



**Public Works and
Government Services Canada**

Requisition Number: _____

MERX I.D. Number: _____

SPECIFICATIONS for:

Project no. R.075645.001
SS Keno National Historic Site
Fire Suppression System Upgrade

Dawson City, Yukon

APPROVED BY:


Regional Manager, AES

2018-03-08
Date


Construction Safety Coordinator

2018-03-08
Date

TENDER:


Project Manager

MAR 09 2018
Date

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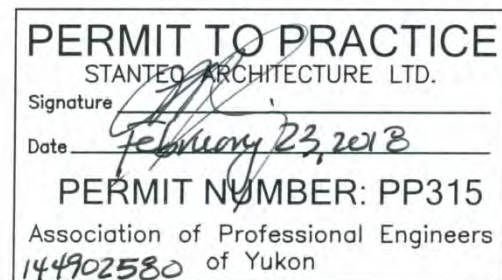
Professionals of Record:

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1. **Mechanical Engineer:**
François-Xavier Lavallée, ing., P.Eng, T.A.P.I.



Engineer's Seal

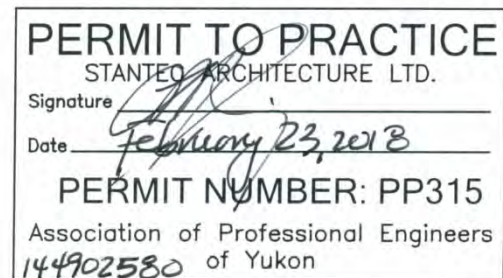


Permit to Practice

2. **Electrical Engineer:**
Jordan Youngs, P.Eng



Engineer's Seal



Permit to Practice

Part 1 General

1.1 SECTION INCLUDES

- .1 Hereinafter is a list of drawings forming the Contract Documents in conjunction with this specification manual.
- .2 APPENDIX A:
 - .1 DRAWINGS:

Dwg No.	Dwg Name
G-001	Cover Sheet
M100	Site Plan and Legends
M101	Demolition Plan: Foundation and Hull
M102	Demolition Plan: Freight Deck & Above and Valve House
M201	New Sprinkler Plan: Foundation and Hull
M202	New Sprinkler Plan: Freight Deck & Above and Valve House
M501	Fire Protection: Schematics and Details
M502	Fire Protection: DEtails 2
E101	Fire Alarm Rise Diagram, Panel, Fire Alarm, and Mechanical Equipment Schedule, Legend
E102	Foundation and Steel Beam, Hull and Freight Floor Plans and Details
E103	Saloon, Boat, and Wheelhouse Deck Floor Plans

END OF SECTION

Part 1 General

1.1 CODES

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

1.2 HISTORICAL IMPORTANCE

- .1 The S.S. Keno is a National Historic Site under the care of Parks Canada. Protection of the heritage value of the historic place, as outlined in the Commemorative Integrity Statement (CIS) - reference Appendix C, and in accordance with the Standards and Guidelines of Historical Places in Canada is required during all stages of the scope of work in this project.
- .2 The Heritage Value of the S.S. Keno resides in the completeness of the vessel in its hull, superstructure, propulsion and auxiliary systems, the surviving unity of the original vessel and equipment, the quality of the construction of the vessel and its components, and the well-executed carvel planking.

