Public Works and Government Services Canada

Requisition No: _____

DRAWINGS & SPECIFICATIONS
for

Pedestrian Walkway Extension Lot B1, Esquimalt Graving Dock, Victoria, BC

Project No.: R.106346.001
March 2020

APPROVED BY:

Paul, Preetipal
Digitally signed by: Paul, Preetipal
DN: CN = Paul, Preetipal C = CA O = GC OU = PWGSC-TPSGC
Date: 2020.09.15 13:11:05 -07'00'

Regional Manager, ___ _____ Date

Kingsley, Jeff
Digitally signed by: Kingsley, Jeff
DN: CN = Kingsley, Jeff C = CA O = GC OU = PWGSC-TPSGC, GTIS-SGTI
Date: 2020.09.15 07:21:22 -07'00'

Construction Safety Coordinator _____ Date

TENDER:

Leonard, Seth
Digitally signed by: Leonard, Seth
DN: CN = Leonard, Seth C = CA O = GC OU = PWGSC-TPSGC
Date: 2020.09.21 09:31:31 -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

SPECIFICATIONS **# of Pages**

DRAWINGS – Bound Separately

C100	Site Plan
E100	Electrical Site Plan, Construction Notes, and Details

END OF SECTION 00 00 01

Civil items only
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
E. B. PAICE
38252
2020-09-29

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. G. EMERY
29024
2020-09-28
for Structural Scope

Electrical Scope
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. RITCHIE
46836
2020-09-28

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 The work is located along the driveway north and west of the Seaspan/VSL Purchasing Office (Building 2001) and adjacent to parking area Lot B1, at the Esquimalt Graving Dock, 825 Admirals Road, Victoria, BC.

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

.1 Line painting for a pedestrian walkway, continuing from the existing end of painting west of Lot B1.

.2 Subsurface work including rock removal, minor grading, and installation of crushed gravel base and subbase layers.

.3 Paving and widening of the drive aisle near a minor park area.

.4 Installation of new street lights and lighting ducts.

.5 Construction of a concrete staircase leading from the drive aisle to the Seaspan/VSL Purchasing Office (approximately 3.5m elevation difference).

.6 Extension of a walkway along this alignment.

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

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

.1 Agreement

.2 Addenda

.3 Supplementary Specifications

.4 Specifications

.5 Drawings

.6 Supplementary Detailed Drawings

.7 Standard Detailed Drawings

.8 Executed Form of Tender

.9 Instructions to Tenderers

.10 All other Contract Documents;

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

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

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

1.5 OTHER CONTRACTS

.1 Further Contracts on the overall EGD site 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 fourteen (14) weeks after Contract Award.

1.8 HOURS OF WORK

.1 Restrictive as follows:

.1 Schedule deconstruction, removal and construction 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, and receiving approval from, the 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 other site 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 Coordinate all work activities on the Contractor’s work site, including the work of other contractors engaged by Departmental Representative.

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

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

.5 Do not enter any area of the 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 PWGSC 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 an independent testing service or laboratory 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 48 hours 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 30 - 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 The Esquimalt Graving Dock is a secure site and public access is not permitted. The Contractor will only be able to visit the site during the tender site meeting.

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 information in SI Metric units.

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

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and 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 will be considered rejected.

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

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

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

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

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

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

1.2 SHOP DRAWINGS

.1 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 PROGRESS PHOTOGRAPHS AND FINAL PHOTOGRAPHS

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

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

.3 Progress and Final Photographs to be submitted using an electronic file share platform acceptable to PWGSC.

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

.5 Submit final photographs with as-built documents.

END OF SECTION 01 33 00

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, Provincial Regulations, and EGD site specific COVID-19 Procedures.

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 NMS Section 00 10 10 Specification Index (Appendix X thru Appendix X)

.9 Esquimalt Graving Dock (EGD) Contractors Safety Booklet (as amended)

1.2 RELATED SECTIONS

.1 Refer to the current NMS sections as indicated in Section 001010 Specification Index, including Appendices.

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 30.

.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 Material Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS 2015) requirements.

.5 Emergency Response Plan and Emergency Evacuation Plan and 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.

.4 All contractor workers shall attend an EGD Safety Orientation prior to ant work starting.

.5 The contractor is responsible for reviewing the Esquimalt Graving Dock (EGD) Contractors Safety Handbook and ensuring that the Site Specific Safety Plan and/or Health and Safety Plan are harmonized with the EGD Contractors Safety Handbook.

1.7 HEALTH AND SAFETY COORDINATOR

.1 The contractor must 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 night time 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 PWGSC and other Federal employees,

.2 EGD (federal) operational staff,

.3 Ship repair and other contractors,

.4 Work over and under water, Protection Against Drowning, Refer to COHS Section A Part X11-Safety Materials, Equipment, Devices and Clothing – Section 12.11 inclusive.

.5 Overhead cranes,

.6 Work at heights, **(2.4m on Federal Property)**

.7 Unpredictable weather conditions,

.8 Threat of tsunami and earthquake,

.9 Confined space and restricted access space,

.10 Work with hazardous substances, and

.11 Refer to PWGSC Preliminary Hazard Assessment Appendix A

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 (.1) above, the authorities having the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.12 WORK PERMITS

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

1.13 FILING OF NOTICE

.1 The General Contractor shall file Notice of Project with Provincial authorities prior to commencement of work. (All PWGSC construction projects require a Notice 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 all project work sites. Identify any known and potential health risks and safety hazards.

.2 Develop, implement, and enforce a Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP) based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

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

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

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

.11 COVID 19 Protocols and Procedures (National, Provincial and EGD Site Specific)

.12 EGD Contractors Safety Handbook

.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. WHMIS 2015 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 site specific safety plan or health and/or safety plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Site Specifc 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 and Other PWGSC staff as required. (reference: EGD Contractors Safety Handbook)

.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 and PWGSC site staff.

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

.1 Work at high angles.

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

.3 Work with hazardous substances.

.4 Underground work.

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

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

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

.5 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.

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

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 as per Section 01 33 30.

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

.3 Provide adequate means of ventilation in accordance with Section 00 01 10.

.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 site.

1.17 OFF SITE CONTINGENCY and EMERGENCY RESPONSE PLAN

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

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

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

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

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

(a) where materials are kept on site for less than 15 days if the employer ensures an alternative effective means for notification of fire departments is in place in the event of fire or other emergency, or

(b) which is not within the service area of a fire department. [Amended by B.C. Reg. 30/2015, effective August 4, 2015.]

1.18. PERSONAL PROTECTIVE CLOTHING and EQUIPMENT

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

1.19 ASBESTOS HAZARD

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

.2 Removal and handling of asbestos shall be in accordance with current applicable Provincial / Federal Regulations (as amended)

1.20 PCB REMOVALS

.1 Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.

.2 Remove, handle, transport and dispose of as indicated in Section 000110 specification index.

1.21 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.

1.22 SILICA

.1 Carry out work in accordance with Worksafe BC regulations.

1.23 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.

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

1.24 ELECTRICAL LOCKOUT

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

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

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

4. Comply with EGD Lockout Policy and Procedures (as amended)

1.25 OVERLOADING

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

1.26 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) (as amended)

1.27 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)

1.28 CONFINED SPACES

.1 Carry out work in compliance with current Worksafe BC Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space.

1.29 RESTRICTED ACCESS

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

1.30 CONFINED SPACE AND RESTRICTED SPACE OUTSIDE OF DEFINED WORK SITE

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

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

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

1.31 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.

1.32 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 Coordinate all hot work with Departmental Representative through the contractors' hot work permit system. Hot Work permits are a mandatory requirement for any hot work activities.

1.33 FIRE SAFETY REQUIREMENTS

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

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

1.34 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.

1.35 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.

1.36 BLASTING OPERATIONS

.1 All blasting operations shall be in accordance with Worksafe BC OHS Regulation Part 21 – Blasting Operations.

1.37 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. Must be posted in a non-inmate access area and locked up when not being used.

.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 Safety Data Sheets (SDS) 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.

1.38 MEETINGS

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

1.39 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.

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 INSPECTION

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

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

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

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

1.2 INDEPENDENT INSPECTION AGENCIES

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

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

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

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

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

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

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

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

1.5 REJECTED WORK

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

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

1.6 REPORTS

.1 Submit 2 copies of inspection and test reports to Department Representative within one week of completing the work.

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

END OF SECTION 01 45 00

PART 1– GENERAL

1.1 GENERAL

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

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

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

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

1.2 SUBMITTALS

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

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

1.3 TEMPORARY ACCESS ROADS

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

1.4 TEMPORARY PARKING AREAS

.1 Parking will be permitted within the contractor’s work area only. Parking outside of the contractor’s work area is not permitted.

1.5 TRAFFIC CONTROL

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

.2 Regulate traffic in general accordance with Esquimalt Graving Dock requirements for uninterrupted access to all parts of this site except where specified otherwise and in compliance with specific requirements stipulated herein. Specific to this requirement, note that the “Parking Lot C” is leaseholder parking. Access to parking lot must remain open at all times.

.3 Access to Parking Lot B must remain open at all times.

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

.5 Provide and maintain reasonable road access and egress to tenants fronting along or in vicinity of work under contract unless approved otherwise by Departmental Representative.

.6 One-way alternating traffic with flaggers present at all times is required during work for this project. Due to the existing grades and configuration, both directions can be considered “blind” roads and flagging is required. Do not close any lanes of road or highway without prior approval of the Departmental Representative. Before re-routing traffic erect suitable signs and devices as approved by the Departmental Representative. Provide sufficient crushed gravel to ensure a

smooth riding surface during work. Replace surface asphalt within one week of completing the trench backfilling.

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

.8 When directed by Departmental Representative, provide well graded, graveled detours or temporary roads to facilitate passage of traffic around restricted construction area. Provide and maintain signs and lights and maintain roadway.

.9 When working on travelled way:

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

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

.3 Do not leave equipment on travelled way overnight.

.10 Traffic Control Informational and Warning Devices

.1 Meet with Departmental Representative prior to commencement of work to prepare list of signs and other devices required for project.

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

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

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

.5 Continually maintain traffic control devices in use by:

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

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

.11 Control of Traffic Using Flaggers

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

.1 When graving dock traffic is required to pass working vehicles or equipment which may block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic signal system is not in use.

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

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

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

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

END OF SECTION 01 55 00

PART 1– GENERAL

1.1 SUBMISSION

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

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

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

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

1.2 FORMAT

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

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

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

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

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

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

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

1.3 CONTENTS, EACH VOLUME

.1 Table of Contents – provide the following:

.1 Title of project.

.2 Date of submission.

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

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

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

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

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

1.4 AS-BUILT DOCUMENTS

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

.1 Field changes of dimension and detail.

.2 Changes made by change orders.

.3 Details not on original Contract drawings.

.4 References to related shop drawings and modifications.

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

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

.2 Changes made by addenda and change orders.

.3 As-built information:

.1 Record changes in red ink.

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

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

.4 Submit to the Departmental Representative.

1.5 TEST RESULTS & INSPECTION REPORTS

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

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

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

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

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

.6 Co-execute submittals when required.

1.6 COMPLETION

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

.1 Work has been completed and inspected for compliance with the Contract documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced as required.

.2 Work is complete and ready for final inspection.

END OF SECTION 01 78 30

PART 1- GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00 – Concrete Reinforcing

.2 Section 03 30 00 – Cast-in-place Concrete

1.2 REFERENCE STANDARDS

.1 American Concrete Institute (ACI):

.1 ACI 347, Guide to Formwork for Concrete.

