of equipment and systems to ensure that it operates in conformity with the Departmental Representative's project requirements and the basis of design in accordance with the contract documents.

.2 **Commissioning Authority** — An independent commissioning agency or an individual who is an independent member of the Consultant and not affiliated with design of this project, to plan, lead and coordinate the commissioning team to implement the commissioning process. The commissioning authority is also responsible for producing a commissioning report. The commissioning authority could also be a commissioning provider.

.3 **Commissioning Check Sheets** — The forms used to document the inspections, tests, etc. performed during the commissioning process prepared by contractor and subcontractors. Commissioning check sheets include verification/static forms, prefunctional checklists,

functional/dynamic forms, functional testing procedures and any other forms and check sheets specified in other sections.

.4 **Commissioning Provider** — An individual or company responsible for planning, coordinating, and carrying out the commissioning process. Note: Commissioning provider can be an individual employed by the General Contractor.

.5 **Consultant** — An individual who provides specialized resources and skills.

.6 **Contractor** — An individual or company that enters a contract with PWGSC to undertake a project.

.7 **Control system** — A local system that controls the operation of a stand-alone mechanical system or mechanical equipment or integrated control of an entire system. A control system comprises controlled devices (e.g., valves), controlling devices (e.g., thermostats), control wiring, a power supply, and a control air system (i.e., pneumatics).

.8 **Designer** — Any special consultant who is involved in the planning and design process.

.9 **Design intent** — The performance that a design is intended to achieve in order to meet the Departmental Representative's project requirements (OPR) and basis of design. The design intent is recorded in a design intent manual and guides the preparation of the contract documents. The design intent documentation should cover the following, for each system and major component:

- .1 General system description
- .2 Objectives and functional use of the system or equipment
- .3 General quality of materials and construction
- .4 Performance criteria (general efficiency, energy and tolerances of the IEQ objectives, etc.)
- .5 Budget and considerations and limitations
- .6 Restrictions and limitations of system

.10 **Functional Performance Testing** – A full range of tests under actual load, conducted to verify specific systems, subsystems, components, and interfaces between systems that conform to a given criteria. These tests are typically used to verify that a sequence of operations is correctly implemented and that the design intent has been met. They are typically done after equipment is placed in full operation.

.11 **Inspection** — A service traditionally provided as part of the normal scope of a designer's work. Inspection includes a review of systems and equipment, or parts thereof.

.12 **Integration -** Making diverse components and systems work together under all potential operating conditions.

.13 **Maintenance and data manual** — A detailed document that provides the operating and maintenance requirements and associated data for the safe and efficient operation of specific pieces of equipment and systems.

.14 **Operations manual (aka systems operation manual)** — A document that describes, in lay terms, the operation of all systems and equipment. An operations manual details

modes of operation and includes associated diagrams that illustrate the sequences of operation for each system and interaction between individual systems.

.15 **Departmental Representative** – the entity that represents the interests of the equipment or system, which may include private sector, public sector and quasi-public sector.

.16 **Testing agency** — A regulatory authority or other agency, individual, or contractor authorized and/or charged by a Departmental Representative, designer, or contractor with the responsibility for carrying out functional performance testing and/or verification of systems and equipment, or parts thereof.

.17 **Commissioning Team -** The individuals who through coordinated actions are responsible for implementing the Commissioning Process. Includes PWGSC Project Leader, PWGSC Project Manager, PWGSC Design Manager or team representative, Commissioning Authority, General Contractor or representative, Sub Contractors, and Design Consultant.

.18 **Data Sheet -** Pre-start-up checklist, sample data sheets are included in Draft Commissioning Plan to indicate requirement for minimum content. These sheets are developed for the entire project by the general contractor and mechanical and electrical subcontractors.

.19 **Test Procedure** - A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems. This documentation required by the construction sub trades responsible for testing of supplied and installed equipment as per the commissioning plan and specification. Testing procedures are developed by the general contractor and mechanical and electrical subcontractors.

.20 **Validate -** For start-up and performance testing: to witness and confirm proper and complete performance testing and record all deficiencies and report to Departmental Representative and design consultant; when the instructed corrections have been completed re-validate all the deficiencies; and to provide full and detailed documentation for the Consultant certification.

.21 **Verify -** The CxA's witnessing of the specified performance tests. The contractor shall attend all verifications and record all deficiencies to be handed out to the CxA for inclusion in final Cx report.

1.6 GENERAL

.1 Cx is a planned program of tests; procedures, documentation and checks carried out systematically on systems and integrated systems of the project. Cx is performed after systems are completely installed, functional and contractor's performance verification responsibilities have been completed and approved by authority having jurisdiction.

.2 Objectives:

.1 To bring mechanical, electrical, communications, and controls systems and components from a state of static completion to a state of dynamic operation.

.2 To support quality management and verifying contract conformance through documented monitoring, checking and validation of the installation.

.3 To minimize issues that occurs during the handover of equipment or systems from contractor to Departmental Representative.

.4 Optimize the operations and maintenance by perform design reviews, testing and verification process, and ensuring comprehensive training is provided to Departmental Representative's staff to enable them to optimize the everyday function.

.5 To confirm installation meets requirements of contract documents.

.6 To provide all testing documents and records.

.7 To ensure completed equipment or system meets user stated requirements.

.8 To provide a Cx report to assist operators in optimizing and maintaining the equipment or system.

.9 Assure that accurate and useful historical records such as as-built drawings and O&M manuals are handed over to the Departmental Representative.

1.7 SYSTEMS TO BE COMMISSIONED

.1 The following section summarizes the tasks to be conducted for the commissioning process with further specifics being provided within applicable specification sections and installations checks, verification activities and performance checks.

.1 Discipline: Structural Systems to be Commissioned

.1 Cover Plates

.1 Review and approve Factory Acceptance Test report.

.2 Confirm steel is properly primed and painted in accordance with manufacturer standards.

.3 Confirm all welds are primed and painted in accordance with manufacturer standards.

.4 Provide certification of quality compliance from fabricator.

.5 Access Hatch:

.1 Confirm correct operation of doors.

.2 Confirm lock assembly operates as required.

.3 Provide verification of proper operation of lighting micro-switch.

.4 Confirm all weatherstripping in place and properly secured.

.2 Discipline: Mechanical Systems to be Commissioned

.1 Dual Head Electric Capstan (incl. 15 hp marine duty TENV electric brake motor, heavy-duty right-angle planetary gearbox, and VFD w/ foot pedal control)

.1 Review and approve Factory Acceptance Test report.

.2 Confirm proper lubrication of all turning points and shafts.

.3 Confirm VFD overloads are set.

.4 Confirm that the motor is inverter rated.

.5 Confirm the circuit breaker feeding the VFD is properly sized.

.6 Verify variable speed control via VFD through adjustment of set-point.

.7 Verify forward foot pedal control at speed set-point.

.8 Verify operation of forward, speed keys as well as system setting and programming keys at HMI.

.9 Confirm enclosure is installed near capstan within 25m.

.10 Verify operation of E-Stop.

.11 Verify operation of the internal dynamic braking resistor.

.12 Verify integrated 'Artic Mode' operation to warm drive in low ambient temperatures.

.13 Demonstrate maintenance required and training

.14 **Manufacturer's authorized representative is recommended to attend start-up and commissioning.**

.2 Inline Exhaust Fan

.1 Confirm correct installation as per manufacturer's instructions.

.2 Confirm correct rotation.

.3 Measure and record motor amperage.

.4 Verify bearings are lubricated. Record lubrication from start-up to final turn over to Departmental Representative.

.5 Verify no vibration exists.

.6 Confirm balancing completed. Verify results.

.3 Electrical Systems to be Commissioned

.1 Service conductors

.1 Confirm installation.

.2 Confirm cables are undamaged.

.3 Megger all conductors.

.2 Interior Feeders

.1 Confirm wire gauge, type and quantity.

.2 Install strap and box connectors.

.3 Confirm routing and support.

.4 Confirm bonding conductor.

.5 Megger all conductors.

.3 Disconnect/Safety Switches

.1 Megger all conductors.

.2 Measure and record voltage and amperage on all conductors under normal load.

.3 Confirm grounding and bonding.

.4 Confirm all connections properly torqued.

.5 Confirm identification installed.

.6 Confirm final cleaning.

.7 Confirm proper rating of overcurrent devices installed.

.4 Equipment Enclosures, Splitters, Junction Boxes

.1 Confirm all conduit and cable connections seated properly in enclosure.

.2 Confirm locknuts and bushings on all conduit connections. Double locknuts on RGS.

.3 Confirm proper grounding and bonding.

.4 Confirm proper support.

.5 Confirm identification installed.

.5 Wiring Devices

.1 Confirm devices installed in proper location.

.2 Confirm proper voltage/amperage rating.

.3 Confirm proper polarity.

.4 Confirm cover plate installed flush on wall.

.5 Confirm identification completed.

.6 Circuit Breakers:

.1 Confirm breaker size as specified.

.2 Confirm breaker properly torqued to panel bus.

.3 Confirm load conductors properly torqued to breakers.

.4 Confirm GFCI breakers operate properly.

.5 Confirm voltage and amperage load on all circuit breakers. Record results.

.7 Electric Heating:

.1 Confirm heater wattage and voltage are correct.

.2 Confirm heater connected to circuit indicated.

.3 Confirm heater controls operate properly.

.4 Confirm heater fastened securely to structure.

.5 Measure voltage and amperage at heaters. Record results.

.8 Conduits:

.1 Confirm all conduits proper size and type.

.2 Confirm all conduits are properly supported.

.3 Confirm conduit fill not exceeded.

.4 Confirm all in slab conduits noted on as-builts.

.5 Confirm pull ropes installed in all spare conduits.

.6 Confirm bonding conductor installed in all conduits.

.9 Contactors

.1 Verify installation of contactors and components.

.2 Verify installation of secondary control devices.

.3 Confirm operation of all devices.

.4 Demonstrate maintenance requirements.

.10 Electrical Outlets

.1 Verify voltage drop test results report meets CSA requirements.

.2 Confirm installation meets specification.

.3 Provide copy of test results.

.11 Lighting

.1 Confirm all lighting systems are properly supported.

.2 Confirm all fixture alignments.

.3 Confirm operation of all fixtures.

.4 Demonstrate maintenance procedures.

.5 Confirm spare parts are provided as specified.

.6 Provide copy of test results.

.7 Provide copy of warranties.

.8 Test and commission lighting control systems.

1.8 COMMISSIONING OVERVIEW

.1 CxA is to be an independent commissioning agency or an individual appointed by the Departmental Representative and not affiliated with mechanical and electrical subcontractors of this project.

.2 CxA is to prepare the final commissioning plan with input from general contractor and mechanical and electrical subcontractors. CxA to maintain and update the Cx Plan throughout the project and at the end this living document should be submitted to the Departmental Representative as part of the Final Commissioning Report.

.3 Cx activities supplement field quality and testing procedure in relevant technical sections.

.4 Cx is conducted in concert with activities performed during stage of project delivery. CxA is involved in the project from construction stage to the completion of the warranty period. This ensures the Departmental Representative receives an equipment or system that is constructed to operate satisfactorily under various conditions to meet functional and operational requirements. Cx also includes the transfer of critical knowledge to the equipment or system operational personnel.

1.9 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and/or associated controls be incorrectly installed or malfunction or do not meet the specifications requirements during CxA's validation phase, CxA is to report it. Contractor is to correct deficiencies, re-verify equipment and components within the un-functional system, including related systems as deemed required by the CxA, Consultant, and in the specifications to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor.

1.10 SUBMITTALS

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

.1 Submit no later than 4 weeks after award of Contract:

.1 Name of Contractor's Cx Co-ordinator.

.2 Request of any modifications to the Cx Plan.

.3 Preliminary Cx Schedule.

.2 The Contractor shall provide the CxA with one copy of the shop drawings and all other submittals related to the system stated in the Cx Plan.

.3 Prior to performance testing, provide copies of related documentation as may be required by the CxA, including, but not limited to, signed certificates, factory test data, start-up sheets, contractor's Cx data, and completed Cx forms.

1.11 WARRANTY

.1 The involvement of the CxA shall not void any guarantees or warranties nor shall it relieve the Contractor out of any contractual responsibilities.

1.12 COMMISSIONING PLAN

.1 CxA to provide commissioning plan and will carry out required modifications and finalize the Plan with input from contractor and subcontractors.

.2 All Cx documents will be placed into the Cx plan and at the end of the project the updated Cx plan will be submitted as the final Cx report. This will be reviewed by the Departmental Representative before the commissioning is accepted.

.3 Provide required input to CxA in timely manner.

.4 Submit commissioning plan prior to 1st progress claim.

1.13 COMMISSIONING SCHEDULE

.1 Provide a detailed Cx schedule as part of the construction schedule.

.2 The contractor shall schedule work to include adequate time for Cx activities noted in technical sections and commissioning sections including:

.1 Approval of Cx reports.
.2 Verification of reported results.
.3 Static Testing.
.4 Functional Performance Testing.
.5 CxA validation.
.6 Repairs, retesting, re-validation.
.7 Systems Start up with Manufacturer.
.8 Systems verification for operation as per the design intent.
.9 Final Dynamic Commissioning of all systems.
.10 Training.

.3 This schedule should be reviewed at each Cx meeting by the CxA, Contractor and their sub trades, and Departmental Representative to ensure the proper time is allowed so commissioning milestones can successfully be achieved.

1.14 COMMISSIONING MEETINGS

.1 Purpose: to review and update Cx schedule and plan as needed, resolve issues, monitor progress, identify deficiencies relating to commissioning.

.2 Cx meetings shall be led by the CxA. CxA shall be responsible to prepare agendas for upcoming Cx meetings. CxA shall prepare and distribute minutes within a week of a meeting.

.3 CxA to inform the parties required attending each meeting and at a minimum, a-group must be able to participate in this meeting by teleconferencing.

.1 Cx Authority
.2 Departmental Representative
.3 General Contractor
.4 Design Consultant
.5 Trades Contractors

.4 CxA shall decide the frequency of the meetings according to the stage of construction and the co-operation of parties above to perform their commissioning tasks.

1.15 STARTING AND TESTING

.1 Contractor assumes liabilities and cost for inspection including disassembly and reassembly after approval, starting, testing and adjusting, and supply of testing equipment.

1.16 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice to parties that must be involved in witnessing starting and testing of equipment.

1.17 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to CxA and other parties that require a copy and these documents must be approved before Cx starts.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.
.2 Pre-start-up inspection reports.
.3 Signed installation/start-up check list.
.4 Start-up reports.
.5 Step-by-step description of complete start-up procedures.
.6 Approved shop drawings.
.7 Approved as built drawings for control systems.

1.18 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of the manufacturer develop written maintenance program and submit to CxA and Consultant for approval before implementation.

.3 Operate and maintain system for the length of time until the equipment is turned over.

1.19 COMMISSIONING FUNCTIONAL PERFORMANCE VERFICATION

.1 Directed by CxA and carried out by the Contractor.

.1 Under actual and accepted simulated operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

.2 Contractor is responsible to run a piece of equipment or system through functional performance testing before the CxA is asked to perform the verification process. If the test is difficult to perform the contractor can submit a list of equipment or system that they would like to do with the CxA present. The CxA will decide what is acceptable,

.3 Contractor to provide all the equipment/instruments required to perform the Cx activities.

.4 The Contractor is to advise the CxA if any testing will void a manufacturer's warranty.

.5 Any adjustments and changes made during the Cx process should be reported to the consultant for their approval and should be documented.

.6 Functional performance test report should document the specified maintenance materials, spare parts, and special have or have not been delivered to site.

1.20 EXTENT OF VERIFICATION

.1 Provide manpower and instrumentation to verify up to 100% of reported results unless specified otherwise in other sections.

.2 Number of report results and locations to be at the discretion of the CxA.

.3 Review and repeat Cx of systems if inconsistencies found in more than 10% of reported results.

.4 Perform additional Cx until results are acceptable to the CxA. All extra cost to repeat Cx to be covered by the contractor.

1.21 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction of the CxA.

.2 All problems, faults, or defects affecting start-up and Cx should be documented by CxA and issued to the Departmental Representative in the form a Cx report. The report should state the issue, the solution or work that is being done to solve the problem, and lastly a timeline if known when the issue will be resolved.

1.22 TRAINING

.1 Provide the services of competent instructors who will give instruction to designated personnel in the adjustment, operation, and maintenance of equipment and systems. Include pertinent safety requirements of the equipment and system specified. The training shall be specifically for the system installed rather than being a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are teaching. The CxA shall have the right to approve or reject the instructors based on

their qualifications. The number of person-days of instruction shall be specified below as a minimum. A training manual shall be provided for each trainee describing in detail the data included in each training program. All equipment and material required for classroom training shall be provided by the General Contractor. One-person day shall be eight hours including one half hour for breaks, and one-person week shall be five person days.

.2 The instructor qualifications and training manual should be submitted 14 days before training session occurs to be reviewed by the CxA and consultant.

.3 Allow a minimum of 2 days to conduct the system training course days, for a detailed training requirement refer to the draft commissioning plan and specifications.

Part 2 Responsibilities of Parties Involved in Commissioning

2.1 COMMISSIONING AUTHORITY

.1 Finalize and complete the Cx plan

.2 Review shop drawings requested in the Cx plan.

.3 Review Cx static data sheets prepared by contractor and subcontractors. Include data sheets in final commissioning plan.

.4 Review Cx functional testing procedure and documents prepared and supplied by installing contractor. Include functional testing procedures in final commissioning plan.

.5 Review Contractor’s Cx schedule.

.6 Review Contractor’s training plan.

.7 Chair and arrange commissioning meetings.

.8 Develop descriptions of systems, intended operation and performance details.

.9 Witness all equipment start-up and collect all manufacturers’ start-up reports.

.10 Verify TAB contractor’s measurements and procedures.

.11 Witness and/or review test reports specified in this specification.

.12 Review test procedures prepared by contractor and subcontractors and direct all functional performance testing.

.13 Review and comment on the O&M manual prepared by the General Contractor.

.14 Review As-Built drawings.

.15 Witness all training and if required ensure that EGD staff receives additional training so the operators can operate and maintain this facility when it is turned over.

.16 Submit final Cx plan to be reviewed by the Departmental Representative.

2.2 PWGSC COMMISSIONING TEAM

.1 Assist the CxA as required in all commissioning activities.

.2 Attend commissioning meetings.

.3 Review and comment on Cx Plan.

.4 Review Cx schedule.

.5 Review training plan.

.6 Review Cx static data sheets and functional performance documents.

.7 Review TAB reports and test reports.

.8 Review and comment on the O&M manual prepared by the General Contractor.

.9 Review As-Built drawings.

2.3 CONSULTANTS

.1 Assist the CxA as required in all commissioning activities.

.2 Attend commissioning meetings.

.3 Review and comment on Cx Plan.

.4 Review Contractor’s Cx schedule.

.5 Review Contractor’s training plan.

.6 Review Cx static data sheets and functional performance documents.

.7 Review TAB reports and test reports.

.8 Before a system or piece of equipment is commissioned, provide a written statement affirming that the system or piece of equipment has been inspected to ensure it in accordance with requirements of contract.

.9 Review the O&M manual prepared by the General Contractor.

.10 Review As-Built drawings.

2.4 GENERAL CONTRACTOR

.1 Appoint Commissioning Authority.

.2 Cooperate fully with commissioning authority in execution of commissioning plan. Before a system or piece of equipment is commissioned, provide a written statement

affirming that the system or piece of equipment is operating properly in accordance with requirements of contract documents.

.3 Arrange and provide all necessary labour, materials, and testing equipment in order to implement commissioning.

.4 Review the Cx plan.

.5 Prepare Cx static data sheets and functional performance documents jointly with subcontractors.

.6 Prepare and provide:

.1 Cx schedule.
.2 Cx training plan.
.3 Schematics and flow diagrams necessary for commissioning.
.4 As-Built drawings.
.5 Start-up reports and testing reports.

.7 Attend all commissioning meetings and activities as required.

.8 Complete all Cx documentation required by the CxA.

.9 Coordinate trades to perform all functional performance testing.

2.5 SUB-CONTRACTORS

.1 Cooperate fully with commissioning authority in execution of commissioning plan.

.2 Attend all commissioning meetings and activities as required.

.3 Prepare Cx static data sheets and functional performance documents jointly with General Contractor.

.4 Arrange and provide all necessary labour, materials, and testing equipment in order to implement commissioning as per commissioning specification and plan.

.5 Submit all O&M data to the General Contractor for inclusion in the O&M Manual.

.6 Ensuring equipment manufacturer complete start-up of equipment and submit start-up reports as requested in the specification. Also ensure equipment manufacture participate in training of EGD operators as required.

Part 1 Execution

.1 Not Used

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes the following:

.1 Disassembly and removal of capstan #1 south and #2 south for salvage and reuse by Departmental Representative.

.1 All existing capstan equipment indicated for disassembly and removal remains the property of PWGSC.

.2 Disconnecting, capping or sealing, and removing site utilities.

1.2 RELATED REQUIREMENTS

.1 Section 02 81 00 - Hazardous Materials

.2 Section 01 35 33 – Health and Safety Requirements

.3 Section 01 35 43 – Environmental Procedures

1.3 REFERENCE STANDARDS

.1 CSA Group (CSA)

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

.2 Department of Justice Canada (Jus)

.1 Canadian Environmental Assessment Act (CEAA), 2012

.2 Canadian Environmental Protection Act (CEPA), 1999

.1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.

.2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34

.4 Motor Vehicle Safety Act (MVSA), 1993

.5 Hazardous Materials Information Review Act, 1985

.3 National Fire Protection Association (NFPA)

.1 NFPA 241-19, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.4 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.2 National Fire Code of Canada 2015 (NFC).

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S660-08, Standard for Non-metallic Underground Piping for Flammable and Combustible Liquids

.2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks

.3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks

.6 United States Environmental Protection Agency (EPA)/Office of Water

.1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles

.2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles

.3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 DEFINITIONS

.1 Disassembly and Removal: coordinated preparation and disassembly for removal and salvage of all existing capstan assemblies for reuse by PWGSC.

.2 Demolition: removal and disposal of equipment not specified for salvage and reuse by PWGSC.

.3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with Departmental Representative for the material ownership including but not limited to:

.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Department Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.

.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative that may be encountered during demolition remain Departmental Representative's property.

.2 Convene site meeting with Departmental Representative prior to demolition, salvage or removal activities. Comply with direction given at site regarding materials to be salvaged for reuse.

.3 Schedule demolition, removal and salvage activities within specified.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide demolition, disassembly, removal and salvage plan for review by the Departmental Representative. Coordinate activities with EGD Docking Schedule as shown in Appendix E and as directed by the Departmental Representative.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA, applicable Provincial/Territorial and Municipal regulations.

.2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

.3 Standards: Comply with ANSI A10.6 and NFPA 241.

1.8 SITE CONDITIONS

.1 Refer to Appendix C - Hazardous Materials Report.

.2 Existing capstans are deemed confined space. Contractor to perform work in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Existing service tunnels are deemed restricted access space. Comply with site requirements while performing work.

.4 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 EXAMINATION

.1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition or disassembly and salvage required.

.2 Inventory and record the condition of items being disassembled, removed and salvaged. Provide written report to Departmental Representative prior to proceeding with disassembly.

.3 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Provide written report to Department Representative prior to proceeding with the work.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Keep noise, dust, and inconvenience to occupants to minimum.

.2 Protect building systems, services and equipment.

.3 Provide temporary dust screens, covers, railings, supports and other protection as required.

.4 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Demolition/Removal:

.1 Disassemble and remove #1 and #2 south capstans and support structures (capstan/cover, gearbox, and motor mount) as indicated for salvage and reuse by PWGSC. #2 South is partially removed and will require only remaining equipment and structure to be removed.

.2 Disassembly, removal and salvage/demolition parts of existing electrical infrastructure to permit new construction.

.3 Disassemble and remove existing cable reels and provide to PWGSC for salvage and re-use. Existing electrical feeders to the winches are live and require removal for the new work to be undertaken. The 110 V receptacle at that location will remain.

.4 At end of each day's work, leave Work in safe and stable condition.

.5 Demolish to minimize dusting in accordance with Section 01 35 43 - Environmental Procedures.

.6 Dispose or recycle material not identified for salvage and reuse in accordance with Section 01 35 43 - Environmental Procedures.

.3 Relocate all equipment identified for disassembly, removal and salvage in location designated by Departmental Representative. PWGSC shall be responsible for securing and protecting all salvaged equipment once handed over:

.1 Existing capstan head, shaft, bushings, first and second stage open gearing, third stage gearbox, coupling, shaft lubrication system, DC motor and cover plates for spares for other capstans.

3.3 SITE RESTORATION & REPAIRS

.1 Below Grade Areas: Rough grade below grade areas ready for further excavation or new construction.

.2 Below Grade Areas: Completely fill below grade areas and voids resulting from structure demolition operations with satisfactory soil materials.

.3 Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes.

.4 Provide a smooth transition between adjacent existing grades and new grades.

.5 General: Promptly repair damage to adjacent construction caused by demolition operations.

.6 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

.7 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

END OF SECTION

Part 1 General

1.1 INTENT

.1 Requirements for the design and preparation of the concrete mix; handling; placing; finishing and curing of cast in place concrete.

1.2 REFERENCES

.1 CSA-A23.1 - Concrete Materials and Methods of Concrete Construction

.2 CSA-A23.2 - Methods of Test for Concrete

.3 CSA-A5 - Portland Cement

.4 CSA A23.5 - Supplementary Cementing Materials

.5 CSA-A266.2 - Chemical Admixtures for Concrete

.6 CSA-A266.1 - Air-Entraining Admixtures for Concrete

1.3 MATERIAL CERTIFICATION

.1 Have available on-site one copy of CSA-A23.1 and CSA-A23.2. These shall form the basis for acceptable standards of concrete practice and methods.

.2 The Contractor will retain and pay for the services of an independent testing agency for on-site testing as follows:

.1 One slump test and one air content test per truckload of ready-mix concrete

.2 Concrete cylinder casting, curing and testing as specified below.

.3 Allow for casual labour and expenses in conjunction with testing.

.4 Concrete Cylinder tests:

.1 At least one set of two (2) cylinders will be made for each of concrete placed, for each type of concrete mix.

.2 Cylinders shall be taken at the point of deposit of the concrete.

.3 Three (3) standard cylinders will be prepared and cured under laboratory conditions.

.4 One cylinder from each test will be broken at seven (7) days and the remaining cylinders at 28 days.

.5 When there is a probability of temperatures falling below 5°C or rising above 27°C additional field cured cylinders will be prepared to verify that adequate strength is attained. A minimum of 2 – 28 day samples must be field cured under similar temperature and humidity to the in-place concrete.