1.3 HERITAGE CONSERVATION MINIMUM INTERVENTION APPROACH

- .1 Reference: Parks Canada Standards and Guidelines for the Conservation of Historic Places in Canada, 2nd Edition. <http://www.historicplaces.ca/en/pages/standards-normes.aspx>
- .2 Considerations of conservation are guided by a minimal intervention approach and advocate the maintenance and repair of elements instead of their removal or replacement. Six (6) specific standards will be followed as outlined in the Standards and Guidelines
 - .1 Standard 1, Do not remove, replace or substantially alter its intact or repairable character defining elements.
 - .2 Standard 3, Conserve heritage value by adopting an approach calling for minimal intervention.
 - .3 Standard 8, Repair character-defining elements by reinforcing their materials using recognized conservation methods. Replace in-kind any extensively deteriorated or missing parts of character-defining elements.
 - .4 Standard 10: Repair rather than replace character-defining elements. Where character-defining elements are too severely deteriorated to repair, and where sufficient physical evidence exists, replace them with new elements that match the forms, materials and detailing of sound versions of the same elements.
 - .5 Standard 11: Conserve the heritage value and character-defining elements when creating any new additions to an historic place or any related new construction. Make the new work physically and visually compatible with, subordinate to and distinguishable from the historic place.

- .6 Standard 12: Create any new additions or related new construction so that the essential form and integrity of an historic place will not be impaired if the new work is removed in the future.

1.4 DESCRIPTION OF WORK

- .1 Work under this Contract involves replacement of an existing fire suppression system throughout multiple levels of the SS Keno National Historic Site and parts of the fire alarm system at the SS Keno National Historic Site located on Hwy-2 in Dawson City, YT.
- .2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents;
 - .1 Work is to be done in a manner that protects the heritage value of the historical asset;
 - .1 A Departmental Representative will be assigned to the project to oversee the heritage preservation aspects of the work see Section 01 73 00 Execution.
 - .2 Removal of the existing automatic fire sprinkler system;
 - .1 The demolition work includes hazardous materials abatement.
 - .1 Refer to Section 02 81 01 Hazardous Materials Abatement and Appendix C.
 - .3 Installation of new automatic fire sprinkler system;
 - .1 Provision of a Fire Watch is required when the automatic sprinkler system is not operational. Refer to Section 01 73 00 Execution and Appendix D.
 - .4 Replacement of fire alarm panel, pull stations, and other fire alarm upgrades;
 - .1 Provision of a Fire Watch is required when the fire alarm system is not operational. Refer to Section 01 73 00 Execution and Appendix D.
 - .5 Minor siteworks to accommodate proposed construction.

1.5 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.

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 1 subcontractor. Responsibility for determining which subcontractor provides the labour,

material, equipment and services required to complete the work rests solely with the Contractor.

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

1.7 WORK SCHEDULE

- .1 Schedule work and provide a Project Schedule in conformance with Section 01 32 16.07 Construction Progress Schedule - Bar (ganttt) Chart
- .2 Do not change approved Project Schedule without notifying Departmental Representative.
- .3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

1.8 HOURS OF WORK

- .1 Adhere to the bylaws of the City of Dawson.

1.9 COST BREAKDOWN

- .1 Within 10 working days after Contract award and before submitting the first progress claim, submit a breakdown of the Contract schedule of values in detail as directed by the Departmental Representative.
- .2 Minimum breakdown as follows:
- .3

DESCRIPTION	VALUE
Mobilization & Demobilization	\$ _____
Demolish existing sprinkler system	\$ _____
Fire Watch - Labour	\$ _____
New Sprinkler System - Material	\$ _____
New Sprinkler System - Labour	\$ _____
New Nitrogen Generator - Material	\$ _____
New Nitrogen Generator - Labour	\$ _____
Nitrogen Generator - Mnfg start-up and training	\$ _____
Start-up and Commissioning	\$ _____
O&M manuals and Record Drawings	\$ _____
TOTAL	\$ _____

1.10 CODES, BYLAWS, STANDARDS

- .1 Perform work in accordance with the latest edition of the National Building Code of Canada (NBC), the National Fire Code of Canada (NFC), the Canadian Electrical Code of Canada of Canada (CEC), the National Plumbing Code of Canada (NPCC), Standards and Guidelines for the Conservation of

Historic Places in Canada, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

- .2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
- .3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.
- .4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.11 DOCUMENTS REQUIRED

- .1 Maintain 1 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/approved shop drawings.
 - .6 Change orders
 - .7 Other modifications to Contract.
 - .8 Field test reports.
 - .9 Reviewed/approved samples.
 - .10 Manufacturers' installation and application instructions.
 - .11 One set of record drawings and specifications for "as-built" purposes.
 - .12 National Building Code of Canada 2015.
 - .13 S.S. Keno National Historic Site Commemorative Integrity Statement
 - .14 Current construction standards of workmanship listed in technical Sections.
 - .15 Building Safety Plan.