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86-14, Engineering Design in Wood.

.3 CSA O121-08 (R2013), Douglas Fir Plywood.

.4 CSA O325-16, Construction Sheathing.

.5 CSA S269.1-16, Falsework and Formwork.

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings for formwork and falsework.

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

.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33 – Health and Safety Requirements.

.4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework and formwork drawings.

.5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 33 – Health and Safety Requirements and Section 01 35 43 Environmental Procedures.

.2 Waste Management and Disposal:

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

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

.3 Divert wood materials from landfill to a recycling, reuse, or composting facility as approved by Departmental Representative.

.4 Divert plastic materials from landfill to a reuse or recycling facility as approved by Departmental Representative.

.5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-S269.1, CSA-O121, and CAN/CSA-O86.

.2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

.3 Rigid insulation board: to CAN/ULC-S701.

.2 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.

.1 Spiral pattern not to show in hardened concrete.

.3 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

.1 Plywood: medium density overlay Douglas Fir to CSA O121, square edge, 19mm thickness.

.5 Form release agent: non-toxic, biodegradable, low VOC.

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal free at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.7 Falsework materials: to CSA-S269.1.

.8 Sealant: to Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1.

.5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.6 Do not place shores and mud sills on frozen ground.

.7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.8 Fabricate and erect formwork in accordance with CSA-S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.9 Align form joints and make watertight.

.1 Keep form joints to minimum.

.10 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.

.11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.13 Construct forms for architectural concrete, and place ties as directed by Departmental Representative.

.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.15 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days for walls and sides of beams.

.2 3 days for columns.

.3 1 day for footings.

.2 Remove formwork when concrete has reached 67% of its specified concrete strength.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction by design.

.5 Maintain falsework supporting beams and slabs until concrete has reached at least 75% of its specified 28 day strength.

.6 Keep falsework or reshoring in place for a minimum of 28 days unless longer time is required to reach the specified concrete strength.

.7 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION 03 10 00

PART 1- GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories

.2 Section 03 30 00 – Cast-in-place Concrete

1.2 REFERENCE STANDARDS

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual.

.2 ASTM International

.1 ASTM A143/A143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.2 ASTM A767/A767M-16 Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

.3 ASTM A775/A775M-16, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 ASTM A1064/A1064M-16b, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.3 CSA International

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-14, Design of Concrete Structures.

.3 CSA-G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare reinforcement drawings in accordance with SP-66 and RSIC Manual of Standard Practice.

.3 Shop Drawings:

.1 Submittal of shop drawings is not required.

.1 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.

.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

.2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

.1 Provide Class B, unless otherwise indicated.

.4 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

1.4 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

.1 Mill Test Report: Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Specifications and 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 off ground and in accordance with manufacturer's recommendations.

.2 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan and Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 35 43 Environmental Procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A1064/A1064M.

.6 Welded steel wire fabric: to ASTM A1064/A1064M.

.1 Provide in flat sheets only.

.7 Welded deformed steel wire fabric: to ASTM A1064/A1064M.

.1 Provide in flat sheets only.

.8 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.9 Galvanizing of non-prestressed reinforcement: to ASTM A767/A767M, minimum zinc coating 610 g/m^2.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.

.3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.

.1 In this case, no restriction applies to temperature of solution.

.4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.

.1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.10 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.11 Mechanical splices: subject to approval of Departmental Representative.

.12 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, SP-66, and CSA-A23.1/A23.2.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Protect epoxy coated portions of bars with covering during transportation and handling.

3.4 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

3.5 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 and reuse in accordance with 01 35 43 Environmental Procedures.

END OF SECTION 03 20 00

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories

.2 Section 03 20 00 – Concrete Reinforcing

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-16, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.5 ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.6 ASTM D624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.7 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.8 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB-51.34-M89, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CSA International

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06(R2016), Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.

.1 Type GU, GUb and GUL - General use cement.

.2 Type MS and MSb - Moderate sulphate-resistant cement.

.3 Type MH, MHb and MHL - Moderate heat of hydration cement.

.4 Type HE, HEb and HEL - High early-strength cement.

.5 Type LH, LHb and LHL - Low heat of hydration cement.

.6 Type HS and HSb - High sulphate-resistant cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15%.

.2 Type CI - with CaO content ranging from 15 to 20%.

.3 Type CH - with CaO greater than 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure Site supervisor, concrete producer, testing laboratories, speciality contractor - finishing, forming, Departmental Representative, and other key personnel attend.

.1 Verify project requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide concrete mix designs for review by Departmental Representative.

.3 Provide testing reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Provide adhesive anchoring system data for review by Departmental Representative. Data to include product description, testing and product evaluation certifications, and factored design resistances in both uncracked and cracked concrete.

.5 Submit composite layout drawings showing embedded items, sleeves, and openings required by all trades for review by Departmental Representative. Do not install any sleeves or openings which are not shown on structural drawings without approval of Departmental Representative.

.6 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

.7 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.8 Provide copy of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 QUALITY ASSURANCE

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

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.2 Packaging Waste Management: remove for reuse and return of pallets, padding, packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 PRODUCTS

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU.

.1 Reduction in cement from Base Mix to Actual Supplementary Cementing Materials (SCMs) Mix, as percentage.

.2 Blended hydraulic cement: Type GUb to CSA A3001.

.3 Portland-limestone cement: Type GUL to CSA A23.1.

.4 Supplementary cementing materials: with minimum 20% fly ash replacement, by mass of total cementitious materials to CSA A3001.

.5 Water: to CSA A23.1.

.6 Aggregates: to CSA A23.1/A23.2.

.7 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixture: to ASTM C1017 and ASTM C494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

.1 Compressive strength: 50 MPa at 28 days.

.9 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.10 Curing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1-chlorinated rubber.

.11 Type 1 Waterstops: ribbed extruded PVC of sizes indicated with shop welded corner and intersecting pieces with legs not less than 600 mm long:

.1 Tensile strength: to ASTM D412, method A, Die "C", minimum 48 MPa.

.2 Elongation: to ASTM D412, method A, Die "C", minimum 275%.

.3 Tear resistance: to ASTM D624, method A, Die "B", minimum 30 kN/m.

.12 Type 2 Waterstops:

.1 Bentonite waterstop.

.13 Premoulded joint fillers:

.1 Bituminous impregnated fibre board: to ASTM D1751.

.2 Sponge rubber: to ASTM D1752, Type I, flexible grade.

.14 Weep hole tubes: plastic.

.15 Polyethylene film: 0.25 mm thickness to CAN/CGSB-51.34.

2.4 MIXES

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

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.

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

.1 Uniformity: uniform density, air content, and slump.

.2 Workability: free of segregation, surface blemishes, loss of mortar, and colour variations.

.3 Finishability: to CSA A23.1/A23.2.

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

.1 Mix: Type 1

.1 Durability and class of exposure: N.

.2 Compressive strength at 28 day age: 25 MPa minimum.

.3 Intended application: Typical unless noted otherwise.

.4 Aggregate size: 20mm maximum

.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

.5 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

PART 3 EXECUTION

3.1 PREPARATION

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

.1 Provide 24 hours minimum notice prior to placing of concrete.

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

.3 During concreting operations:

.1 Development of cold joints not allowed.

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

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

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

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

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

.10 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

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

.2 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.

.2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.

.5 Confirm locations and sizes of sleeves and openings shown on drawings.

.3 Anchor bolts:

.1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.

.4 Drainage holes and weep holes:

.1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Grout under base plates and equipment using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.6 Finishing and curing:

.1 Finish concrete to CSA A23.1/A23.2.

.2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete surfaces.

.4 Finish concrete floor to CSA A23.1/A23.2. Class A.

.5 Concrete floor to have finish hardness equal to or greater than Mohs hardness to CSA A23.1/A23.2.

.6 Provide hand screeded and steel trowel finish unless otherwise indicated.

.7 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

.7 Waterstops:

.1 Install waterstops to provide continuous water seal.

.2 Do not distort or pierce waterstop in way as to hamper performance.

.3 Do not displace reinforcement when installing waterstops.

.4 Use equipment to manufacturer's requirements to field splice waterstops.

.5 Tie waterstops rigidly in place.

.6 Use only straight heat sealed butt joints in field.

.7 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.

.8 Joint fillers:

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.

.2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form expansion, isolation, construction joints as indicated.

.4 Install joint filler.

.5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.9 Dampproof membrane:

.1 Install dampproof membrane under concrete slabs-on-grade inside building.

.2 Lap dampproof membrane minimum 150 mm at joints and seal.

.3 Seal punctures in dampproof membrane before placing concrete.

.4 Use patching material at least 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1. Straightedge Method to tolerance of 8mm in 3000mm.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory approved by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Ensure test results are distributed for review by Departmental Representative.

.4 Contractor will retain the testing laboratory and pay for costs of tests.

.5 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

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

3.5 CLEANING

.1 Clean in accordance with Section 01 35 43 Environmental Procedures.

.2 Waste Management: separate waste materials for recycling and reuse in accordance with Section 01 35 43 Environmental Procedures.

.1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.

.2 Provide appropriate area on job site where concrete trucks and be safely washed.

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

.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.

.7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION 03 30 00

PART 1– GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 – Cast in Place Concrete.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A36/A36M-14, Standard Specification for Carbon Steel.

.2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.3 ASTM A123/A123M-15, Standard Specification for Zinc (Hot Dip Galvanized) coating on Iron and Steel Products.

.4 ASTM A143/A143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.5 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.6 ASTM F1554-15e2, Standard Specification for Anchor Bolts, Steel 36, 55 and 105 ksi Yield Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

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

.3 CSA International

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA S16-14, Design of Steel Structures.

.4 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.

.5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.

.6 CSA W55.3-08(R2014), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.7 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.

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

.1 Material Safety Data Sheets (MSDS).

.5 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers.

.1 Systems and Specifications Manual, Volume 2, 2008 Edition.

.2 NACE No. 3/SSPC SP-6-16, Commercial Wet Abrasive Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit adhesive anchor product information for anchor installation in concrete for review and approval by Departmental Representative.

.3 Shop Drawings:

.1 Pipe railings: Submit shop drawings for review by Departmental Representative. Do not proceed with fabrication until receiving reviewed shop drawings.

.1 Indicate materials, component profiles, sizes, core thicknesses, connections, joints, anchorage, size and type of fasteners, accessories, and finishes. Include erection drawings, elevations, and details where applicable.

.2 Indicate welded connections using standard welding symbols.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVER, 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse by manufacturer of padding, crates, packaging materials, and pallets in accordance with Section 01 34 43 – Environmental Procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel plates: to CSA G40.20/G40.21, Grade 300W.

.2 Steel Pipe Sections: to ASTM A53 Grade B (Yield strength = 240 MPa).

.3 Anchor bolts: to ASTM F1554 Galvanized (Yield strength = 300 MPa).

.4 Welding materials: to CSA W48 Series and CSA W59 and certified by Canadian Welding Bureau.

.5 Hot dip galvanizing: galvanize all steel to ASTM A123, minimum zinc coating of 600 g/m^2.

.6 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA-A23.1/A23.2.

.1 Compressive strength: 50 MPa at 28 days.

.2 Flowable, 15 MPa at 24 hours.

.3 Net shrinkage at 28 days: maximum 5%.

.7 Adhesive Anchors:

.1 Concrete: Injectable two-component hybrid or epoxy adhesive.

2.2 FABRICATION

.1 Fabricate in accordance with reviewed shop drawings.

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

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

.4 Continuously seal members by continuous welds. Grind smooth and flush.

