

Statement of Work

EGD Caisson #1

Reference 217-037

Revision 4

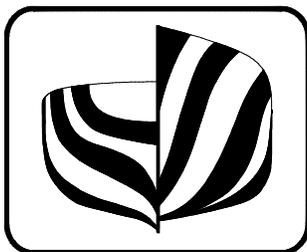
July 30, 2018

Prepared for:

**Public Services and Procurement Canada –
Services publics et Approvisionnement Canada**
Esquimalt Graving Dock, Victoria BC

Revised by
Public Services and Procurement Canada
EGD Operations

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NOTE: THIS SPECIFICATION IS BASED ON A STANDARD NUMERIC FORMAT. NOT ALL NUMBERS ARE NECESSARILY ALLOCATED IN THIS SPECIFICATION, ONLY THOSE LISTED IN THE TABLE OF CONTENTS.

* * *

Statement of Work

EGD Caisson #1

Refit

**For: Public Services and Procurement Canada –
Services publics et Approvisionnement Canada
Esquimalt Graving Dock, Victoria BC**

PART 100 – GENERAL

100.1 Description

Public Services and Procurement Canada (PSPC) owns and operates the graving dock in Esquimalt, BC. In order for the dock to function the open end is sealed with a gate – semi-submersible caisson – prior to pumping out the water. The dock can be segmented for maximum utilisation by floating a second caisson internally. The two gates, which are virtually identical, were built in 1978 by Vancouver Shipyards and have been in service since then. In 2003 the gates received a minor structural seismic update with locking pins and deck end flare strengthening.

This refit specification is for a major mid-life refit of the caisson gates, and is intended to allow the gates to provide useful service for many additional years. The refit specification is based on Herold Engineering's Inspection Report of 2015 and Robert Allan Ltd.'s own inspections.

All work is to be performed at the Esquimalt Graving Dock, although small items may be removed and refurbished remotely.

102. DEFINITIONS

102.1 Organizations

- Owner Public Services and Procurement Canada (PSPC)
Contact: Stafford Bingham, Director, Esquimalt Graving Dock
Engineering Assets / Infrastructure Assets
Management
Email: Stafford.bingham@pwgsc-tpsgc.gc.ca
Phone: 250-363-3256
Fax: 250-363-8059
- Contractor Organization selected by Owner to carry out the
specified work
- Owner's Naval Architect /
Design Agent Robert Allan Ltd.
230 - 1639 West 2nd Avenue
Vancouver, BC V6J 1H3
Contact: Evan Gatehouse, P. Eng
Email: egatehouse@ral.ca
Phone: 604-736-9466
Fax: 604-736-9483
- Owner's representative A person or organization designated by the Owner to
represent them during work on this vessel

102.2 Terminology

- Equal - considered equal to the specified materials or
equipment in terms of: availability of spare
parts/service, efficiency, performance, reliability,
service life, size, weight
- Good Shipbuilding Practice - designs, applications, and procedures proven
successful through long term in marine vessels

102.3 Abbreviations

- ANSI - American National Standards Institute
- ASME - American Society of Mechanical Engineers
- ASTM - American Standard for Testing and Materials

- A, B, C, D
 - A End - Bow
 - B End - Stern
 - C Face - Starboard
 - D Face - Port
- BS
 - Breaking Strength
- DIN
 - Deutsches Institut für Normung (German Institute for Standardization)
- GFCI
 - Ground Fault Circuit Interruption
- GSM
 - Government Supplied Material
- IACS
 - International Association of Classification Societies
- IMO
 - International Maritime Organization
- ISO
 - International Standards Organization
- P
 - Port
- S
 - Starboard
- SNAME
 - Society of Naval Architects and Marine Engineers
- SWL
 - Safe Working Load
- TBD
 - To Be Determined

102.4 Language and Units

- Drawings, reports, specification, manuals
 - English
- Labels and nameplates
 - English
- Units
 - SI metric units

104. REGULATION AND CLASSIFICATION

- International / National / Provincial Standards as applicable, including (but not limited to):
 - WorkSafeBC
 - Labour Canada
 - Esquimalt Graving Dock Best Management Practises
 - industry type approved certification for mechanical components
 - type approved electrical components and fittings

106. CONTRACT

106.1 Intent of Specification

- This Specification and accompanying Drawings will form part of a Contract between Owner and Contractor
- The Specification is to be interpreted as an instruction to Contractor regarding matters of the work to be done , and as such is written in the positive imperative tense
- Apart from requirements set forth in this Specification, or indicated on Drawings, it is to be understood that Contractor is responsible for refitting the Caisson in accordance with the contract, in a manner reflecting good current shipbuilding and marine engineering practise
- Contractor is responsible for ascertaining and ensuring that any materials, components, equipment, or parts (other than Owner Furnished Equipment) selected for incorporation into the caisson during the refit are suitable for the service as defined and intended. If any equipment, device, material, or parts required for the successful operation of any systems are not specifically mentioned in the Specification or Drawings, bring the requirement for such components to the attention of Owner's Representative prior to entering into the Contract. Once the Contract is in place, omitted items will then be considered as included, or not included, as deemed necessary for successful operation of the specified systems and equipment, and the Contract price will include the cost of supplying and installing such components. This reference is not intended to include items required for the general installation of shipboard systems such as general hardware and ironmongery, fittings, clips, fasteners, couplings, etc. All such items are deemed to be included in the definition of the associated systems, whether specifically mentioned or not
- In the event of contradictions between the Drawings and Specification, or indications in one and not the other, or contradictions in the Specification being discovered subsequent to signing of the Contract, the following will be considered as the order or priority of documents:
 - Contract
 - Specification
 - Drawings
- Contradictions in the Specification not clarified in the Contract will be decided by Owner's Representative