1.12 REGULATORY REQUIREMENTS

- .1 Obtain and pay for - Building Permit, Certificates, Licenses and other permit required by regulatory municipal, territorial or federal authorities to complete the work.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

1.13 CONTRACTOR'S USE OF SITE

- .1 Use of site:

- .1 Contractor will have full use of the project site during construction for execution of work. The site has other buildings and parking areas which will remain open to Parks Canada during construction. Areas for temporary offices, lay down of materials and equipment and storage will be defined and agreed to during the project startup meeting.
 - .2 Assume complete responsibility for assigned premises for duration of this work until substantial completion has been granted by the Departmental Representative.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as other construction contractors working on site, moving contractors, equipment installers and Parks Canada Agency staff.
- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
 - .3 Do not unreasonably encumber site with material or equipment to the satisfaction of the Departmental Representative.

1.14 EXAMINATION

- .1 Examine site and be familiar and conversant with existing conditions likely to affect work .
- .2 Provide photographs of surrounding properties, objects and structures liable to be damaged, to assist in the resolution of subsequent claims attributed to contractor damages during construction.

1.15 EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the utilities and Departmental Representative.

1.16 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Historical asset preservation is paramount in this project. If specific location of equipment is not immediately clear based on existing architectural penetrations or existing equipment locations, consult the Departmental Representative for direction.
- .2 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .3 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .4 Inform Departmental Representative of impending installation and obtain approval for actual locations.
- .5 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative.

1.17 CUTTING AND PATCHING

- .1 Work is to be carried out in accordance with accepted historic conservation techniques, and as outlined in the Standards and Guidelines for the Conservation of Historic Places in Canada.
- .2 Do not cut any holes unless approved by Departmental Representative.
- .3 If approved, make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .4 Fit work airtight to pipes, sleeves ducts and conduits.
- .5 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 metres in ambient light, and includes painting the whole surface to the next change in plane.

1.18 SETTING OUT OF WORK

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

1.19 QUALITY OF WORK

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2015 and applicable Construction Standards.
- .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

1.20 WORKS COORDINATION

- .1 Coordinate work of subtrades;
 - .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
 - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
 - .1 Pay particular close attention to overhead work above ceilings

and within or near to building structural elements.

- .2 Identify on coordination drawings, building elements, service lines, rough-in points and indicate location services entrance to site.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Publish minutes of each meeting.
 - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work coordination:
- .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
 - .3 Ensure disputes between subcontractors are resolved.
- .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.

1.21 DISCOVERY OF A CULTURAL RESOURCE/ARTIFACT

- .1 The contractor and/or any member of their team shall not remove, disturb or displace any cultural resource/artifact discovered within or around the S.S. Keno. All cultural resources and objects discovered remain the custodial responsibility of the Crown (through Parks Canada) and must be reported immediately.
- .2 If a cultural resource/artifact is encountered during the course of any work within the S.S. Keno, the contractor shall record the find to the best of their ability (digital photographs, and notes) and report the find to the Parks Canada Representative immediately. The contractor shall only resume activity when permitted to proceed with the authorization of Parks Canada.
- .3 The contractor and/or any member of their team shall not divulge the finding of cultural resources/artifacts nor share photographs unless it is with the express permission of Parks Canada.
- .4 Definition of a Cultural Resource: any object, grouping of objects, place or evidence of past human occupation that may be associated with an aspect of human history and culture.