.5 Site modification and field welding not permitted.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with minimum zinc coating 600g/m^2 to ASTM A123.

2.4 PIPE RAILINGS

.1 Steel pipe: 32mm diameter of wall thickness, formed to shapes and sizes as indicated on drawings.

.2 Galvanize all pipe railings after fabrication.

PART 3- EXECUTION

3.1 APPLICATION

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

3.2 GENERAL

.1 Metalwork: in accordance with reviewed shop drawings.

.2 Welding: in accordance with CSA W59 and shall be performed by fabricators “fully approved” by the Canadian Welding Bureau.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications 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.

.2 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

3.4 INSTALLATION OF PIPE RAILINGS

.1 Install pipe railings as indicated.

.2 Field modification and field welding will not be permitted, except for locations indicated on drawings.

.3 Touch up galvanized coating field welded surfaces at completion of erection with cold galvanizing compound.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with:

.1 Section 01 11 55 – General Instructions.

.2 Section 01 35 43 – Environmental Procedures.

.3 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 reuse 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 installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION 05 50 00

PART 1 - GENERAL

1.1 RELATED SECTIONS & SUMMARY

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenderers / Bidders). This section covers items common to all Electrical sections and is intended only to supplement the requirements of Division 01.

.2 Reference to “Electrical Divisions” shall mean all sections of Divisions 26 and 33 in the Master Format or the Canadian Master Specifications.

.3 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.4 Provide materials, equipment and plant, of specified design, performance 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 schedules, ensure timely performance, ensure coordination, and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this and other electrical sections shall govern.

.6 All work shall be in accordance with the PROJECT Drawings and Specifications and their intent, complete with all necessary components, including those not normally shown or specified, but required for a complete installation.

.7 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Owner. Uncrate equipment, move in place and install complete; start-up and test. Include all field assembly of loosely/separately packaged accessories

.8 Summary of Work:

.1 The work shall include and not limited to the following:

.1 Provision of roadway lighting as indicated on the drawings.

.1 Includes all wiring and conduit installation

.2 Step-lighting on stairway as indicated on the drawings

1.2 CODES AND STANDARDS

.1 Comply with all laws, ordinances, rules, regulations and codes of all authorities having jurisdiction relative to this project.

.2 The project will be constructed to the current adopted edition of applicable standards, including:

.1 CSA C22.1, Canadian Electrical Code (CEC), current edition.

1.3 REFERENCES

.1 Install in accordance with CSA C22.1 (current adopted edition) – except where specified otherwise.

.2 Refer to CSA C22.1 Appendix A “Safety Standards for Electrical Equipment” for applicable codes and the related revisions

.3 Refer to CSA C22.1 Pages xxix – xxxii for related ‘Reference Publications’

.4 Comply with Local Electrical Bulletins and by-laws relating to the Authority having Jurisdiction.

.5 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current adopted edition) – except where specified otherwise.

.6 Preferred Voltage Levels for AC Systems, 0-50,000V in accordance with CAN3-C235 (current adopted edition)

1.4 PERMITS

.1 Submit to the Electrical Inspection Authority having jurisdiction the necessary number of drawings and specifications for review and approval prior to commencement of the project.

.2 Pay all associated fees and obtain all permits, licenses etc. to complete the project.

.3 Obtain a Certificated of Acceptance from the Inspection Authority having jurisdiction upon completion of the project and include in the O&M manual.

1.5 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235- current edition

.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.

.3 All electrical work to be installed with common work practices and methods.

1.6 SUBMITTALS

.1 Submittals to be in accordance with Division 01.

.2 Shop Drawings:

.1 The term “shop drawing” means drawings, diagrams, illustrations, schedules, performance characteristics, brochures and other data which are to be provided by the contractor to illustrate details of a portion of the work.

.2 Prior to submitting the shop drawings to the Departmental Representative, the contractor shall review the shop drawings to determine that the equipment complies with the requirements of the specifications and drawings.

.3 Submit shop drawings, product data and samples for all electrical equipment and materials in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.

.4 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.5 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.

.6 Manufacturer of products shall conform to revised shop drawings.

.3 Content

.1 Shop drawings submitted title sheet.

.2 Data shall be specific and technical.

.3 Identify each piece of equipment including specific options selected for each type to be included in the project.

.4 Information shall include all scheduled data.

.5 Advertising literature will be rejected.

.6 The project and equipment designations shall be identified on each document.

.7 The shop drawings/product data shall include:

.1 Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weights and mounting point loads.

.2 Mounting arrangements.
.3 Control explanation and internal wiring diagrams for packaged equipment.
.4 A written description of control sequences relating to the schematic diagrams.
.5 Copies of factory tests, where applicable.

.4 Format

.1 Shop Drawings to be submitted in PDF format; larger submittals may be submitted on flash drives or uploaded to an FTP site set up the contractor.

.5 Coordination

.1 Where electrical equipment requires support or backing by other trades or mechanical connections, the shop drawings shall also be circulated through the other "services" contractor(s) prior to submission to the Departmental Representative.

.6 Keep one [1] copy of shop drawings and product data, on site, available for reference.

.7 Quality Control: in accordance with Division 01 - Quality Control

.1 Provide CSA certified equipment and material. Where CSA certified equipment and/or material is not available, submit such equipment and/or material to the authority having jurisdiction for special approval before delivery to site.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Submit, upon completion of Work, the electrical “load balance” report.

.8 Permits and Fees:

.1 Submit to Electrical Inspection Department, Local Fire Authorities and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain all required permits and pay all fees.

.2 Arrange for inspection of all Work by the authorities having jurisdiction. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - Quality Control

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial and/or Territorial Act.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings: in accordance with Division 01 - Construction Progress Schedule

.1 Site Meetings: as part of Manufacturer's Field Services: schedule site visits, to review Work, at stages listed below:
.1 At time of initial shop drawing submission to confirm any existing conditions and to coordinate with the project schedule and any cross discipline requirements.
.2 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
.3 During progress of Work at key schedule points as determined.
.4 At commissioning.
.5 Upon completion of Work, after cleaning is carried out.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - Health and Safety Requirements.

1.8 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:

.4 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.5 Store and protect equipment and materials from nicks, scratches, and damage. Protect from dust where applicable.

.6 Replace defective or damaged materials with new.

1.9 SYSTEM START-UP

.1 Refer to Division 01 and as follows.

.2 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of equipment.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

1.10 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with the Waste Reduction Work plan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

1.12 DRAWINGS AND MEASUREMENTS

.1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings. Obtain accurate dimensions from the Architectural and Structural drawings.

.2 Take field measurements, where equipment and material dimensions are dependent upon site dimensions.

.3 Where imperial units have been indicated in brackets [ ] following the requirements in SI units, the conversion is approximate and provided for convenience. The SI units shall govern.

1.13 PROJECT COORDINATION

.1 Check drawings of all trades to verify that underground conflicts do not occur. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the Owner, without the Departmental Representative's written approval.

.2 Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.14 WARRANTY

.1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.

.2 Furnish a written warranty stating that all work executed under this Division will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance and include in O&M manual.

.3 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work and all other damages thereby which becomes defective during the time of the warranty.

1.15 TENDER INQUIRIES

.1 All contractor queries during the tender period shall be made in writing to the Departmental Representative. Contractor queries will be collected and suitable addenda will be issued for clarification. No verbal information will be considered valid or issued by the Departmental Representative's office during tender. All tender queries may be emailed, mailed or couriered to the Departmental Representative's office. No telephone questions will be answered.

1.16 RESPONSIBILITIES

.1 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Departmental Representative during the tendering period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.

.2 Protect equipment and material from the weather, moisture, dust and physical damage.

.3 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the Trade being required to adequately clean or replace materials and equipment at no extra cost to the Owner.

.4 Refinish damaged or marred factory finish to factory finish.

.5 The specifications and drawings form an integral part of the Contract Documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, vice versa, shall be considered as properly and sufficiently specified and shall be provided. Misinterpretation of any requirement of either plans or specifications shall not relieve this Contractor of the responsibility of properly completing his trade to the approval of the Departmental Representative.

1.17 STANDARD OF ACCEPTANCE

.1 Standard of Acceptance means that the item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 Where a manufacturer’s equipment is listed, the manufacturer's listed equipment was used in preparing the base design. Tenders may be based on the listed equipment or preapproved

alternate manufacturer's equivalent products, provided that they meet every aspect of the base design and every aspect of the drawings and specifications.

.3 Where other than the listed manufacturer's equipment is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any necessary redesign of installation or structure. Submit redesign drawings for review with Shop Drawings. Maintain installation, access and servicing clearances. Equipment/materials shall not exceed the available space limitations. Redesign drawings shall be to scale and of a standard equal to the Project Drawings.

.4 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

.5 All materials shall be new, of the quality specified and shall confirm to the standards of the Canadian Standards Association. Where equipment or materials are specified by technical description only, they shall be of the best quality for the listed application in which it is to be installed.

.6 All work shall be executed in a neat and workmanlike manner by qualified tradespersons. Electrical contractor shall keep a competent foreman and necessary assistants all satisfactory to the Departmental Representative during the progress of the work.

1.18 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material/products considered to satisfy the specification, but of a manufacturer other than those named may be submitted to the Departmental Representative for consideration not later than five (5) working days prior to closing of tender or of bid depository subtrade tender whichever is earlier. Manufacturer must submit supporting documentation such as photometric data and isolux diagram of the site to confirm that they meet the indicated design criteria and calculated results.

.2 Alternate approvals will be given by written addendum only. No other substitution will be permitted after closing of tenders.

.3 Alternate approvals granted before the closing of tenders will be limited to a manufacturer's system and/or series only. This limited approval will not preclude substitute equipment/material from complying with specific features included with equipment/material specified. Determine that the alternate product meets the specification intent before basing a tender on the product

.4 Where alternate equipment/materials are selected, allow for effects on other parts of the work of this Trade and other Trades. Where substantial changes in arrangement are required, submit shop drawings of the proposed changes with Plan and Section views and show effects on work of other Trades. Alternate equipment/materials shall not exceed the available space limitations. Maintain installation, access and servicing clearances. No extra will be allowed due to the use of alternate equipment/materials.

.5 Where two or more items of equipment and/or material, of the same type, are required, provide products of a single manufacturer.

.6 Install and test all equipment and material, in accordance with the detailed recommendations of the manufacturer.

1.19 PROGRESS CLAIM AND CHANGEORDER BREAKDOWNS

.1 In particular cases more detail may be necessary to properly assess a change order or progress claims. This additional information could include all suppliers and all sub-contractors when requested by the Departmental Representative. Provide details for each section of the electrical work listed for each separate electrical change order item.

.2 Mark-up information is required for change orders but is optional on the original tender price.

.3 Progress claims will not be certified nor payment made beyond 90% of the overall Electrical contract until commissioning and verification of the systems are complete. This procedure is to allow for any necessary deficiency holdbacks on items which do not become apparent until the systems are commissioned.

1.20 PROJECT CLOSE-OUT REQUIREMENTS

.1 Refer to detailed specifications in each section for detailed requirements. Record drawings to be submitted to Departmental Representative and all life safety systems must be operational, verified and tested and demonstrated to Departmental Representative prior to issuance of Schedule C.

1.21 SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 Before the Departmental Representative is requested to make a site review for substantial performance of the work:

.1 Commission all systems and prove out all components, interlocks and safety devices.

.2 Submit a letter certifying that all work is complete for the intended use, operational, clean and all required submissions have been completed.

.3 A complete list of incomplete or deficient items shall be provided. If, in the opinion of the Departmental Representative, this list indicates the project is excessively incomplete, a substantial completion review will not be performed.