106.2 Contractor's Responsibility

- Contractor is responsible for coordination and integration of all equipment into vessel in order to provide the fully functioning vessel as specified herein, and as shown on the Drawings, in the time frame agreed to in the construction Contract. Accordingly, coordinate the supply and delivery of all equipment to Shipyard in a timely manner
- The Contractor is responsible for proper execution and functioning of contracted work as per the Design Drawings and Specification only and is responsible for corrective action

in the event of improper or inadequate function related to Contractor work as specified in the Design Drawings and Specification

- Contractor is responsible for corrective action in the event of local vibration of members, panels, items of outfit, piping systems, and similar details, other than a vibration of hull as a whole or vibration attributable to malfunction of Owner's selected or purchased items

106.3 Form of Contract

- See Owner's Contract document

106.4 Insurance

- See Owner's Contract document

106.5 Departure from Refit Specification Documents

- Notify Owner's Representative of any proposed departures from these documents, whether in principle or detail, and obtain written approval before such changes are committed
- Owner reserves the right to make alterations in detail as work progresses with an extra charge where extra cost of labour or material may be involved. Such extra charges must have written authorization of Owners Representative before work is committed. An alteration alone is not justification for extra charges
- Changes in detail to conform with Yard practice, or changes considered and agreed upon as improvements, may be put forward by Contractor but must have written approval of Owner's Representative before any related work is committed
- Substitutions by Contractor of alternate scantlings, items, or materials may be considered in order to facilitate delivery or utilize available stock, but such changes must be approved by Owner's Representative before work is committed
- Owner reserves the right to substitute materials or equipment for those specified or indicated on Drawings where such change may be to his advantage in relation to availability or future service. Due allowance to be made where cost is affected
- Changes to contracted delivery date for vessel brought about by modifications to be agreed in writing before modification is put in hand

106.6 Procedures for Changes and/or Credits

- Refer to Owner's Contract document

115. DOCUMENTS

- Refit Specification - this document
- Drawings - 76-14-2602 - Timber Fendering Details
- 76-14-3311 - Pumping and Flooding Arrangement
- 1012 – Docking Plan, as built

115.2 Vendors Drawings

- contractor to provide Owner with certified drawings and documentation of Contractor-purchased equipment

115.4 • Purchase Orders

- provide Owner's Representative with two (2) copies of requisitions of all purchase orders prior to processing
- do not issue purchase orders to suppliers before receiving written approval of Owner's Representative

115.6 • Manuals

- provide complete instruction manuals and parts lists for all purchased items of machinery, electrical and electronic equipment, and mechanical equipment supplied by Contractor at conclusion of refit. Supply two (2) copies of each document

120. PRODUCTION

120.1 • Scheduling

- as soon as practicable after being notified of tender acceptance, collaborate with Owner's Representative in preparation of an overall production schedule, based on best information then available on delivery of critical items and other relevant details

120.6 • Cleanliness

- in addition to cleaning of steel surfaces, etc., as covered in "Painting" (Section 380), Contractor is responsible for thoroughly cleaning compartments, bilges, tanks, pockets at conclusion of project
- contractor is responsible for disposal of all waste generated during project, including any hazardous waste

120.7 • Safety

- ensure safe working conditions exist at refit site. Provide adequate guardrails; ladders, elevated platforms, gangplanks, scaffolding; provide ample lighting; and keep the site orderly and free from obstruction and hazards
- where required contractor to provide specialised PPE
- allow time for a safety orientation briefing for all workers who have not been previously briefed in past calendar year.
- Follow EGD lockout policy and procedures. Lockout requests to be sent to EGD electrical supervisor
- ensure permit to work for hot work is in accordance with contractor procedures, EGD procedures and WorkSafeBC
- ensure permit to work aloft is in accordance with contractor procedures, EGD procedures and WorkSafeBC
- ensure permit to work for entry into confined spaces is in accordance with contractor procedures, EGD procedures and WorkSafeBC
- contractor to provide all necessary measures and equipment for safe entry, and conduct atmospheric testing prior to and during initial entry
- **NOTE:** Some compartments inside the caisson are confined spaces within a confined space
- **NOTE:** Refer to Part G for lead paint abatement procedures

120.8 • Installation of Equipment and Materials

- install each item of material not of Contractor's manufacture in or on vessel in accordance with the applicable specifications and/or the manufacturers' instructions. In the event Contractor does not consider installation of these items reasonably possible or practical as specified, or as directed in manufacturers' instructions, advise Owner's