.5 Test results shall be delivered directly from the test laboratory to the Departmental Representative and to the Contractor.

.6 Test reports shall include:

.1 project name

.2 date and time of sampling

.3 supplier, truck and departure time
.4 specified strength and mixtures
.5 cement type
.6 exact location in structure
.7 slump and air content
.8 maximum aggregate size
.9 test strength and age at time of test
.10 date cylinder received by lab
.11 testing technician identification
.12 weather and temperature information.

.7 If any tests reveal concrete not meeting Specifications, the Departmental Representative may enforce one or more remedial procedures such as:

.1 change in mix design
.2 change in concrete supplier
.3 additional testing by coring or impact hammer
.4 replacement of work
.5 other procedures as necessary

.8 The costs of remedial work to bring concrete to meet specifications shall be borne by the Contractor.

.9 The Departmental Representative may retain and pay for the services of an independent testing agency for testing for quality assurance for the Departmental Representative's purposes.

1.4 SCHEDULING OF WORK

.1 Notify Departmental Representative of any planned or accidental interruption of water supply to hydrants.

1.5 SUBMITTALS

.1 Submit mix design and aggregate gradation curves for review at least 10 days in advance of concreting.

.2 Submit samples of aggregates, water and cement to be used, to an approved testing agency, if required by the Departmental Representative.

.3 Submit schedule of proposed construction joints to the Departmental Representative for review.

.4 Submit mill certificates for cement and supplementary cementing materials required by Departmental Representative.

Part 2 Products

2.1 CEMENT

.1 Conform to CSA-A5 Portland Cement.

2.2 WATER

.1 Potable.

2.3 FINE AND COARSE AGGREGATES

.1 Conforming to CSA-A23.1

2.4 REINFORCING

.1 Grade 400 (400 MPa) rebar

.2 Conforming to CSA-G30.18

2.5 AIR ENTRAINING MIXTURES

.1 Air entrainment to CSA-A266.1.

.2 No other air entraining mixture shall be used regardless of the type of cement selected, unless approved by the Departmental Representative.

2.6 CHEMICAL ADMIXTURES

.1 Conforming to CSA-A266.2.

.2 Use only as approved by the Departmental Representative.

2.7 POZZOLANIC MINERAL ADMIXTURES

.1 Conforming to CSA-A23.5.

.2 Use only as approved by the Departmental Representative.

2.8 FLYASH

.1 Flyash may be used only on the approval of the Departmental Representative.

.2 Maximum cement replacement of 20%.

2.9 EXPANDING GROUT

.1 Premixed non-shrink, non-metallic aggregate, developing minimum compressive strength of 35 MPa at 28 days.

.2 Use only as shown on the drawings or approved by the Departmental Representative.

2.10 CONCRETE MIX REQUIREMENTS

.1 Concrete for Capstan curb to be as follows:

- .1 Exposure Class: C-2
- .2 Min Compressive Strength at 28 days: 32 MPa
- .3 Cement Type: GU
- .4 Conform to CSA-A23.1

2.11 MIXING

.1 Ready-mixed concrete:

.1 Mix premixed or Transit-mixed concrete according to CSA-A23.1 and to ASTM-C94.

.2 Ensure that the concrete supplier has sufficient plant capacity and transporting apparatus to provide delivery so that the interval between successive loads does not exceed 15 minutes.

.2 Site-Mixed Concrete shall be in accordance with CSA-A23.1-M77.

Part 3 Execution

3.1 PREPARATION

.1 The Departmental Representative will inspect forms, foundations, reinforcing steel, construction joints, mixing, conveying and placing equipment before concreting.

.2 Do not place concrete on soil that has been softened by mechanical disturbance or moisture.

.3 Retighten forms at construction joints.

.4 Thoroughly remove foreign matter and laitance from concrete.

.5 Make suitable arrangements to prevent damage to fresh concrete by adverse weather conditions, such as rain, wind or extreme temperatures.

.6 Concrete shall not be poured against frozen ground, frozen concrete or into frosted formwork.

.7 Prepare all sleeves and ducts to be cast into concrete at the same time as the concrete formwork to ensure that correct assembly and fit is obtained.

.8 Check civil, mechanical and electrical drawings for sleeves, inserts, etc.

.9 Set sleeves, ties, anchor bolts, pipe hangers and other inserts and openings in concrete floors and walls as required.

.10 Install continuous preformed vertical anchor slots to forms where masonry walls or partitions abut concrete vertical surfaces.

3.2 DELIVERY HANDLING AND STORAGE

.1 Store all material in accordance with CSA-A23.1, Storage of Materials, except as otherwise noted.

.2 Store each shipment of cement separately to provide access to identification and inspection of each shipment.

.3 Clean stockpile areas of foreign materials.

.4 Do not use stockpiled material within 150 mm of the ground surface if the stockpile is placed directly on the ground.

.5 Refer to drawing for soil stockpile areas. Include excavation, trucking and stockpiling of excavated material in this location ($50m^3$ maximum stockpiles) for soils characterization by PWGSC. Scope does not include disposal. Test results will determine what direction/action will be taken by PWGSC.

3.3 PLACING OF REINFORCING

.1 Reinforcing to conform to CSA-G30.18.

.2 Ensure proper placement and support of reinforcement and embedded material immediately ahead of a pour.

.3 Reinforcing splices – min 600mm for 15M bars and min 750mm for 20M bars.

.4 Do not temporarily displace reinforcement for convenience in placing concrete.

.5 Do not use wood for chairing reinforcing. No wood is allowed to be cast into concrete.

.6 Do not insert reinforcement into fresh concrete.

3.4 PLACING OF CONCRETE

.1 According to CSA-A23.1, and as specified herein.

.2 All formwork shall be cleaned of all debris, loose material, snow and ice immediately prior to pouring.

.3 Confine concrete in a suitable vertical drop pipe to within 1.0 m or less of the concrete in place.

.4 Set screeds accurately for level surfaces or to maintain cambers as required.

.5 Ensure that concrete is adequately consolidated in the forms.

.6 Place concrete in such a manner that the concrete in the form is still plastic and can be integrated with fresh concrete.

.7 To prevent segregation, deposit concrete in approximately horizontal layers of 300 to 450 mm thickness, as near as possible to its final position.

3.5 COLD WEATHER REQUIREMENTS

.1 When the air temperature is at or below 5°C, or when there is a possibility of it falling to that limit within 24 hours of placing, the requirements according to CSA-A23.1 shall be met.

.2 Calcium chloride to 1% may be used upon written approval of the Departmental Representative.

.3 Withdraw protection and heating gradually so that air temperature around the concrete does not drop more than 15°C per day.

.4 Concrete shall be protected from alternate freezing and thawing for 14 days.

.5 Provide enclosures for heating such that air circulation is maintained.

.6 Frozen concrete will be rejected.

3.6 HOT WEATHER CONCRETE WORK

.1 Hot weather shall be an air temperature of 27°C or greater.

.2 Hot weather methods shall conform to CSA-A23.1.

.3 The concrete temperature at the time of placing in hot weather shall not exceed those specified in CSA-A23.1. If this limit is exceeded the concrete operations shall be suspended until the constituent materials of concrete are cooled.

.4 Retarding admixtures shall be used only if approved by the Departmental Representative prior to use in the concrete.

.5 The use of ice may be required to lower the temperature of concrete for large pours.

3.7 REINFORCING

.1 Reinforcing to conform to CSA-G30.18.

.2 Reinforcing splices – min 600mm for 15M bars and min 750mm for 20M bars.

.3 Do not temporarily displace reinforcement for convenience in placing concrete.

.4 Do not use wood for chairing reinforcing. No wood can be cast into concrete.

.5 Do not insert reinforcement into fresh concrete.

3.8 CONTROL JOINTS

.1 Construction, and/or control joints shall be provided where required and as shown on the drawings or according to CSA-A23.1.

.2 Concrete slab-on-grade elements in excess of 6m length to have control joints installed at 6m on center.

.3 Control joints to be 6mm wide by 30mm deep saw-cut joints or 10mm by 30mm deep trowel joints. Saw-cut joints are to be cut 24 hours after concrete pour. After concrete has reached 7 days, joint is too be filled with flexible polyurethane sealant. Product to be approved by Departmental Representative.

3.9 CONSTRUCTION JOINTS

.1 Carefully finish all face edges exposed to view true to line and elevation.

.2 At water-tight horizontal joints, apply the first layer of new concrete above the joint with an excess of mortar, obtained by omitting 20 to 50 percent of coarse aggregate from the normal mix.

.3 Make all construction, or control joints in accordance with details shown on the drawings, layout to be submitted by Contractor for approval by Departmental Representative.

.4 See typical details for isolation joints at walls, and other locations.

.5 Construction joint layouts shown on the drawings take precedence over above requirements.

3.10 GROUTING

.1 Grout underside of equipment baseplates with non-shrinking grout to manufacturer's instructions.

3.11 FINISHING

.1 To CSA-A23.1 and as specified herein:

.1 Ordinary surface finish.

.1 Use on concrete surfaces not exposed to view in the completed structure.

.2 Chip off fins and irregular projections.

.3 Patch honeycomb and fill tie holes with mortar containing approved bonding agent. Mix according to manufacturer's directions.

.2 Rubbed finish.

.1 Use on formed concrete exposed to view in the completed structure.

.2 Remove fins and projections, patch honeycomb and fill tie holes as required.

.3 Saturate with water and rub with medium coarse carborundum stone using a small amount of cement-sand mortar.

.4 Continue rubbing until a uniform surface with no irregularities is obtained. Do not remove the paste produced by this rubbing.

.5 Carry out final rubbing with a fine stone and water.

.6 After the surface is dry, remove loose powder by rubbing with burlap.

.7 Leave final surface free from unsound patches, paste, powder and objectionable marks.

.3 Floated surface finish

.1 Strike off the compacted concrete to the cross section and elevation shown on the drawings. Keep a slight excess of concrete in front of the screed at all times.

.2 Obtain a uniform surface by floating as necessary. If floating is not completed before excess water appears at the surface, remove this water before continuing with floating.

.3 Add or remove concrete during floating as required to obtain a surface with no more than 3 mm deviation from the required surface in any 3 m length.

.4 Do not overwork the concrete surface. Float only enough to obtain a dense uniform surface.

.4 Broomed finish

.1 After completion of Article 3.9.3 (d), broom to produce a non-slip surface with regular corrugations not more than 3 mm deep.

.5 Troweled finish

.1 After completion of Article 3.9.3 (d), trowel to produce a dense smooth finish.

.2 Areas which are exterior walkways, driveways or landings, shall receive a broomed non-slip surface.

3.12 CURING

.1 Curing shall be according to CSA-A23.1 and as specified herein.

.2 Prevent loss of moisture from concrete surfaces for at least seven days after concreting.

.3 Protect unformed surfaces as follows, subject to approval by the Departmental Representative.

.1 Curing compound

.2 Waterproof covering

.3 Sprinkling or ponding

.4 Damp sand, burlap or other suitable material

.4 Protect formed surfaces as follows, subject to approval by the Departmental Representative.

.1 Leave forms in place and keep concrete wet by pouring water between concrete and forms.

.5 Maintain concrete temperatures as recommended according to CSA-A23.1.

3.13 FORM REMOVAL

.1 Forms shall not be removed until removal operations will cause no damage to concrete surfaces.

3.14 PATCHING AND FINISHING OF HARDENED CONCRETE

.1 Patching, if required and if allowed, shall be done immediately after stripping.

.2 Methods of patching and repair shall be submitted to the Departmental Representative and accepted before repair work is started.

.3 All form ties shall be cut back a minimum of 25 mm and all tie holes shall be neatly patched and rubbed down.

3.15 CONCRETE SPECIALITIES

.1 Provide and install all concrete specialties as shown on the drawings and/or as necessary to complete the concrete work.

.2 Included are fibreboard expansion joint covers, water stop and bond breakers.

3.16 ENVIRONMENTAL PROTECTION

.1 Washing out of concrete trucks is not permitted on site.

.2 Ensure concrete spillage is cleaned up promptly. No spillage shall interfere with rail mounted cranes or site drainage system.

.3 Perform environmental protection, clean up and disposal work as per Section 01 35 43 Environmental Procedures.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop fabricated miscellaneous metal items.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

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

.3 Canadian Standards Association (CSA)

.1 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1, Limit States Design of Steel Structures.

.4 CSA W48 Series, Electrodes for Welding

.5 CSA W5903 (R2008) – Welded Steel Construction (Metal Arc Welding).

.4 The Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume 2, Systems and Specifications.

.5 National Building Code (NBC) 2015.

1.3 SUBMITTALS FOR REVIEW

.1 Section 01 33 00 – Submittal Procedures.

.2 Shop Drawings:

.1 Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

.2 Indicate welded connections using standard welding symbols. Indicate net weld lengths.

1.4 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00 – Submittal Procedures.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 00 – Closeout Submittals.

1.6 QUALITY ASSURANCE

.1 Welders' Certificates: Submit to Section 01 33 00 – Submittals requirements, certifying welders employed on the Work, verifying qualification within the previous twelve (12) months to CSA requirements

.2 Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in British Columbia.

Part 2 Products

2.1 MATERIALS

.1 Rolled W-Shapes and T-Shapes: To CAN/CSA-G40.20/G40.21, Grade 350W.

.2 Other Steel Sections and Plate: To CAN/CSA-G40.20/G40.21, Grade 300W.

.3 Steel Pipe: To ASTM A 53/A53M, Type S, Grade B, weight class and finish as specified by item, of sizes indicated.

.4 Welding Materials: To CSA W59.

.5 Welding Electrodes: To CSA W48 Series.

.6 Anchor Bolts: To ASTM A307.

.7 Steel to Steel Connection Bolts: ASTM A325.

.8 Exposed Fasteners: Of same material, colour and finish as the metal to which applied, unless indicated otherwise.

.9 Grout: Non-shrink, non-metallic, flowable, 50 MPa at 28 days.

.10 Epoxy Grout: Multi-component epoxy grout with high bond strength for anchoring bolts, pipes, base plates in concrete and masonry.

.11 Headed Anchor Rods: ASTM A 307, Grade C.

.12 Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4, galvanized steel, ASTM A 653/A 653M with G90 coating.

.13 Aluminum Hatches:

.1 Designed by supplier for 6 kPa distributed load, or 18 kN point load over a loaded area of 120mm x 120mm.

.14 Steel Checkerplate:

.1 Hot dip galvanized finish as per Section 2.3

.2 Designed by supplier for the following:

.1 Support of dual capstan head and all associated loading.

.2 6 kPa distributed load, or 18 kN point load over a loaded area of 120mm x 120mm.

2.2 FABRICATION

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

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible fit work and shop assemble ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Remove and grind smooth burrs, filings, sharp protrusions, and other projections from metal fabrications to prevent possible injury. Correct dangerous or potentially harmful installations.

2.3 FINISHES

.1 Galvanizing: Hot dipped galvanizing with minimum zinc coating 600 g/m² (2.0 oz/ft²) to CAN/CSA-G164.

.2 Shop Coat Primer: To CAN/CGSB-1.40.

.3 Zinc Primer: Zinc rich, ready mix to CAN/CGSB-1.181.

2.4 SHOP PAINTING

.1 Clean surfaces in accordance with SSPC Painting Manual, Volume 2, minimum SP3.

.2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, or grease. Do not paint when temperature is lower than 7°C.

.4 Clean surfaces to be field welded; do not paint.

Part 3 Execution

3.1 ERECTION

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

.2 Erect metalwork in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Secure wall mounted items securely and rigidly in place as follows:

- .1 Stud walls: screws into solid backing. Do not use toggle bolts for stud walls.
- .2 Hollow masonry: toggle bolts.
- .3 Concrete: bolts and expansion anchors.

.5 Grout under base plates with non-shrink gout.

.6 Exposed fastening devices to match finish and be compatible with material through which they pass.

.7 Provide components for building by other sections in accordance with shop drawings and schedule.

.8 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.9 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.10 Hand items over for casting into concrete to appropriate trades together with setting templates.

.11 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.12 Touch-up galvanized surfaces with zinc primer where scratched, ground off, or burned by field welding.

3.2 THRESHOLD COVERS AND FRAMES

.1 Set top of angle frame flush with adjacent concrete surface.

.2 Install covers.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Prepare exterior steel, ventilation goosenecks for paint.

.2 Paint exterior steel, ventilation goosenecks to provide a high visibility, permanent, rust resistant coating for a marine environment.

1.2 REFERENCE STANDARDS

.1 The Master Painters Institute (MPI)

.1 Exterior Structural Steel and Metal Fabrications, 07.

.1 EXT 5.1D, Alkyd.

.2 EXT 5.1G, Polyurethane, Pigmented (over epoxy zinc rich primer and high build epoxy).

.2 Environmental Choice Program (ECP)

.1 CCD-047-98 (R2005), Architectural Surface Coatings.

.3 Federal Standard (FS)

.1 FED-STD-595B-89, Colours Used in Government Procurement.

.4 The Society for Protective Coatings (SSPC)

.1 SSPC-SP 1-82 (R2004), Solvent Cleaning.

.2 SSPC-SP 2-82 (R2004), Hand Tool Cleaning.

.3 SSPC-SP 3-82 (R2004), Power Tool Cleaning.

.4 SSPC-SP 6/NACE No. 3-07, Commercial Blast Cleaning.

.5 SSPC-SP 7/NACE No. 4-07, Brush-off Blast Cleaning.

.6 SSPC-Vis-1-89 Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specs.).

.7 SSPC-SP 10/NACE No. 2-07, Near White Blast Cleaning.

.8 SSPC-PA 2-04, Measurement of Dry Coat Thickness with Magnetic Gauges.

.9 SSPC Good Painting Practices, Volume 1, 4th Edition.

.5 NACE International

.1 NACE International

.1 ANSI/NACE No. 13/SSPC-ACS-1-2016 - SG, Industrial Coating and Lining Application Specialist Qualification and Certification.

1.3 RELATED SECTIONS

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

.2 Section 01 35 43 - Environmental Procedures.

.3 Appendix C - Hazardous Materials Report, dated October 2020 Stantec.

1.4 DEFINITIONS

.1 Application Specialist: An individual who performs surface preparation and application of protective coatings and linings to steel and concrete surfaces of complex industrial structures.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 1 electronic copy in PDF format of WHMIS SDS in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Samples:

.1 Provide for review and acceptance of each unit.

.2 Upon request, Departmental Representative will furnish qualified products list of paints.

.3 Paints that do not appear on MPI Approved Products List must be approved by Departmental Representative before use on project.

.4 Certificates:

.1 Provide product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Submit certifications for Application Specialists to demonstrate compliance to the requirements of ANSI/NACE No.13.

.5 Test Reports:

.1 Provide test reports showing compliance with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Packaging Waste Management: remove for recycling, all packaging materials as specified in Section 01 35 43 - Environmental Procedures.

Part 2 Products

2.1 MATERIALS

.1 Paint:

.1 Sustainability Characteristics:

.1 VOC limit: 150 g/L maximum to CCD-047.

.2 Ensure paint does not contain chemical restrictions to CCD-047.

.2 Primer MPI #79: MPI EXT 5.1C, primer, marine for steel.

.1 Primer for second coat: tinted sufficiently off finish colour of first coat to show where second coat is applied.

.2 Tinting material: compatible with primer and not detrimental to its service life.

.3 Enamel: MPI EXT 5.1G, W.B. light industrial, alkyd, marine, exterior; first and second coat colour to be determined by Departmental representative based on FS-595B paint color specification. If majority of paint application is to be by brushing, use paint to MPI EXT 5.1D.

.4 Sand for sandblasting: to SSPC (Steel Structures Painting Council).

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for painting exterior metal surfaces installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with painting only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Remove existing loose paint and rust from exterior metal surfaces.

.2 New metal surfaces:

.1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:

.1 Commercial blast cleaning: to SSPC-SP 6.

.2 Solvent cleaning: to SSPC-SP 1.

.3 Hand tool cleaning: to SSPC-SP 2.

.4 Power tool cleaning: to SSPC-SP 3.

.5 Brush-off blast cleaning: to SSPC-SP 7.

.6 Near White Blast Cleaning: to SSPC-SP 10/NACE No. 2.

.3 Metal surfaces to be repainted:

.1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with following.

.1 Commercial blast cleaning: to SSPC-SP 6.

.2 Brush-off blast cleaning: to SSPC-SP 7.

.3 Solvent cleaning: to SSPC-SP 1.

.4 Hand tool cleaning: to SSPC-SP 2.

.5 Power tool cleaning: to SSPC-SP 3.

.2 Commercial blast clean rusted and bare metal surfaces where existing paint system has failed.

.3 Brush-off blast clean remaining metal surfaces to be painted.

.4 Scrape edges of old paint back to sound material where remaining paint is thick and sound, feather exposed edges.

.4 Compressed air to be free of water and oil before reaching nozzle.

.5 Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

.6 Apply paint after prepared surfaces have been accepted by Departmental Representative.

.7 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-Vis1.

.1 Apply primer, paint, or pre-treatment after surface has been cleaned and before deterioration of surface occurs.

.2 Clean surfaces again if rusting occurs after completion of surface preparation.

.8 Mixing paint:

.1 Do not dilute or thin paint for brush application.

.2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.

.3 Do not mix or keep paint in suspension by means of air bubbling through paint.

.4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.9 Number of paint coats: 2, minimum.

.1 New metal surfaces.

.1 Shop: 2 primer coats to minimum dry film thickness of 35 microns per coat.

.2 Field: 2 alkyd enamel coats to minimum dry film thickness of 25 microns per coat.

.2 Repainting existing metal surfaces.

.1 One primer coat to minimum dry film thickness of 35 microns to bare and commercial sand blasted areas.

.2 Two alkyd enamel coats to minimum dry film thickness of 25 microns per coat.

3.3 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Apply paint by spraying, brushing, or combination of both. Use sheepskins or daubers when no other method is practical in places of difficult access.

.3 Where surface to be painted is not under cover, do not apply paint when:

.1 Air temperature is below 10 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.

.2 Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.

.4 Surface to be painted is wet, damp or frosted.

.5 Previous coat is not dry.

.4 Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.

.5 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or, condensation. Prepare surface again and repaint.

.6 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.7 Brush application:

.1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.

.2 Brush out runs and sags.

.3 Remove runs, sags and brush marks from finished work and repaint.

.8 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.

.3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.4 Apply paint in uniform layer, with overlapping at edges of spray pattern.

.5 Brush out immediately runs and sags.

.6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.

.7 Remove runs, sags and brush marks from finished work and repaint.

.9 Shop painting:

.1 Do shop painting after fabrication and before damage to surface occurs from weather or other exposure.

.2 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.

.3 Do not paint metal surfaces which are to be embedded in concrete.

.4 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.

.5 Remove weld spatter before painting. Remove weld slag and flux by methods as specified in paragraph 3.2.3 Metal Surfaces to be Repainted.

.10 Field painting:

.1 Paint steel components as soon as practical after assembly.

.2 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.

.3 Field paint surfaces (other than joint contact surfaces) which are accessible before assembly, but which are not to be accessible after erection.

.4 Apply final coat of paint after concrete work is completed or as directed by Departmental Representative. If concrete pouring or other operations damage paint, clean and repaint damaged area. Remove concrete spatter and droppings before paint is applied.

.5 Where painting does not meet with requirements of specifications, and when so directed by the Departmental Representative, remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.

.11 Handling painted metal:

.1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.

.2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.4 FIELD QUALITY CONTROL

.1 Site Tests, Inspections:

.1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 35 43 - Environmental Procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 35 43 - Environmental Procedures.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 35 43 - Environmental Procedures.

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

3.6 PROTECTION

.1 Protect painted surfaces from damage during construction.

.2 Protection of surfaces:

.1 Protect surfaces not to receive paint.

.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.

.3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

.3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Assemble and support plastic piping for use as ventilation ducts in Capstan Chamber.

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM D2564- 04e1, Standard Specification for Solvent Cements for Poly Vinyl-Chloride: PVC Plastic Piping Systems.

.2 CSA Group (CSA)

.1 CAN/CSA-Series B1800- 06, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.

.3 Green Seal Environmental Standards (GSES)

.1 Standard GS-36- 00, Commercial Adhesives.

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

.1 Safety Data Sheets (SDS).

.5 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada 2015 (NPC).

.6 South Coast Air Quality Management District (SCAQMD), California State

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Provide 1 electronic copy in PDF format of WHMIS SDS - Safety Data Sheets in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Manufacturer’s written instructions.

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

.3 Store at temperatures and conditions recommended by manufacturer.

.4 Packaging Waste Management: remove for recycling, all packaging materials in accordance with Section 01 35 43 - Environmental Procedures.

Part 2 Products

2.1 MATERIAL

.1 Adhesives and Sealants: In accordance with Section 07 92 00 - Joint Sealants.

.1 Maximum VOC limit 250 g/L GSES GS-36 and to SCAQMD Rule 1168.

2.2 PIPING AND FITTINGS

.1 For piping used as ventilation ducting to:

.1 CAN/CSA B1800.

2.3 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

Part 3 Execution

3.1 APPLICATION

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

3.2 INSTALLATION

.1 Install in accordance with the National Plumbing Code, Provincial Plumbing Code and requirements of local authority having jurisdiction.

3.3 TESTING

.1 Not required where piping is used as ventilation ducting.

3.4 CLEANING

.1 Clean in accordance with Section 01 35 43 - Environmental Procedures.

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

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 35 43 - Environmental Procedures.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Provide supports for exhaust fan and PVC ventilation piping in Capstan Chamber.

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

- .1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.

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

- .1 MSS SP582002, Pipe Hangers and Supports - Materials, Design and Manufacture.
- .2 MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.
- .3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.3 National Research Council Canada (NRC)

- .1 National Plumbing Code of Canada 2015 (NPC).

.4 Underwriter's Laboratories of Canada (ULC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

- .1 Provide manufacturer's printed product literature and data sheets for supports and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

- .1 Submit drawings in PDF format.
- .2 Submit shop drawings for:
  - .1 Horizontal support brackets.
  - .2 Connections to PVC ventilation piping and structure.

.4 Certificates:

- .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturer’s Instructions:

- .1 Provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

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

.3 Packaging Waste Management: remove for recycling, all packaging materials in accordance with Section 01 35 43 - Environmental Procedures.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Construct pipe support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

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

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

2.2 GENERAL

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

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

2.3 PIPE SUPPORTS

.1 Finishes:

.1 Pipe supports and hardware: galvanized after manufacture.

.2 Use hot dipped galvanizing process.

.2 Attachment to concrete chamber wall:

.1 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69.

.3 Shop and field-fabricated assemblies:

.1 Steel brackets: 38mm x 38mm x 6mm angle, fabricated as indicated on drawings.

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

.1 Finishes for PVC pipework: galvanized, with formed portion plastic coated.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

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

3.3 SUPPORT SPACING

.1 PVC piping serving as ductwork: at 610 mm intervals and a minimum of 2 supports per horizontal run of piping.