.2 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

.1 All reported deficiencies have been corrected.

.2 Operating and Maintenance Manuals completed.

.3 "As Built" Record Drawing ready for review.

.4 Systems Commissioning has been completed and has been verified by Departmental Representative.

.5 All demonstrations to the owner have been completed.

1.22 DEFICIENCY HOLDBACKS AND DEFICIENCY INSPECTIONS

.1 Work under this Division which is still outstanding when substantial performance is certified will be considered deficient and a sum equal to at least twice the estimated cost of completing that work will be held back.

.2 It is expected that outstanding work will be completed in an expeditious manner and the entire holdback sum will be retained until the requirements for Total Performance of work have been met and verified.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment as follows.

.1 Material and equipment to be CSA certified. Where CSA certified material or equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval.

.2 Where equipment or materials are specified by technical description only, they are to be of the best quality available for the application for which it is to be installed.

2.2 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.3 FINISHES

.1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside and at least two coats of finish enamel.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original finish.

2.4 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other Divisions.

2.5 OPERATION AND MAINTENANCE DATA

.1 Refer to Section 01 78 00 – Closeout Submittals for Operation and Maintenance Manual requirements.

.2 Provide operation and maintenance data for incorporation into maintenance manual specified in Division 01 and as follows.

.3 Include in operations and maintenance data:

.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective 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.

.4 Names and addresses of local suppliers for items included in maintenance manuals.

.4 Include in the manual the following major sections:

.1 Title page (in plastic cover).

.2 Comprehensive description of the operation of the systems, including the function of each item of equipment within the system.

.3 Detailed instructions for the normal maintenance of all systems and equipment installed including procedures and frequency of operational checks and service and troubleshooting instructions.

.4 Local source of supply for each item of equipment.

.5 Wiring and control diagrams.

.6 Spare parts list.

.7 Copies of guarantees and certificates.

.8 Manufacturer's maintenance brochures and shop drawings.

2.6 PROJECT RECORD DRAWINGS

.1 Provide project record documents as specified in Division 01 as further called for in this Division.

.2 The contractor shall keep a complete set of white prints at the site office, including all addendums, change orders, site instructions, clarifications and revisions for the purpose of record drawings. As the work on site proceeds, the contractor shall clearly record in Red all as-built conditions which deviate from the original contract documents. Record drawings to include cable runs (complete with number of cables and ID number) and locations of all telecommunications equipment.

.3 Prior to substantial performance, the Contractor shall submit completed red-line record drawings to the Departmental Representative. The Contractor shall certify, in writing that the as-built record drawings are complete and that they accurately indicate all electrical services and electrical pathway, including exposed as well as concealed items.

.4 Preparation of record drawings in AutoCAD shall be performed by the Contractor after Departmental Representative reviews and accepts contractor prepared red-lines based on the red-line record drawings submitted by the Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

3.3 FIELD QUALITY CONTROL

.1 Conduct and pay for the following tests:

.1 Circuits originating from branch distribution panels.

.2 Provide Departmental Representative with at least one week’s notice prior to testing.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Reports:

.1 Provide written reports in a timely manner upon completion of the testing and load balance. Indicate test hour and date.

3.4 CLEANING

.1 Do final cleaning in accordance with Division 01.

.2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

.3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

3.5 WORKMANSHIP

.1 Workmanship shall be in accordance with well-established practice and standards accepted and recognized by the Departmental Representative and the Trade.

.2 The Departmental Representative shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.

.3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Departmental Representative.

3.6 PROTECTION OF WORK

.1 Protect equipment and materials, stored or in place, from the weather, moisture, dust and physical damage.

.2 Mask machined surfaces. Secure covers over equipment openings and open ends of equipment and conduit, as the installation work progresses.

.3 Equipment having operating parts, bearings or machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.

.4 Refinish damaged or marred factory finish.

3.7 EQUIPMENT INSTALLATION

.1 Provide means of access for servicing equipment.

.2 CSA identification and equipment labels to be clearly visible after installation.

3.8 CUTTING, PATCHING, DIGGING, CANNING, CORING & CONCRETE

.1 Lay out all cutting, patching, digging, canning and coring required to accommodate the electrical services. Coordinate with other Divisions. The performance of actual cutting, patching, digging, canning and coring is specified under other Divisions.

.2 The Electrical Contractor shall be responsible for all cutting, patching, digging, canning and coring required to accommodate the electrical services.

.3 The Electrical Contractor shall be responsible for correct location and sizing of all openings required under Electrical Divisions, including piped sleeves.

.4 Poured concrete for duct encasements, pole bases, transformer pads and housekeeping pads shall be provided by other Divisions, coordinated and supervised by the Electrical Divisions.

.5 Precast concrete items such as transformer pad bases, pull boxes and light pole bases to be provided and installed by the Electrical Divisions unless otherwise specified.

.6 Excavation and backfilling will be provided by other Divisions. This Division to supervise the work and provide all layouts and parameters.

END OF SECTION 26 05 00

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 TERMS OF REFERENCE

.1 Typically use insulated 98% conductivity copper conductor wiring enclosed in Rigid PVC conduit. Refer to section 33 65 76 Direct-Buried Underground Ducts

1.3 PRODUCT DATA

.1 Provide product data in accordance with Division 01

PART 2 - PRODUCTS

2.1 WIRING & CABLES – GENERAL

.1 Conductors: stranded for 10 AWG and larger. Minimum size #12 AWG.

.2 Insulation to be 600-Volt RWU90XLPE for underground installations.

.3 Conductors to be colour-coded. Conductors #10 AWG and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size #8 AWG and larger may be colour-coded with adhesive colour coding tape, but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible. Where colour-coding tape is utilized, it shall be applied for a minimum of 50 mm at terminations, junctions and pullboxes and conduit fittings. Conductors shall not be painted.

2.2 WIRE & BOX CONNECTORS

.1 Pressure type wire connector current carrying parts to be copper and sized to fit conductors used.

.2 Fixture type splicing connector current carrying parts to be copper sized to fit conductors 10 AWG or less.

.3 Bushing stud connectors to EEMAC 1Y-2 and suitable for stranded copper conductors

.4 Clamps or connectors for armoured cable, flexible conduit, as required.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install all cables and wiring.

.2 All grounding and bonding conductors and straps to be copper. All bonding conductors to have green insulation jacket.

.3 Colour coding to be strictly in accordance with Section 26 05 00 – Common Work Results.

3.2 WIRE & BOX CONNECTORS

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65

.2 Install fixture type connectors and tighten. Replace insulating cap.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2

END OF SECTION 26 05 21

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 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1, Canadian Electrical Code Part 1, Latest Adopted Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturers instructions, printed product literature and data sheets for roadway lighting and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00 – Submittal Procedures.

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

PART 2 - PRODUCTS

2.1 JUNCTION AND PULL BOXES

.1 Construction: Reinforced concrete with steel frame.

.2 Lid: Penta bolt down, galvanized steel checkerplate.

.3 Rating: H-20 static loading.

.4 Size: As indicated on drawings.

.5 Covers Flush Mounted: 25mm minimum extension all around.

PART 3 - EXECUTION

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1

.3 Junction and pull boxes installed in concrete or pavement where subject to vehicular traffic shall be installed with an 8” concrete collar around the box as per manufacturer’s specifications.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 – Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating voltage, phase and system name 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.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturers instructions, printed product literature and data sheets for roadway lighting and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect roadway lighting from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 CABLE PROTECTION

.1 38 x 140mm planks pressure treated with clear copper napthenate or 5% pentachlorophenol solution, water repellant preservative.

2.2 MARKERS

.1 Concrete type cable markers: 600 x 600 x 100mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs.

.2 Cedar post type markers: to CAN/CSA-Z809 or FSC or SFI 89 x 89mm, 1.5m long, pressure treated with clear or copper napthenate or 5% pentachlorophenol solution, water repellent preservative with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.

.1 Nameplate: aluminum anodized 89 x 125mm, 1.5m thick mounted on cedar post with mylar label 0.125mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

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 roadway lighting 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 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacked to reduce pulling tension.

.5 To facilitate matching of color coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.3 MARKERS

.1 Mark cable every 150mm along duct runs and changes in direction.

.2 Mark underground splices.

.3 Where markers are removed to permit installation of additional cables, reinstall existing markers.

.4 Install cedar post type markers.

.5 Lay concrete markers flat and centered over cable with top flush with finished grade.

3.4 FIELD QUALITY CONTROL

.1 Perform test in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Perform test using qualified personnel.

.1 Include necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds.

.1 Ensure resistance to ground of circuits is not less than 50 megaohms.

.5 Pre-acceptance tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests:

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit testing and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.5 CLEANING

.1 Progress Cleaning:

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

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

3.6 PROTECTION

.1 Repair damage to adjacent materials caused by cable installation.

END OF SECTION 26 05 43.01

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 REFERENCES

.1 CAN/CSA C22.1, Canadian Electrical Code, Part I, latest adopted edition

.2 CAN/CSA C22.2 No.9.0, General Requirements for Luminaires.

.3 IESNA Illuminating Engineering Society of North America - Lighting Handbook, latest adopted edition

.4 ASHRAE 90.1 – American Society of Heating, Refrigerating and Air-Conditioning Engineers, latest adopted edition

.5 IES RP-33 Lighting for the Exterior Environment, latest adopted edition.

1.3 INTENT

.1 Provide lighting fixtures and accessories as shown on drawings.

.2 Lighting fixtures shall be structurally well designed and constructed, using new parts and materials of the highest commercial grade available.

.3 Bond all lighting equipment to grounding system.

.4 Verify all finishes before ordering fixtures and provide fixtures suitable for mounting as specified.

.5 Fixtures of the same or similar type shall be supplied by the same manufacturer.

.6 Electrical contractor shall supply and install all luminaries complete with lamps, mounting brackets, lenses, ballasts (dimming or otherwise), drivers and all necessary accessories in accordance with luminaire types shown on drawings and listed in luminaries' schedule unless otherwise noted.

PART 2 - PRODUCTS

2.1 LED DRIVERS

.1 LED drivers shall be fully dimmable, Energy Star compliant, maximum THD of 20%, power factor to be greater than .95, have high voltage regulation and have internal surge protection.

.2 LED lit luminaires shall meet the LM-79 and LM-80 test protocols (70% output at 50,000 hours), a minimum efficacy of 90 watts per lumen and shall meet or exceed ENERGY STAR SSL standards to ensure lumen and color consistency between luminaires.

2.2 LAMPS

.1 Provide and install lamps in all fixtures in the project.

.2 All fixtures shall be provided with proper, new, and operable lamps. Provide lamps indicated on the Fixture Schedule, or, if not indicated, as recommended by the fixture manufacturer. Lamps shall be compatible with the respective fixture in all cases.

.3 All luminaires to be supplied complete with lamps.

.4 Install lamps with the same Watt rating as called for on the electrical drawings. Install lamps as called for in a fixture schedule. Refer to schedule for lamp colour and colour rendering index.

.5 Store the lamps in a safe place and install them in accordance with the requirements of this specification leaving fixtures completely lamped and in operating condition.

2.3 FIXTURES

.1 Provide fixtures as indicated on the fixture schedule on the electrical drawings.

.2 All fixtures shall comply with CSA Standard C22.2 No.9. Accessories and components shall comply with relevant CSA Standards applicable to accessory or components.

.3 All fixture diffusers, lens panels, lens frames, etc., shall be securely and adequately supported and shall be removable without the use of tools for cleaning.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

.1 Lighting fixtures shall be installed as indicated on Electrical Drawings, and per approved shop drawings.