- Representative in writing as soon as the information is known
- install equipment so regular cleaning, servicing, and maintenance can be carried out without removing equipment or piping not directly associated with the cleaning, servicing, or maintenance
 - locate instrumentation so it can be read easily during operation
 - existing coatings should be considered as containing lead, and as such Part G of this specification should be referred to
 - some electrical mastic are Asbestos Containing Materials (ACMs), but within acceptable limits
 - comply with all requirements of the Workers Compensation Act, WorkSafeBC regulations and guidelines, and Occupational Health and Safety Regulations, and industry standards related to hazardous materials
 - comply with all requirements contained within the EGD Environmental Best Management Practices
 - contractors must develop;
 - a Risk Assessment, Exposure Control Plan (ECP)
 - provide a WorkSafeBC Notice of Project (NOP)
 - refer to Part G of this specification
- 120.9** • Hazardous Materials
(Asbestos, Lead)

135. GOVERNMENT SUPPLIED MATERIAL (GSM)

- General
 - owner will supply the following gsm items at the EGD at time of refit:
 - caisson rubber lip seals
 - hard wood timber
 - cathodic protection (anodes)

140. DRY DOCKING

- General
 - owner has supplied dock blocks to allow access to underside of seals
 - owner has had a contractor prepare and arrange dock blocks based on provided docking plan, with guidance from the Owner
 - owner has arranged for the dry docking and subsequent shoring of the Caisson in accordance with the docking plan DWG 8950113//1012.
 - upon completion of the work, the contractor will remove the shoring, the stabilizing cables, and the gangway and supply tugs and crew to move the Caisson into its temporary moorage location as directed by the owner

150. TESTS AND TRIALS

- After refit construction
 - void / tank integrity testing – see section 200
 - testing of ballast system – see 700
 - electrical – see section 600

160. WARRANTY

- General
 - refer to Contract

PART 200 - STRUCTURE

201. CONSTRUCTION

201.5 Workmanship

- General
 - do not cut holes or openings in structural members for pipes, cables, access, or other purpose unless authorized on approved drawings and approved compensation provided, or as approved by Owner's Representative using EGD hotwork procedures
 - preserve structural integrity of hull and tanks and refer any questions involving such integrity to Owner's Representative
 - neatly and carefully execute all plate edges and holes burned in structure, with cuts regular in outline without notches
 - openings burnt in shell, deck, or other main strength members to be circular or have well-rounded corners. Grind edges of such cuts smooth and bullnose
 - remove sharp or jagged edges of exposed structural work
 - remove and grind smooth all erection clips or bridges and projections. Avoid removal of material from plate, but if occurring fill with weld deposit. Grind such items flush and smooth where exposed to view inside or out
 - cut limber holes for drainage where necessary to permit total drainage to lowest point of compartment or tank
 - cut limber holes smooth on a minimum 50 mm radius or as indicated on drawings. In bottom of ballast tank, use larger radius holes to match existing beam limber holes

205. CONSTRUCTION MATERIALS

- Replacement Materials
 - steel: new ASTM A36 steel, treated with pre-weld primer before fabrication
 - aluminum: 5000 or 6000 series marine alloys
 - stainless steel fasteners: Grade 304 or 316 for interior/dry spaces
Grade 316/316L for tank/exterior/wet spaces

- Welding
 - use CSA qualified welders
 - properly prepare and fair up all plate edges before welding
 - where stress concentrations may arise at corners, edges, and terminals, continue welding runs around the joint for a distance of at least 35 mm
 - continuously weld all brackets all around
 - continuously weld ends of stiffeners for a distance equal to twice stiffener depth on both sides
 - completely seal all exposed faying steel surfaces by welding so no water can gain access to cause corrosion. Do not perform any intermittent welding on exterior
 - leave finished work clean and smooth with all projections and rough welds chipped flush and ground smooth.
 - chamfer edges of insert plates on a three-to-one bevel down to thickness of surrounding plate, and provide corners with a generous radius
 - ensure the surfaces of all parts to be welded are clean, dry, and free from rust, scale, and grease.
 - all welds to be sound, uniform, and substantially free from slag inclusion and porosity. Take care to ensure thorough penetration and fusion; avoid undercutting. Before a sealing run is applied to a butt weld, expose the clean metal of the original root run
 - remove and reweld all welds not meeting these conditions
 - complete all welding to approval of Owner's Representative

- Testing
- full penetration welds in way of:
 - tank bulkheads
 - areas of high stress
- double continuous welds in way of:
 - areas susceptible to corrosion (exterior, flooding and ballast tanks)
- non-destructive testing (dye penetrant, X-ray, etc.) as deemed necessary for work conducted

210. HULL STRUCTURE

210.1 Crop and Renew

- B end trim tank
- B end passage, deck II
- Fendering
- weld aft stringer face flat at connection to bulkhead for approximately 150 mm
- crop previous insert, and renew
- crop and renew wasted deck in vicinity of mooring ring insert in mooring ring space
- grind and reweld leaking seam in mooring ring space
- see section 450 for details

212. APPENDAGES

212.9 Seals

- Rubber lip seal
 - remove existing seal and install new owner furnished rubber lip seal to entire perimeter of each side of the caisson
 - approximate length of lip seal = 218 feet (66.5 m)
 - refer to drawing 76-14-2602 Timber Fendering Details
- Wood blocking
 - remove existing wood blocking and install new owner furnished *Ekki* hardwood on each face
 - remove existing wood blocking and install new owner furnished *Ekki* hardwood on base