.2 Within 200 mm of each elbow.

3.4 SUPPORT INSTALLATION

.1 Install bracket so that it is horizontal under operating conditions.

.2 Adjust hangers to equalize load.

3.5 FINAL ADJUSTMENT

.1 Adjust supports:

.1 Ensure that load imposed by PVC ducts is equally distributed among all supports.

.2 U-Bolts:

.1 Tighten only enough to permit longitudinal movement of PVC piping transverse to pipe support.

3.6 CLEANING

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

.2 Waste Management: separate waste materials for recycling.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and requirements for the identification of duct work and, ventilation fan including the installation and location of identification systems.

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

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

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data: Material, environmental resistance, application instructions, color, etc.

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

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.2 Health and Safety:

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

.2 Waste Management and Disposal:

.1 Waste Management and Disposal: separate waste materials for recycling.

.2 Dispose of unused paint and/or labeling material at official hazardous material collections site approved by Departmental Representative.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic nameplate mechanically fastened to ventilation fan by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

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

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

2.2 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

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

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

2.3 IDENTIFICATION OF PIPING USED FOR DUCTWORK SYSTEMS

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.

.2 Colours: black, or co-ordinated with base colour to ensure strong contrast.

.3 Indicate direction of flow.

2.4 LANGUAGE

.1 Identification in French & English.

.2 Use one nameplate and label for both languages.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 TIMING

.1 Provide identification only after painting specified Section 09 91 13.23 - Exterior Painting of Structural Steel has been completed.

3.3 INSTALLATION

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

.2 Identify systems, equipment to conform to PWGSC Project Management Support Services (PMSS).

3.4 NAMEPLATES

.1 Locations:

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

.2 Protection:

.1 Do not paint, insulate or, cover.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 Adjacent to each change in direction.

.2 At least once in cover plate through which piping or, ductwork passes.

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

.4 Where system is installed in confined spaces, at entry and exit points, and at access openings.

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

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

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

3.6 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 Steel U-bends to be applied as 180º ventilation duct goosenecks exposed to outdoor conditions.

.2 Pipe nipples to extend inside capstan camber cover plate for connection to interior PVC ventilation ducts.

.3 Welding to join steel U-bends to capstan chamber cover plate.

1.2 REFERENCE STANDARDS

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

.1 ANSI/AWWA C111/A21.11-07, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 American Society of Mechanical Engineers (ASME)

.1 ASME B16.1-10, Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

.2 ASME B16.3-10, Malleable Iron Threaded Fittings: Classes 150 and 300.

.3 ASME B18.2.1-12, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loaded Head and Lag Screws (Inch Series).

.4 ASME B18.2.2-15, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.3 ASTM International (ASTM)

.1 ASTM A47/A47M-99 (2018), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-18, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.

.3 ASTM A536-84 (2019) e1, Standard Specification for Ductile Iron Castings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit drawings in PDF format.

.2 Indicate on drawings:

.1 Dimensions and materials of construction.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for hydronic systems for incorporation into manual.

.1 Include special servicing requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, in dry location and, in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect steel pipe and fittings from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for recycling, all packaging materials.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 To NPS 6: Schedule 40.

2.2 PIPE JOINTS

.1 Pipe thread: taper.

.2 MJ style mechanical couplings to CSA B602 and ULC listed to 102.2 / 10.

2.3 FITTINGS

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.

.2 Butt-welding fittings: steel, to ASME B16.9.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for hydronic systems installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for recycling.

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

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by hydronic systems installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)

.1 ANSI/AMCA Standard 99-2016, Standards Handbook.

.2 ANSI/ASHRAE 51-2016 (ANSI/AMCA 210-16), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.3 ANSI/AMCA Standard 300-2014, Reverberant Room Method for Sound Testing of Fans.

.4 ANSI/AMCA Standard 301-2014, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit 1 electronic copy in PDF format of manufacturer's instructions, printed product literature and data sheets for HVAC fan and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit shop drawings in PDF format.

.2 Provide:

.1 Fan performance curves showing point of operation, W (bhp) and efficiency at operating point.

.2 Sound rating data at operating point.

.3 Indicate:

.1 Motors, sheaves, bearings, shaft details.

.2 Minimum performance achievable with variable speed controllers.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

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

.1 Provide:

.1 Furnish list of individual manufacturer's recommended spare parts for equipment, include:

.1 Bearings and seals.

.2 Addresses of suppliers.

.3 List of specialized tools necessary for adjusting, repairing or replacing.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect HVAC fan from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for recycling, all packaging materials as specified in Section 01 35 43 - Environmental Procedures.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.

.2 Capacity: flow rate, static pressure, W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.3 Fans: statically and dynamically balanced, constructed in conformity with ANSI/AMCA Standard 99.

.4 Sound ratings: comply with ANSI/AMCA Standard 301, tested to ANSI/AMCA Standard 300.

.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA Standard 210.

2.2 FAN GENERAL

.1 Motor:

.1 EC type for use with solid state variable speed controller.

.2 Complete with overload protection with automatic reset.

.3 Enclosure class: IP44

.4 Insulation class: B

2.3 AXIAL FLOW FAN (TUBE-AXIAL OR VANE-AXIAL)

.1 Casing: Corrosion proof, sealed composite.

.2 Casing configuration: Cylindrical to match diameter of round PVC ventilation duct.

.3 Blade material: composite. Hub material: aluminum.

.4 Supports: Duct mounted with factory supplied mounting bracket.

.5 Bearings: ball.

.6 Direct drive:

.1 Fixed blade wheel: totally enclosed, air over motor.

.2 Diameter of wheel hub: at least equal to that of motor frame.

.7 Fan duty: 38lps @ 102Pa, 2720rpm, 26.5W

.8 Fan speed controller: Solid state with NEMA 4 enclousre.

.9 Electrical characteristics: 120V / 1ph / 60Hz, 37W

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for HVAC fan installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 FAN INSTALLATION

.1 Install fan as indicated on drawings.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 35 43 - Environmental Procedures.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 35 43 - Environmental Procedures.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 35 43 - Environmental Procedures.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.2 No.46-M1988 (R2011), Electric Air-Heaters.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for radiant heaters for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect radiant heater from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for recycling, all packaging materials as specified in 01 35 43 Environmental Procedures.

Part 2 Products

2.1 INFRARED RADIANT HEATERS

.1 Radiant heater: to CSA C22.2 No.46, Suitable for outdoor and washdown exposed areas and consisting of one, hair pin, quartz tube, infrared heating element at 1600W, 600V / 1ph / 60Hz, mounted in extruded, aluminum fixture housing with anodized and chemically brightened, aluminum single reflector and wire guard.

.1 60 degree energy radiation beam spread and provision for energy radiation beam direction adjustment.

.2 Fixture suitable for wall surface mounting.

.3 Moisture resistant terminal housing.

.4 Wall mounted thermostat with NEMA 4X enclosure, 5°C to 30°C setting / thermometer range.

.5 Maximum, overall length: 590mm.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for radiant heaters installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install infrared heater and thermostat as indicated and in accordance with manufacturer's instructions.

.2 Install infrared heater such that reflector is not directed at PVC ducts inside the Capstan Chamber.

.3 Install thermostat on same wall as radiant heater such that the radiant heater reflector cannot be directed toward thermostat.

.4 Ensure that manufacturer's mounting instructions for the fixture, including minimum distances from ceiling, walls or combustible materials, are followed.

.5 Make power and control connections.

3.3 TESTS

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 35 43 Environmental Procedures.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 35 43 Environmental Procedures.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 35 43 Environmental Procedures.

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

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by radiant heaters installation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Devices integral to the Surface Water Detection System: controls, low voltage current transformers, sensors.

.2 Related Sections:

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI).

.1 ANSI/IEEE C57.13-2016 Standard Requirements for Instrument Transformers.

.2 National Electrical Manufacturer's Association (NEMA).

.1 NEMA 250-2014, Enclosures for Electrical Equipment (1000 Volts Maximum).

.3 CSA Group CSA Group

.1 CSA-C22.1-2018, Canadian Electrical Code, Part 1 Safety Standard for Electrical Installations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions for specified equipment and devices.

1.4 EXISTING CONDITIONS

.1 Repair surfaces damaged during execution of Work.

Part 2 Products

2.1 GENERAL

.1 Surface water detector and power supply to be of same manufacturer.

.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, heat resistant, assembly.

.3 Operating conditions: 0 - 32 degrees C with 10 - 90 % RH (non-condensing) unless otherwise specified.

.4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.

.5 Sensor to be unaffected by external transmitters including walkie talkies.

.6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

.7 Use weatherproof construction in NEMA 4 enclosures.

2.2 SURFACE WATER DETECTORS

.1 Requirements:

.1 100dB audible alarm on detection of water.

.2 Re-usable, self resetting, height adjustable, continuity bridge type sensor.

.3 One set of dry contacts: 1 amp at 28V.

.4 Unaffected by moisture in air.

.5 Wall mounted, 115Vac power supply with transformer and NEMA 4 enclosure.

.6 Power supply to include rechargeable battery to provide backup power in event of line power failure.

Part 3 Execution

3.1 INSTALLATION

.1 Install surface water detector on 25mm concrete block such that water is detected when level in capstan chamber reaches 25mm.

.2 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

.3 Install surface water detector and power supply in accordance with manufacturer’s recommended methods, procedures, and instructions.

.4 Electrical:

.1 Complete installation in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.

3.2 IDENTIFICATION

.1 Identify surface water detector and power supply with red lamacoid plates.

3.3 TESTING AND COMMISSIONING

.1 Test surface water detector and power supply and rectify any malfunction prior to turnover.

END OF SECTION

1.1 GENERAL

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenders/Bidders). This Section covers items common to Sections of Division 26.

.2 Reference to "Electrical Division" shall mean all related Electrical Sections and components including Division 26.

.3 The word "Provide" shall mean "Supply & Install" the product and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.4 Provide materials, equipment and devices of specified design, performance, intent and quality; and current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedule, ensure timely performance, ensure coordination and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this section, other electrical sections and drawings shall govern.

.6 All work shall be in accordance with the project drawings and specifications and their intents complete with all necessary components, including those not normally shown or specified but required for a complete installation.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with Canadian Electrical Code, CSA C22.1-2018.

.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender at time of tender submission.

.3 Perform work in accordance with CSA Z462 - Workplace Electrical Safety and WorkSafeBC.

1.3 DEFINITIONS

.1 Electrical and Electronic terms: unless otherwise specified or indicated, terms used in these specifications and on drawings are those defined by IEEE SP1122.

1.4 PERMITS, FEES

.1 Submit to Electrical Inspection Department necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Obtain and pay for an electrical permit to cover all electrical, and telecommunications work.

.4 Submit a copy of electrical permit to the Departmental Representative prior to commencement of work on site.

.5 Departmental Representative will provide drawings and specifications required by Electrical Inspection Department at no cost.

.6 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.

.7 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Departmental Representative.

1.5 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with Division 1.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, single line and schematic diagrams.

.4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

1.6 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Division 26.

.2 Additional maintenance material requirements are included under various other Sections.

1.7 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Division 26.

.2 Include in operations and maintenance data:

.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.3 Wiring and schematic diagrams and performance curves.

.4 Names and addresses of local suppliers for items included in maintenance manuals.

.5 Copy of reviewed shop drawings.

1.8 CARE, OPERATION AND START-UP

.1 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of equipment.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with all aspects of its care and operation.

1.9 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.10 MATERIALS AND EQUIPMENT

.1 Equipment and material to be new and CSA certified, and manufactured to standard quoted.

.2 Where there is no alternative to supplying equipment, which is not CSA certified, obtain special approval from Inspection Department.

1.11 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Lamicoid 3 mm thick plastic engraving sheet, white face, and black core, self-adhesive unless specified otherwise.

.2

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.3 Allow for average of twenty-five (25) letters per nameplate.

.4 Identification to be English.

.5 Nameplates for junction boxes to indicate system and/or voltage characteristics.

.6 Nameplates for pull boxes to indicate system and type of cable.

1.12 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding for 347/600 V, and 120/208V wiring throughout.

1.13 WIRING IDENTIFICATION IN UNDERGROUND PULL BOXES

.1 CABELS LABELS:

- .1 Stainless steel, type 304, 0.737 mm thickness.
- .2 Approximately 38mm diameter.
- .3 Hole at one end of label.
- .4 Loop in label hole in addition to tie-wrap fastener on cable. Extra loop required to ensure label hangs freely. Stainless steel ring.
- .5 Remove sharp edges.
- .6 Cable identification laser-etched on label.
- .7 Submit samples of etched label complete with holes, lop and tie-wraps for approval by Departmental Representative.
- .8 Tie-wraps:
  - .1 Stainless steel (316) with locking device in head
  - .2 At least 4.5mm width for fastening to cables.
- .9 Test 3 mm height minimum. Maximize test size to aid readability.

1.14 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

1.15 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

1.16 CONDUIT AND CABLE INSTALLATION

.1 Refer to drawings for type of conduit and cable to be used.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.3 Run parallel or perpendicular to building lines.

1.17 CUTTING, CORING AND PATCHING

.1 Make arrangements with Contractor for all cutting, coring and patching in this work.

.2 Conduct ground penetrating radar (GPR) scans prior to coring or cutting existing concrete slabs or walls.

1.18 FIRESTOPPING

.1 Where cables or conduits pass through fire rated ceilings and fire rated walls, pack space full of a ULC approved firestopping system.

1.19 FIELD QUALITY CONTROL

.1 Conduct and pay for testing, commissioning, demonstration and training of the following:

- .1 Insulation resistance testing:
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Check resistance to ground before energizing.
- .2 Circuits originating from branch distribution panels.
- .3 Backup generator, automatic transfer switch and Distribution equipment.
- .4 Fire alarm system.

.2 Refer to each Section for additional testing requirements.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that each system is taken out of service the shortest possible amount of time.

.5 Submit test results for Departmental Representative review.

1.20 POWER INTERRUPTIONS

.1 Contractor shall work closely with EGD personnel to arrange all interruptions of any portion of the existing electrical distribution systems.

.2 All interruptions to existing electrical distribution systems and shutdown of existing power distribution in the workshops building shall be carried out outside normal working

hours, or on weekends. Normal working hours of EGD are 0700 to 1600 hours, Monday through Friday, except holidays.

.3 Contractor shall submit request for any power shutdown 10 working days prior to such power shutdown. Request shall indicate start time of interruption and duration of interruption. Indicate in request exactly what buildings and/or systems will be affected by the requested power shutdown.

.4 No interruptions to power shall be carried out without the approval of the Departmental Representative.

1.21 CLEANING

.1 Do final cleaning in accordance with Division 26 and directed by the Departmental Representative.

.2 At time of final cleaning, clean luminaire reflectors, lenses, and other luminaire surfaces that have been exposed to construction dust and dirt.

1.22 RECORD DRAWINGS

.1 Refer to Division 26.

.2 Indicate conduit and cable runs, junction boxes and circuit numbers.

END OF SECTION

PART 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger, minimum size 12 AWG.

.2 Copper conductors with 1000 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 ARMOURED CABLES

.1 Type AC90. Conductors: Insulated, copper, minimum size 12 AWG.

.2 Armour: interlocking type fabricated from aluminum strip.

PART 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 – Conduits, Fastenings and Fittings.

.2 In underground duct bank systems in accordance with Section 26 05 44 – Installation of Cables in Ducts.

.2 Provide a green insulated bond conductor in all conduits sized in accordance with CSA C22.1-2018, Canadian Electrical Code, Part 1.

3.2 INSTALLATION OF ARMOURED CABLES

.1 Terminate cables using connectors approved for armoured cable.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section covers items common to Sections of Division 26 and 28. This Section supplements requirements of Division 01.

1.2 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the National Building Code.

.2 All electrical and communications equipment that is new or being relocated is to be seismically restrained.

.3 Restraints shall meet the requirements of the ECA seismic restraint manual, latest edition.

1.3 SEISMIC RESTRAINT DESIGN AND INSPECTION

.1 Arrange and pay for the services of a Professional Engineer registered in the Province of BC. “Specialty Engineer” shall provide all required engineering services related to seismic restraints of the electrical and communications equipment.

.2 The Specialty Engineer shall provide assistance to the Contractor during the course of the equipment install if necessary.

.3 The Specialty Engineer shall inspect the completed seismic installation and shall submit a letter to the Departmental Representative stating that the complete seismic installation is installed in accordance with the Specialty Engineer’s drawings and it complies with all regulatory requirements.

1.4 SUBMITTALS

.1 Submit shop drawings of all restraining devices, including details of attachments to the structure, either tested in an independent testing laboratory or approved by a BC Registered Professional Engineer.

1.5 SCOPE OF WORK

.1 Provide restraint for electrical equipment, including but not limited to, conduits, panels and luminaires, etc., to prevent injury or hazard to persons and equipment and to retain equipment in its normal position in the event of an earthquake.

.2 Provide all seismic restraint related hardware, including bolts and anchors, from point of attachment to equipment through to and including attachment to structure.

.3 It is the entire responsibility of equipment manufactures to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

PART 2 Products

2.1 GENERAL

.1 Provide anchor bolts, straps and other mounting materials as specified by Specialty Engineer.

PART 3 Execution

3.1 INSTALLATION

.1 Carry out all seismic restraint works on electrical equipment as per the recommendations of the Specialty Engineer and in accordance with all regulatory requirements.

.2 Co-ordinate the work with other trades as required.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

1.3 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE)

.2 Transformer grounding shall comply with CSA C22.2 No.41.

.3 All grounding conductors to be stranded soft annealed copper unless otherwise noted.

.4 Install complete grounding and bonding system in accordance with Canadian Electrical Code and local inspection authority requirements.

1.4 TESTING REQUIREMENTS

.1 Perform ground continuity and resistance tests using method appropriate to site conditions. Measure ground grid resistance.

.2 Any third party testing agency costs for the testing and reporting shall be included in the Electrical Division base tender and shall be carried out by a pre-approved testing agency.

1.5 ADDITIONAL SCOPE

.1 Existing grounding system to be extended to ground new panel boards and new added equipment. Refer to drawings for extent of grounding in addition to code requirements.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Grounding equipment to: CSA C22.2 No.41.

2.2 EQUIPMENT

.1 Clamps for grounding of conductor, size as required.

.2 Rod electrodes, existing

.3 System and circuit, equipment, grounding conductors, bare stranded copper, soft annealed, sized as indicated. Insulation where specified or required to be green.

.4 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.5 Non-corroding accessories necessary for grounding system, type, size material as indicated, including but not necessarily limited to:

.1 Grounding and bonding bushings.

.2 Protective type clamps.

.3 Bolted type conductor connectors.

.4 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

2.3 STANDARDS OF ACCEPTANCE

.1 Acceptable manufacturers:

.1 Burndy Corp.

.2 Erico Inc.

.3 Cadweld.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories.

.2 Provide ground wire in EMT/PVC conduits installed in grade or below slabs.

.3 Install connectors in accordance with manufacturer's instructions.

.4 Protect exposed grounding conductors from mechanical injury.

.5 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process or permanent mechanical connectors approved for the use.

.6 Use mechanical connectors for grounding connections to equipment provided with lugs.

.7 Soldered joints not permitted.

.8 Install bonding wire for flexible conduit, connected at both end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit. Provide a ground conductor in all flexible conduit and secure to system grounding lugs at both the equipment and source.

.9 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.10 Install separate ground conductor to each outdoor lighting standard.

.11 Connect building structural steel and metal siding to ground by welding copper to steel.

.12 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

.13 Bond single conductor, metallic armoured cables to cabinet at supply end and provide non-metallic entry plate at load end.

.14 Ground secondary service pedestals.

.15 Coordinate ground rod installation with local soil conditions to assure proper grounding system.

.16 Provide a bonding conductor appropriately sized within each raceway routed within the building.

.17 All bonding and grounding connections to be compression type unless noted otherwise.

.18 Ground the secondary winding of potential and current transformers.

.19 Supply and install complete grounding and bonding system as indicated and as required by Canadian Electrical Code and the local electrical inspection authorities.

.20 Provide grounding/bonding bus bars mounted on standoff insulators or as shown on the drawings.

.21 All components shall be securely and adequately bonded and where required to accomplish this, bonding jumpers, grounding studs and bushings shall be used.

.22 Ensure that all raceways, terminal panels, etc. for fire alarm, etc. are securely and adequately bonded and provide grounding conductor to main ground bus where called for or when required.

.23 All interior metallic gas piping which may become energized to be made electrically continuous and to be bonded in accordance with requirements of Canadian Electrical Code.

.24 Bond all low-tension equipment with #6 AWG green insulated bonding conductor.

.25 Run separate #6 AWG green insulated in the new underground PVC conduits to bonding conductor to bond the existing two capstans steel vaults, installed treaded connection or weld a minimum ¼" bolt for bonding. Connection point to be cleaned and appropriate joint connector and materials to be used.

.26 All metallic conduits longer than 1m in length, containing a single grounding or bonding conductor, shall be bonded as per the Canadian Electrical Code.

3.2 ELECTRODES

.1 Provide additional grounding as necessary to meet the ground resistance specified.

.2 In certain difficult circumstances, in-situ concrete encased grounding conductors *("UFER")* grounding may be used to enhance grounding grid system.

.3 Provide ground test well over one of the rods on the ground grid to allow access to the grid for testing.

3.3 BUILDING SERVICES BONDING

.1 N/A (existing)

3.4 GROUNDING BUSSES

.1 New to be integral to the panel boards, copper busses only.

3.5 EQUIPMENT GROUNDING OR BONDING

.1 Install grounding or bonding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, UPS, control panels, building steel work, generators, elevators, distribution panels and outdoor lighting.

.2 Provide a grounding conductor from the secondary of every distribution transformer to the grounding system. Ground conductor to be sized and installed in accordance with Canadian Electrical Code.

.3 Provide grounding conductor(s) from all major switchgear to solidly ground the secondary system. This includes equipment located in the main electrical room as well as each sub-electrical room. Grounding conductors to be sized to Canadian Electrical Code and switchgear manufacturer's requirements.

3.6 MECHANICAL EQUIPMENT GROUNDING

.1 Provide a #8 ground conductor from the SSSR room ground bus to each VFD location.

.2 Ground wires to be installed in all conduit serving motor feeder circuits and to extend to ground screws on junction and outlet boxes for bonding.

3.7 EMERGENCY GENERATOR GROUNDING

.1 N/A

3.8 DATA & VOICE GROUNDING

.1 N/A

3.9 CABLE TRAY BONDING

.1 N/A (existing to be reused)

3.10 ACCESS FLOOR BONDING

.1 N/A

3.11 SERVICE BOXES (MANHOLES)

.1 N/A (existing to be reused)

3.12 POST MOUNTED LUMINAIRE BONDING

.1 N/A

3.13 LABELLING

.1 Provide equipment identification labelling nameplates for grounding bus bar, bonding and grounding conductors. Refer to Section 26 05 00.

.2 Apply identification and warning labels to grounding bus bar, bonding and grounding conductors.

3.14 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions.

.3 Measure ground grid resistance with earth test megohmmeter and install additional ground rods and conductors as required until resistance to ground complies with Code requirements and is less than 1Ω.

.4 Carry out all tests required by the Electrical Inspection Authority and provide all required reports and copied to the Consultant. Include all associated costs.

.5 Ensure test results are satisfactory before energizing the electrical system.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended.

PART 3 Execution

3.1 INSTALLATION

.1 Secure equipment to masonry, tile and plaster surfaces with lead anchors or nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

- .1 Support individual cable or conduit runs with 6 mm dia. threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia. threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 5 m on center spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of the Departmental Representative.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 26 05 00 - Common Work Results - Electrical

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

.3 Minimum size: 104 mm square unless shown otherwise, maximum fill as per CEC22.1.

.4 Pull Boxes dimensions as shown on the drawings.

.5 Weatherproof with rain tight seal and fittings for all outside installation.

2.2 TELEPHONE CABINETS

.1 N/A

PART 3 Execution

3.1 JUNCTION AND PULL BOX INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 All junction and pull boxes are not indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

.3 Ground pull boxes as indicated.

3.2 TELEPHONE CABINET INSTALLATION

.1 N/A

3.3 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Install size 2 identification lamicoids indicating system name on pull boxes and junction boxes.

.3 Install size 6 identification lamicoid on telephone cabinet.

END OF SECTION

Part 1 General

1.1 LOCATION OF CONDUIT

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

1.2 CONDUIT SIZES

.1 Note that conduit sizes referenced in the 2018, Canadian Electrical Code are used.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 CONDUITS

.1 Underground ducts: rigid type PVC, size as indicated.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Rigid steel conduit: to CSA C22.2 No. 45, galvanized steel, threaded.

.4 Flexible metal conduit: to CSA C22.2 No. 56, steel.

2.2 CONDUIT FASTENINGS

.1 One-hole steel straps to secure surface conduits 50 mm and smaller.

.2 Two-hole steel straps for conduits larger than 50 mm.

.3 Channel type supports for two or more conduits at 1.5 m on center.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 EMT couplings and connectors shall be malleable steel, set screw type. Connectors shall have insulated throats. Cast fittings are not acceptable.

2.4 FISH CORD

.1 Polypropylene.

PART 3 Execution

3.1 INSTALLATION

.1 All wiring to be in Electrical metallic tubing (EMT) type conduit unless otherwise indicated on drawings.

.2 Install wiring in threaded Rigid Steel Conduit where indicated on drawings.

.3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.4 Conceal conduits above T-Bar Ceiling “for fire alarm system wiring/conduits”.

.5 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.6 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 21 mm diameter.

.8 Dry conduits out before installing wire.

.9 Install fish cord in empty conduits.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Group conduits wherever possible on surface channels.

.3 Do not pass conduits through structural members except as indicated.

3.3 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work

.2 Section 26 05 34 – Conduits, Conduit Fastenings, and Conduit Fittings

.3 Section 26 28 21 – Moulded Case Circuit Breaker

.4 Section 01 33 00 – Submittal Procedures

.5 Section 01 35 43 – Environmental Procedures

1.2 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Division 1.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.3 PLANT ASSEMBLY

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

1.4 REFERENCES

.1 Canada Standards Association (CSA International).

.1 CSA C22.2 No.29-M1989 (R2000), Panelboards and enclosed Panelboards.

PART 2 Products

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.

.2 Provide all switch/fuse type and breaker type distribution panelboards for use in the 600/347V 3PH 4W and 208/120 V, 3PH, 4-W systems. Breaker sizes and number of branch units as shown on the drawings and panel schedule.

.3 Silver plated copper bus with full size 100% rated neutrals and equipped with pressure type solderless lugs. The copper shall be thoroughly cleaned and pre-plated before the final tinplating is applied. All bus work shall be suitably supported to withstand a short circuit current of minimum 50kA RMS amperes symmetrical or greater.