.2 Verify locations and spacing of lighting fixtures with plans and notify Departmental Representative of any variance or conflict between the plans and field conditions. Do not proceed until conflict has been resolved.

.3 Work shall be coordinated with other trades.

3.2 INSTALLATION AND SUPPORTS

.1 Provide complete and proper support for all fixtures, fixture hangers, etc..

.2 Support fixtures as shown on the drawings, level, plumb and true with the structure and other equipment in a horizontal or vertical position as intended.

.3 All hangers, supports, fastenings or accessory fittings shall be protected against corrosion. Care shall be taken during the installation to assure that insulation and corrosion protection is not damaged.

.4 Install fixture lenses as late in the project schedule as possible to protect from dirt and dust. Remove and clean or replace lenses to the satisfaction of the Departmental Representative.

.5 Provide and install all conduit, boxes and wire.

END OF SECTION 26 50 00

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 REFERENCE STANDARDS

.1 CSA Group

.1 CAN/CSA-A14-07 (R2017), Concrete Poles.

.2 CSA C22.2 No.206-17, Lighting Poles.

.3 CAN/CSA-O15-15, Wood Utility Poles and Reinforcing Stubs.

.4 CAN/CSA-O80 Series-08 (R2012), Wood Preservation.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturers instructions, printed product literature and data sheets for roadway lighting and include product characteristics, performance criteria, physical size, finish and limitations.

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 off ground and in accordance with manufacturer s recommendations in clean, dry, well-ventilated area.

.2 Store and protect roadway lighting from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 POLES

.1 poles: to CSA C22.2 No.206 designed for underground wiring and:

.1 Mounting on concrete base.

.2 Style: monotube, minimum 3mm wall thickness, tapered octagonal.

.3 Straight for 1 luminaire mounting bracket.

.4 Terminating in a single or double curved davit.

.5 Access handhole 300mm above pole base for wiring connections, with welded-on reinforcing frame and bolted-on cover.

.1 Size: 120mm x 194mm.

.2 Handhole cover shall be lockable and tamper proof.

.6 Anchor bolts: four 25mmø x 915mm long steel with shims, nuts and covers.

.7 Finish: Powder coated grey finish to match existing

.8 Grounding lug.

2.2 LUMINAIRE MOUNTING BRACKETS

.1 Mounting brackets steel for specified luminaires:

.1 Single or double brackets as indicated.

.2 Arm extension length: 2500mm.

.3 Single or double tapered davit type.

2.3 LUMINAIRES

.1 Luminaire with cast aluminum weatherproof housing and:

.1 Lamp type: LED, wattage: 25W.

.2 Light Distribution:

.1 IES distribution Type 2.

.3 Self-locking latches of stainless steel and aluminum.

.4 Factory wired terminated at terminal block.

.5 Style: Cobra head.

.6 Color: grey.

.2 Wattages noted on drawings are approximate and depend on final fixture selected.

.3 Provide two spare luminaires and hand over to EGD staff.

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 roadway lighting 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 poles true and plumb, in accordance with manufacturer s instructions.

.2 Install luminaires on pole and install lamps.

.3 Check luminaire orientation, level and tilt.

.4 Connect luminaire to lighting circuit.

.5 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.3 CLEANING

.1 Progress Cleaning:

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

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

.1 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.

.2 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.

.3 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative,

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

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

END OF SECTION 26 56 19

PART 1– GENERAL

1.1 REFERENCES

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

.1 ASTM C88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregate.

.3 ASTM C117, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.

.4 ASTM D1557, Specification for Test Methods for Aggregate Mixtures using 10 lb (4.54 kg) Rammer and 18 inch (457 mm) Drop.

.5 ASTM D698, Standard Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures using 2.49 kg Rammer and 304.8 mm Drop.

.6 ASTM D 2487 (2000), Classification of Soils for Engineering Purposes (Unified Soil Classification System.

.7 ASTM D 5434 (1997), Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock.

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction.

1.2 REGULATIONS

.1 Protect slopes and banks and perform all work in accordance with Federal, Provincial and Municipal regulations whichever is more stringent.

.2 Not later than one week before backfilling or filling, provide test results from the approved testing firm certifying the suitability of the chosen material.

.3 Do not begin backfilling or filling operations until material has been approved for use by the Departmental Representative.

.4 Not later than 48 hours before backfilling or filling with approved material, notify the Departmental Representative.

.5 Before commencing work, conduct, with the Departmental Representative, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

1.3 BURIED SERVICES

.1 Before commencing work verify the location of all buried services on and adjacent to the site.

.1 Contractor to conduct ground penetrating radar (GPR) to all excavation areas prior to proceeding with the work. Provide written report to the Departmental Representative detailing all findings and location of buried services.

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

1.4 PROTECTION

.1 Protect excavations from freezing.

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

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

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

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

.6 Midden and burial sites shall not be disturbed without prior written approval by the Departmental Representative. Refer to 3.4 Contaminated & Midden Containing Material within this section.

PART 2–PRODUCTS

2.1 MATERIALS

.1 Furnish all necessary materials, at a minimum furnish:

.1 8 mil minimum plastic sheeting for base of any stockpiles;

.2 8 mil plastic sheeting for covering of contaminated soil in any stockpiles.

.2 Gravel to be composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. In absence of satisfactory performance records over a five year period for particular source of material, soundness to be tested according to ASTM test procedure C-88 or latest revised issue. Maximum weight average losses for course and fine aggregates to be 30% when magnesium sulphate is used after five cycles.

.3 All crushed gravel when tested according to ASTM C-136 and ASTM C-117, or latest revised issue, to have a generally uniform gradation and conform to following sieve must have one or more fractured faces. Determination of the Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "A", which determines fractured faces by count. The Plasticity Index for crushed gravel to not exceed 6.0.

.4 Native material is workable soil free of organic or foreign matter; obtained within limits of Contract may be deemed native material if it is approved by the Departmental Representative. Native material may be reused only if tested and confirmed to be "Uncontaminated Soil" as defined in Specification 31 23 11- Excavation and Handling of Contaminated Material, Section 1.4.1 and approved by the Departmental Representative. Native material is not acceptable if it is contaminated or impracticable to control its water content or compact to specified density.

PART 3–EXECUTION

3.1 SITE PREPARATION

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

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

3.2 EXCAVATION

.1 All excavated soil under this contract shall be treated as potentially contaminated soil. Excavate, handle and store excavated soil as per this Section and other related sections.

.2 Topsoil stripping

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.

.3 Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify the Departmental Representative when excavations are complete.

.4 Excavate for concrete sidewalks and paving to subgrade levels. In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.3 BACKFILLING

.1 Asphalt areas disturbed by the work to be repaired with hot-mix asphalt concrete compacted to a minimum of 95% of 75 blow Marshal density in accordance with ASTM D1559 to a minimum finished thickness of 80mm. Contractor to submit asphalt concrete mix design to Departmental Representative for approval minimum of one week prior to asphalt paving.

.2 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by the Departmental Representative.

.3 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.4 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.5 Compaction: place backfill and compact to following Modified Proctor densities in compliance with ASTM D1557. (All densities in compliance with ASTM D1557).

.1 Roads, driveways, shoulders, re-shaped ditches and sidewalks to minimum 95%.

.2 Use caution in pipe zone to ensure no damage to pipe.

.6 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

.7 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.

.8 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.4 CONTAMINATED & MIDDEN CONTAINING MATERIAL

.1 Potentially Contaminated and Midden Containing Soil

.1 The soils at Esquimalt Graving Dock are known potentially to contain contaminants such as hydrocarbons and metals. Soils in the areas are also known to contain midden and potentially archeological artifacts. Contractor is to take appropriate measures per this Section for excavation work.

.2 All excavated soil under this contract shall be treated as potentially contaminated soil. Excavate, handle and store excavated soil as per this Section and all other related sections.

.2 Contaminated/Midden Material Removal

.1 Excavation

.1 As directed by Departmental Representative.

.2 Dewatering

.1 Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met.

.3 Contaminated/Midden Containing Soil Handling

.1 Soil Segregation

.1 Excavate known or suspect material and place in stockpile at storage area designated by Departmental Representative. In no case will the material be transported off site before laboratory analysis has been received and excavated materials have been characterized for disposal.

.2 As directed by Departmental Representative.

.2 Soil Testing

.1 Testing of excavated soil will be performed by the Departmental Representative. Soil will be assessed for indications of contamination and will be classified as confirmed contaminated soil, special waste soil, or uncontaminated soil.

.2 The Departmental Representative will dispose of the excavated soil material after testing is completed, according to applicable rules and regulations.

3.5 GRADING

.1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by the Departmental Representative.

3.6 SHORTAGE AND SURPLUS

.1 Supply all necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.

.2 Dispose of surplus aggregate material off site.

END OF SECTION 31 00 99

PART 1– GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 Excavating, Trenching and Backfilling

1.2 MEASUREMENT AND PAYMENT

.1 Cost of blasting, blast survey, drilling, vibration monitoring, and rock removal will be paid by Contractor. The cost for these items will be incorporated into the Contractor's Lump Sum price for the entire project.

1.3 REFERENCES

.1 Definitions:

.1 Rock is defined as all solid rock in form of bedrock, masses, ledges, seams or layers and includes igneous rock of any sort, conglomerate, sandstone or shale, that requires breaking by continuous drilling and blasting before excavation and removal. Rock also includes rocks having individual volumes in excess of 1.0m3, removed by blasting or other means.

.2 Dense tills, hardpan, partially cemented materials, clay or frozen materials which do not require breaking by continuous drilling and blasting before excavation and removal are not classified as rock."

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Blasting Submittals:

.1 Submit for approval to Departmental Representative and authorities having jurisdiction a written proposal of operations for removal of rock minimum 48 hours in advance of planned drilling and blasting work. Proposal to include the following:

.1 Proposed method of carrying out work, equipment, types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and noise control and other pertinent details.

.2 Site location map indicating blast area, signage locations, fencing, flagger locations (where required).

.3 Dates and timing of blasting. Times listed are to indicate within 15 minutes of proposed blast.

.2 Submit records to Departmental Representative at end of each shift. Maintain complete and accurate record of drilling and blasting operations.

.3 Provide written methodology for protection of existing structures and surface features including, but not necessarily limited to the following: buildings, retaining walls, fencing, sidewalks, roads, site lighting, duct banks, services tunnels, crane rails, sanitary drains, storm drains and watermains.

.1 Include within the written report how the contractor or subtrade will rectify damages that may occur due to blasting operations.

.4 In the event a cruise ship or naval vessel is in the Dock, Contractor is to provide 48 hours' notice of blasting to allow Departmental Representative to inform and coordinate security personnel responsible for handling of bomb sniffing canines.

.3 Qualification Statements:

.1 Retain licensed explosives expert to program and supervise blasting work, to interpret recommendations of pre-blasting report, and to determine precautions, preparation and operations techniques.

.2 Submit documentation verifying explosives expert's qualifications.

.4 Contractor to submit pre and post blast rock surveys to Departmental Representative for review and verification of quantities. Survey of quantities by Contractor are at no additional cost to Contract.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 QUALITY ASSURANCE

.1 Blasting Survey and Monitoring:

.1 Visit property holders of adjacent buildings and structures in advance of blasting to determine existing conditions, conduct pre-blast survey where required, describe blasting and seismic recording operations and obtain their permission for setting up seismographs.

.2 Seismographic monitoring to be conducted during entire progress of blasting operations.

.3 Conduct post blast survey where required.