- Steel banding
 - approximately 1320 feet of 12"x5" (402 m of 300 mm x 125 mm) finished dimension, required for bottom and sides
 - refer to drawing 76-14-2602 Timber Fendering Details
 - chamfer edges and counter bore as per drawing
 - fit new galvanized 2"x1/4" (50 mm x 6 mm) flat bar to secure lip seal along its entire length, top and bottom
 - refer to drawing 76-14-2602 Timber Fendering Details
- Fixtures/fittings
 - secure wood blocks on face with new 3/4 inch studs, washers and nuts
 - secure base wood blocks with new 1/2 inch through bolts, washers and nuts
 - secure steel banding with new 1/2 inch studs, washers and nuts
 - all fixtures to be galvanised
 - threads to be lubricated with Never Seize prior to installation
 - block counter bores to be sealed with non-hydrocarbon based mastic

PART 300 – OUTFIT AND FURNISHINGS

305. MANHOLES AND HATCHES

- Manholes & Deck Access Hatches
 - clean gasket recesses
 - fit replacement rubber gaskets for all manholes and hatches (23 total)
 - replace all interior bolted manhole nuts with 316L stainless steel nuts and washers
 - replace all damaged or missing studs . Include an allowance for replacement of up to 100 replacement studs.
 - provide owner a credit if less than 100 studs require replacement
- Deck escape hatch (2)
 - remove rust, scale, and other debris from the gutter
 - ensure drain holes and connected drain lines are clear and free of debris
 - crop and renew drain lines as required

306. WINDOWS

- Control Room Windows
 - replace four (4) control room windows, 16” diameter, trim rings, fasteners and mounting flanges

380. PAINTING AND PROTECTION

- General
 - paint specification in Part F of this Specification is to be confirmed with Owner, and in consultation with supplier
 - prior to application of any coating, surface condition to be verified by coating representative
 - all equipment in areas to be painted are to be removed or adequately protected from over spray
 - pipework and valves, to be included in painting process where instructed by Owner
 - where required replace and cover wasted zinc anodes prior to painting
 - all new welds and welded seams to be stripe coated before spraying

380.1 Hull Exterior, hull below waterline

- Preparation
 - degrease entire hull to SSPC-SP1 solvent cleaning standard
 - remove the existing marine coating system to the SSPC - SP 6 Commercial Blast Cleaning standard or Sa2 ISO 88501-1, using the paint manufacture's recommended blast profile (anchor pattern)
 - ensure surfaces are dry, free from rust, dust, grit
- Cathodic protection
 - zinc anodes, replace as required Z-19, 10 kg weld on (Government Supplied Material)
 - anticipate twenty eight (28), but confirm with owners rep prior to installation previously used anodes
- Painting
 - refer to paint specification, Part F
- Marks
 - draft, identification (orientation) marks to be picked out in white
- Area
 - approximate underwater area per caisson is 920 m²

380.2 Hull Exterior, hull above waterline / deck

- Preparation
 - remove existing marine coating system by blasting to SSPC-SP6 standard or equal (Sa2)
 - ensure surfaces are dry, free of dust, rust, grit
 - degrease entire area with solvent to SSPC-SP1 standard
- Painting
 - refer to paint specification, Part F
- Marks
 - identification (orientation) marks to be picked out in white
 - deck caution areas to be picked out in yellow
- Hull area
 - approximate area per caisson is 510 m²
- Deck
 - remove existing coating system to bare steel (spot blast) approximately 5% of deck area
 - remove loose coating system by sweep blast 95%
 - refer to paint specification, Part F

380.3 Hull Interior, tanks / wet spaces

- Main ballast tank - remove and replace existing zinc anodes
- A end trim tank - remove and replace existing zinc anodes
- B end trim tank - remove and replace existing zinc anodes
- Wing space C, deck II - remove and replace existing zinc anodes
- Wing space C, deck III - remove and replace existing zinc anodes
- Wing space D, deck II - remove and replace existing zinc anodes
- Wing space D, deck III - remove and replace existing zinc anodes

380.4 Hull Interior, voids / dry spaces

- A end void
 - remove loose coating system by sweep blast
 - spot blast scale to bare steel, approximately 2%
 - renew desiccant and install on completion of painting and de-humidifying process
 - refer to paint specification, Part F
- B end void
 - remove loose coating system by sweep blast
 - spot blast scale to bare steel, approximately 2%
 - renew desiccant and install on completion of painting and de-humidifying process
 - refer to paint specification, Part F
- Wing void C
 - remove loose coating system by sweep blast
 - spot blast scale to bare steel, approximately 2%
 - renew desiccant and install on completion of painting and de-humidifying process
 - refer to paint specification, Part F
- Wing void D
 - remove loose coating system by sweep blast
 - spot blast scale to bare steel, approximately 2%
 - renew desiccant and install on completion of painting and de-humidifying process
 - refer to paint specification, Part F