.4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.5 Panelboards: mains, main breaker, number of circuits, and number and size of branch circuit breakers as indicated.

.6 Complete circuit directory with typewritten legend showing location and load of each circuit for all new panelboards.

.7 Two keys for each panelboard and key panelboards alike.

.8 Mains: suitable for bolt-on breakers.

.9 All panelboards to have isolated neutral bus.

.10 All panelboards to be seismically rated for minimum of Zone 5 area.

.11 Sized for full width breakers.

.12 All surface mounted panels to be provided with drip-shield and rated for use in sprinklered building.

.13 Provide: sub-feed lugs, and interconnect wiring as required. Note that sub-feed wiring neutrals to be installed through common raceway as hot conductor sub-feed connections.

.14 Trim and door finish: baked grey enamel.

.15 Lockable door.

.16 All surface mounted panelboards to be mounted on 21 mm G1S painted plywood backboards. Paint to be fire retardant grey colour. Back boards to be provided by Contractor; all products shall be CSA Approved.

2.2 BREAKERS

.1 Breakers: to Section 26 28 21 – Moulded Case Circuit Breakers.

.2 Breakers with thermal magnetic tripping in panelboards except as indicated otherwise.

.3 GFEPD breakers for 30 mA equipment protection

.4 GFCI breakers for 5 mA personnel protection.

.5 Manufacturer's tie-locks for critical and code required systems:

1. Fire alarm

2. ULC approved communicators (and security equipment) used for fire alarm communication.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.

.2 Provide nameplate for each panelboard, size 4 engraved as indicated. Confirm exact wording of nameplate prior to manufacture.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit.

PART 3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.

.2 Install surface-mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard. mount at height as indicated.

.3 Connect loads to circuits as indicated.

.4 Connect neutral conductors to common neutral bus with respective neutral identified.

.5 Coordinate with the Contractor for the provision of continuous fire rated wall, ceiling and floor assemblies where panelboards are flush mount in fire separations and fire rated partitions.

.6 Install flush-mount panelboard in wall framing. Report to the Contractor and to the Departmental Representative during rough-in where wall framing depth does not allow flush mount of electrical tub trim. Contractor to provide architectural trim around panel tub, increased depth of framed wall or other increased framing depth work to the approval of the Departmental Representative. Contractor to request written instructions from the Departmental Representative prior to implementation of trim or wall depth increase work

.7 All panelboard feeders to be continuous without splice.

.8 Provide Contractor testing as directed by the Departmental Representative. Insert test result data in O&M manuals.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-00 (R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55-(R2020), Special Use Switches.

.4 CSA C22.2 No.111-18, General-Use Snap Switches (Bi-national standard, with UL 20).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit shop drawings in pdf format for review prior to ordering equipment.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for recycling, all packaging materials.

Part 2 Products

2.1 SOLID STATE ELECTRICAL TIMER

.1 24 hour, 1 circuit, electronic time switch.

.2 120VAC, 60Hz, SPST switch type.

.3 Normally open, 30A inductive, 1HP motor @ 120VAC.

.4 6W maximum power consumption.

.5 Operating temperature range -40C to 40C.

.6 Battery backup.

.7 Dimensions: 200mm H x 88mm D x 130mm W.

2.2 ENCLOSURE

.1 NEMA 6P / IP68, polyester and polycarbonate blend.

.2 Integrated wall mounting tabs.

.3 Removable, hinged cover with screw down securement.

.4 Moulded, double sealing gasket.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Electrical Timer and Enclosure:

.1 Install enclosure on chamber wall, where indicated on drawings.

.2 Install timer inside enclosure to manufacturer’s instructions and to the requirements of CSA C22.2 No.55-(R2020), Special Use Switches.

.3 Timer shall control power to the chamber ventilation fan speed controller.

.4 Set timer for “ON” operation 1 hour per day.

3.3 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for recycling and place in appropriate containers.

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

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 26 05 00 – Common Work Results – Electrical.

.2 Section 26 24 16.01 – Panelboards – Breaker Type.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

1.3 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker, quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-trip breakers with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

.4 Circuit breaker interrupting capacity: 35 kA (symmetrical), or as indicated.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 COUNTERFEIT CIRCUIT BREAKERS

.1 Counterfeit circuit breakers are defined to mean any circuit breaker not authorized by the panel manufacturer.

.2 Submit a letter from the manufacturers authorized technical representative that all breakers supplied within this project are not counterfeit and they are authorized by the panelboard manufacturer for use in each panelboard.

PART 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

.2 Provide lamicoid nameplates as indicated.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

1.2 RELATED SECTIONS

.1 Refer to the following sections as required:

1. Section 01 35 43 – Environmental Procedures

PART 2 Products

2.1 DISCONNECT SWITCHES

.1 Non-fusible and fusible disconnect switches in CSA Enclosure 1.

.2 Fuseholder assemblies to CSA C22.2 No. 39.

.3 Provision for padlocking in on and off switch positions by three locks.

.4 Fuses as indicated. Allow for Class J or L for general circuits. Class RK5 for motor or other high inrush current circuits.

.5 Fuseholders in each switch suitable without adaptors, for type of fuse as indicated.

.6 Mechanically interlocked door to prevent opening when handle in ON position.

.7 Quick-make, quick-break action.

.8 ON-OFF switch position indication on switch enclosure cover.

PART 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses where indicated or required.

.2 Install size 2 lamicoid nameplate indicating system name, voltage and phase, or as indicated.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

.2 Motor starters, miscellaneous control devices.

1.2 RELATED SECTIONS

.1 Division 01 – Submittal Procedures.

.2 Division 01 – Health and Safety.

.3 Division 01 – Environmental Procedures.

.4 Division 01 – Closeout Submittals.

.5 Division 01 – Common Work.

1.3 REFERENCES

.1 CSA C22.1-18, except where specified otherwise.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Division 01 - Submittal Procedures.

.2 Submit product data sheets for sills, bus bars, and compartments. Include product characteristics, physical size, and finish.

.3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence and cleaning procedures.

.4 Submit shop drawings and indicate:

- .1 Outline dimensions.
- .2 Configuration of identified compartments.
- .3 Floor anchoring method and dimensioned foundation template.
- .4 Cable entry and exit locations.
- .5 Dimensioned position and size of bus bars and details of provision for future extension.
- .6 Schematic and wiring diagrams.

.5 Closeout Submittals: provide operation and maintenance data for motor control centre for incorporation into manual specified in Division 01 - Closeout Submittals.

.6 Include data for each type and style of starter.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials in accordance with Section 01 35 43 – Environmental Procedures.

1.6 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - Health and Safety Requirements.

1.7 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 26 05 00.

.2 Provide listed spare parts for each different size and type of starter:

- .1 (1) starter heater
- .2 (1) control transformer
- .3 (1) pilot lights
- .4 (1) contacts, stationary
- .5 (1) contacts, movable
- .6 (1) contact, auxiliary
- .7 (1) operating coil
- .8 (1) fuses

PART 2 Products

2.1 MOTOR STARTERS

.1 All motor starters supplied under Division 26 shall be of the same manufacturer.

.2 Motor starters are indicated on the mechanical drawings (where/if applicable) by letter types in conjunction with numerical suffixes. The letters indicate the type of starter and the numerals indicate special features which must be incorporated into or placed adjacent to the starters as specified.

.3 The following letter types shall apply:

- .1 Type A - Magnetic in general purpose enclosure
- .2 Type B - Magnetic in Motor Control Centre, where/if applicable
- .3 Type C - Manual starter in general purpose enclosure
- .4 Type D - Manual open type flush mounted in switchbox and fitted with plate to match other switch plates in the area
- .5 Type E - Manual with special features where applicable
- .6 Type F - Combination breaker/magnetic starter in an NEMA I enclosure; Overcurrent device rating shall be as noted on Contract Documents. Overcurrent devices to be capable of being locked “OFF" and “ON”
- .7 Type G- Combination un-fused switch/magnetic starter in an NEMA I enclosure
- .8 Type H - Fusible switch in Motor Control Centre, where/if applicable

.9 Type R-2 (2SP) - Two-speed relay type starter w/o overload heaters. Locate in NEMA 1 enclosure

.4 The following suffixes shall apply:

.1 Reset only in cover

.2 Reset and HAND-OFF-AUTOMATIC or LOCAL-OFF-REMOTE switch in cover

.3 Reset and START-STOP pushbuttons in cover

.4 Run (red) and Stop (green) PUSH-TO-TEST pilot lights in cover

.5 Fitted with special features, where/if applicable refer to mechanical drawings

.6 Reset and ON-OFF selector switch in cover

.5 All individual starters shall have RUN and STOP pilot lights, with PUSH-TO-TEST feature, and START/STOP pushbuttons or selector switches as required or indicated.

.6 Starters located in finished areas (other than service spaces) shall be of a flush-mounted type with stainless steel cover.

.7 Fit all motor starters supplied under Division 26 with adjustable electronic overload trips in all normally ungrounded lines.

.8 All magnetic starters, including combination starters provided under Division 26 shall be complete with 4 sets of spare auxiliary contacts (2 sets N/C, 2 sets N/O, all sets reversible). Each and every starter shall have a separate control transformer complete with fused secondary protection at 120 volt, 60 Hz AC. Transformer volt-ampere rating will be confirmed with Mechanical Division prior to ordering. Where line over current protection exceeds 15 amperes, provide primary fuses for the control transformers.

.9 Minimum magnetic starter size shall be NEMA Size 1.

.10 Coordinate with the BMS Controls Contractors. Interposing relays required to interface BMS system to the wiring in motor starters shall be provided by BMS Controls Contractor, where/if applicable.

.11 Provide interposing relays for fire alarm shutdown of motors, where/if applicable, refer to mechanical drawings.

2.2 MISCELLANEOUS CONTROL DEVICES

.1 Pushbuttons: Heavy Duty Oil-Tight.

.2 Selector Switches: Heavy Duty Oil-Tight.

.3 Indicating (Pilot) Lights: Transformer Base PUSH-TO-TEST Type, 12 volt LED indicator lamps. Coordinate the pilot light transformer and circuit voltages such that not more than 12 volts are available at the lamp terminals.

.4 Control Circuit Transformers: Confirm the volt-ampere rating of the control transformer with Mechanical Division prior to ordering.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Manual starter designation label, white plate, black letters, Type B, engraved as indicated.

.3 Magnetic starter designation label, white plate, black letters, Type B, engraved as indicated.

PART 3 Execution

3.1 MOTOR STARTERS

.1 Install, and wire adjacent to the starters, all devices, equipment, and enclosures described in the Mechanical Equipment Schedule with applicable special letter types and suffixes.

.2 Furnish and install for every motor in the building, unless otherwise noted, either a manual or magnetic motor starter as indicated in the Motor Schedule.

.3 Check the actual nameplate current rating of all motors installed before ordering the electronic overloads for motor starters.

3.2 MOTOR CONTROL WIRING

.1 All motor control wiring (120V line voltage and 24V low voltage) including conduit as well as supply and installation of control devices will, except where specifically noted on the electrical drawings, in the Motor Schedule, or outlined below, be provided as described in Mechanical Division of the Specification. Except where specifically directed to the contrary, motor control wiring, associated conduits, and control devices do not form a part of Division 26 work.

.2 The motor control work which shall be provided under Division 26 shall include the following:

- .1 All conduit and control wiring specifically noted on the contract drawings and outlined in the different parts of the Specification
- .2 All control wiring as specified on the mechanical drawings
- .3 Control wiring related to air handling shutdown during fire alarm, where/if applicable

3.3 MOTOR POWER WIRING

.1 Connect all motors shown on the drawings or mentioned in this Specification. The locations of motors are approximate only. Check to determine correct locations and install wiring to these points.

.2 Responsibility of Contractor to coordinate all mechanical requirements in accordance with the mechanical equipment schedule included with the mechanical contract documents.

.3 Check motor rotation before mechanically coupling to load.

.4 Except where otherwise directed, connect all motors with flexible conduits. Ground the conduit system with a separate grounding conductor installed in the flexible conduit.

3.4 STARTER VERIFICATION

.1 Field check motor starters supplied prior to commissioning equipment. As a minimum, verify the following:

.1 Check of control circuits

.2 Verify that overload relay installed is correctly sized for motor used

.3 Record overload relay size and motor nameplate amperage

.4 Visual inspection of fuses and contactors

.5 Ensure all connections are tight

.2 Measure and record motor amps, under load conditions and compare with full load amps and motor service factor. Report any excessive readings and unbalance. Measure voltage as close to motor terminals as possible while motor is running.

.3 Set all motor circuit protectors to the minimum level which will consistently allow the motor to start under normal starting conditions.

3.5 OVERLOAD RELAYS

.1 For starters provided, select overload relays in accordance with relay and motor manufacturers' recommendations, considering motor service factors, ambient temperature, temperature differences between motor and starter locations. Monitor motor operation during start-up to ensure motor operation is satisfactory and relays provide proper protection. For side inlet fans and other long acceleration time loads, provide special overload relays to suite the start-up condition. Provide manufacturers' curves and data sheets where necessary to provide supporting data for motor protection.

3.6 FIELD QUALITY CONTROL

.1 Operate switches, contactors to verify correct functioning.

.2 Perform starting and stopping sequences of contactors and relays.

.3 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Mechanical: Divisions 23, 25 and 35.

.2 Section 01 35 43 – Environmental Procedures.

1.2 REQUIREMENTS

.1 Provide a complete system of wiring to motors and other mechanical equipment as specified herein and as shown on the drawings.

.2 Unless specifically noted otherwise, wire and leave in operation all electrically operated equipment supplied under this contract or relocated or re-wired as part of the scope. Examine the drawings and shop drawings of all Divisions for the extent of electrically operated equipment supplied under other divisions.

.3 Unless specifically noted otherwise, supply all disconnects, relays, starters, etc., necessary of the operation of equipment. Check all starters, relay coils and thermal elements to ensure that they provide the necessary protection for motors and other equipment.

.4 Do not operate mechanical equipment unless approval is obtained from the trade providing the equipment.

.5 Examine drawings and shop drawings of other Divisions to obtain exact location of mechanical equipment shown on the drawings. Where necessary, obtain information for conduit locations from other trades' drawings and shop drawings.

.6 Assist in placing in operation all mechanical equipment having electrical connections.

.7 Provide single or three phase starters with fused 120V control transformers and overload relays where indicated.

.8 Provide all power wiring for all motors.

.9 Provide power wiring for heating ventilating and air conditioning equipment. Provide terminations in starters and MCC for control wiring so that starter control circuits may be extended. Where 120V power is required for any mechanical equipment, wiring to equipment terminal is the work of this Division.

.10 Refer to Mechanical Equipment Schedule on the drawings for more details.

.11 Mechanical equipment control work which shall be provided under Division 26 shall include the following:

- .1 All conduit and 120V control wiring and any other control wiring specifically noted on the drawings or outlined in the different parts of the Specifications.
- .2 Conduit and 120V control wiring for baseboard heaters, unit heaters and force flow heater thermostats.

.3 All control wiring as specified in the Mechanical Equipment Schedule.

.4 Where applicable, control wiring related to shut down on any mechanical equipment during fire alarm.

PART 2 Products

2.1 3-PHASE DISCONNECT SWITCHES to 600V

.1 Industrial type 'A', having quick make, quick break visible blade mechanism, cover interlocks and padlocking switch in the closed or open position. Use EEMAC 4 enclosures outdoors, and EEMAC 1 indoors, switches to be H rated, heavy duty type.

2.2 120V, 1-PHASE DISCONNECT SWITCHES

.1 Manual disconnect switch hp rated without overload relay.

2.3 208V, 1-PHASE DISCONNECT SWITCHES

.1 Manual disconnect switch hp rated without overload relay -2 poles.

PART 3 Execution

3.1 INSTALLATION

.1 Provide disconnect switches adjacent to all equipment unless the specifically noted otherwise.

.2 Provide automatic starters complete with magnetic contactor for equipment shutdown by the fire alarm systems when activated as indicated on the drawings and described here in.

.3 Provide all wiring between all force flow and unit heaters and their thermostats if the T-stats are 120V. Install wiring between all mechanical components to provide a functional system.

.4 Do control wiring as indicated on the drawings and the Mechanical Equipment Schedule.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 SCOPE OF SUPPLY

.1 Capstans: Qty: 2 Required. #1 and #2 South.

1.3 REFERENCE STANDARDS

.1 ASTM International (ASTM)

- .1 ASTM A27/A27M-20, Standard Specification for Steel Castings, Carbon, for General Application.
- .2 ASTM A48/A148M-20, Standard Specification for Steel Castings, High-Strength, for Structural Purposes.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.61-04, Exterior and Interior Marine Alkyd Enamel.
- .2 CAN/CGSB-1.212-04, Chromate and Lead-Free Marine Primer for Steel and Light Alloy Surfaces.

.3 CSA Group (CSA)

- .1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA C22.1-18, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.

.4 Master Painters Institute (MPI)

- .1 Architectural Painting Specification Manual-February 2004.
  - .1 MPI #9, Exterior Alkyd Enamel.
  - .2 MPI #79, Marine Alkyd Metal Primer.

.5 National Electrical Manufacturers Association (NEMA)

- .1 Electrical Standards.
- .2 NEMA ICS 7.0 AC Adjustable Speed Drives

1.4 DESCRIPTION

.1 Design Requirements:

- .1 Working line pull: 53.4 / 30.0 kN.
- .2 Ultimate line pull: 111.2 / 63.4 kN.
- .3 Line speed: 3.66 meters per minute / 6.71 meters per minute (over speed).
- .4 Electric driven.
- .5 Dual head capstan head. Vertical orientation.

.6 Non-reversing operation.

.7 Fail safe, spring applied brake.

.8 Variable Frequency Drive (VFD).

.9 Foot switch operation – marine rated.

.10 Anti-condensation heater for motor.

.11 Dimensions: 2819 mm L x 1448 mm W x 876 mm H maximum (excluding capstan head).

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications, and datasheet.

.3 Submit shop drawings, sealed by an Engineer in the province of BC, indicating following items:

.1 Capstans and ancillary equipment with dimensions, clearance locations and direction of assemblies as installed on structures.

.2 Locations, sizes, and installation tolerances of anchor bolts.

.3 Locations and sizes of required electrical cables to supply power to capstans.

.4 Detailed specification of electrical motors for capstans.

.5 Detailed description of structural modifications required to accommodate mooring devices.

1.6 FUNCTIONAL ACCEPTANCE TESTING

.1 A functional acceptance test shall be completed at manufacturer’s facility prior to shipping. The Departmental Representative or Consultant shall be invited to witness the functional acceptance testing.

1.7 QUALITY ASSURANCE

.1 Submit Capstan test certificates and results showing test load and operational testing.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions.

.3 Variable Frequency Drive (VFD) and options UL listed as a complete assembly.

.4 VFD and options tested to ANSI/UL Standard 508 and listed by a nationally recognized testing agency such as UL or ETL, subject to the drives are suitable for use on nominal voltages up to 600 V AC with a nominal supply range of ±5%.

1.8 CLOSEOUT SUBMITTALS

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

.2 Include record drawings.

1.9 WASTE MANAGEMENT AND DISPOSAL

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

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Provide weatherproof electrical and mechanical equipment operable under local environmental conditions of extreme temperatures, rain, water, spray, and ice.

.1 Annual temperature range at site is approximately -10 degrees C to 30 degrees C.

.2 Average annual thickness of ice up to 10 mm may form on and around mooring equipment (above pit).

Part 2 Products

2.1 MATERIALS

.1 Capstans:

.1 Type: Free Standing.

.1 Mounting: Flat Base Plate. Structural welds to be inspected by x-ray.

.2 Drum diameters: 600 mm (upper) / 1050 mm (lower).

.2 Electrical drive motor: CSA approved. 575V, 3 phase, 60 Hertz totally enclosed, non-ventilated type to NEMA standard suitable for full voltage starting and rated for VFD operation.

.3 Foot operated switch: Marine rated, IP68, 24 VDC, supplied with 4 ft flexible cable, non-reversing operation, sized to accommodate a standard steel toe boot.

.4 Emergency stop switch: Nema 4X rated.

.5 Electrical supply cable to capstan will be supplied by 3C #6 TECK90 + GRD from VFD.

.1 Cable to enter body of capstan.

.2 Make connection of supply cable.

.2 Variable Frequency Drive:

.1 Electronic pulse width modulating design for speed control of NEMA Design B induction motors,

.2 CSA listed, mounted in CSA Standard C22.1 Type 1 NEMA 3R enclosure,

.3 Door or frame mounted interlocked disconnect switch, pad-lockable, to disconnect all input power from the drive and all internally mounted options,

.4 Manually controlled bypass,

.5 Operating voltage:

.1 +30%, -35% of nominal supply voltage range to drive,

.2 Protection circuitry to lock-in drive or bypass over this voltage tolerance,

.3 As per associated equipment

.6 Environmental operating conditions:

.1 Temperature: -10°C - 30°C continuous,

.2 Altitude: 0 - 1000 m above sea level,

.3 Humidity: up to 95% relative humidity non-condensing.

.7 Cooling fans:

.1 Designed for easy replacement, and without requiring removing the VFD from the wall or removal of circuit boards,

.2 Operate only when required; VFD cycles the cooling fans on and off as required.

.8 Manufacturer:

.1 VFD's manufacturer by a 3rd party and "brand-labeled" are not acceptable.

.3 Paint:

.1 Shop prime coat: to CAN/CGSB-1.212 MPI #79.

.2 Two finish coats: to CAN/CGSB-1.61 MPI #9, colour as directed by Departmental Representative.

.4 Grout: shrinkage compensating non-metallic.

Part 3 Execution

3.1 CAPSTANS

.1 Install capstans in accordance with manufacturer's instructions.

3.2 VARIABLE FREQUENCY DRIVES

.1 Install variable frequency drives in accordance with manufacturer's requirements.

.2 Where a separate disconnect is installed between the drive and the controlled equipment, provide interlock wiring between disconnect status contact switch, and VFD, to prevent drive from operating if disconnect switch is open.

.3 Provide power wiring, conduit and branch circuit protection to line side of VFD, selected for drive input current.

.4 Mount all loose VFD provided as part of this contract.

.5 Coordinate wiring with Division 26.

3.3 SETTING AND GROUTING

.1 Set mooring devices at locations and elevations as indicated.

.1 After tightening of anchor bolts or positioning wedges, grout under base.

.2 Ensure that temperatures of foundation, air, base and grout are within range specified by grout manufacturer.

.2 Do not grout until location of anchor bolts have been approved by Departmental Representative.

3.4 CLEANING

.1 Proceed in accordance with Section 01 35 43 Environmental Procedures.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

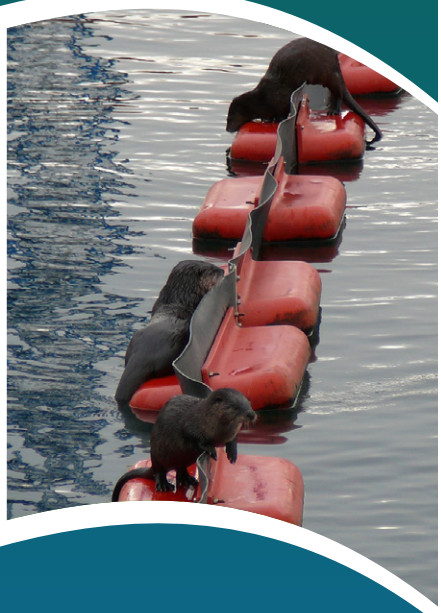
APPENDIX A

EGD Environmental Best Management Practices (EBMP)

dated October 2016

EGD
Esquimalt Graving Dock

Environmental Best Management Practices



Prepared by:
Public Services and Procurement Canada
Environmental Services

October 2016
Version: 05

INDEX

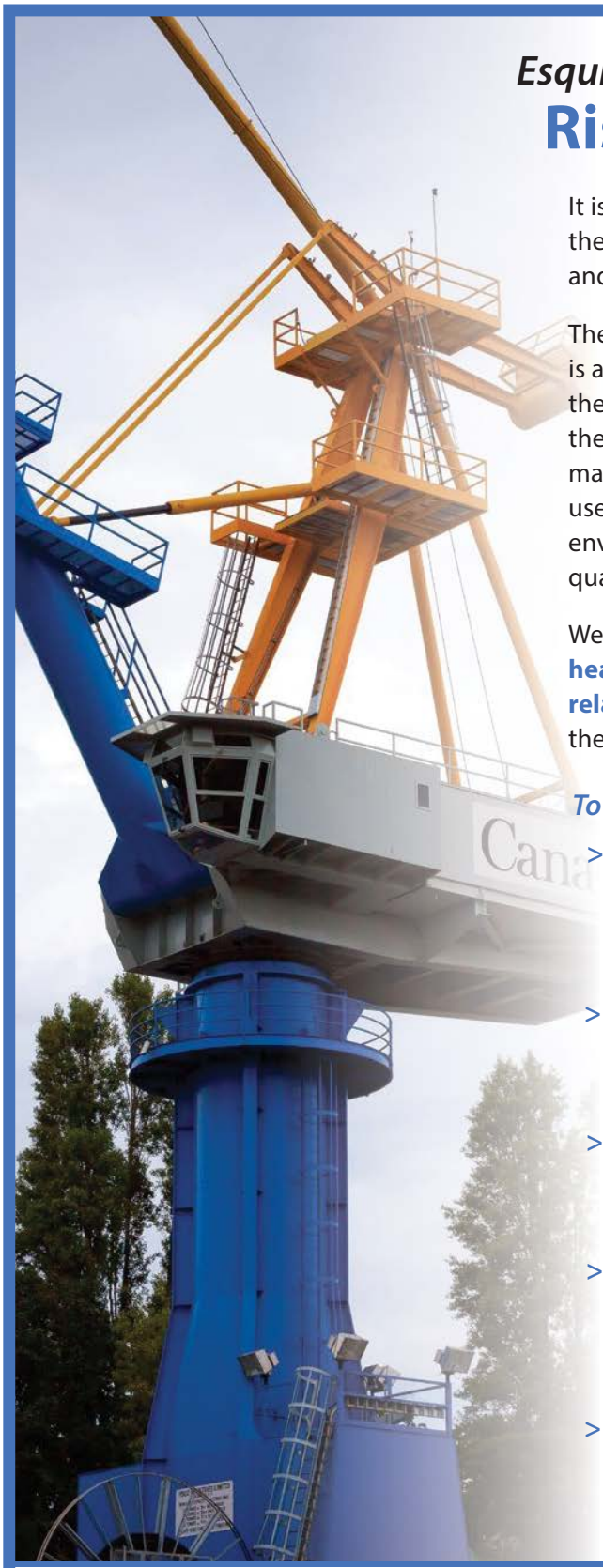
OVERVIEW

The **Esquimalt Graving Dock** (*EGD*) is a federal government owned and operated, multi-user ship repair and maintenance facility located in Esquimalt, British Columbia. The facility has been in operation since 1925, and provides service to local, Federal, and international vessels. The vessel repair and maintenance work at the EGD is carried out by privately owned shipyard repair contractors that rent the required sections of the drydock, lease upland work space from the government, and pay a fee for services such as cranes, compressed air, water, sewer and power.