.4 Provide copies of pre-blast and post-blast survey to Departmental Representative.

.2 Blasting and Vibration Control:

.1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.

.2 Blasting not permitted within distance of 30 m of fresh concrete or grout poured within 24 hours.

.3 Complete blasting before any structural element including socketed piles and caissons, rock anchors, concrete footings, walls and columns are installed within 30 m from blast holes.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3- EXECUTION

3.1 ROCK REMOVAL

.1 Co-ordinate this Section with Section 01 35 33 - Health and Safety Requirements.

.2 Strip Rock of all earth.

.3 Notify Departmental Representative minimum 48hrs prior to blasting.

.4 Contractor to survey stripped rock surface at no additional cost to the contract to determine pre-blast rock surface.

.5 In the event a cruise ship or naval vessel is in the Dock, Contractor is to provide 48 hours' notice of blasting to allow Departmental Representative to inform and coordinate security personnel responsible for handing of bomb sniffing canines.

.6 Remove rock to alignments, profiles, and cross sections as indicated.

.7 Explosive blasting is not permitted at locations indicated.

.8 Do blasting operations in accordance with local and provincial codes.

.9 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.10 Excavate rock to horizontal surfaces with slope not to exceed Geotechnical Consultant's recommendations.

.11 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.12 Excavate trenches to lines and grades to minimum of 150 mm below pipe invert or duct bank as indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.

.13 Cut trenches to widths as indicated.

.14 Use pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques unless specified otherwise.

.15 Remove boulders and fragments which may slide or roll into excavated areas.

.16 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 DISPOSAL

.1 Rock Disposal:

.1 Submit to Departmental Representative for review location for offsite disposal of surplus rock.

.2 Dispose of surplus removed rock at an approved location offsite.

3.3 PROTECTION

.1 Prevent damage to surroundings and injury to persons by erecting fencing, post guards, sound warnings and display signs when blasting to take place.

.2 The Contractor is advised of existing high voltage electrical duct bank in the vicinity as well as other underground services directly in the work area.

.3 Ensure adequate blast mats are in place to prevent fly rock.

END OF SECTION 31 23 16.26

PART 1– GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 Submittal Procedures.

.2 Section 01 35 33 Health and Safety Requirements.

.3 Section 01 35 43 Environmental Procedures.

.4 Section 01 45 00 Quality Control.

.5 Section 31 23 16.26 Rock Removal.

.6 Section 31 00 99 Earthworks for Minor Works

.7 Section 32 11 23 Aggregate Base Courses

1.2 REFERENCES

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

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

.1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (600 kN- m/m ³).

.5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (2,700 kN- m/m ³).

.6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

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

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

.2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

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

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

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

.1 Rock: solid material in excess of 1.00m^3, and which cannot be removed by means of heavy duty mechanical excavating equipment available on site. Frozen material not classified as rock

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

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

.3 Topsoil:

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

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

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

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

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

.7 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

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

.2 Table:

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

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

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

1.4 MEASUREMENT AND PAYMENT

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

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

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

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

1.5 EXCAVATION AND DISPOSAL

.1 Contractor is to excavate all native materials and stockpile for testing by the Departmental Representative. PWGSC will determine if the Contractor is to remove/dispose of material off-site via a Change Order.

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

.3 Payment for disposal (including loading and hauling costs) of characterized material will be paid as a negotiated change order to the contract. Contractor must provide PWGSC will all disposal records including weigh bills, disposal receipts and chain of custody documentation.

1.6 SUBMITTALS

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

.2 Preconstruction Submittals:

.1 Contractor to submit records of underground utility pre-locates of existing utilities (GPR) for review by Departmental Representative as noted in Section 31 00 99 Earthworks for Minor Works.

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

.1 All tracked equipment to have rubber track pads when working on concrete or paved surfaces on site.

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

.3 Submit certificates for proposed granular materials to confirm compliance with the Canadian Council of Ministers of the Environment (CCME) Residential/Parkland (RL/PL) Land Usage Soil Quality Guidelines.

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

.1 Submit name of professional engineer retained by the Contractor for design and review of temporary works related to underpinning and bracing of existing structure and excavations for review and approval by Departmental Representative.

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

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

.4 Submit for review by Departmental Representative proposed dewatering heave prevention methods as described in PART 3 of this Section.

.5 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

.6 Submit to Departmental Representative written notice when bottom of excavation is reached.

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

.4 Samples:

.1 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide documentation that proposed fill meets CCME guidelines.

1.7 QUALITY ASSURANCE

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

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

.3 Keep design and supporting data on site.

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

.5 Health and Safety Requirements:

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

1.8 WASTE MANAGEMENT AND DISPOSAL

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

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

1.9 EXISTING CONDITIONS

.1 Buried services:

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

.2 Conduct Ground Penetrating Radar (GPR) in all areas of excavation to identify location and approximate depth of services as noted in Section 31 00 99 Earthworks for Minor Works.

.3 Conduct a “Hydro-Vac” excavation of utilities identified on Contract documents and:

.1 Conduct a survey and record vertical and horizontal location of service in UTM-10 NAD 86 coordinate and geodetic elevation format.

.2 Record the diameter of piping, width and depth of concrete ducting and size of structures.

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

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

.6 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.7 Prior to beginning excavation Work, notify applicable Departmental Representative to establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

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

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

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

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

.2 Existing buildings and surface features:

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

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

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

PART 2- PRODUCTS

2.1 MATERIALS

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

.1 Crushed or screened stone, gravel or sand.

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

.3 Table:

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

.2 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum cement content of 25 kg/m; to CSA-A3001, Type GU.

.3 Minimum strength of 0.07MPa at 24 h.

.4 Concrete aggregates: to CSA-A23.1/A23.2.

.5 Cement: Type GU.

.6 Slump: 160 to 200 mm.

PART 3- EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 SITE PREPARATION

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

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

3.3 PREPARATION/PROTECTION

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

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

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

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

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

3.4 STRIPPING OF TOPSOIL

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

.2 Strip topsoil to depths as indicated.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Departmental Representative.

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

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

3.5 STOCKPILING

.1 Stockpile fill materials in areas as directed by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

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

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

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

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

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

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

.4 Obtain permit from authority having jurisdiction for temporary diversion of water course.

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

.6 During backfill operation:

.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

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

.8 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

3.7 DEWATERING AND HEAVE PREVENTION

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

.2 Provide for Departmental Representative review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut- offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas or containment facilities and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

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

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

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

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

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

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

.5 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations. No more than 5 m of trench may be exposed at end of day's operation and must be securely covered. Road plates are to be used to cover exposed excavations in areas of vehicular travel.

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

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material in location with PWGSC property approved by Departmental Representative.

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

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

.11 Notify Departmental Representative when bottom of excavation is reached.

.12 Obtain Departmental Representative approval of completed excavation.

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

.14 Correct unauthorized over-excavation as follows:

.1 Fill with granular base material to not less than 95% Modified Proctor Density.

.15 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated.

.2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

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

.1 Departmental Representative has inspected and approved installations.

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

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

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

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

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

.5 Backfilling around installations:

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

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

.3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.

.6 Place unshrinkable fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage system in backfill as indicated.

3.11 RESTORATION

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

.2 Replace topsoil as indicated.

.3 Reinstate lawns to elevation which existed before excavation.

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

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

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

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

END OF SECTION 31 23 33.01

PART 1– GENERAL

1.1 RELATED SECTIONS

.1 Section 32 12 16.01 – Asphalt Paving

.2 Section 32 16 00 – Curbs, Gutters, and Sidewalks

1.2 REFERENCES

.1 ASTM International

.1 ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN- m/m³).

.5 ASTM D1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).

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

.7 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

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

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

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

.4 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia – Section 31 05 17 – Aggregates and Granular Materials.

.1 Sub-section 2.0 – Products

.2 Sub-section 3.0 – Execution

1.3 ACTION AND INFORMATION SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit certificates for proposed granular materials to confirm compliance with the Canadian Council of Ministers of the Environment (CCME).

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer/supplier guidelines and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

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

.1 Crushed or screened stone, gravel or sand.

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

.3 Table:

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

PART 3- EXECUTION

3.1 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 PLACEMENT AND INSTALLATION

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

.2 Placing:

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

.2 Ensure no frozen material is placed.

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

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

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

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

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

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

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

.3 Compaction Equipment:

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

.4 Compacting: in accordance with Section 01 45 00 – Quality Control:

.1 Compact to density not less than 95% Modified Proctor Density to ASTM D1557.

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

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

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

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

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

.5 Proof rolling:

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

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

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

.4 Where proof rolling reveals areas of defective subgrade:

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

.2 Backfill excavated subgrade with common material and compact.

.3 Replace sub-base material and compact.

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

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

3.3 SITE TOLERANCES

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

3.4 PROTECTION

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

3.5 CLEANING

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

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

END OF SECTION 32 11 23

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 32 11 23 – Aggregate Base Courses

1.2 REFERENCES

.1 Asphalt Institute (AI)

.1 AI MS-2-1994, Mix Design Methods for Asphalt Concrete and Other Hot-Mixes.

.2 ASTM International

.1 ASTM C88-13, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3 (2,700 kN-m/m^3))

.3 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual.

.1 MPI #32, Traffic Marking Paint, Alkyd.

.4 Master Municipal Contract Documents (MMCD), Platinum Edition Volume II - 2009, British Columbia, Specification 32 12 16 – Hot Mix Asphalt Concrete Paving.

.1 Section 2.0 – Products

.2 Section 3.0 – Execution

1.3 SUBMITTALS

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

.2 Submit asphalt concrete mix design to Departmental Representative at least 2 weeks prior to commencing work.

1.4 SAMPLES

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

.2 Submit to Department Representative, samples of material for sieve analysis at least 2 weeks before beginning Work.

1.5 QUALITY ASSURANCE

.1 Testing to be completed by accredited testing laboratory.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 35 43 – Environmental Procedures.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

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

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

.7 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.

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

1.7 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect aggregate from damage.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Prime coat: N/A

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

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

.4 Asphalt concrete: MMCD Upper Course #2

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

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

PART 3 - EXECUTION

3.1 FOUNDATIONS

.1 Foundations for roadways and parking lots comprise:

.1 250mm compacted thickness of granular subbase.

.2 100mm compacted thickness of granular base.

.2 Compaction: compact each lift of granular material to 95% maximum density to ASTM D698. Maximum lift thickness: 150 mm.

3.2 PAVEMENT THICKNESS

.1 Pavements for roadways and parking lots as per MMCD Specification 32 12 16 – Hot-Mix Asphalt Concrete Paving (Section 2.1.2).

.1 Base course: 40mm, MMCD Upper Course #2

.2 Wear course: 40mm, MMCD Upper Course #2

3.3 PAVEMENT CONSTRUCTION

.1 Construction of asphalt concrete: to MMCD Specification 32 12 16 – Hot-Mix Asphalt Concrete Paving (Section 3.0).

.1 Sections 2 – Products

.2 Section 3 – Execution

.2 Surface preparation: to MMCD Specification 32 12 16 – Hot-Mix Asphalt Concrete Paving (Section 3.0).

.1 Sections 2 – Products

.2 Section 3 – Execution

3.4 TRAFFIC MARKINGS

.1 Refer to Section 32 17 23 – Pavement Markings

3.5 FINISHED TOLERANCES

.1 Ensure finished asphalt surface within 6 mm of design elevation but not uniformly high or low.

.2 Ensure finished asphalt surface does not have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.

.3 Water ponding not permitted.

.4 Against concrete gutter, finished asphalt surface to be higher than the gutter by not more than 6mm.