- A end passage, deck II
 - remove existing coating system from floor and 150 mm up bulwarks to SP 2.5
 - sweep blast remaining bulkhead and deckhead to remove loose coating system
 - refer to paint specification, Part F
- A end passage, deck III
 - remove existing coating system from floor and 200 mm up bulwarks to SP 2.5
 - sweep blast remaining bulkhead and deckhead to remove loose coating system
 - spot blast scale to bare steel, approximately 5%
 - refer to paint specification, Part F
- Control Room
 - remove loose coating system by sweep blast
 - spot blast scale to bare steel, approximately 10%
 - refer to paint specification, Part F
- B end passage, deck II
 - remove existing coating system from floor and 150 mm up bulwarks to SP 2.5
 - sweep blast remaining bulkhead and deckhead to remove loose coating system
 - refer to paint specification, Part F
- B end passage, deck III
 - remove existing coating system from floor and 200 mm up bulwarks to SP 2.5
 - sweep blast remaining bulkhead and deckhead to remove loose coating system
 - spot blast scale to bare steel, approximately 5%
 - refer to paint specification, Part F

385. SIGNS AND MARKINGS

- Caisson markings
 - paint markings “A” and “B” on exterior sides.
Note: confirm correct orientation with Owner prior to painting
- Draft marks
 - re-paint draft marks with white epoxy 2 part paint

PART 400 – DECK MACHINERY AND FITTINGS

410. LINE HANDLING/MOORING EQUIPMENT

- Mooring Bollards
 - mechanically prepare prior to painting – N.B. do not paint center section of bollards, paint only tops and base of bollards
- Mooring Line hull fittings
 - not often used – no special attention
 - remove damaged wire ends or shackles
- Reel drive electric deck winches
 - remove winches and cut off brackets, fixtures and fittings
 - make fair deck, and include in painting programme

450. FENDERING SYSTEM

- Side Fendering (soft wood)
 - remove existing wood blocks and re-install where condition is acceptable, where not, install new locally obtained Douglas Fir sections
 - 168 pieces per each face (3 per section, 28 sections), with dimensions of
 - approximately 4' x 12"x4" (1200 mm x 300 mm x 100 mm)
 - notch blocks as required to fit under vertical steel tees
- Side Fendering (hardwood)
 - remove existing wood blocks and re-install on completion of other work – N.B. integrity of wood to be maintained during removal, and sections to be stored safely prior to re-install
 - install/replace approximately 30' (9.0 m) of 12" x 5" (300 mm x 125 mm) new *Ekki* hardwood horizontal fender
- Fixtures/fittings
 - remove existing vertically mounted T bar, ensuring integrity of shell plate and horizontally fitted flat bar is maintained
 - approximately 130 feet (40.0 m) per side

- fit new T bar 4 inch x 4 inch x ¼ inch (100 mm x 100 mm x 6 mm), – NB. If T bar of correct dimension is not available, use cut I beam
- slot one side of each section to allow fitting of wood
- fit locking tabs for wood as required
- crop and renew horizontally fitted flat bar as required – N.B. allow for approximately 150 feet (45 m)
- remove and renew wasted ½ inch studs
- secure hard wood blocks with new ½ inch washers and nuts
- threads to be lubricated with Never Seize or equivalent product prior to installation
- horizontal hard wood block counter bores to be sealed with non-hydrocarbon based mastic
- Bottom Fendering (hardwood)
- See Section 212

PART 600 – ELECTRICAL SYSTEMS

601. SYSTEM

- General
 - perform an arc flash / arc fault study after replacement of electrical equipment noted below
 - apply arc flash decals to 600V distribution equipment
 - provide a copy of all studies to the Owners Representative

606. SHORE POWER

- Interlock
 - provide an interlock to the caisson end of the shore power cable so that cable cannot be unplugged while still energized
 - interlock could take form of “trapped key” system where key to unlock shore power plug is only released when shore power breaker is de-energized
 - interlock to provide safety and security to the caisson.
 - other interlock solutions will be considered by Owner e.g. Meltric DS 200 or equal
- Cable
 - as required Caisson end of the shore power cable to have plug fitted to suit interlock receptacle on Caisson

610. SWITCHBOARD

- Circuit Breakers
 - replace main 600 volt / 3 phase breaker (1 x 200 Amp)
 - replace 600 volt / 3 phase shore power breakers (2 x 200 Amp)
 - reinstall mechanical interlock
 - replace main switchboard 600 volt breakers as follows:
 - 2 phase, 15 Amp, two (2) off
 - 3 phase, 15 Amp, four (4) off

- 3 phase, 40 Amp, two (2) off
- 3 phase, 70 Amp, three (3) off
- replace secondary panel 600 volt breakers as follows:
- 3 phase, 15 Amp, twelve (12) off
- replace missing lamicoïd label “SHORE POWER A END” on main switchboard

618. CABLES

- Power trim pump
 - replace power trim pump cable from starter in Control Room, to pump in main ballast tank
 - renew cable gland in pump housing, and re-secure cable with stainless straps
- 600 volt power circuits
 - megger test and provide written results to Owners Representative
- Exterior cables
 - replace all existing 1000 volt Teck cables that run between lower and upper deck toe-rail
 - remove wiring for previous flood lights circuits
 - remove and replace rusted 2.4 m x 21 mm steel conduit
 - terminate new cables with weather proof Teck connectors
 - seal conduit ends where cables enter / exit
 - clean out and seal unused conduits
 - mark all below deck junction boxes e.g. spare, power, lighting etc.
 - install unpainted aluminium or painted steel protection plates where exposed Teck cables on deck could be damaged by dock or towing lines