The EGD is committed to managing the actual and potential health and safety, environmental, security, financial and public relations risks, while ensuring quality operations and services. In order to identify and manage these risks, the EGD has implemented an **Environmental Management System** (*EMS*) and a Risk Management Framework (*in conformance with the internationally recognized standards ISO 14001 and ISO 31000*). The EMS provides the framework for identifying environmental impacts, and ensures adequate controls are in place to effectively manage them.

This manual contains a series of **Environmental Best Management Practices** (*EBMPs*) developed to reduce impact to the environment related to common activities and operations at the Esquimalt Graving Dock. The manual contains guidance and recommendations for those operating at the EGD, and is intended to complement existing environmental legislation. It does not remove the responsibility of all contractors and companies operating at the EGD to abide by all applicable regulatory requirements and industry standards. All users of the facility are expected to follow the EBMPs.

For additional information contact the EGD Environmental Services Department.



Esquimalt Graving Dock

Risk Management Policy

It is the goal of the Esquimalt Graving Dock, in partnership with the ship repair industry, to be the premier ship repair, construction and maintenance facility on the west coast of North America.

The Esquimalt Graving Dock acknowledges that risk management is an integral part of attaining this goal. We recognize that risk is the effect of uncertainty on our operations and is inherent within the ship repair industry. Our objective is to identify, monitor and manage risk in order to prevent the harm of our employees, site users, contractors, neighbours, other stakeholders, the environment and our facility, while ensuring and maintaining quality operations and services.

We are committed to managing the actual and potential **health & safety, environmental, security, financial and public relation risks** pertaining to strategies, policies and practices at the Esquimalt Graving Dock.

To meet our commitment we will:

> *Implement systems and processes to consistently identify, measure, mitigate, minimize and report on risks, while continuing to uphold and adapt the established Environmental Management System and other relevant Management Frameworks.*

> *Meet or exceed applicable federal, provincial and municipal legislation and regulations, departmental policies, industry standards, practices and other requirements.*

> *Communicate openly with our employees to ensure they are aware of and understand our Risk Management Framework, the nature of our operations and their roles and responsibilities in managing risk.*

> *Monitor and review our Risk Management Framework to ensure we are meeting our goals. Ongoing oversight of the effectiveness of our Risk Management Framework is the responsibility of the Esquimalt Graving Dock Risk Management Team.*

> *Provide the necessary resources to effectively implement our Risk Management Framework, while continuing to improve our programs, procedures and operations.*

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Jim Milne
Director
Esquimalt Graving Dock
Engineering Assets
Strategy Sector

David Latoski
Operations Manager
Esquimalt Graving Dock
Engineering Assets
Strategy Sector

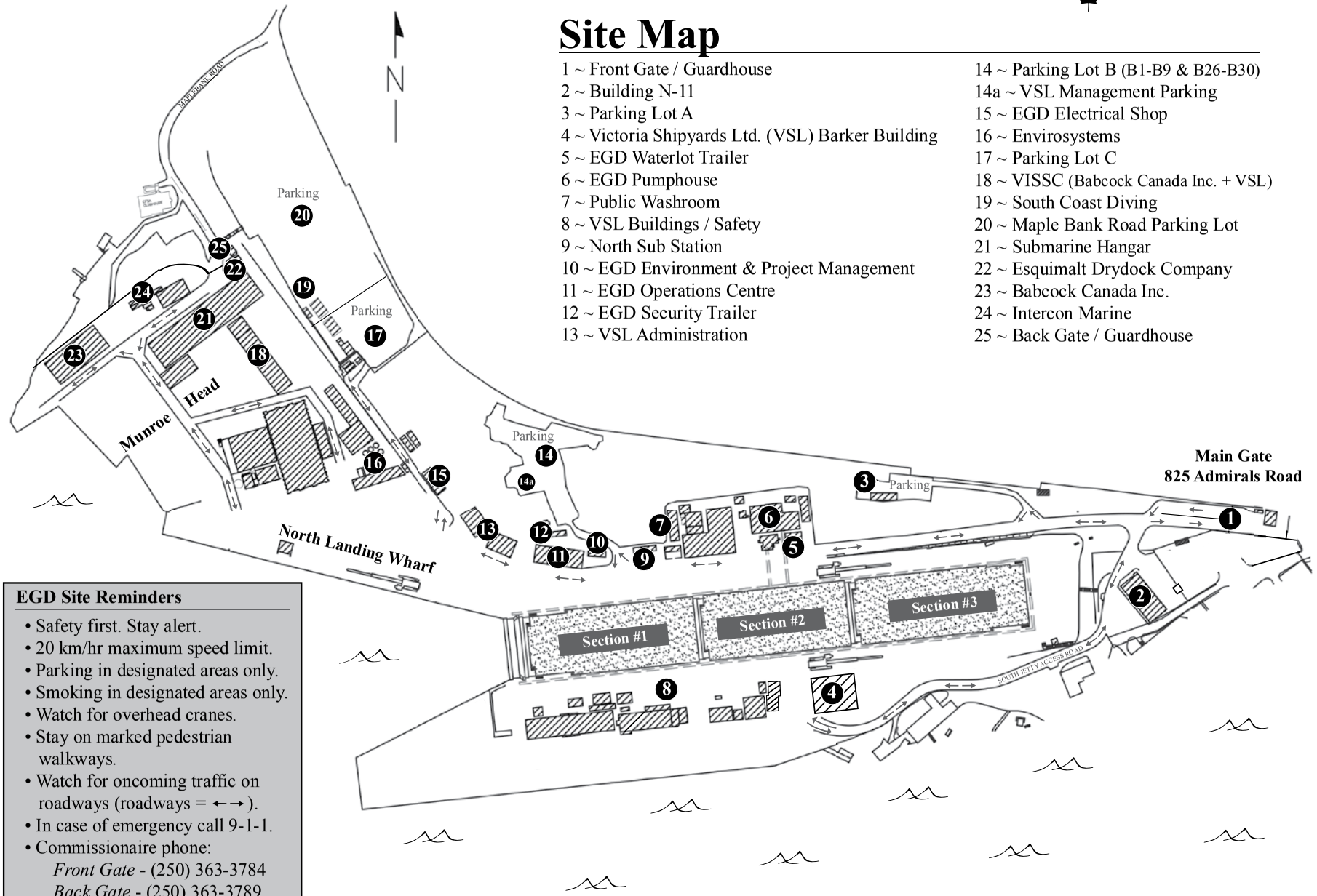
Canada

August 2015

EGD
Esquimalt Graving Dock

Site Map

1 ~ Front Gate / Guardhouse
2 ~ Building N-11
3 ~ Parking Lot A
4 ~ Victoria Shipyards Ltd. (VSL) Barker Building
5 ~ EGD Waterlot Trailer
6 ~ EGD Pumphouse
7 ~ Public Washroom
8 ~ VSL Buildings / Safety
9 ~ North Sub Station
10 ~ EGD Environment & Project Management
11 ~ EGD Operations Centre
12 ~ EGD Security Trailer
13 ~ VSL Administration
14 ~ Parking Lot B (B1-B9 & B26-B30)
14a ~ VSL Management Parking
15 ~ EGD Electrical Shop
16 ~ Envirosystems
17 ~ Parking Lot C
18 ~ VISSC (Babcock Canada Inc. + VSL)
19 ~ South Coast Diving
20 ~ Maple Bank Road Parking Lot
21 ~ Submarine Hangar
22 ~ Esquimalt Drydock Company
23 ~ Babcock Canada Inc.
24 ~ Intercon Marine
25 ~ Back Gate / Guardhouse



EGD Site Reminders

- Safety first. Stay alert.
- 20 km/hr maximum speed limit.
- Parking in designated areas only.
- Smoking in designated areas only.
- Watch for overhead cranes.
- Stay on marked pedestrian walkways.
- Watch for oncoming traffic on roadways (roadways = ←→).
- In case of emergency call 9-1-1.
- Commissionaire phone:
  Front Gate - (250) 363-3784
  Back Gate - (250) 363-3789

Environmental Best Management Practices

EBMP #1: Pressure Washing (High and Ultra High)

One of the first activities to occur on a drydocked vessel is pressure washing of the hull to remove salts, marine growth and residual paint, prior to surface preparation or painting. This typically involves pressure washing the underwater hull and/or super structure with water at 2,000 – 3,500 psi. This activity produces large volumes of paint contaminated wastewater (*e.g. washwater*). Ship repair contractors may also use an Ultra High Pressure (*UHP)* washing process (*from 40,000 – 55,000 psi*) to completely remove all paints, often eliminating the need for further surface preparation (*e.g. sandblasting*) prior to painting. UHP generates even larger volumes of wastewater and slurry solids. All wastewater created from pressure washing and UHP requires management (*i.e. assessment, collection, handling, treatment and disposal*).

Management of Wastewater on the Graving Dock Floor

- Ensure all wastes and wastewater discharges, resulting from hull and anchor chain washing, as well as dock bottom clean-up activities, are collected and disposed of properly.
- Close all sump well valves in the drydock floor collection system prior to and during pressure washing operations.
- Manage pumps to ensure they are handling the volume of washwater sufficiently.
- Manage washwater storage containers to ensure they are not overfilled.
- Divert contaminated wastewater, that falls outside of the drydock floor collection system, away from the tunnel drains.
- Direct non-contaminated water (*e.g. ballast water, cooling water, dock wall/moon pool leakage water*) away from contaminants on the drydock floor.
- Collect and dispose of stormwater that comes into contact with contaminants.
- Do not use detergents or additives in washwater.

Opening Sump Well Valves

Sump well valves in the drydock floor can be opened to manage rainwater under the following conditions ONLY:

- Dock floor has been pre-cleaned, prior to the completion of the work period.
- A filter cloth has been installed to reduce the migration of debris.

All wastewater containing paint contaminants must be directed to the collection trench drains and sump wells on the drydock floor, collected, and sent for proper treatment.

Antifoulant contaminated washwater entering the collection system (trench drains and sump wells) on the drydock floor.

The sill diversion pump removes clean seawater from the pool at the front of Section 1 (moon pool) and discharges into the tunnel drains through a hard pipe on the graving dock wall.

Sediment from the harbour often settles on dock bottom after dewatering. If this becomes contaminated with paint, etc., it must be disposed of.

The hull of a cruise ship being ultra high pressure washed.

Section 1 Considerations:
Caisson and Dock Wall Leakage & Drydock Floor Sediment

Managing Caisson and Dock Wall Leakage:

- Divert caisson leakage water away from pressure washing areas.
- Water leakage from the caisson can be diverted by using a sump pump connected to the PVC diversion pipe installed on the north wall of the drydock Section 1.
- Divert water leakage from the graving dock walls, during high tide, directly into the drainage tunnel.

Managing Entrained Sediment:

Harbour sediment may accumulate in the corners, trenches, keel blocks and sumps of the drydock Section 1 during normal docking procedure. Users of the section will need to consider management of this sediment and are responsible for removal and proper disposal if it becomes contaminated from their operations and activities on dock floor (*e.g. pressure washing wastewater, sandblast grit, paint chips, paint overspray, and other contaminants*).

Ultra High Pressure (UHP) Washing

Ultra high-pressure washing generates significant volumes of wastewater and sludge that may pose a challenge for collection and disposal.

- Prepare in advance for the management of UHP waste.
- Remove all water, sludge and debris, generated from UHP washing, from the drydock.
- Ensure the washwater and sludge is disposed of at an appropriately permitted facility.
- Disposal certificates may be requested, by EGD Management, to ensure washwater is being properly managed.

Management of Pressure Wastewater in Upland Areas/Dockside

- Perform pressure washing of small vessels and parts, in designated areas only, where wastewater management can be effectively achieved.
- Approval for pressure washing in upland areas (*including the use of a stormwater trench for water collection*) is required from EGD Management
- Wash vessel parts in a suitable contained area (*e.g. enclosed skip*).
- Completely block all drains in the area where pressure washing will occur (*e.g. cover nearby trench drains with filter cloth, place a foam bung in the trench drain to prevent migration of wash water should an incident occur*).
- Ensure sufficient equipment (*e.g. pumps, totes, tanks, foam blocks and sandbags*) is available for the timely collection, control and removal of washwater.
- Contaminated washwater requires proper treatment for disposal. Label containers.

A small vessel is power washed on the North Landing Wharf (NLW).

The trench drain is blocked and a sump pump is installed to collect wash water into a tote.

Example of high density styrofoam blocks used as a drain blocker on the NLW.

Large tank dockside with an attendant.

EBMP #2: Abrasive Blasting

Abrasive blasting is a common operation performed at the Esquimalt Graving Dock (*EGD*) to prepare vessel surfaces for painting. However, this operation creates challenges with respect to controlling air emissions and the waste materials generated.

The dust emissions generated from abrasive blasting operations can contain harmful environmental pollutants and have the potential to negatively effect employees, facility users, neighbours, equipment and infrastructure if it is not properly managed. Fugitive dust may also impact the local marine environment by entering the Esquimalt Harbour directly, or via stormwater runoff, and through direct deposit to uplands soil.

Waste grit may be highly contaminated with antifouling paint and other metals, which also poses a risk to the environment if not handled and disposed of properly.

Dust Control

- Establish dust suppression controls in advance of starting any work.
- Do not abrasive blast during conditions that render containment ineffective *(e.g. during windy conditions)*.
- No abrasive blasting of vessels shall be performed while vessels are docked alongside the North Landing Wharf or South Jetty.
- Minimize dust emissions by ensuring blast nozzles are angled perpendicular to the vessel and aimed slightly downward during blasting.
- Properly manage (*contained, covered and secure*) all sandblast product and wastes during transport.

ADEQUATE containment.

Hoarding (*Physical Containment*)

- Use containment such as tarps, shrouds or portable structures to prevent airborne particles from entering the atmosphere and surface waters.
- Containment should be large enough to adequately enclose or segregate the working area and reach the dock floor or walls.
- Ensure containment is properly installed (*connected and overlapped*) so there are no gaps.
- Used tarps with tears and holes should be replaced, repaired or doubled with additional layers.

INADEQUATE containment.

Water Use (*Fugitive Dust Suppression*)

- Where physical containment techniques are not sufficient to prevent fugitive dust emissions, water may be used to mitigate dust.
- Users may requisition use of Dust Suppression Units (*e.g. Dust Boss*) from the EGD. The units are highly effective at mitigating dust.
- Monitor areas where dust escapes physical containment and adjust dust suppression unit water spray accordingly.
- Do not allow water from the dust suppression units to enter other sections of the dock, especially in the case where another user occupies it.
- Do not allow water from the dust suppression units to come in contact with contaminants on the drydock floor or other work areas. Adjust water spray and relocate contaminants to mitigate impacts.
- Fire nozzle "water curtains" may only be used to control dust emissions when approved by EGD Management in advance. The dust suppression units generates a more effective water mist and uses significantly less fresh water during operation.

Waste Grit Management

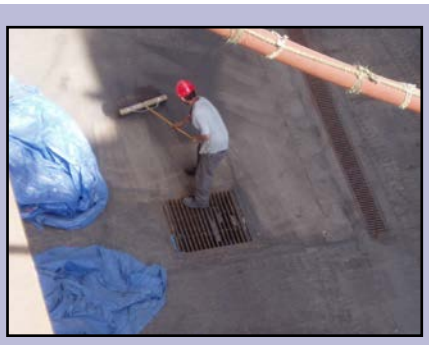
- Cover trench drains and tunnel grates in work areas with filter cloth. Replace the cloth as required.
- Manage waste grit by sweeping it into central areas, away from trenches, tunnel grates and dock floor traffic.
- Remove waste grit from work areas as soon as possible.
- Store all waste grit in appropriate containers to prevent leakage.
- Cover all skips, storage bins, tanks, and hoppers to prevent dust emissions and spills.
- Characterize and dispose of waste grit in accordance with applicable provincial regulations.

Dust suppression unit in operation.

Store all waste grit away from drains, to prevent contaminates migrating into the marine environment.

INADEQUATE waste grit storage.

ADEQUATE waste grit storage.



Clean up waste grit to prevent it from being washed into the drainage system by clean water (e.g. cooling water discharge, stormwater, dust suppression unit spray).

Store waste grit in appropriate containers.

Remove waste grit from work areas as soon as possible to prevent migration of contaminates throughout the drydock floor.

Keel / Bilge Blocks

Keel and bilge blocks on dock bottom present a challenge for the clean up of spent waste grit.

Waste grit must be removed from areas around excess blocks stored in the dock bottom. To prevent grit from collecting between the blocks, they can be relocated or covered prior to sandblasting.

Power washing at the base of the blocks can be effective in removing contaminants.

EBMP #3: Painting and Coating

Ship repair and maintenance often requires the painting and coating of vessel surfaces to protect them from corrosion or to inhibit the growth of marine life. The industrial nature of marine paints and solvents, in particular antifouling paints, may result in negative impacts to the environment and surrounding infrastructure, if not properly managed.

Spray Painting

Paint overspray has the potential to impact the marine environment, soils, neighbouring residences, and nearby equipment and infrastructure.

- Use containment such as tarps, shrouds or portable structures to prevent airborne particles from entering the atmosphere and surface waters.
    - Containment should be large enough to adequately enclose or segregate the working area.
    - Ensure containment is secured so there are no gaps.
    - Ensure that containment reaches the dock floor or walls.
    - Do not use keel blocks, dock floor or dock walls to test paint sprayers.
- Do not spray paint during conditions that render containment ineffective (*e.g. windy*).
- Place containment beneath and around structures being painted on dock floor and in work areas to ensure overspray does not reach the surrounding area (*e.g. during painting of anchor chains, or grates*).
- Manage overspray on the drydock floor to prevent safety hazards (*e.g. slippage*).
- When spray painting materials inside the stabilizer pockets, ensure the area is sealed and that the walls and floors are covered.
- For vessels docked in Section 1, ensure that overspray does not reach the caisson sill/moon pool water. Avoid docking vessels so they extend over sill area.

Spray Painting

ADEQUATE containment.

INADEQUATE containment.

INADEQUATE containment. Ensure tarps are in place to prevent overspray impacting the surrounding work area.

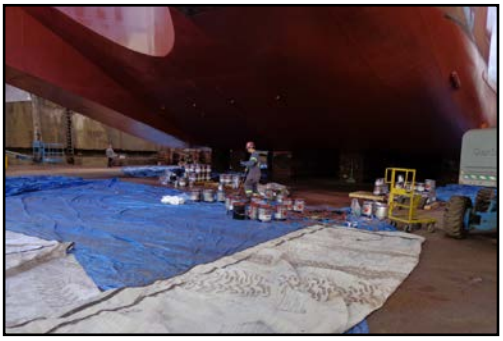
ADEQUATE containment on stablizer pocket doors.

Paint overspray due to INADEQUATE containment stablizer pocket doors.

Manual Painting

Painting by hand (*roller, brush*) can be conducted without shrouding the work area; however, the potential remains for product to migrate into the environment. Work spaces and product handling must be managed with care, similar to dockside painting.

- Containment should be large enough to adequately cover the work area and provide a barrier between the work and the environment (*e.g. dock floor, ocean and soil*).
- Ensure containment is secured so there are no gaps.
- Product container lids are to be secured.



ADEQUATE containment.

Painting Dockside

- Do not spray paint vessels docked alongside the wharves or jetties *(e.g. North Landing Wharf)*.
- Use rollers and brushes to paint vessels dockside.
- Ensure tarps are in place below work areas, as well as in between the vessel and the dock, to prevent spills and drips from entering the water.
- Ensure paint cans are stored securely when working alongside vessel edges.
- Ensure floor grates of manlifts are covered to prevent spills from going into the marine environment.
- Waste generated from painting and other activities such as grinding, hand tooling and welding, must be prevented from entering the marine environment.

While painting vessels docked alongside the wharves or jetties, do not spray paint. Take sufficient measures to prevent paint from entering the marine environment.

Environmental Best Management Practices

Empty paint cans must be properly stored on dock bottom and dock side.

Temporary Paint Storage/Mixing Areas

- Must be under cover to protect from inclement weather.
- Only in designated areas.
- Must be on secondary containment (*a tarp at minimum*).
- Ensure empty paint cans and other associated wastes from painting are stored properly, protected from the weather, and removed from dock bottom as soon as possible.
- Ensure empty paint containers being dried for disposal are protected from rain.
- Do not dispose of used paint containers that still contain wet paint.

IMPORTANT!

In rare situations (*e.g. shape of the vessel, combined with ideal weather conditions*) containment may not be necessary to prevent overspray from escaping the area.

In this situation, the User must notify EGD Management prior to beginning the work, and obtain approval (*in writing*) to paint without completely enclosing the vessel.

Restrictions and monitoring requirements will be applied.

To this date this has only been allowed in three situations:

- Painting underneath a flat bottom barge.
- Painting the underwater hull portion of the midsection of a cruise ship.
- Painting of a C-class ferry underwater hull area, during calm wind conditions.

Environmental Best Management Practices

EBMP #4: Dry Dock Floor Management and Clean Up

Drain Management

- All sump well valves must be closed prior to and during power washing operations.
- Cover all tunnel drains and net cages during sandblasting, painting and power washing to prevent contaminants from entering the marine environment.
- In the case of a spill or release on dock bottom all sump well valves must be closed and all contaminated material contained and removed from dock bottom.
- Direct all contaminated water to the trench drain system, to avoid entering the tunnel drains.
- Collect and properly dispose of all contaminated water. Ensure sufficient equipment is available for contaminated water collection.
- Ensure all non-contaminated water is directed away from work areas and into the tunnel drain system (*e.g. ballast water, cooling water, caisson sill water*).

Hazardous Materials Managementt

- Store hazardous materials (*e.g. fuel, paint, waste oils*) away from the drains on dock bottom.
- Store hazardous materials to the inside of the trench drains so that any spills or releases can be captured.
- Store hazardous materials in areas protected from the weather, water curtains and other water sources.
- Ensure adequate spill response equipment is in close proximity to hazardous material transfer operations. At a minimum one spill kit is required per section of the graving dock.

Collect and properly dispose of all contaminated water.

Sediment Management

- Segregate any marine sediment, that may enter the dock during vessel transfer, from the waste generated during vessel repair. This is to reduce the amount of wastes requiring disposal.
- Collect and properly dispose of marine sediment that becomes contaminated with waste generated from vessel repair.
- Remove all contaminants and residues from the trench drains and sump wells prior to flooding at the end of work period.

Housekeeping

- Remove waste sandblast grit from the work area as soon as possible to prevent migration of grit contaminants into tunnel drain system.
- Store wastes collected from the dock floor in appropriate secondary containment and remove from dock bottom as soon as possible.

Residual paint in the cans may drip out of the skip and enter the marine environment through the drain systems.

Leaving garbage around the work site attracts wildlife such as seagulls, racoons and rats.

When cleaning dock bottom, skips of waste sandblast grit may leak contaminated water and should be removed as soon as possible.

All hazardous materials must be stored in appropriate containment and away from tunnel drain system.

Inspection and Cleanliness

- Prior to flooding, the drydock must be cleaned to meet the Esquimalt Graving Dock (*EGD*) *Standard of Cleanliness (see below),* as determined by the EGD undocking supervisor.
- Users must ensure that the dock floor is free of deleterious substances prior to flooding.
- Water may be used to clean the dock floor; however, any wastewater generated must be collected and disposed of properly.
- If a vessel occupies a shared portion of a dock section each User must clean the trench drains up to and including the section sump well.

ADEQUATE:
Example of a dock floor that would pass inspection.

INADEQUATE:
Example of a dock floor that would not pass inspection.

EGD Standards of Cleanliness

Due to the importance of drydock cleanliness prior to flooding, and since quantitative testing is impractical due to time and cost restrictions, the following guidelines will be used to assess cleanliness of drydock surfaces.

- All drydock surfaces, including stairwells and sills must meet the standard for "**residue free**" prior to flooding of the drydock. "**Residue free**" is considered met when a person of normal visual acuity, while standing, is unable to detect visible accumulations of potential pollutants.
- This includes, but is not restricted to:
    - the removal of abrasive grit,
    - paint residues or paint chips,
    - cutting and grinding wastes,
    - oil and grease,
    - food and drink containers,
    - ear plugs,
    - dust masks,
    - rope,
    - cigarette butts, or
    - any other refuse that may have been deposited during the work period.
- Debris of natural origin that may have been deposited during the previous flooding of the drydock, such as wood, sand, silt, seaweed, or marine life may be exempt from these requirements, as long as it will not contaminate the environment upon reintroduction.

AREAS IN NEED OF *SPECIAL ATTENTION*

ACCEPTABLE		NOT ACCEPTABLE
	**RAMPS**	
	**SILLS**	
	**KEEL BLOCKS**	
	**TRENCH DRAINS**	
	**SUMP WELLS**	

Environmental Best Management Practices

EBMP #5: Hazardous Materials Handling and Storage

A variety of hazardous materials are used, stored and transported by Users at the Esquimalt Graving Dock (*EGD*). If not handled appropriately, these materials have the potential to negatively impact worker health and safety, infrastructure and the environment. Hazardous materials commonly used at the EGD include: antifoulant paint, fuels and oils, antifreeze.

Storage

Users must have designated storage areas suitable for the materials they use on site. Where applicable, these areas must:

- Have appropriate secondary containment suitable to the quantity and nature of the material in that area.
- Ensure materials are stored in accordance with compatibility requirements.
- Be protected from the weather (*covered, lids secured, valves closed*).
- Have placards and proper ventilation.
- Have controlled access.
- Be located away from pathways to the marine environment.
- Be located on impervious surfaces (*e.g. concrete*).

Handling

All hazardous materials must be:

- Labelled appropriately with the owner name, product name, first aid information, and PPE requirements.
- Secured appropriately during transport.
- Transported by equipment that can sufficiently handle its weight and size.
- Transported in containers that are stable and not in need of repair (*e.g. totes with broken feet, excessive rust, faulty valves*).

ADEQUATE storage.

ADEQUATE storage.

INADEQUATE storage.

Any container holding hazardous materials must be clearly and properly labelled.

Areas to Avoid Storing Hazardous Materials

Trench Storm Drains
Any containers placed directly over top or beside a trench drain have the potential to spill to the drain leading directly to the ocean.

Storm Drains
Any containers placed directly over top or beside a storm drain have the potential to spill to the drain leading directly to the ocean.