3.6 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening upper mix and removing or adding material as required.

.2 If irregularities or defects remain after final compaction, remove upper course promptly and lay new material to form a true and even surface and compact immediately to specified density.

3.7 CLEANING

.1 Remove lids or covers from all castings and clean any prime, tack coat or hot-mix asphaltic concrete from frames, lids and covers of all castings.

.2 Progress Cleaning:

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

.3 Final Cleaning:

.1 Upon project completion, remove surplus materials, rubbish, tools and equipment.

3.8 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38 degrees C.

.1 Do not permit stationary loads on pavement until 24 hours after placement.

END OF SECTION 32 12 16.01

PART 1– GENERAL

1.1 RELATED SECTIONS

.1 Section 31 00 99 – Earthworks for Minor Works

.2 Section 32 11 23 – Aggregate Base Courses

1.2 REFERENCES

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

.1 ASTM C117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.5 ASTM D260-86(2001), Standard Specification for Boiled Linseed Oil.

.6 ASTM D1557-12e1, Modified Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3(2,700 kN- m/m^3)).

.7 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-3.3-99(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.

.2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 SUBMITTALS

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

.1 Submit concrete mix designs 2 weeks prior to construction

1.4 QUALITY ASSURANCE

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

.2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Cold weather concrete.

.2 Curing.

.3 Finishes.

.4 Formwork removal.

.5 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials:

.1 Hand-formed and hand-placed concrete:

- Slump: 80mm
- Air entrainment: 5-8%
- Max. aggregate size: 20mm
- Min. cement content: 335 kg/m3
- Min. 28 day strength: 32 MPa

.2 Joint filler:

.1 Bituminous impregnated fibre board: to ASTM D1751.

.3 Granular base: material to following requirements:

.1 Crushed stone or gravel per Section 32 11 23 – Aggregate Base Courses.

.4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

.5 Fill material:

.1 Granular material as specified on contract drawings

.6 Curing compound: to be spray applied, liquid type conforming to CSA A23.1/A23.2 and ASTM C309 containing a fugitive dye, applied in accordance with manufacturer's recommendations, or other during methods such as sheet material and burlap mats, subject to Departmental Representative approval.

PART 3- EXECUTION

3.1 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 00 99 – Earthworks for Minor Works and 32 11 23 – Aggregate Base Courses.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials.

.1 Dispose of surplus and unsuitable excavated material in approved location off site.

.3 Place fill in maximum 300 mm layers and compact to at least 95% Modified Proctor Density in compliance with ASTM D1557.

3.2 GRANULAR BASE

.1 Obtain Departmental Representative's approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base in maximum 300 mm layers to at least 95% Modified Proctor Density in compliance with ASTM D1557.

3.3 FORMWORK

.1 Ensure wood forms of select dressed lumber, straight and free from defects and thoroughly cleaned.

.2 Use flexible forms for all curves less than 60m radius.

.3 After obtaining Departmental Representative’s approval of compacted base, set forms to line and grade as shown on Contract Drawings, free from waves or irregularities in line or grade.

.4 Forms to be of shape, lines, and dimensions of work being formed.

.5 Adequately brace forms to maintain specified tolerances after concrete is placed.

.6 Treat forms lightly with approved form release agent and remove surplus agent.

3.4 INSPECTION

.1 Immediately prior to placement of concrete, carefully inspect all formwork to ensure forms are properly set at required horizontal and vertical alignment, sufficiently rigid, clean, surface treated and ready for placement of concrete. Obtain Departmental Representative’s approval of formwork and compacted base.

3.5 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in Section 01 33 00 – Submittal Procedures.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory approved by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Ensure test results are distributed for review by Departmental Representative.

.4 Contractor will retain the testing laboratory and pay for costs of tests.

.5 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

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

3.6 CONCRETE

.1 Obtain Departmental Representative approval of granular base prior to placing concrete.

.2 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.

.3 Provide edging as indicated with 10 mm radius edging tool.

.4 Do not place concrete during rain or on ponded water or frozen base.

.5 Do not place concrete when air temperature appears likely to fall below 5°C within 24h, unless specified precautions are taken and approved by departmental representative.

.6 Schedule concrete placement to ensure sufficient daylight hours available to permit edging and finishing or provide adequate illumination.

.7 Moisten granular base immediately prior to placing concrete.

.8 Place concrete within 1.5h of batching time.

.9 Place concrete in forms, ensuring no segregation of aggregate and consolidate with approved mechanical vibrator or power screed.

.10 Place concrete in continuous operation until entire panel or section completed. Do not place fresh concrete on concrete which has achieved partial set.

.11 Incorporate all casting into concrete at time of placement.

.12 Discontinue placement at expansion, construction, or isolation joints only.

.13 Remove face forms as soon as practical to permit face finishing. Do not leave face forms in place overnight.

3.7 TOLERANCES

.1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.8 EXPANSION AND CONTROL JOINTS

.1 Install expansion joints at intervals of 9 m.

.2 Install transverse control joints after floating, when concrete is stiff, but still plastic, at intervals of 3 m.

.3 Install tooled “dummy joint” at intervals of 1.5m between control joints.

.4 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.9 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.2 Install Use 13mm pre-moulded hardboard joint material to form isolation joints joint filler in isolation joints.

.3 Seal isolation joints with sealant noted on drawings.

3.10 CURING

.1 Cure concrete by adding moisture continuously in accordance with CSA- A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.

.2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period of at least 7 days.

.3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.

3.11 BACKFILL

.1 Allow concrete to cure for 7 days prior to backfilling.

.2 Backfill with new organic material and make good to satisfaction of Departmental Representative.

3.12 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.

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

END OF SECTION 32 16 00

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 32 12 16.01 – Asphalt Paving

1.2 REFERENCES

.1 ASTM International

.1 CGSB1-GP-74M-79, Paint, Traffic, Alkyd.

.2 CGSB1-GP-12c-68, Standard Paint Colours.

.3 ASTM E1360-05 2015, Standard Practice for Specifying Color by Using the Optical Society of America Uniform Color Scales System.

.2 Environment Canada (EC)

.1 Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations, SOR/2009-264.

.3 Green Seal (GS)

.1 GS-11 - Edition 3.2 (2015), Standard for Paints and Coatings.

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

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit 2 copies of WHMIS MSDS for products used.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

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

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

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

.7 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.

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer specifications.

.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 in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

PART 2- PRODUCTS

2.1 MATERIALS

.1 Alkyd Traffic Paint and Markings:

.1 To CGSB1-GP-74M, Alkyd traffic paint.

.2 Colour: to CGSB1-GP-12C.

.1 Pedestrian walkway marking to be yellow 505-308.

.3 Upon request, Departmental Representative will supply qualified product list of paints applicable to work. Qualified paints may be used but Departmental Representative reserves right to perform further tests.

.2 Thinner: to CGSB 1-GP-5M.

.3 Glass reflective beads: type suitable for application to wet paint surface for light reflectance.

.4 Alternative products may be used provided they meet or exceed the relevant specifications and are approved by the Departmental Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.2 Proceed with Work only after unacceptable conditions rectified.

3.2 EQUIPMENT REQUIREMENTS

.1 Paint applicator: approved pressure type mobile with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

.2 Distributor: capable of applying reflective glass beads as overlay on freshly applied paint.

3.3 REMOVING PAVEMENT MARKINGS

.1 Paint over existing pavement marking with black paint in accordance with CGSB1-GP-12c-68, Standard Paint Colours.

3.4 APPLICATION

.1 Lay out pavement markings.

.2 Unless otherwise approved by Departmental Representative, apply paint when air temperature minimum 10 degrees C, wind speed maximum 60 km/h and no rain forecast within next 4 hours.

.3 Apply traffic paint evenly at rate of 3 m2/L to form minimum 8 mil dry film thickness, in accordance with MPI Architectural Painting Specification Manual “Preparation of Surfaces” and “Application” for “Approved Product” listing.

.4 Do not thin paint unless approved by Departmental Representative.

.5 Symbols and letters to dimensions indicated.

.6 Paint lines of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

.8 Apply glass beads at rate of 0.5 kg/L of painted area immediately after application of paint.

3.5 TOLERANCE

.1 Paint markings: within plus or minus 10 mm of dimensions indicated.

3.6 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day in accordance with Section 01 35 43 Environmental Procedures.

.2 Final Cleaning:

.1 Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 35 43 Environmental Procedures.

3.7 PROTECTION

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION 32 17 23

PART 1 - GENERAL

1.1 RELATED SECTION

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

1.2 REFERENCES

.1 CSA C22.2 No. 211.2, latest adopted edition, Thickwall PVC Conduit

1.3 SUBMITTALS

.1 Submit WHMIS Material Safety Data Sheets (MSDS), acceptable to Human Resources Development Canada and Health Canada, for solvent cement. Indicate VOC content.

1.4 WORKMANSHIP

.1 The electrical underground ducts shall be installed by the Electrical Contractor's qualified electrical personnel.

.2 Care shall be maintained that the joints are kept clean and free of soil prior to connections.

PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid thickwall PVC ducts: in accordance with CSA Standard C-22.2 #211.2. Size as indicated.

.2 Rigid PVC couplings, bell-end fittings, plugs, caps, and adapters as required to make complete installation.

.3 Rigid PVC 90°, 45°, and 22½° bends as required.

.4 Rigid PVC 5° angle couplings as required.

2.2 CABLE-PULLING EQUIPMENT

.1 6mm stranded nylon pull rope tensile strength 5kN.

2.3 WARNING TAPE

.1 Heavy gauge polyethylene warning tape with wording, "CAUTION - ELECTRIC LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 INSTALLATION OF DUCTS

.1 Install RPVC ducts as indicated on drawings and in accordance with manufacturer's instructions.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5m throughout duct length.

.4 During construction, cap ends of ducts to prevent entrance of foreign materials.

.5 Pull through each duct a steel or wooden mandrel not less than 300mm long and of a diameter 6mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth, and other foreign matter. Pull stiff bristle brush through each duct immediately after backfilling. Maintain a current written record of mandrelling of ducts.

.6 In each duct, install pull rope continuous throughout each duct run with 3 m spare rope at each end.

.7 Install warning tape as indicated.

.8 Pre-drill pull pits to accept installation of primary cable piping and secondary cable duct.

3.2 DUCT DRAINAGE

.1 Where possible, drain ducts into pull boxes. Otherwise make five 3/8" drill holes in a row at the bottom of each duct whenever duct turns upwards to enter a pull box. Cover holes with a plastic or galvanized steel mesh to prevent soil entering ducts.

3.3 INSPECTIONS

.1 Advise Departmental Representative so that he may inspect the duct installation prior to backfilling.

END OF SECTION 33 65 76

APPENDIX A

PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.106346.001
Location:	Esquimalt Graving Dock
Date:	January 28th, 2020
Name of Departmental Representative:	Seth Leonard
Name of Client:	PSPC
Name of Client Project Co-ordinator	Tim Aikin

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**	
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		Possible blasting adjacent to main access road – NLWSR Project
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		Overhead wires at small electrical shed and BC Ferries Building in Lot A
Live Electrical Systems or Equipment	X		X		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions	X		X		Rock areas
Earthquake	X		X		
Tsunami	X		X		
Avalanche		X		X	
Forest Fires		X		X	
Fire and Explosion Hazards	X		X		
Working in Isolation		X		X	
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	No access to confined spaces required.
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	None known in project work area
Designated Substance Present		X		X	
Chemicals Used in work	X		X		Active ship repair facility
Lead in paint	X		X		Paint on steel and concrete surfaces may contain lead
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		
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		
Is a Permit to Work required?			**N/A**
Is a Confined Space Entry Permit required?			**N/A**
Is a Confined Space Entry Log required?			**N/A**
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.