619. RECEPTACLES

- GFCI
 - test all GFCI outlets and report any faulty units to Owners representative
- GPO's
 - remove and replace three (3) existing 120 volt / 15 Amp single outlets located outside on upper deck, with 120 volt 15 Amp duplex outlets
 - fit with weatherproof boxes with cover plates

620. MOTORS AND CONTROLLERS

- Ballast pump motors
 - remove, overhaul, and re-install, three (3) electric motors
 - megger test windings
 - megger test supply cables
 - check anti-condensation heaters
- Starters
 - refurbish ballast pump motor starter, with new contact and springs as required
 - check all connections for tightness
 - check pilot lamps for correct operation
 - check local and remote control function

625. LIGHTING

- Emergency lighting
 - remove and replace one (1) 12 volt incandescent lamp on self-contained unit, with a 12 volt LED
 - remove and replace three (3) 12 volt incandescent remote lamps, with 12 volt LED
 - remove and replace two (2) 12 volt / 6 Ah batteries in self-contained units
 - test operation of emergency lighting for a minimum of 30 minutes
- Interior lighting
 - Remove and replace sixteen (16) 120 volt T12 x 48" fluorescent vapor tight fixtures, with T12 x 48" LED equivalent

PART 700 – SHIP'S SERVICES

701. PIPING SYSTEMS GENERAL

- Standards
- ASTM pipes, fittings, valves

705. FILL, VENT AND SOUNDING

- Sounding
 - remove existing remote sounding system probes and associated fixtures and fittings, cabling, displays etc.
 - install a new continuous reading ultrasonic tank level system for the main ballast tank and the two trim tanks
 - remote display at main console to show tank level for each tank simultaneously, with programmable units
 - 120 Volt AC or 12 / 24 Volt DC supply through dedicated UPS

720. BALLAST AND TRIM SYSTEM

- Valves
 - remove and replace the following valves;
 - eleven (11) 12 inch gate valves
 - two (2) 10 inch gate valves
 - one (1) 6 inch gate valve
 - with the following characteristics:
 - 125 lb class
 - Flanged connection and bolted bonnet
 - Non rising stem
 - Cast Iron body
 - Bronze/316 S.S. trim
 - Removable seats
 - AWWA C550 Epoxy 2 part coating suitable for salt water immersion.
 - Polymer coated gates
 - New nuts, bolts, washers at flanges
 - ASME B16.34 standard

- Valve treatment
 - interior of all valves to be coated with AWWA C550 approved epoxy coating
 - gates to be treated with compatible coating to same standard
- Testing
 - pressure test new valves with blank flange on inboard face of valves
 - use compressed air for testing
 - ensure valves maintain pressure for minimum of 24 hours
 - provide all fittings, hoses, gauges, gaskets, blanking flanges and other items required.
 - arrange mutually convenient time for Owner's Representative to witness tests
- Valve extended spindles
 - replace packing glands for extended pipe spindles as follows:
 - 8 flooding valve spindles at deck II
 - 2 trim valve spindles at deck II
 - 3 overboard discharge valve spindles at deck III
 - 1 power trim valve spindle at deck III
 - fit replacement glands with stainless steel grease nipples
 - in enclosed alcoves on deck II, fit extended grease hoses of 1m length
 - grease all glands and bushings with a waterproof grease.
 - replace all U-joints inside main ballast tank. Fit with watertight rubber boots (similar to CV joint) and pack with waterproof grease
 - add SS, grease nipples to any bushings in main ballast tank that are missing grease nipples
 - inspect all bushings for wear and as a minimum;
 - replace two (2) bushings for lower flooding valves #3 inboard and outboard
 - replace two (2) bushings immediately above the two (2) trimming valves and power trim valve
 - all bushing to have SS grease nipples fitted
- Valve actuators
 - remove and replace fourteen (14) total Rotork 1400 series actuators
 - actuators to be electrically powered with manual handwheel

- Expansion pieces
 - Ballast pump
 - Trim pump
- determine require actuator torque from torque characteristics of new valves + add 25% extra torque above valve specifications to allow for future wear
 - remove and replace with like three (3) rubber expansion pieces, installed on ballast pump discharge lines
 - remove and overhaul three (3) deep well ballast pumps, Cascade Pump 10 MF, Serial #10370
 - replace impellers, bushing s and seals as required
 - remove in-line trim pump from pipe housing, located in base of ballast tank
 - replace with new 10 HP submersible pump with similar performance

PART 800 – DOMESTIC SERVICES

815. HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

- Control Room Baseboard Heaters
 - Control Panel heater
 - Main Switchboard & Panel boards
 - Thermostats
- remove baseboard heaters and install two (2) 1.5 kW fan forced unit heaters. Install one heater in corner with main transformer
 - replace Edison base heater in control panel with 500W low watt density baseboard type heater
 - install new 100 W anti-condensation 100 W heaters in main switchboard and each panel board
 - install new tamper proof thermostats for each new heater

* * *

PART F – PAINT SPECIFICATION

The following is based on International Marine Paints and is considered as a minimum standard.

DFT = Dry Film Thickness

As a general note, the following paint spec is indicative of a system acceptable for the conditions; however it should be confirmed with supplier for;

- applicability
- availability (in Canada)

It is always recommended to clear previous coating programmes before applying a new system

Overcoating times will vary depending on climatic conditions – temperature, moisture, direct sunlight etc.