Alongside Wharves and Jetties
Any containers placed alongside the edge of the wharves and jetties at the EGD have the potential to spill directly to the ocean, as there are no berms or secondary containment available.

Dock Floor Trench Drains
If a tote or drum is placed directly over or beside a trench drain, hazardous materials have the potential to flow down the drain and into the marine environment. Although the drains are designed for rapid containment and recovery, there is no guarantee that workers will be present to close drain valves during an incident.

Dock Floor Sump Wells
When the sump well valve is open the sump drains directly into the marine environment. Any containers placed on top of or adjacent to the sump well have the potential to enter the ocean if a spill were to occur.

Dock Floor Tunnel Grate Drains
Tunnel grate drains lead directly to the marine environment. Any containers placed directly over top of or beside a tunnel grate have the potential to impact the marine environment, should a spill occur.

Environmental Best Management Practices

Safety Data Sheet *(formerly Material Data Safety Sheet)*

A Safety Data Sheet (SDS) is a document that contains information on the potential hazards (*health, fire, reactivity and environmental*) and how to work safely with the product. SDSs also contains information on the use, storage, handling and emergency procedures all related to the hazards of the material. SDSs must be available (*electronically or hardcopy*) for all products stored on site and be readily available to all employees.

Storage Tanks and Totes

Storage tanks and totes are used for a variety of materials at the EGD, including: washwater, fuel products, bilge water, waste oil/fuel and other waste liquids. Storage tanks and totes may be considered portable/mobile, temporary or permanent. The regulatory requirements for proper use of these tanks vary and is dependent on a variety of factors.

Federal Regulation for Fuel Storage Tanks

The EGD is a Federal facility; therefore, storage tanks onsite need to comply with the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. Users may be required to register their tanks with Environment Canada. **Contact EGD Environmental Services for information.**

There are four different fuel tanks at the Esquimalt Graving Dock.

National Fire Code

The National Fire Code outlines the requirements for containment, labelling and location of flammable liquid storage.

Environmental Best Management Practices

EBMP #6: Waste Management and Recycling

Operations at the Esquimalt Graving Dock (*EGD*) generate a variety of waste streams including hazardous waste, controlled waste, biological waste, international waste, and general refuse and recyclables.

Hazardous Waste

Hazardous wastes generated at the EGD may include waste oil and oil filters, antifreeze, batteries, paint and solvents, oily rags and absorbent materials, spent grit, solids generated during power washing, mercury, PCB containing equipment and asbestos. Appropriate management of hazardous waste will reduce environmental liability associated with inappropriate disposal and storage as well as reduce the risk of human injury and environmental impact.

Hazardous waste storage should be segregated from new product storage.

- Ensure designated storage areas are away from active work areas.
- Ensure areas are covered to reduce exposure to environment and wildlife.
- Ensure that waste accumulation areas are organized.

Hazardous waste should be segregated into separate containers.

- Ensure containers used are appropriate for the type of waste (*e.g. separate drums for waste oil, oil filters, antifreeze, batteries, paint and solvents, oily rags and absorbent material, spent grit*).
- Store batteries in a manner that prevents leakage of acid to the environment.
- Properly dispose of contaminated clean-up materials (*e.g. absorbents, rags, etc.*).
- Do not dilute or mix hazardous waste, other hazardous or non-hazardous wastes.
- Cover waste containers to prevent exposure to weather (*e.g. rain*).

All hazardous waste must be carefully stored and disposed of.

Asbestos

All asbestos containers and asbestos-containing materials must be identified by signage and labelling in accordance with applicable legislation.

Companies that engage in asbestos related work at the EGD must be qualified to do so.

Clearly label all hazardous waste containers.

- Labels should include: type of waste, generator/company name, and contact information.

Controlled Waste

Controlled waste such as animal feces, sewage, contaminated grit, stormwater catch basin waste, creosote wood and dead animals can be disposed of at the **Capital Regional District (*CRD*) Hartland Landfill.**

Controlled waste disposal at requires a permit.

For more information about Controlled Waste disposal contact the CRD Hotline at (250) 360-3030.

Large scale food waste bin.

An example of a Waste Management Area at the EGD.

Food Waste

During normal activity at the EGD, food waste is collected in conveniently located and accessible receptacles onsite and disposed of at the landfill. During larger projects, however, alternative measures are taken to account for the increase in generated wastes.

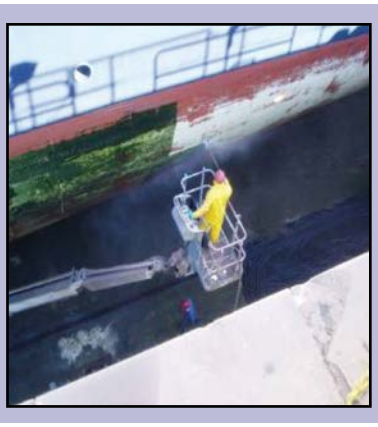
General Refuse

General refuse should be separated into categories to enable easy disposal. Users are responsible for properly disposing of refuse and recyclable materials. There are many containers throughout the site for disposal of common refuse materials (*e.g. steel, wood, glass, cardboard etc.*).

Biological Waste

Marine life removed from vessel hulls and sea chests may contain paint contaminants. This waste may be considered a controlled or hazardous waste and would need to be handled and disposed of accordingly.

Biological waste should be stored out of the sun, covered and removed from the facility quickly to prevent any odours from emanating.



Recycling

All Users of the EGD are responsible for collecting and disposing of the solid waste they generate from their activities, properties and vessels they are responsible for.

- Recycle solid waste such as plastic, glass, aluminum, mixed paper and cardboard. Recycling areas should be conveniently located and easily identifiable.
- Segregate other solid waste, such as scrap metal, wood, electronics, polystyrene foam and soft plastics for recycling at an approved facility.
- Leaf and yard waste collected on property should be composted or disposed of appropriately.
- Construction and demolition waste should be reused or recycled wherever cost effective and technically feasible.
- Encourage the use of recyclable products to reduce the solid waste impact on the environment.

International Waste

Like hazardous waste, International Wastes may pose a threat to human health and the environment.

Dunnage from vessels has been known to carry invasive species to local areas. Foreign dunnage must be identified, stored, and disposed of at an approved facility without delay.

Food wastes may carry pathogenic organisms that could cause illness to those handling it. Food wastes shall be kept in separate, closed containers. The **Canadian Food Inspection Agency *(CFIA)*** will inspect foreign vessels and issue directions on disposal.

EBMP #7:
Fuelling and Oil Transfer

The transfer of fuel and oil is a common activity at the Esquimalt Graving Dock (*EGD*). Transfer may be from ship to shore (*e.g. removal of waste fuel/oil*), from shore to ship (*e.g. refuelling a vessel from a truck)* or land based.

An accidental release during these operations has the potential to negatively impact the environment and health and safety of those at the facility.

- Prior to any fuelling or oil transfer operations:
    - the ***EGD Oil Transfer Checklist*** must be complete;
    - an emergency plan must be in place and readily available;
    - adequate spill response equipment must be available; and
    - personnel must be aware of spill response procedures.
- All transfer and storage equipment must be in good condition, tested, and properly connected.
- Do not place storage and transfer equipment near pathways to the marine environment (*e.g. storm drains, trench drains, edge of the dock*) without effective mitigation measures in place.

Vessel Fuelling and Bulk Oil Transfer
Definition of Oil: as described in the Canada Shipping Act **oil** is considered petroleum in any form, including: crude oil, fuel oil, sludge, oil refuse, gasoline, lube oil and refined products.

Berthed Vessels

- ALL berthed vessels receiving fuel from a truck or a barge require a containment boom.
- Transfers of fuel and oil to and from ALL berthed vessels require a containment boom.
- An ***EGD Oil Transfer Checklist*** must be filled out and signed by representatives from the truck and the vessel and submitted to EGD representatives in the Pumphouse prior to fuelling or oil transfer operations.
- Transfer operations must comply with the *Canada Shipping Act, Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals Subdivision 5*.

Vessels in Drydock

- ALL fuel and oil transfers occurring in the drydock require spill kits to be placed nearby and are not to be completed next to drainage pathways to the marine environment (*e.g. trench drains, sump wells, tunnel grate drains*).

On Land Transfers

- ALL fuel and oil transfers occurring on land require spill kits to be placed nearby and are not to be completed next to drainage pathways to the marine environment (*e.g. storm drains, edge of dock*).

Containment Boom Requisition

The Esquimalt Graving Dock has containment boom and deployment equipment available for requisition. To arrange for booking or rental, contact the EGD Operations Manager.

An orange inshore containment boom fully surrounds the vessel while being fuelled.

The hydraulic powered deployment reel with inshore containment boom available for requisition.

EXAMPLE SCENARIO REQUIREMENTS

Scenario 1: FUELLING A BERTHED VESSEL

- Completed and signed ***EGD Oil Transfer Checklist*** submitted to EGD Pumphouse.
- Containment boom deployed and effectively secured at both ends.
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

EXAMPLE SCENARIO REQUIREMENTS (*Continued*)

Scenario 2: BULK OIL TRANSFER FROM A BERTHED VESSEL

- Completed and signed ***EGD Oil Transfer Checklist*** submitted to EGD Pumphouse.
- Containment boom deployed and adequately secured at both ends.
- Receiving containers located away from pathways to the harbour (*e.g. storm drains, edge of dock*).
- Receiving containers in secondary containment and in good condition.
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

Scenario 3: FUELLING A VESSEL OR BULK OIL TRANSFER IN THE DRYDOCK

- Pumphouse operation on site prepared to shut down auxiliary pumps in case of an emergency.
- Receiving containers located away from pathways to the harbour (*e.g. trench drains, sump wells, tunnel grate drains*).
- Receiving containers in secondary containment and in good condition.
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

Scenario 4: ONSHORE OIL TRANSFER BETWEEN CONTAINERS

- All containers located away from pathways to the harbour (*e.g. storm drains, edge of dock)*.
- Receiving containers in secondary containment and in good condition.
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

Environmental Best Management Practices

EBMP #8: Invasive Species

Invasive species are a significant threat to the marine ecosystems of British Columbia. The Esquimalt Harbour is known to have a disproportionately high number of non-indigenous species. It has been widely recognized that the primary source of non indigenous marine species in local waters are the ballast tanks and hull surfaces of transoceanic vessels. Ship repair contractors are encouraged to report unusual species observed during hull cleaning activities.

Ballast Water

- Vessels must follow *Transport Canada Ballast Water Control and Management Regulations*

Ballast Tank Sediment

- Shipyards must follow *Transport Canada Ballast Water Control and Management Regulations*
- Sediments removed from the ballast tanks at the EGD must be contained, collected and disposed of at an authorized facility.
- Sediments must not be allowed to enter the harbour.

Anchor chain-growth

- All biological material removed from anchor chains must be contained, collected and disposed of appropriately.

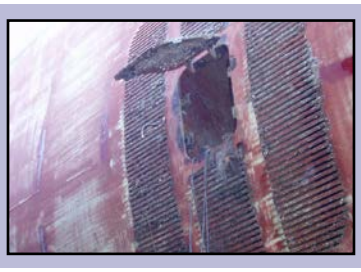
Sea chests

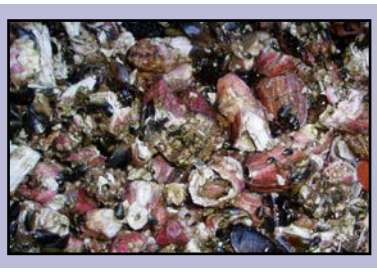
- All biological material removed from sea chests must be contained, covered and disposed of appropriately.
- Material must be stored away from direct sunlight/heat and disposed of as soon as possible, to avoid nuisance odour pollution.

Marine growth removed from vessel hulls must not be allowed to enter the harbour through the drydock drainage system.

INADEQUATE containment: Biological waste on drydock floor near drains.

INADEQUATE containment: Biological growth mixed with paint waste on drydock floor.





Sea chests, such as this one from a cruise ship docked at the EGD, often contain a significant amount of marine life.

If not managed appropriately, this marine life has the potential to negatively impact the local ecosystem of the harbour.

EBMP #9: Fish and Wildlife Management

The daily operations and activities of the Esquimalt Graving Dock (*EGD*) have the potential to negatively impact wildlife that frequents the property. The *EGD Wildlife Management Plan* has been developed to assist EGD employees and Users to properly manage interaction with fish and wildlife that are common to the facility.

Fish

Fish and other marine life have the potential to become stranded in the drydock during normal vessel docking/undocking operations. This may include, but is not limited to: salmon and other fish species, seals and octopus.

- The bubble curtain must be employed during vessel transfer into and out of the drydock.
- EGD employees must monitor the drydock for stranded fish and/or other marine life during dewatering and report cases to EGD Environmental Services.
- Whenever possible, EGD employees must retrieve fish and marine life and safely return them to the Esquimalt Harbour.
- Users are prohibited from removing fish and marine life from the drydock.

Report all cases of fish and marine life interaction with the drydock to EGD Environmental Services.

Wildlife

A variety of wildlife is known to occupy areas of the EGD property. In some cases wildlife may use the facility as a nesting/breeding ground, while others are present for short periods of time during migration or to feed. Activities and operations at the EGD have the potential to impact the well being of wildlife at the facility.

Such wildlife includes: deer, raccoon, mink, river otter, great blue heron, osprey, raven, Canada goose and a variety of other common waterfowl, nesting and songbirds and pollinators *(e.g. bats, native bees)*.

Bubble curtain employed during vessel transfer.

Stranded marine life must be carefully returned back to the Harbour.

Fisheries Act - Destruction of Fish

The EGD has received authorization for the destruction of fish associated with normal operation of the drydock from the Department of Fisheries and Oceans (*DFO*).

Conditions of the Authorization:

- Take all reasonable precautions to prevent the trapping and mortality of fish.
- Monitor the success of preventative measures and retrieval success.
- Report to the DFO annually.

Environmental Best Management Practices

- ALL wildlife must be left alone. Do not approach or handle newborn or juvenile wildlife.
- Injured or orphaned wildlife must not be handled without proper experience and equipment.
- Dispose of dead wildlife appropriately.
- Report observations of injured or deceased animals to EGD Environmental Services.
- Prior approval from EGD Environmental Services is required for the relocation or removal of nesting wildlife; a Migratory Bird Damage or Danger Permit is required to remove nests and retrieve eggs of migratory birds (*e.g. seagulls*).
- Never mistreat, remove or destroy any areas that could provide habitat for wildlife without prior approval and receipt of appropriate permits from the relevant authority.

Contact EGD Environmental Services for wildlife related information, incidents and interactions.
Contact the Front Gate Commissionaires for afterhours assistance.

A variety of wildlife is known to occupy areas of the Esquimalt Graving Dock property.

Incidents with wildlife are managed on a case by case basis.
Direction and/or assistance must be taken from the appropriate authority when required.

EBMP #10: Water Use

The Esquimalt Graving Dock (*EGD*) is considered a major consumer of fresh water. Water is provided to the facility by the Capital Regional District (*CRD*) distribution system, on a fee for use basis. Inefficient use of water may result in a negative economic and environmental impact. Water consumption and the quality of water are both considerations of the environmental management systems at the EGD.

Water Consumption

Large volumes of water are used during normal operations at the facility; because of this, the EGD is considered a high volume user of fresh water in the CRD. Users must be conscious of activities that consume high volumes of water and work to mitigate any water waste.

In order to reduce the amount of water consumed onsite:

- Mitigate dust in problem areas using high efficiency Dust Suppression Units, when physical containment techniques are not sufficient to prevent fugitive dust emissions.
- Use fire nozzle water curtains only when all other attempts to contain particulate emissions from sandblasting have failed. Water curtain use must be approved by EGD Management in advance.
- Avoid use of freshwater to clean work areas, where possible.
- Maintain fittings in buildings and on equipment to prevent leakages.

Water Consuming Activities

Activities associated with vessel surface preparation and dust control use significant amounts of water.

Conventional pressure washing and ultra high pressure (UHP) washing use large amounts of water at high pressure to scour paint and biological material from the hulls of ships.

Dust Suppression Units

Dust Suppression Units are used to mitigate the escape of dust from sandblasting operations in the drydock.

Water Quality

The water distribution system at the EGD was originally designed as a fire suppression system; therefore, the water in certain areas of the system may not be considered potable.

- Potable water is not available throughout the facility (*this includes intake to vessels moored alongside or in the drydock*).
- Users of the facility are responsible for ensuring that the water they use meets the guidelines for the purpose intended.
- Users must use backflow prevention when accessing the water distribution system.

The EGD maintains the fresh water distribution system.

- Flushing of the entire system is conducted on an annual basis.
- Collection and analysis of water, in comparison to drinking water quality guidelines, is conducted on an annual basis.

Metered Water Use at the Esquimalt Graving Dock

- Users of the facility must ensure that water is accessed from a metered line when connecting to the water distribution system.
- Portable meters are to be used when required.
- The EGD Pumphouse must be contacted for proper access to the water distribution system.

EBMP #11: Energy Conservation

The Esquimalt Graving Dock (*EGD*), as an industrial facility, is a major consumer of energy. Inefficient energy use may result in negative economic and environmental impacts. Economic impacts are associated with inefficient electrical usage (e.g. cost), while environmental impacts include those associated with the consumption of fuel (*e.g. air emissions*).

Energy consumption also results in the production and release of greenhouse gas emissions through the combustion of fossil fuels. Every aspect of work at the EGD results in the release of greenhouse gases, whether it is operating the cranes or printing a report. It is important to minimize energy consumption wherever possible to reduce the release of harmful greenhouse gases and conserve energy.

Electrical Consumption

There are a number of opportunities to increase the efficiency of electrical usage at the EGD:

- Turn off lights and equipment when not in use (*e.g. flood lights, office buildings*).
- Install energy efficient devices in buildings (*e.g. sensor switches, efficient light bulbs*).
- Use energy efficient equipment whenever possible and consider energy efficient options when purchasing new equipment.
- Stagger equipment start-up to decrease load on electrical system.

Environmental Best Management Practices

Fuel Consumption and Emissions

Opportunities to decrease the amount of fuel consumed by day to day activities include:

- Using energy efficient vehicles.
- Using alternative fuels where possible (*e.g. Biofuels*).
- Using alternative energy sources where possible (*e.g. LED, solar, rechargeable*).
- Avoid idling vehicles (*e.g. delivery vehicles*).
- Use shore power where possible.
- Encourage staff to try alternative means for commuting to work (*e.g. carpool, public transit, cycling*).

Be aware of the potential impacts of emmissions on neighours near the EGD.

Idling Vehicles

- Do not idle vehicles near building doorways or air intakes
- Vehicles must be turned off if idling for more than 3 minutes in a 60-minute period.

Idling vehicles produce unnecessary air emissions and noise.

Shore Power

For vessels moored alongside at the North Landing Wharf and in the drydock it is important that they utilize shore power when possible. With shore power, the auxiliary generator can be turned off, thereby saving fuel and preventing the release of harmful air pollutants.

Did You Know?

Shore Power may be accessed at the EGD:

- 208V and 480V available on the North Landing Wharf and drydock.

EBMP #12:
Nuisance Pollution (Noise/Odour/Light)

The daily operations of the Esquimalt Graving Dock (*EGD*) Users have the potential to negatively impact neighbouring residents and businesses, as well as the immediate work area. Nuisance pollution is often created by noise, odour and light.

Noise

- Noise pollution can be generated and recognized in decibel levels, pitch, oscillation and duration.
- The main sources of noise at the EGD include sandblasting, drilling, hammering, compressors, generators and the crane warning bell. Even general shop repair activities generate large amounts of noise.
- Sound carries. Operational noise, vehicle noise and loud voices can be heard in nearby areas. Site Users must be aware of the potential impacts of all activities taking place at EGD and be respectful of neighbours.
- Schedule noisy activities for daytime hours 0700 hrs to 2300 hrs on weekdays, weekends and holidays. Through worker education and good practice the generation of high-level intermittent or non-continuous noises can be minimized.
- Personal vehicles, including motorcycles, can disturb neighbouring residents. Your vigilance is appreciated especially during quiet hours. Warning signs are posted at parking areas to remind personnel to be respectful of neighbours when arriving and departing the EGD.
- The EGD recognizes applicable municipal laws and regulations. Operations will consider the requirements of the *Municipality of Esquimalt Bylaw 2826 Maintenance of Property, Unsightly Properties and Nuisance Bylaw Part III Nuisances Noise Contro*l.

The EGD is located in close proximity to residential areas.

Personal vehicles with loud engines can disturb neighbouring residents.

Warning signs in parking areas act as a reminder to minimize noise at EGD.

Responses to nuisance pollution complaints will be taken on a concern-by-concern basis.

To submit a nuisance complaint contact the Esquimalt Graving Dock Information Line at (250) 363-0227.

Environmental Best Management Practices

Odour

- Daily dock operations often create strong and unpleasant odours whether from the release of VOCs, H2S, organic materials, or chemicals. An offensive smell can reduce the quality of the work environment for neighbouring tenants and residents. Biological material removed from bilges, sea chests and hulls must be contained, covered and disposed of appropriately. Be proactive in planning for timely transport and proper disposal of material; a permit may be required for disposal.
- Material must be stored away from direct sunlight/heat and disposed of in a timely manner, to avoid nuisance odour pollution.
- Odour mitigating measures may be required, if odours are negatively affecting neighbouring properties or onsite personnel.
- The EGD recognizes applicable municipal laws and regulations. Operations will consider the requirements of the *Municipality of Esquimalt Bylaw 2826 Maintenance of Property, Unsightly Properties and Nuisance Bylaw Part III Odour and Disturbances*.

ADEQUATE containment of odorous waste.

INADEQUATE containment of odorous waste.

Light

- Night time dock operations require spotlights to provide a safe work environment. Be aware that strong spotlights can be a significant intrusion for residential neighbours.
- Only utilize spotlights when absolutely necessary. This will help prevent disturbing the neighbours, as well as to ensure a more energy efficient work environment.
- Changing the direction of stationary and portable lights in the workplace may reduce the effect they have on the neighbours.
- Turn off any unnecessary lights.
- The EGD recognizes applicable municipal laws and regulations. Operations will consider the requirements of the *Municipality of Esquimalt Bylaw 2826 Maintenance of Property, Unsightly Properties and Nuisance Bylaw Part III Odour and Disturbances.*

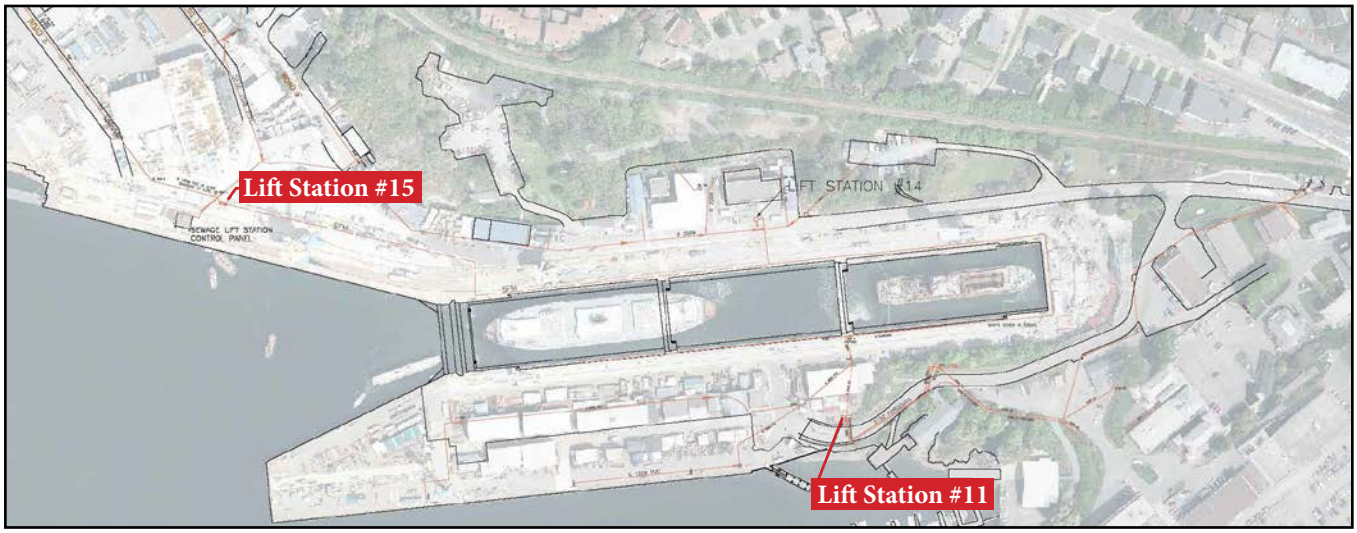
Only utilize spotlights when necessary.

Changing the direction of spotlights can reduce light impact on neighbours.

EBMP #13:
Sanitary Waste Management and Sewer Use

The Esquimalt Graving Dock (*EGD*) is authorized by the Capital Regional District (*CRD*) as a ship and boat waste disposal facility. The authorization allows for the proper discharge of sanitary waste, grey water and superchlorinated water at designated locations at the EGD, and stipulates the requirements that must be met prior to discharge.

Discharge to the sanitary sewer at any location other than at LS#15, LS#11 or at vessel connections located in the services tunnels of the drydock is prohibited.



Lift Station #11.

Lift Station Maintenance.

The EGD is authorized to discharge to the sanitary sewer at:

- Lift Station #15 (*LS#15*),
- Lift Station #11 (*LS#11*), and
- Vessel connections in the drydock.

Permitted wastes include:

- Sanitary waste, *
- Grey water, and
- Treated superchlorinated water.**

Sanitary Waste: *must contain <50,000 ppm total solids.*

***Superchlorinated Water:** must not be discharged to the sanitary sewer unless it has been de-chlorinated to less than 5 ppm chlorine.*

Prohibited wastes include:

- Bilge and ballast water,
- Wastewater sludge, and
- Fuel and oil, paint, paint thinner, solvents, and products containing toxic chemicals.

Other Wastes

Other wastes may be considered for discharge to the sanitary sewer on a case-by-case basis; approval *must be* requested from EGD Management prior to discharge.

Discharge to the sanitary sewer at locations other than those authorized may be considered on a case-by-case basis; approval *must be* requested from EGD Management prior to discharge.

Waste Discharge Notification

Envirosystems Inc. will, as a standard operating procedure, notify the EGD Pumphouse prior to large volume discharges to the sewer system (*e.g. any "batch discharge" in excess of 20,000 litres*). Coordination of discharge may be required depending on usage of the sanitary sewer system at the time.

Envirosystems Inc. will contact the Pumphouse on a regular work day if Envirosystems Inc. is planning to discharge large volumes during times other than Monday to Friday, day shift (*0730 hrs to 1600 hrs*) or on statutory holidays.