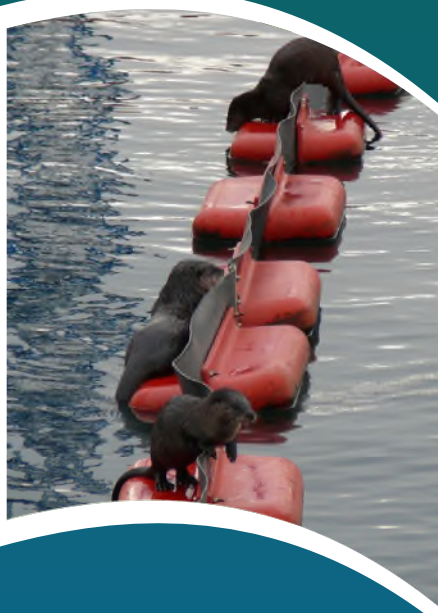
(2) TBD means To Be Determined by Service Provider.

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 B

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

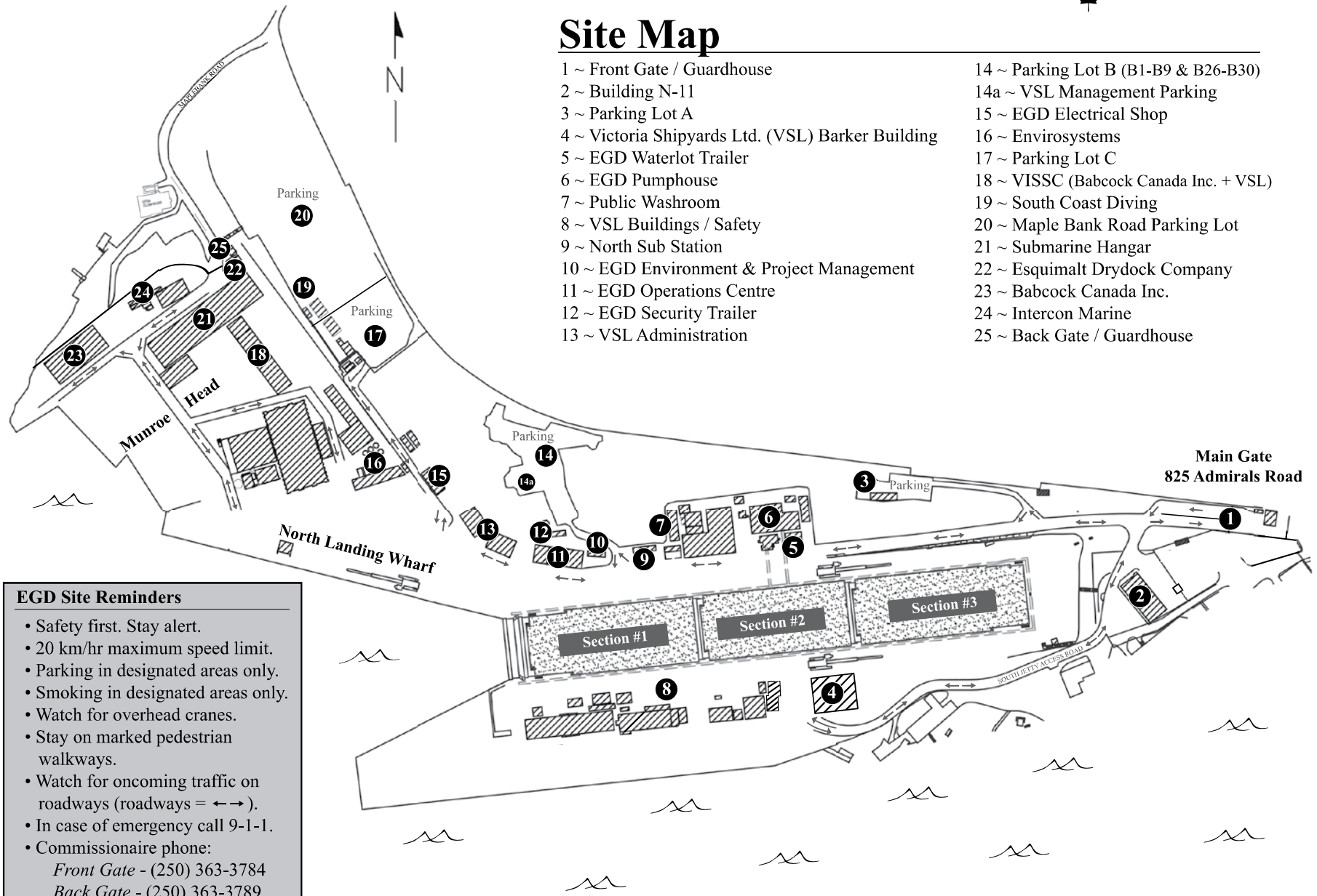
David Latoski
Operations Manager
Esquimalt Graving Dock
Engineering Assets
Strategy Sector

Canada

August 2015

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

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

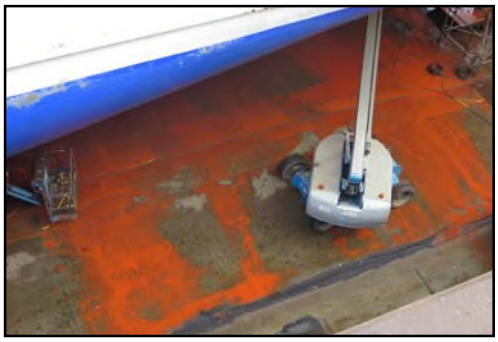
- Ensure all wastes and wastewater discharges, resulting from hull and anchor chain washing, as well as dock bottom clean-up activities, are collected and disposed of properly.
- Close all sump well valves in the drydock floor collection system prior to and during pressure washing operations.
- Manage 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.

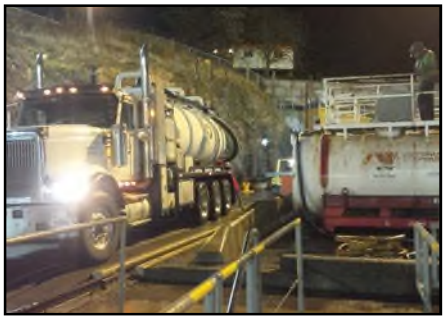
Management of Pressure Wastewater in Upland Areas/Dockside

- 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.

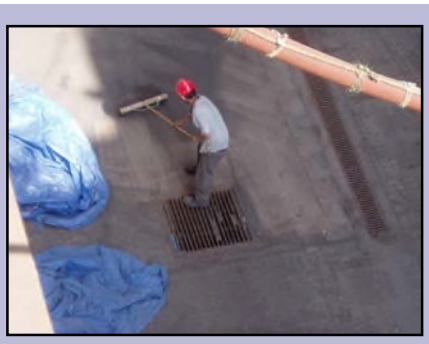
Dust suppression unit in operation.

Store all waste grit away from drains, to prevent contaminates migrating into the marine environment.

INADEQUATE waste grit storage.

ADEQUATE waste grit storage.

Environmental Best Management Practices



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.

Environmental Best Management Practices

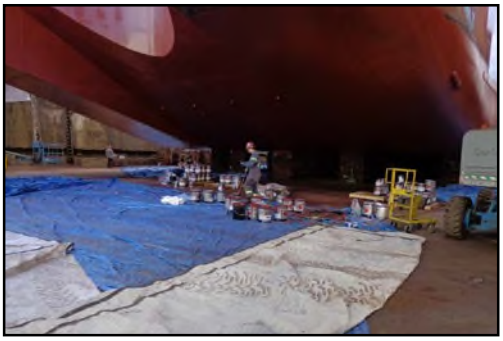
ADEQUATE containment on stablizer pocket doors.

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.

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.

Environmental Best Management Practices

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.

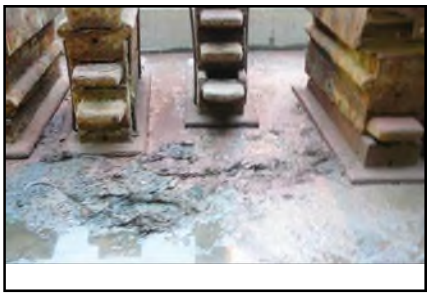
INADEQUATE:
Example of a dock floor that would not pass inspection.

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	

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.

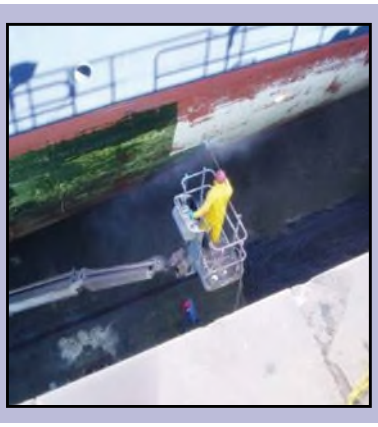
General Refuse

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.

Environmental Best Management Practices

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.

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.*

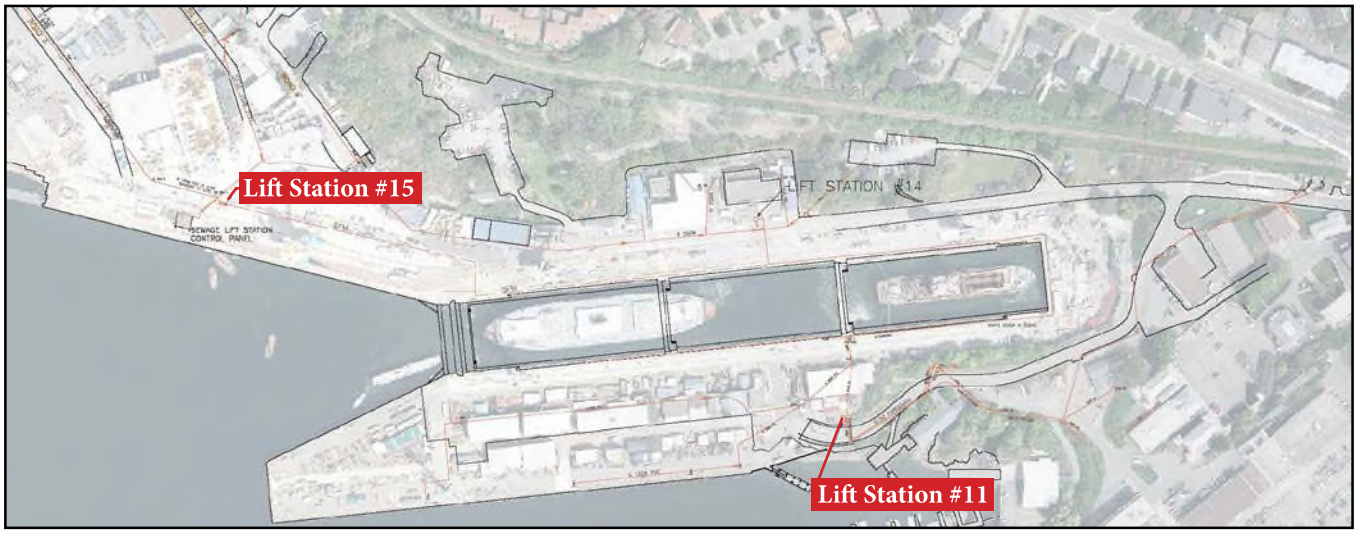
Only utilize spotlights when necessary.

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.