Read in conjunction with Section 380 Painting and Protection, of the refit specification

1.0 Hull Exterior – hull below waterline

- Primer
- Antifouling
- Intergard 5000
 - 2 coats, 150 microns DFT each
- Interflex 8700 SPC
 - 2 coats, 150 microns DFT each

2.0 Hull Exterior – hull above waterline / deck

- Topsides
- Deck - An Intershield 300HS aluminum pure epoxy scheme with anticorrosive abrasion resistance Intergard 264 epoxy topcoats. Aluminum oxide (Mixture of #16 & # 24) non-skid compound to be added (270 grams per m2 or 1 lb per 18 sq. ft)
- Deck fittings/structures
- Intergard 5000
 - 2 coats, 150 microns DFT each
- Formula 151 Topcoat
 - 1 coat, 3 mils DFT
- Intershield 300HS Bronze
 - 1 coat, 125 microns DFT
- Intershield 300 HS Aluminum
 - 1 coat, 125 microns DFT
- Intergard 264 epoxy
 - One strip coat over weld seams
 - One full coat at 125 microns
 - Second full coat at 125 microns DFT
- Interbond 201
 - 2 coats, 150 microns DFT each
- Intercryl 588
 - 1 coat, 2 mils DFT

3.0 Hull Interior – tanks / wet spaces

- Main ballast tank
 - Intershield One-2-One Aluminium
 - 2 coats 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT
- Trim tank
 - Intershield One-2-One Aluminium
 - 2 coats, 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT
- Wing space C, deck II
 - Intershield One-2-One Aluminium
 - 2 coats 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT
- Wing space C, deck III
 - Intershield One-2-One Aluminium
 - 2 coats 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT
- Wing space D, deck II
 - Intershield One-2-One Aluminium
 - 2 coats 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT
- Wing space D, deck III
 - Intershield One-2-One Aluminium
 - 2 coats 75 microns DFT each
 - Interbond 998
 - 1 coat, 350 microns DFT

4.0 Hull Interior – voids / dry spaces

- End voids
 - Intergard 5000
 - 2 coats, 150 microns DFT each
 - Intergard 740
 - 1 coat, 50 microns DFT
- Wing voids
 - Intergard 5000
 - 2 coats, 150 microns DFT each
 - Intergard 740
 - 1 coat, 50 microns DFT
- Passage, deck II
 - Intergard 5000
 - 2 coats, 150 microns DFT each
 - Intergard 740
 - 1 coat, 50 microns DFT

- Passage, deck III
 - Intergard 5000
 - 2 coats, 150 microns DFT each
 - Intergard 740
 - 1 coat, 50 microns DFT
- Control room
 - Intergard 5000
 - 2 coats, 150 microns DFT each
 - Intergard 740
 - 1 coat, 50 microns DFT

PART G – HAZARDOUS MATERIALS PROCEDURE

The following is based on industry standard procedure for dealing with lead paint removal, by mechanical and blasting methods. Reference is also made to industry and legislative standards

PART 100 – GENERAL

101. DESCRIPTION

This procedure is prepared in order to provide guidance for the removal of paint containing lead elements on the steel surfaces of the EGD caissons, located in the graving dock, Esquimalt, BC

All steel surfaces are coated, and should thus be considered as contaminated with lead paint.

All spaces contained internally – outside of the Control Room and its immediate environs – are to be considered as being a confined spaces, and thus appropriate atmospheric testing is required prior to entry and as necessary, mechanical forced ventilation.

102. PROVINCIAL REGULATIONS

- WorkSafeBC
- Occupational Health and Safety Regulation (OHSR)
- BC Reg. 296/97, as amended by BC Reg. 30/2015

Materials including asbestos, lead or other heavy metal or toxic substance, and flammable or explosive materials that may be handled, disturbed or removed during demolition must be identified and removed or safely contained prior to demolition. In addition, a copy of the survey report identifying these materials must be available at the work site.

- Hazardous Waste Regulation
- BC Reg. 63/88, including amendments up to BC Reg. 63/2009

Federal and provincial guidelines limit lead concentrations in paint to 90 mg/kg for high risk individuals e.g. pregnant women and children, and any concentrations that exceed this limit would be considered a lead based paint.

WorkSafeBC suggests that improper removal of paint with a lead concentration of 600 mg/kg or more can result in airborne lead concentrations that exceed 50% of the airborne lead exposure limit of 0.05 mg/m³.