Envirosystems Inc. must contact EGD Management if there is a change in normal discharge operations (*e.g. increase in daily volume*).

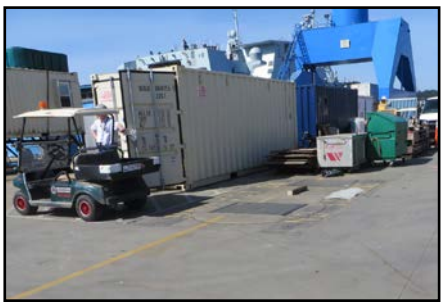
Access to the Sanitary Sewer

- Users must notify the Pumphouse before conducting any discharges to the sanitary sewer. Typical methods of discharge include: large (*direct connection and discharge from a vessel*), and small (*portable discharges from totes and tanks*).
- Users must complete a ***Sanitary Sewage Discharge Form*** and provide it to the Pumphouse prior to discharging to the sanitary sewer.
    - Pumphouse Operators will ensure that sanitary sewer discharges are in accordance with applicable regulations and authorizations.
    - Pumphouse Operators will provide all completed ***Sanitary Sewer Discharge Forms*** to EGD Environmental Services.
- Users must ensure a sample collection point is accessible at the point of discharge.
- Users must request approval from EGD Management to connect directly to the sanitary sewer for regular domestic waste (*e.g. washrooms, sinks, toilets*). Any other waste is prohibited from being discharged of through these lines.

Lift Station Maintenance

- Commissionaires will contact the Pumphouse on radio Channel 4 when DND sewer maintenance personnel enter the facility.
- Pumphouse staff will supervise DND personnel work on the lift stations where required.

AUTHORIZED Sanitary Sewer Discharge point, Lift Station #11.



AUTHORIZED Sanitary Sewer Discharge point, Lift Station #15.

UNAUTHORIZED Sanitary Sewer Discharge point (i.e. storm drain).

UNAUTHORIZED Sanitary Sewer Discharge point (i.e. trench drains).

UNAUTHORIZED Sanitary Sewer Discharge point (i.e. sewer manhole).

EBMP #14: Spill Preparedness and Response

The Esquimalt Graving Dock (*EGD*) is committed to the protection of human health and the environment. Safety and environmental management programs have been implemented at the EGD to reduce the potential for accidents and spills. Emphasis is placed on the prevention of spills, and although the potential for spills can be reduced through these programs, spills do still happen.

All Users operating at the EGD must have the capability to effectively manage spills resulting from their activities and operations.

- User employees must have adequate training in spill response.
- User employees must have access to spill response equipment and materials appropriate to the work they are performing.
- Users must have plans and procedures in place to respond to spills.

For spills which are beyond the capability of the User or are not being effectively responded to by the User, the EGD will provide assistance. The EGD has additional resources available, including:

- Spill kits and response materials for land and water based spills.
- Containment boom, deployment reels and boat.
- Pneumatic skimmer with drum and brush recovery modules, deployment and retrieval services.
- Staff trained to deal with land and water based spills.

For spills beyond the capability of the facility to manage, contact *Emergency Management* (EM*BC*). Additional resources will be coordinated for response to land and water based spills.

ALL Spills at the Facility
MUST BE REPORTED to EGD Management.
Details are to be provided in an *Incident or Spill Report*.

Spill response training at EGD.

Spill response training at EGD.

Spill response equipment: Skimmer.

Spill response equipment: Spill Kit.

Environmental Best Management Practices

Assess the situation.

Stop product flow.

Secure the area.

Steps to Spill Response

Assess the Situation

- Never rush in. Warn others in the immediate area.
- Stay upwind of the spill and avoid low lying areas.
- Quickly and accurately gather details that may need to be communicated to spill response personnel and the authorities including:
    - What equipment or work activity is involved?
    - What hazards are associated with the spilled product?
    - How large is the spill?
    - Is the situation under control or is it escalating?
    - What areas are or could be affected?
    - Proposed strategy to contain/control the spill.
    - Notify others in the area of the spill.

Stop Product Flow

- Act quickly to stop product flow, ONLY IF SAFE TO DO SO.
- Activate emergency shutdowns (*if applicable*).
- Close delivery truck manifold valves, etc. (*if applicable*).

Secure the Area

- Clear the area of public and untrained personnel.
- Ensure those onsite are wearing appropriate PPE.
- If spill is indoors, ensure the building is evacuated.
- Isolate large spills in all directions.
- Limit or prevent access to the site.
- Enforce safety procedures.

Contain the Spill

- Approach the spill from an upwind direction and avoid low lying areas.
- Use appropriate PPE (*e.g. gloves, eye protection, respirator*).
- Follow safe work procedures.
- Block drains, culverts, and ditches to prevent entry into waterways, sewers or confined areas.
- Contain spill with absorbent materials (*from spill kits*), earth, sand, or other non-combustible materials.

Notify the Authorities

- Contact your Supervisor immediately.
- Report the spill to EGD Management.
- For spills greater than 100L on land, or any spill of any size that enters the marine environment, contact: Emergency Management (*EMBC*) Reporting Line: 1-800-663-3456.
- Additional reporting requirements may be required depending on the spilled material.

Recovery and Clean Up

- Use appropriate materials to recover spilled product (*e.g. loose absorbent, pads, booms, socks*).
- Place waste in labelled 6mm plastic bags or leak proof containers.
- Store waste in secure, dry, well-ventilated location, away from heat and ignition sources.
- Consult with authorities before removing waste from site.
- Arrange for waste disposal at an approved facility by a qualified contractor.

Investigation & Reporting

- Investigate the spill or incident and complete and submit required reports to the authority having jurisdiction.

Contain the spill.

Environmental Emergency Contacts (24 Hours):

EGD Commissionaires
250-363-3784

Emergency Management (*BC*) Reporting Line
1-800-663-3456

DND QHM
250-363-2160
or
VHF Channel 10

Recovery and clean up.

EBMP #15:
In-Water Hull Cleaning and Maintenance

The cleaning, maintenance and repair of the underwater hull and associated appendages in water has the potential to release harmful contaminants into the marine environment.

In-water Hull Cleaning

- In-water hull cleaning of vessel hulls, that are coated with antifouling paint, is **prohibited** at the Esquimalt Graving Dock.
- In-water hull cleaning of vessels coated in non-biocide containing paints (*such as silicone based*), **may be considered** on a case-by-case basis and must be approved by EGD Management prior to the commencement of work. This applies to in-water hull cleaning to remove organic growth only, NOT to coating removal.

In-water Maintenance

- In-water maintenance may be considered on a case by case basis and must be approved by EGD Management prior to the commencement of work. In-water maintenance may include but is not limited to:
    - Cleaning of anodes, inlets, props, and transducers for operational and inspection purposes only.

All vessels approved for in-water hull cleaning or maintenance must have a containment boom in place prior to work starting.

Additional requirements may be required on a case by case basis depending on the scope of work involved.

NOTE: Cleaning of the above water hull while berthed alongside the dock is PROHIBITED.

Did You Know?

Antifouling paints and their residues contain heavy metals, such as copper, which are toxic to aquatic organisms, including salmon and shellfish.

Wash water and solid residues from the washing, scraping, sanding and blasting of antifouling paints from boat hulls are considered "*deleterious substances*" under the *Fisheries Act*. Releasing these wastes to fish bearing waters is a violation of the Act.

Environmental Best Management Practices

EBMP #16: Housekeeping

An organized, clean facility provides an environment that reduces the potential for pollutants to enter surface and ground water through spills and accidents. General cleanliness will lead to more organized and consistent handling of hazardous materials and waste products. Good housekeeping programs will identify and assign responsibilities for shift clean up, day-to-day cleanup, proper waste disposal, removal of unused material, and regular inspection.

Clean-Up

- Clean debris from work areas immediately after any maintenance activity. Dispose of collected material appropriately.
- Ensure garbage and recycling containers are available in all leased areas and are emptied regularly.
- Do not use running water to clean the work areas where potentially contaminated water could enter the stormwater system.
- Ensure trench and storm drains within designated leased areas are kept clean and free of debris.
- Sweep and/or clean active working areas on a regular basis.

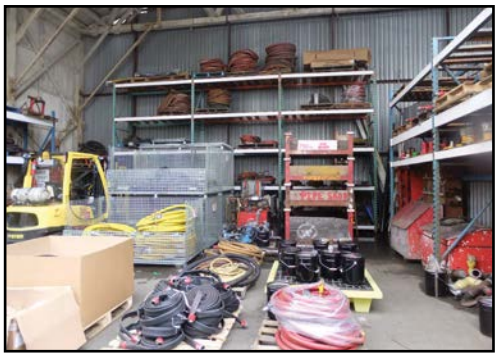
Storage

- Do not store materials or equipment outside of leased areas.
- Regularly inspect lease areas for unidentified or improperly stored materials.
- Ensure all stored products and wastes are clearly labelled and identifiable.
- Place a drip pan underneath vehicles and equipment when performing maintenance. Promptly transfer used fluids to the proper waste or recycling drums.
- Ensure all containers (*e.g. drums, totes, pails*) are in good condition and have a clean exterior at all times. Ensure containers are not left open; secure lids or cover containers when not in use.

INADEQUATE: Keep work areas neat & orderly.

INADEQUATE:
Keep trench and storm drains free of debris.

INADEQUATE:
Ensure storage containers are not left open.



ADEQUATE: Keep work spaces organized and clear of debris to prevent accidents.

EBMP #17: Stormwater Management

Stormwater has been identified as one of the primary pathways of contaminant loading to the local harbour associated with Esquimalt Graving Dock (*EGD*) operations. Common contaminants found in stormwater samples include metals, extractable petroleum hydrocarbons (*LEPH/HEPH)*, and total suspended solids (*TSS*). Five upland stormwater catchment areas terminate into the Esquimalt Harbour from the EGD property. The drydock floor tunnel drainage system leads directly to the Esquimalt Harbour. Any material entering the tunnel drainage system, either through tunnel grate drains or open sump well valves, will end up in the harbour. Deleterious materials must not be allowed to enter the storm or tunnel drain system.

Uplands Stormwater Management

- Store hazardous materials away from storm drains and trenches on the dock floor and in upland areas.
- Ensure totes, drums, pails and skips containing hazardous materials are protected from the weather (*e.g. lids secure, tarps in place*).
- Place filter cloth over storm and trench drains when working with deleterious substances that are in close proximity to, and that could pose a hazard to the marine environment.
- Divert and contain stormwater runoff containing contaminants and sediment with proper materials and filtration, prior to entering the drains (*e.g. use filter cloth, hay bales, sand bags*).
- During heavy stormwater events, ensure storm drains and trenches are kept clear of debris to prevent flooding.
- Conduct regular inspections of storm and trench drains in lease areas to ensure they are kept clear of debris.
- When using trench drains for secondary containment, ensure the containment system is monitored and removed in a stormwater event. A blocked trench drain may cause flooding of the area.

Prevent deleterious substances entering marine environment by placing filter cloth in the trench drains.

Sand bags used on dock bottom to divert and filter excess water.

Do not allow trench drains to build up with debris. This helps to prevent flooding during heavy stormwater events.

Drydock Floor Stormwater Management

- Stormwater has the potential to mix with washwater and other contaminants on the drydock floor during normal operations. Users of the drydock must plan in advance for stormwater management during their work period.
- To reduce the amount of washwater requiring treatment, stop power washing operations until stormwater can be controlled.
- To prevent contamination of stormwater with washwater, waste sandblast grit and other hazardous materials and wastes, cleanup work areas as soon as possible.
- Sump well valves may be opened to allow stormwater to drain into the tunnel drains when the trench drains, sump wells and dock floor area is clear of contaminants and debris. In the case where washwater collection is completed, but the trench drains, sump wells and dock floor have not been cleaned, a filter cloth may be secured over an open sump well valve to allow stormwater flow. This procedure prevents contaminants and debris from entering the drainage system. This method requires dedicated personnel management of the process and regular filter cloth replacement. Do not poke holes in the filter cloth.
- Tunnel grate drains on the drydock floor in Section 2 and 3 may be uncovered enough to allow stormwater to flow into the drains. Ensure the area is clear of contaminants and debris.
- Sump well valves must be closed in sumps containing visibly contaminated material. Sump wells must be pumped out and cleaned prior to opening the valves.
- Ensure there is capacity in the trench drain/sump well collection system to manage expected stormwater volume. This will allow for continued collection and will prevent flooding of the dock floor.
- Prior to flooding and dewatering of the drydock, ensure all sump well valves are open.

Uplands storm drain with filter cloth. Avoid storing hazardous materials near storm drains, which are directly linked to the marine environment.

Filter cloth secured over sump well valve to allow stormwater flow.

EBMP #18:
Property and Infrastructure Maintenance, Modifications and Construction

Significant environmental issues and potential impacts are known to be related to the management of Esquimalt Graving Dock (*EGD*) property and infrastructure. Any new property and infrastructure construction or modification projects at the EGD must consider environmental issues in project planning and implementation. Common environmental aspects that require consideration and management when planning and implementing projects include: dust emissions, hazardous materials and wastes, storm water runoff, noise, and prevention and response to accidental spills and releases. Requirements for the operational aspects are identified in specific sections of the EGD EBMPs.

Infrastructure Maintenance & Repair

Maintenance and repair of existing facility property and infrastructure often results in waste generation and other environmental aspect considerations to be addressed.

Minor Concrete Work

- Contain dust emissions from cutting and drilling.
- Prevent concrete slurry runoff from entering storm drains.
- Prevent debris from mixing concrete from entering storm drains or the marine environment.
- Prevent concrete slurry runoff from entering the trench and tunnel drains and the "moonpool" on the drydock floor.

Use of Preserved Wood

- Avoid use of creosote preserved wood products where possible.
- Follow applicable guideline for use of preserved wood products.
- Creosote wood waste may be considered a hazardous, restricted or controlled waste, and must be handled and disposed of accordingly.

Demolition/Renovation

- Ensure structures are assessed for the presence of hazardous materials prior to demolition or renovation (*e.g. asbestos, lead based paint, PCB and mercury containing ballasts, mould*).
- Hazardous materials and waste must be handled and disposed of according to applicable regulatory requirements.
- Halocarbon containing equipment must be managed in accordance with the Federal Halocarbon Regulations.

Land Use Application

The EGD Land Use Application (*EGD LUA*) contains sections specific to potential environmental aspects related to the project. These sections must be completed with all relevant information.

EGD Management will respond with additional environmental protection and mitigation measures if required.

Infrastructure Modification & Construction

All modification and construction projects at the EGD must be assessed for environmental impacts, and plans put in place to mitigate the identified impacts. Projects managed by the EGD will be completed in accordance with the national project management system and site specific requirements.

For projects managed by Users:

- Any changes to infrastructure, changes to an existing lease or application for a new lease, must be approved by EGD Management.
- Prior to the approval of a property or infrastructure project, the EGD Land Use Application must be completed in full and submitted to EGD Management for review.

Green Space and Vegetation

The EGD property includes areas of vegetation that provides many benefits, including important habitat for wildlife and sensitive native plant species, and act as a buffer between the industrial operations of the facility and the neighbouring residential area.

All projects which have the potential to impact green space, vegetation and wildlife habitat must be reviewed and approved by EGD Management.

Tree and Vegetation Compensation Policy

To facilitate the EGD wildlife management plan and reduce the likelihood of habitat loss at the facility, property and infrastructure projects that require the removal of vegetation must provide compensation in the form of appropriate vegetation replacement. Additional supplies are also required when compensation vegetation is purchased to ensure that new plantings will be successful (*e.g. soil, mulch, tree protection, and water bags*). Consult with EGD Management prior to work to determine what compensation is required.

Soil Management

The EGD has undergone significant capital and operation and maintenance projects in recent years. Extensive investigations into the soil conditions (*e.g. contamination and structure*), utility mapping and identification of archaeological conditions have taken place. The industrial history of the facility has resulted in known contamination of the soil and in-fill material used on site. The primary contaminants commonly found at levels exceeding industrial soil standards include: arsenic, cadmium, copper, lead, mercury, zinc, and polycyclic aromatic hydrocarbons (*PAH*).

Requirements for Excavation

Planning Excavation

1. Consult with EGD Management prior to excavation to identify:

- Project area and excavation boundaries.
- Known utilities, structures, and historical information regarding the proposed excavation area.
- Known contaminated soil locations and the nature and level of contaminants potentially in the soils to be excavated.
- Archaeologically significant areas, requirements for mitigation of archaeological impacts, and dealing with unanticipated archaeological finds.

2. Prepare a plan for soil management: stockpiling and sampling of soils to be excavated. Key issues to be considered include:

- Turnaround times for sample results may take up to 2 weeks.
- Parameters to be sampled may vary depending on the area of excavation. Common parameters include total metals, leachable metals, PAHs, and hydrocarbons (*LEPH, HEPH*).
- EGD Management must approve stockpile areas.
- Soils which exceed the CCME Industrial Levels or BC CSR Industrial Levels: must be disposed of off site at an approved disposal facility.
- Soils which are below industrial standards: may remain on site if geotechnically suitable, if there is an identified use for the soil, and when approved by EGD Management.

3. Ensure contractors and employees are aware of the health and environmental risks associated with the suspected contaminated soils and have procedures in place to mitigate the risks. This includes adequate Personal Protective Equipment (PPE) and hygiene practices (e.g. no smoking, wear gloves).

ADEQUATE soil stockpile management. Soils placed on poly and covered.

INADEQUATE stockpile of contaminated soil. Soil should be covered to prevent exposure to elements, runoff and people.

Conducting Excavation

- Ensure appropriate PPE and hygienic precautions are in place to prevent exposure to contaminants in the soils.
- Monitor all excavations for visible soil contamination or archaeologically significant material.
- Ensure soil is stockpiled, sampled and analyzed in accordance with the Environmental Management Act and Contaminated Sites Regulation, and BC Ministry of Environment Technical Guidance Document 1, Site Characterization BC Government Technical Guidance on Contaminated Sites (*January 2009*).
- Ensure soils suspected of contamination are stockpiled on an impervious surface (*e.g. 6 mil PVC or plastic poly liner*) and adequately covered to prevent exposure to wind, storm water runoff or people. Stockpiles must not exceed 50m^3 in size.
- Imported fill material used for surfacing, backfilling or any other use must meet CCME Residential/Parkland (*RL/PL)* Land Usage Soil Quality Guidelines. Fill material information must be provided to and approved by EGD Management before being used on site.

After Excavation

- Ensure all soil is disposed of at a facility that is permitted to accept that material.
- Obtain all disposal records, including: waste manifests, weigh bills and disposal certificates from the receiver.
- Report the volume, analysis results, excavation details and dimensions and disposal records to EGD Management.
- Provide all as-builts and project drawings to EGD Management in the format compatible with the EGD drawing standards.

Archaeological Considerations

The EGD property and surrounding area has a rich First Nations history. There are Provincially Registered Archaeological Sites listed within the property boundaries of the EGD.

- All excavation projects must be reviewed and approved by EGD Management prior to work beginning.
- Depending on the scope of the project a detailed Archaeological Impact Assessment may be required.
- All Users, including contractors and employees working on excavation projects, must be made aware of the potential for archaeological chance finds. In the case where suspect archaeological material is discovered during excavation, work must stop in that area and EGD Management must be notified immediately.

Archaeological Overview Assessment

An Archaeological Overview Assessment was conducted for the EGD which outlines the archaeologically sensitive areas on the property and identifies areas of high archaeological potential.

Archaeological significant materials found during excavation projects at the facility include shell midden, artifacts, faunal and human remains.

Many archaeologically sensitive areas exist on the EGD Property.

First Nations archaeologists examine materials unearthed during excavations at EGD.

APPENDIX B

PWGSC Preliminary Hazard Assessment

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.109207.001
Location:	Esquimalt Graving Dock
Date:	October 10, 2020
Name of Departmental Representative:	Jon Siska
Name of Client:	PWGSC
Name of Client Project Co-ordinator	

Site Specific Orientation Provided at Project Location **Yes** **X** **No** ☐

Notice of Project Required **Yes** **X** **No** ☐

NOTE:
PWGSC requires "**A Notice of Project"** for all construction work related activities.

NOTE:
OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PWGSC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PWGSC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	**PWGSC, OGD's, or tenants**		**General Public or other contractors**		Note: When thinking about this pre-construction hazard assessment, remember a **hazard** is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the **risk** is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
	Yes	**No**	**Yes**	**No**	
Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	**X**		**X**		No natural gas services on site
Slip Hazards or Unsound Footing	**X**		**X**		
Working at Heights	**X**		**X**		
Working Over or Around Water	**X**		**X**		During docking operations only
Heavy overhead lifting operations, mobile cranes etc.	**X**		**X**		

Marine and/or Vehicular Traffic (site vehicles, public vehicles, etc.	X		X		
Fire and Explosion Hazards	X		X		
High Noise Levels	X		X		
Excavations	X		X		Active construction sites
Blasting		X		X	
Construction Equipment	X		X		
Pedestrian Traffic (site personnel, tenants, visitors, public)	X		X		
Multiple Employer Worksite	X		X		

Electrical Hazards					**Comments**
Contact With Overhead Wires		X		X	
Live Electrical Systems or Equipment	X		X		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions		X		X	
Earthquake	X		X		
Tsunami	X		X		
Avalanche		X		X	
Forest Fires		X		X	
Fire and Explosion Hazards	X		X		
Working in Isolation		X		X	None allowed on site.
Working Alone	X		X		
Violence in the Workplace	X		X		
High Noise Levels	X		X		
Inclement weather	X		X		
High Pressure Systems	X		X		
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces	X		X		Inside capstan pit is confined space. Service tunnels are restricted access.
Suspended / Mobile Work Platforms	X		X		
Other:					
Biological Hazards					
Mould Proliferations		X		X	
Accumulation of Bird or Bat Guano		X		X	
Bacteria / Legionella in Cooling Towers / Process Water		X		X	
Rodent / Insect Infestation		X		X	
Poisonous Plants		X		X	
Sharp or Potentially Infectious Objects in Wastes	X		X		Multiple employer workplace

Wildlife	X		X		Resident deer population
Chemical Hazards					
Asbestos Materials on Site	X		X		Refer to HAZMAT report.
Designated Substance Present		X		X	
Chemicals Used in work	X		X		Active ship repair facility
Lead in paint	X		X		Refer to HAZMAT report.
Mercury in Thermostats or Switches		X		X	
Application of Chemicals or Pesticides		X		X	
PCB Liquids in Electrical Equipment		X		X	
Radioactive Materials in Equipment		X		X	
Other:					
Contaminated Sites Hazards					
Hazardous Waste	X		X		Suspected contaminated soils
Hydrocarbons	X		X		Suspected contaminated soils
Metals	X		X		Suspected contaminated soils
Other:	X		X		Suspected contaminated soils

Security Hazards					**Comments**
Risk of Assault	X		X		Multiple employer workplace
Other:	X		X		Unauthorized entry to site
Other Hazards					

Other Compliance and Permit Requirements[1]	**YES**	**NO**	**Notes / Comments[2]**
Is a Building Permit required?		X	
Is a Electrical permit required?	X		**Obtain from Technical Safety BC**
Is a Plumbing Permit required?			**N/A**
Is a Sewage Permit required?			**N/A**
Is a Dumping Permit required?			**N/A**
Is a Hot Work Permit required?	X		**Obtain from EGD.**
Is a Permit to Work required?			**N/A**
Is a Confined Space Entry Permit required?	X		**Per WorksafeBC**
Is a Confined Space Entry Log required?	X		**Per WorksafeBC**
Discharge Approval for treated water required?			**N/A**

Notes:

(1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.

(2) TBD means To Be Determined by Service Provider.

Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.			
Service Provider Name			
Signatory for Service Provider		**Date Signed**	
RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			

APPENDIX C

Hazardous Materials Report, dated October 2020 Stantec

Stantec

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT—SITE REVIEW REPORT

Client:	Public Services and Procurement Canada	PSPC Project Number:	R.109207.001
Stantec Site Rep.:	Sean Brigden	Stantec Project #:	123221691
		Site Review Date:	October 7, 2020
Location:	Capstans South #1 and #2 Esquimalt Graving Dock – 825 Admirals Road, Esquimalt, BC	Issued Date:	October 28, 2020

Reference: **Capstans South #1 and #2 Replacement Project - Esquimalt Graving Dock, 825 Admirals Road, Esquimalt, BC**

Stantec Consulting Ltd. (Stantec) was retained by Public Services and Procurement Canada (PSPC) to complete a pre-renovation hazardous building materials assessment of capstans south #1 and #2 (subject structures) at the Esquimalt Graving Dock (subject facility) in support of a project that will involve replacement of the capstan components. Capstans south #1 and #2 were reportedly installed circa 1925.

Stantec understands that information pertaining to the identity, location and approximate extent of hazardous building materials (if any) within the subject structures is not on-file. Stantec further understands that a replacement project is planned that will require significant alterations/replacement of the components within capstans south #1 and #2, to improve their functionality and reliability (the Project):

PSPC commissioned this assessment as a measure of diligence in maintaining compliance with the following, as they pertain to identifying hazardous building materials in support of renovation projects:

- Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR)
- British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97)
- WorkSafeBC 2017 publication Safe Work Practices for Handling Asbestos (BC Asbestos Guide)
- PSPC June 5, 2017 Asbestos Management Standard (AMS) and Asbestos Management Directive (AMD)

STANDARDS, SCOPE AND METHODOLOGY

Site work was conducted in general compliance with the requirements of the COHSR, BC Reg. 296/97, the BC Asbestos Guide, the PSPC AMS and AMD, and Stantec's Safe Work Practices (SWPs).

Mechanical systems, structures and finishes associated with the subject structures were visually examined to determine the suspected presence of the following hazardous building materials, specifically pertaining to those components anticipated to be impacted by the Project:

- asbestos-containing materials (ACMs)
- lead, including lead-containing paints (LCPs)
- steel components that may have heavy metals that would require consideration for welding, grinding or torch cutting activities
- lubricants/grease and/or oily water that may require special consideration during the Project

Applicable standards for each of the hazardous building materials considered during this assessment are summarized below, along with the scope and methodology completed pertaining to those materials, during this assessment.