There are no special disposal requirements for materials coated with lead paint unless the lead is found to be leachable in excess of the regulated standard of 5 mg/L in the HW Regulations while considering the entire mass of the object the paint is coating

103. REFERENCE DOCUMENTATION

- Hazardous Building Materials Survey
- Lead High Risk SWP
- SNC Lavalin, March 31st, 2016
- North West Environmental Group, July 25th 2010

PART 200 – EQUIPMENT

201. PORTABLE - FIXED

201.1 Yard supply – equipment

- Fans
 - exhaust fans with HEPA type filtration to be placed inside each space, in proximity to work being carried out (local)
 - supply fans with direct feed from fresh air source, clear from exhaust fan discharge
- Vacuum
 - a vacuum to be made available to collect debris after removal. HEPA filter to be installed on discharge
- Supplies
 - plastic waste bags
 - barricade tape, caution tape
 - rags
 - portable lighting

201.2 Yard supply – PPE

- Coveralls
 - supply impervious disposable coveralls for each person involved in the operation. Suit should include hood and foot covers, or additional supply of impervious boot covers and head covers
- Gloves
 - supply impervious disposable gloves
- Respirators
 - PAPR (Powered Air Purifying Respirators) fitted with P100 cartridges (protection factor 1000)
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PART 300 – SAFETY PROCESS'S

301. PERSONNEL RESPONSIBILITY - PREPARATION

- General
 - to follow High Risk Lead Abatement procedures as indicated in this document
 - provide and clearly identify an area located close to work area for decontamination purposes
 - work force is to be provided all appropriate PPE
 - set up work area, and cordon off as necessary
 - confirm regulatory bodies have been consulted and recommendations suitably in place;
 - WorkSafeBC NOP
 - PAO Testing Records
 - MSDS
 - Breathing Air Testing CSA Z180.1-00
 - ensure PWGSC related procedures are in place and adhered to for the task at hand, including;
 - enclosed space entry, and atmospheric testing
 - working at height (fall protection)
 - working from crane baskets (fall protection)
 - working from Man-Lift (fall protection)
- Training
 - Contractor safety training for EGD site procedures conducted on site by EGD Safety
 - equipment familiarity
 - certified operators as required
- Safety/Fire watch
 - as required ensure personnel not directly involved in work process are available for safety watch
 - on site first aid attendant if required
 - industrial hygienist for periodic monitoring
-
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-
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PART 400 – PROCEDURES

401. PREPARATION

401.1 Areas

- Work
 - establish perimeter of work area, and identify with Caution tape
 - provide signage indicating lead hazards present
 - provide signage restricting access
 - establish dust control barrier within work area to minimise contamination
- Decontamination
 - locate an area in close proximity (where practical) to work area, with sufficient space for work force
 - provide a *clean room* changing area
 - provide a *dirty room* area for waste coveralls, rags, hoods, gloves etc. with facilities for;
 - washing/cleaning with water and cleansing agents
 - HEPA vacuum
 - adequate light and ventilation to be provided
 - make available shower facilities, with hot/cold water, cleansing agents, towels, hand drying machines
 - all waste water to be filtered and tested prior to disposal

402. WORKING

402.1 Entry/Egress

- Entry
 - clean coveralls, hoods, boot covers, gloves, eye wear i.e. full PPE etc. to be donned in *clean room*
 - sandblasting suits and equipment should remain in the *dirty room* for re-use
 - entry to immediate work area should be via *dirty room*
 - sandblasting armoured suits to be
- Egress
 - egress from work area should be via *dirty room* with following measures taken;

- decontamination with vacuum and wet wipe coveralls with cleansing agent
- clean respirator hood – mechanical
- clean hood and protective gear – blasting
- all visible dust etc. to be cleaned up prior to departing *dirty room*
- remove disposable coveralls, hoods, boot covers, gloves, respirator etc.
- Clean Room
- Shower and change

402.2 Paint removal

- Needle gun or sanding
 - provide air operated tools, for either local hard scale removal or heavy grit sanding
 - protect ancillary equipment and tools from contamination, with 6 mil poly sheet and tape
 - locate drop sheets where possible to collect paint / debris
 - completed surfaces to be vacuumed and wiped with water
 - collect solid debris in heavy duty plastic waste bags
 - collect waste water in buckets
 - waste rags to be collected in heavy duty plastic waste bags
 - all contaminated bags and buckets to be sealed and labelled before removal from area
- Sandblasting
 - protect ancillary equipment and tools from contamination, with 6 mil poly sheet and tape
 - completed surfaces to be vacuumed and wiped with water
 - collect waste material in heavy duty plastic waste bags
 - collect waste water in buckets
 - waste rags to be collected in heavy duty plastic bags
 - all contaminated bags and buckets to be sealed and labelled before removal from area
- Waste evaluation
 - all waste to be removed from work area before egress of labour
 - where possible waste material to be removed from area without passing through *dirty room*

- solid and liquid waste to be stored in a secure area for evaluation prior to disposal, in line with EGD Best Management Practices

402.3 Re-establishment of work area

- Surfaces
 - all surfaces subject to paint removal to be vacuumed and wet wiped down
 - vacuum to be fitted with brush so as to facilitate final dust removal
- Materials
 - all solid materials used in work area to be collected in heavy duty plastic waste bags
 - all liquid/wet material used in work area to be collected in buckets
 - commence clean up at point furthest from entry point (or negative air source) working backwards
 - plastic sheeting to be wiped clear of dust prior to bagging
 - all contaminated tools to be cleaned prior to removal from work area
- Inspection
 - prior to egress from work area a final inspection to be conducted by Supervisor
 - as required final vacuum and wipe of floor
 - all contaminated bags and buckets to be sealed and labelled before removal from area

402.4 Completion

- Tear down
 - retain PPE protocol during tear down of entry/egress *dirty room*
 - all materials to be cleaned and all contaminated bags and buckets to be sealed and labelled before removal from area
 - solid and liquid waste to be stored in a secure area for evaluation prior to disposal, in line with EGD Best Management Practices