- Asbestos
  - The presence of asbestos in federal workplaces and pertaining to federally regulated workers is governed by the COHSR. According to the COHSR, ACM means:
    - Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.
  - The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. According to the current version of BC Reg. 296/97, ACM means:
    - Any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos
  - As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the subject structures, and as the provincial regulations have a more stringent definition of ACM, and generally include the requirements noted in the COHSR, this assessment was conducted to meet the requirements of BC Reg. 296/97
  - Where observed, samples were collected from each “homogenous application” of suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) that are anticipated to be impacted by the Project. Samples were submitted to EMSL Canada Inc. (EMSL) in Mississauga, ON for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 analytical method “Asbestos (bulk) by PLM.” EMSL’s analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).
  - The number of samples collected for each homogenous application of a suspected ACM was based on the recommendations provided in the BC Asbestos Guide, along with the assessor’s experience and understanding of the consistency of the observed building material applications.
    - When asbestos is detected in concentrations greater than half of one percent in one of the samples within a set that was collected to represent a “homogenous application” of a particular material (or detected in any concentration, in a set of samples collected for applications of vermiculite), the entire sample set, and the entire application of that material is then considered to be an ACM.
- Lead
  - Under the COHSR and BC Reg. 296/97, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. The occupational exposure limit (OEL) for airborne lead dust or fumes per both regulatory instruments should not exceed the time-weighted average value of 0.05 milligram per cubic metre of air (mg/m^3). The OEL represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.
  - WorkSafeBC has published the following document, which is intended to provide guidelines for managing lead exposures within applicable limits during renovation or demolition work, and which would meet the requirements of both the COHSR and BC Reg. 296/97:
    - Safe Work Practices for Handling Lead, 2017 (BC Lead Guide)
  - In Canada, the *Surface Coating Materials Regulations* (SOR/2005-109) under the federal *Hazardous Products Act* provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country (90 parts per million, or “ppm”). However, it is important to note that this regulation does not comment on the potential occupational exposure if the material is disturbed.

- With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:
  - The improper removal of lead paint containing 600 mg/kg (equivalent to “parts per million” or “ppm”) lead results in airborne lead concentrations that exceed half of the exposure limit.
    - This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
  - Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children.
    - Any risk assessment should include for the presence of high risk individuals within the workplace.
- In addition to the above, the BC Lead Guide indicates the following:
  - Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.
- When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this building/structure/site during building material alteration activities (i.e., renovation) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation
- Further, using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97. In addition, the following information is provided in the Lead Guideline:
  - Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).
  - Given this information and that the analytical detection limit for lead paint analysis is 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut represents a potential lead exposure hazard.
- Samples of suspected LCPs were collected from major paint applications. The sampling of paint applications involved the collection of paint chip samples of paint layers to the substrate, where possible. Samples collected were submitted to EMSL in Mississauga, ON for analysis of total lead content using EPA Method SW 846 3050B*/7000B. EMSL’s analytical laboratory is also accredited by the AIHA Environmental Lead Laboratory Approval Program (ELLAP).

- Other items
  - As requested by PSPC, assessment for the presence of the following was completed through visual means:
    - steel components that may have heavy metals that would require consideration for welding, grinding or torch cutting activities
    - lubricants/grease and/or oily water that may require special consideration.

ASSESSMENT FINDINGS

Observations made, and results of samples collected on October 7, 2020 are summarized in the table below.

Area	Hazardous Material Considered	Observation	Photographs	Samples Collected	Analytical Results
Capstan South #2 (pit)	Asbestos	Suspected ACM – Plate/cover adhesive on north, sound and east edges Anticipated to be impacted by the Project Anticipated to be similar product used on Capstan South #1		A-01A A-01B A-01C	No asbestos detected
Capstan South #2 (pit)	Asbestos	Suspected ACM – Sealant/putty on anchor point (north wall) Anticipated to be impacted by the Project Anticipated to be similar product used on Capstan South #1		A-02	**4.4% Chrysotile** **(Confirmed ACM)**
Capstan South #2 – Dis-assembled parts	Asbestos	Suspected ACM – Red rubber gasket (lower arrow) and "Thermoseal" gasket (top arrow) in disassembled parts (general) Anticipated to be impacted by the Project Anticipated to be similar products used on Capstan South #1		A-03 (red gasket) A-04 (Thermoseal gasket)	No asbestos detected

Capstans South #1 and #2 Replacement Project - Esquimalt Graving Dock, 825 Admirals Road, Esquimalt, BC

Area	Hazardous Material Considered	Observation	Photographs	Samples Collected	Analytical Results
Capstan South #2 – Dis-assembled parts	Asbestos	Suspected ACM – Thread sealant on disassembled parts (vent pipe on gear cover) Anticipated to be impacted by the Project Anticipated to be similar product used on Capstan South #1		A-05	No asbestos detected
Capstan South #1	Lead in paint	Suspected LCP – Bright yellow on cap (top arrow) and yellow stripes (bottom arrow) on lower portion on steel capstan Anticipated to be impacted by the Project Anticipated to be similar products used on Capstan South #2		P-01 (cap) P-02 (stripes)	**2,600 ppm (cap, confirmed LCP)** **14,000 ppm (stripes, confirmed LCP)**
Capstan South #1	Lead in paint	Suspected LCP – Grey on steel decking Anticipated to be impacted by the Project Anticipated to be similar product used on Capstan South #2		P-03	**<850 ppm (presumed LCP)**

Area	Hazardous Material Considered	Observation	Photographs	Samples Collected	Analytical Results
Capstan South #2 (pit)	Lead in paint	Suspected LCP – Red on interior steel wall (left arrow) and red on main cylinder (right arrow) Anticipated to be impacted by the Project Anticipated to be similar products used on Capstan South #1		P-04 (wall) P-05 (cylinder)	**440,000 ppm (wall, confirmed LCP)** **71,000 ppm (cylinder, confirmed LCP)**
Capstan South #2 – Dis-assembled parts	Lead in paint	Suspected LCP – Red/beige on steel gear cover Anticipated to be impacted by the Project Anticipated to be similar product used on Capstan South #1		P-06	**140,000 ppm (confirmed LCP)**

Area	Hazardous Material Considered	Observation	Photographs	Samples Collected	Analytical Results
Capstans South #1 and #2	Steel components (heavy metals)	Primary components and structures in and around (covering) the pits for each capstan appear to be comprised primarily of steel	 	N/A	N/A
Capstan South #1	Lubricants, grease and/or oily water	Limited oil/grease observed on the floor of the capstan pit – absorbent pads laid out to address this material		N/A	N/A

Area	Hazardous Material Considered	Observation	Photographs	Samples Collected	Analytical Results
Capstan South #2 (pit)	Lubricants, grease and/or oily water	Oily water – expected to be rainwater that has fallen on surfaces with resicual oil and grease) observed wihtin the main cylinder. Remaining surfaces appear to have minor surficial grease/oil residue mixed with particulate (soil, rust, etc.)			

The certificates of analysis for the samples submitted as part of this assessment, as provided by EMSL, are attached to this document, for reference.

CONCLUSIONS AND RECOMMENDATIONS

In summary, the following hazardous building materials that are anticipated to be impacted by the Project were identified through this assessment:

- Asbestos
  - Capstan South #2 – confirmed ACM
    - Sealant/putty on anchor point (north wall). Similar material is expected to be present in similar application in Capstan South #1
- Lead
  - Confirmed LCPs, presumed to be common products used within both Capstan South #1 and #2
    - Bright yellow cap on steel capstan.
    - Lower yellow stripes on steel capstan.

    - Grey on steel decking (presumed LCP – additional testing may indicate lead content to be less than 600 ppm. Paint extremely well adhered to surface).
    - Red on interior steel wall.
    - Red on main cylinder.
    - Red/beige on steel gear cover.
- Primary components and structures in and around (covering) the pits of both Capstans South #1 and #2 appear to be comprised primarily of steel
- Residual oil/grease is present on the surfaces within the pits of both Capstans South #1 and #2

Based on the above, the following recommendations are provided as they pertain to the Project:

- Asbestos
  - ACMs that may be impacted during the Project should be handled (altered, removed and/or disposed of) by appropriately trained personnel (e.g., asbestos abatement contractor personnel), in accordance with the requirements of the COHSR, BC Reg. 296/97 and the BC Asbestos Guide.
  - Suspected ACMs deemed visually similar to the ACMs identified in this report should be considered asbestos-containing and handled as such, unless proven otherwise, through analytical testing.
  - Should a material suspected to contain asbestos fibres become uncovered during renovation or other activities, all work in the areas that may disturb the material should be stopped, and the material should be considered ACM and handled as such, unless proven otherwise through analytical testing.
  - Ensure asbestos containing waste is handled, stored, transported and disposed of in accordance with the requirements of the Federal Transportation of Dangerous Goods Regulation and the British Columbia Hazardous Waste Regulation (BC Reg. 63/88).
- Lead
  - When paints associated with the subject structures are to be disturbed and/or removed, including in instances where paint chip debris is removed and/or paint debris is created, ensure compliance with the following:
    - exposure protection requirements of the COHSR and BC Reg. 296/97, including the provisions of the Lead Guideline
    - transportation and disposal requirements of BC Reg. 63/88
    - transportation requirements of the Federal Transportation of Dangerous Goods Regulation
  - Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the COHSR and BC Reg. 296/97 eight-hour occupational exposure limit (OEL) of 0.05 mg/m^3 during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust.
  - Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.
    - Any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or tasks-specific risk assessment and safe work practices are developed by a qualified person.
  - Ultimately, the Contractor is responsible to review the work tasks required and the ways in which materials (including those coated with paints that may contain lead in varying concentrations) will be impacted, as well as the individuals that will be present in the immediate vicinity of the work (i.e., potential for high-risk individuals) in order to determine the appropriate personal protective equipment (PPE—including respirators and protective clothing), containment and/or decontamination measures and work procedures that should be followed to protect workers from lead exposure.

- Given that components of the subject structures appear to be primarily comprised of steel, appropriate precautions should be taken (in accordance with applicable industry standards and guidelines) should welding, torch cutting or grinding of surfaces be required as part of the project.
- Measures should be taken to clean-up/remove residual oil, grease and/or lubricants, including water that is contaminated by those materials, during the Project. Oily water and soiled absorbents/waste should be disposed of in accordance with applicable environmental protection regulations.

SITE REVIEW LIMITATIONS

This report has been prepared for general information purposes to support the Project. In preparation of this report, Stantec used professional judgment based on experience. The work was conducted in accordance with generally accepted professional standards. Stantec relied on information gathered during the site investigation and laboratory analytical reports.

This report reflects the observations made within accessible and accessed portions of the subject structures, and the results of analyses performed on the specific material sampled during the assessment. Analytical results reflect the sampled material at the specific sample locations.

This report has been prepared for the exclusive use of PSPC, for the purpose of assessing general conditions pertaining to the work planned within the subject structures as described by PSPC. Any use that a third party makes of this report, or reliance on, or decisions to be made on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

PHYSICAL AND SAMPLING LIMITATIONS

Sampling was conducted pertaining only to suspected ACMs and suspected LCPs. The assessment for the presence of other materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible spaces only.

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas and limitations associated with working in occupied/operational spaces, there are specific limitations to the information that can be provided regarding each hazardous building material considered in this assessment, as outlined below.

- Building materials that may contain asbestos but were not accessible for sampling include, but are not limited to the following:
  - materials in capstan south #1 pit – identified as a confined space, expected to be similar to the disassembled parts of capstan south #2
- Samples of paint applications suspected to contain lead were collected from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour were presumed to be the same, regardless of differing sub surface paints, if any.
- In general, the assessment for the presence of hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible accessed spaces only. Additional hazardous building materials are potentially present in inaccessible areas not assessed including, but not limited to: ceiling spaces, wall cavities as well as buried materials.

CLOSING

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this document, we request that we be notified immediately to reassess the information provided herein.

We trust that the document meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Regards,

Stantec Consulting Ltd.

Field report prepared by:

Zack Kranjec Dipl. T. (Env.)
Senior Technologist
Phone: 604-363-1227
Zack.Kranjec@stantec.com

Keith Irwin Dipl. Tech.
Team Lead
Phone: 604-369-0055
Keith.Irwin@stantec.com

Sean Brigden B.Sc., P.B.Dipl., CRSP
Senior Associate
Phone: 250-655-6062
Sean.Brigden@stantec.com

Attachments: Attachment 1: Laboratory Certificate of Analysis—Bulk Samples for Asbestos Analysis (EMSL) – 2 pages
Attachment 2: Laboratory Certificate of Analysis—Paint Chip Samples for Lead Analysis (EMSL) – 1 page

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

EMSL Canada Order 552012989
Customer ID: 55JACQ30NN
Customer PO: 123220469
Project ID:

Attn: Sean Brigden
Stantec Consulting Ltd.
400 - 655 Tyee Road
Victoria, BC V9A 6X5

Phone: (250) 389-2346
Fax:
Collected:
Received: 10/09/2020
Analyzed: 10/16/2020

Proj: 123221691

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: A-01A ***Lab Sample ID:*** **552012989-0001**
Sample Description: Plate/cover adhesive

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Brown	0.0%	100%	None Detected	

Client Sample ID: A-01B ***Lab Sample ID:*** **552012989-0002**
Sample Description: Plate/cover adhesive

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Brown	0.0%	100%	None Detected	

Client Sample ID: A-01C ***Lab Sample ID:*** **552012989-0003**
Sample Description: Plate/cover adhesive

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Brown	0.0%	100%	None Detected	

Client Sample ID: A-02 ***Lab Sample ID:*** **552012989-0004**
Sample Description: Sealant/Putty

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Brown	0.0%	95.6%	**4.4% Chrysotile**	

Client Sample ID: A-03 ***Lab Sample ID:*** **552012989-0005**
Sample Description: Red rubber gasket

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Red	0.0%	100%	None Detected	

Client Sample ID: A-04 ***Lab Sample ID:*** **552012989-0006**
Sample Description: Thermoseal gasket

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	White	0.0%	100%	None Detected	

Client Sample ID: A-05 ***Lab Sample ID:*** **552012989-0007**
Sample Description: Thread sealant

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	10/16/2020	Tan	0.0%	100%	None Detected	

EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com

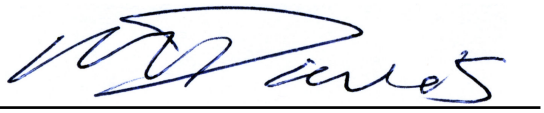
EMSL Canada Order 552012989
Customer ID: 55JACQ30NN
Customer PO: 123220469
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Analyst(s):

Stephanie Achaiya	PLM Grav. Reduction (6)
Tiffany Pilon	PLM Grav. Reduction (1)

Reviewed and approved by:



Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Report amended: 10/16/202015:58:05 Replaces initial report from: 10/16/202014:57:55 Reason Code: Client-Change to Sample ID

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552012882
CustomerID:	55JACQ30NN
CustomerPO:	123221691
ProjectID:	

Attn: **Sean Brigden**
Stantec Consulting Ltd.
400 - 655 Tyee Road
Victoria, BC V9A 6X5

Phone: (250) 389-2346
Fax:
Received: 10/9/2020 10:40 AM
Collected: 10/7/2020

Project: **123221691**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
P-01 *552012882-0001*	10/7/2020	10/9/2020 Site: Capstan S#1 Desc: Bright yellow cap on steel capstan	0.1217 g	160 ppm	2600 ppm
P-02 *552012882-0002*	10/7/2020	10/9/2020 Site: Capstan S#1 Desc: Lower yellow stripes on steel capstan	0.0939 g	430 ppm	14000 ppm
P-03 *552012882-0003*	10/7/2020	10/9/2020 Site: Capstan S#1 Desc: Grey on steel decking Insufficient sample to reach reporting limit.	0.0235 g	850 ppm	<850 ppm
P-04 *552012882-0004*	10/7/2020	10/9/2020 Site: Capstan S#2 Desc: Red on interior steel wall	0.0486 g	21000 ppm	440000 ppm
P-05 *552012882-0005*	10/7/2020	10/9/2020 Site: Capstan S#2 Desc: Red on main cylinder	0.2473 g	4000 ppm	71000 ppm
P-06 *552012882-0006*	10/7/2020	10/9/2020 Site: Capstan S#2 Desc: Red/beige on steel gear cover	0.2416 g	4100 ppm	140000 ppm

Rowena Fanto, Lead Supervisor
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 10/16/2020 09:37:06

APPENDIX D

EGD Standard for Surveys

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Revised 2012-02-28

1. INTRODUCTION

This standard is written to provide the British Columbia Land Surveyor (BCLS) a guideline for producing acceptable topographic survey for all EGD projects.

2. APPLICATION OF THE STANDARD

This standard applies to surveys that are intended to show new installation of structures, utilities and underground conduits including the existing structures, utilities and underground conduits in the vicinity of the project and as requested by EGD Representative.

The Surveyor in making topographic surveys uses accepted terrestrial and/or GPS surveying methods. Topographic surveys that additionally depict the location of property lines must also be in compliance with the current standard for property surveys and show all legal boundary evidence found.

3. DEFINITIONS

1) Benchmark (control point) is a relatively permanent material object, natural or artificial, bearing a marked point whose elevation above or below an adopted datum is known and whose horizontal coordinates are known in an accepted coordinate system (UTM NAD 83 CSRS Zone 10).
2) A Contour is an imaginary line on the ground, all points of which are of the same elevation above or below a specified datum.
3) The Parcel is the area designated by an EGD Representative and is usually, but not necessarily, given by a legal description of the property.
4) Utilities are services provided by governmental and private entities that provide the following: electric power, telephone, water, sanitary and storm sewer, gas, etc.
5) Acronyms and Definitions:
    - BCLS: British Columbia Land Surveyor
    - EGD: Esquimalt Graving Dock
    - NEZ: Northing, Easting, Elevation – Coordinates
    - PBM: Permanent Benchmark (Control point)
    - TBM: Temporary Benchmark (Control point)
    - Headwall: concrete wall structure on top of or on each side of culvert.

4. RESEARCH AND INVESTIGATION

1) The Surveyor shall acquire the elevation and datum of all benchmarks to be used in the survey. The elevation used shall be based on a nationally accepted datum whenever practical or unless otherwise instructed by an EGD Representative. The EGD Representative shall specifically describe the parcel to be surveyed.
2) At least four (4) benchmarks shall be established using Global Positioning System and electronic survey total stations, in which the position of all survey works and detected objects shall relate.
3) The benchmarks shall be established on stable ground within 6 m (20 ft) adjacent to the project site or as directed by EGD Representative. The benchmarks shall have reference numbers, coordinates and heights above the established datum (geodetic and/or chart datum).

5. THE SURVEY

The survey shall be performed on the ground to obtain the information required in this standard and any additional information requested by EGD. The Surveyor shall select the equipment and procedures necessary to obtain the horizontal and vertical positional accuracy required by these standards.

6. DATA

The surveyor shall locate and show on the survey map the following information:

1) The location of permanent structures including retaining walls and culverts.
2) The location of street or road paving, entrances, driveway openings and sidewalks.
3) Elevations on the top of curbs, gutters and sidewalks.
4) EGD building numbers assigned to the parcel.
5) North arrow and scale of drawing.
6) Legend depicting the symbols and abbreviations used on the drawing.
7) Provide buildings footing corners, exterior corners, roof line corners and main floor elevations of all required building listed in Appendix A.
8) Location and elevation of existing structures, utilities, underground conduits or drainage courses on or near the surveyed parcel.

9) Schedule of all benchmarks with the reference numbers coordinates (UTM NAD83 CSRS Zone 10) and heights above the established datum (geodetic and/or chart). Description and location of the benchmarks shall also be submitted.

10) Original copy of the survey field logbooks or electronic logbook printouts data duly endorsed by the British Columbia Land Surveyor. All survey data from field logbooks or electronic notebooks shall include and clearly indicate corrections or errors done during surveying work.

11) Certificates showing that the surveying equipment used have been calibrated in the last twelve (12) months shall also be attached. These certificates shall also be submitted prior to start of work.

12) The surveyor map grid coordinate system shall be based on NAD 83 (North American Datum) UTM Zone 10.

13) Levels related to established datum (geodetic and/or chart).

14) All other items listed in **Appendix A**.

7. POSITIONAL ACCURACY

The following relative positional accuracies are provided as a guide for surveys.

	Vertical Positional Accuracy Feet	**Horizontal Positional Accuracy Feet**
Contour line 300 mm (1') interval	± 200 mm (0.65 ft)	± 300 mm (1 ft)
Contour line 600 mm (2') interval	± 400 mm (1.30 ft)	± 600 mm (2 ft)
Contour line 1.2 m (4') interval	± 800 mm (2.60 ft)	± 1.200 m (4 ft)
Contour line 1.5 m (5') interval	± 1.000 m (3.20 ft)	± 1.200 m (4 ft)
Contour line 3.0 m (10') interval	± 2.000 m (6.50 ft)	± 2.400 m (8 ft)
Floor elevations	± 10 mm (0.05 ft)	± 300 mm (1 ft)
Spot paving elevations	± 10 mm (0.05 ft)	± 300 mm (1 ft)
Spot ground elevations	± 50 mm (0.20 ft)	± 600 mm (2 ft)
Sewer invert elevations	± 10 mm (0.05ft)	± 300 mm (1 ft)
Underground utilities/conduits	± 10 mm (0.05ft)	± 300 mm (1 ft)
All underground services/structure	± 10 mm (0.05ft)	± 300 mm (1 ft)

Positional Accuracy is given at the 95 percent confidence level.

8. ELECTRONIC DATA DISTRIBUTION

Surveyor to provide the survey data in an AutoCAD 2012 or 2010 .dwg drawing file. The surveyor shall also provide a signed and sealed hard copy drawing. This drawing shall be the official map and shall be deemed to be correct and superior to the electronic data.

The electronic data file shall also contain a statement that the file is not a certified document and that the official document was issued and sealed by (*name and commission number of the BCLS*) on (*date*). Surveyor to also provide a table of the survey points data (NEZ) in electronic format (MS Excel, MS Word or PDF).

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Appendix A - ITEMS TO BE INCLUDED IN SURVEY

Revised 2012-02-28

The following items marked with an **(X)** are to be included in the survey:

( ) Boundary survey of the parcel.

( ) Plot the location of easements and rights-of-way as shown on the recorded subdivision subdivision plan and all easements evidenced by a recorded document provided by EGD. The plan or document number of each shall be shown.

( ) Vicinity map with subject property highlighted.

( ) Observable evidence of recent earth moving work, borrow or fill.

( ) Cross-section of offsite drainage courses for engineering studies.

( ) Spot elevations covering the entire survey limits showing high points, low points, grade changes, and at sufficient intervals to represent the general character of the terrain. Existing contours shall be drawn with major contour lines at 10m (25') intervals and minor contour lines at 2m (5') intervals unless otherwise noted.

( ) Elevations at the inside of walk, top of curb, and gutter at approximately one inch 3cm (1") intervals at the final map scale.

( ) Dimensions of curb, sidewalk, and gutter lines or ditch lines and centerline of all streets, alleys or roads adjoining the parcel. Indicate type of paving surface and condition.

( ) Location, width and elevation at both ends of all existing sidewalks. Include a description of the kind and general condition of the sidewalk.

( ) Location, diameter, and species of all trees over 10 cm diameter.

( ) Perimeter outline only of thickly wooded areas unless otherwise directed.

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Appendix A - ITEMS TO BE INCLUDED IN SURVEY

Revised 2012-02-28

(X) Electric utilities – the location of:

- ( ) power poles – 1 point at ground elevation
- ( ) power poles – 1 point at top of pole elevation
- ( ) guy wires – 1 points
- ( ) anchors – 1 points
- (X) Rectangular junction/pull boxes – 4 corners
- ( ) Round junction/pull boxes – cover center
- (X) Underground conduits – all tie-ins (existing or new) and change of directions
- (X) vaults – 4 corners

( ) Storm, sanitary or combined sewers – the location of:

- ( ) manholes – cover center
- ( ) culverts – 2 centreline measurements to show direction of flow
- ( ) headwalls – 4 corners
- ( ) catch basins – 4 corners + 1 centre measurement at gutter line
- ( ) clean-outs – center point
- ( ) Include elevations of the top and bottom of manholes, culverts, headwall and catch basins.
- ( ) Show type, size, and direction of flow and invert elevation of all pipes or culverts.

( ) Water – the location of:

- ( ) all water valves – center point
- ( ) standpipes – center point
- ( ) regulators – center point
- ( ) fire hydrants – 1 point at ground elevation
- ( ) fire hydrants – 1 point at top of hydrant elevation

( ) Gas – the location of:

- ( ) all valves – center point
- ( ) meters – center point
- ( ) gas line markers – center point
- ( ) Show elevation on top of any valves.

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Appendix A - ITEMS TO BE INCLUDED IN SURVEY

Revised 2012-02-28

( ) Telephone – the location of:

- ( ) all poles – 1 point at ground elevation
- ( ) all poles – 1 point at top of pole elevation
- ( ) manholes – center point
- ( ) Rectangular junction/pull boxes – 2 opposite corners
- ( ) Round junction/pull boxes – cover center

( ) Street/Roads – the location of:

- ( ) all lamp poles – 1 point at ground elevation
- ( ) all lamp poles – 1 point at top of pole elevation
- ( ) Rectangular junction/pull boxes – 4 corners
- ( ) Round junction/pull boxes – cover center
- ( ) road cross-section: Survey spot levels along cross-sections at maximum 5m (15') intervals up to 30m (100') beyond the edges of the road shoulder. The interval of the spot levels shall be varied based on the condition at site. If required, closer spacing shall be surveyed where the terrain is not uniform such as deep gullies and creek areas.

( ) Heating – the location of:

- ( ) steam manholes – center point
- ( ) vaults – 4 corners

( ) Location and dimensions of:

- ( ) tanks – 2 opposite corners minimum
- ( ) fences – corners/gates + changes of direction
- ( ) fences cross-section: Survey spot levels along cross-sections at maximum 5m (15') intervals up to 30m (100') beyond the edges of the fences lines. The interval of the spot levels shall be varied based on the condition at site. If required, closer spacing shall be surveyed where the terrain is not uniform such as deep gullies and creek areas.
- ( ) obstructions – 2 opposite corners minimum

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Appendix A - ITEMS TO BE INCLUDED IN SURVEY

Revised 2012-02-28

Esquimalt Graving Dock (EGD)
STANDARDS FOR SURVEYS

Appendix A - ITEMS TO BE INCLUDED IN SURVEY

Revised 2012-02-28

(X) Existing buildings – the location of:

- (X) Building 3000 (all four corners at base)
- (X) Building 3005 (all four corners at base)
- (X) Building 3060 (all four corners at base)
- (X) Building 3070 (all four corners at base)
- ( ) _____
- ( ) _____

( ) Location and description of any building or major structure on adjoining land that is not more than _____ feet outside the parcel being surveyed.

(X) Other – the location of:

- (X) Capstan #1 South – four corners
- (X) Capstan #2 South – four corners
- (X) Location of new panel/kiosk – 4 corners at base
- (X) Stop #2 at drydock – all outside and inside corners at roadway level
- (X) Stop #3 at drydock – all outside and inside corners at roadway level
- (X) Edge of drydock at 2 locations either side of Stop #2 and Stop #3
- (X) Edge of South Jetty west of Stop #1 – 2 locations within 10m of Stop #1
- ( ) _____
- ( ) _____
- ( ) _____
- ( ) _____
- ( ) _____