1.22 PROJECT MEETINGS

- .1 The Contractor will arrange project meetings in conformance with Section 01 31 19 - Project Meetings.

1.23 TESTING AND INSPECTION

- .1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative.
- .2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of correct work.
- .4 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .7 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

1.24 CLEANING

- .1 Conduct cleaning and disposal operations daily. Comply with local ordinances and anti-pollution laws.
- .2 Ensure cleanup of the work areas each day after completion of work.
- .3 Clean interior building areas when ready to receive finish painting and continue cleaning on an as-needed basis until building is sufficiently completed or ready for occupancy.
- .4 In preparation for interim and final inspections:
 - .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
 - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces,

including glass and other polished surfaces.

- .5 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.

1.25 DUST CONTROL

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

1.26 ENVIRONMENTAL PROTECTION

- .1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

1.27 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

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

1.28 ADDITIONAL DRAWINGS

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

1.29 BUILDING SMOKING ENVIRONMENT

- .1 Smoking within the building is not permitted.

1.30 SYSTEM OF MEASUREMENT

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Meeting minutes will be recorded by the Consultant.
- .7 Distribution of minutes will be by the Consultant.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 10 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANNT) Chart .
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences .
 - .5 Delivery schedule of specified equipment.
 - .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

- .8 Owner provided products.
- .9 Departmental Representative for heritage will review the historic site with the contractor, and the implications of the Commemorative Integrity Statement (CIS).
- .10 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .11 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .13 Monthly progress claims, administrative procedures, photographs, hold backs.
- .14 Appointment of inspection and testing agencies or firms.
- .15 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 During course of Work schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work Departmental Representative are to be in attendance.
- .3 Notify parties minimum 7 days prior to meetings.
- .4 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Safety
 - .13 Other business.

Part 2 Product

.5 Not Used.

Part 3 Execution

.6 Not Used.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Milestone: significant event in project, usually completion of major deliverable.
- .7 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .8 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Project Schedule is practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

Procedures.

- .2 Submit Project Schedule to Departmental Representative within 10 working days of award.
- .3 Revise and resubmit project schedule as requested by the Departmental Representative.

1.4 PROJECT SCHEDULE

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Demolition
 - .6 Sprinkler Installation
 - .7 Fire Alarm System Installation
 - .8 Sprinkler System Testing
 - .9 Fire Alarm System Testing & Verification
 - .10 Final Cleanup
 - .11 Demonstration
 - .12 Demobilization

1.5 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on a monthly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.6 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 Product
2.1 NOT USED
 .1 Not used.

Part 3 Execution
3.1 NOT USED
 .1 Not used.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections.
- .2 Present shop drawings, product data and samples in SI Metric units.
- .3 Where items or information is not produced in SI Metric units, converted values are acceptable.
- .4 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submissions.
- .5 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations.
- .6 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations.
- .7 Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative.
- .8 Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative.
- .9 Do not proceed with work until relevant submissions are reviewed and approved by the Departmental Representative.

1.2 SUBMISSION REQUIREMENTS

- .1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow 10 ten days for Departmental Representative's review of each submission, unless noted otherwise.
- .3 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.

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

1.3 SHOP DRAWINGS

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work which are specific to project requirements.
- .2 Maximum sheet size: 850 x 1050 mm.
- .3 1 digital copy for each requirement requested in the specification sections and/or as requested by the Departmental Representative.
- .4 Cross-reference shop drawing information to applicable portions of the Contract documents.

1.4 SHOP DRAWINGS REVIEW

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

- .2 This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.
- .3 This review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents.
- .4 Without restricting the generality of the foregoing, the Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at the job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Coordination of the work of all sub-trades.

1.5 PRODUCT DATA

- .1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract documents.
- .5 Submit 6 copies of product data.

1.6 SAMPLES

- .1 Samples: examples of materials, equipment, quality, finishes and workmanship.
- .2 Include sample of seismic restraint system.
- .3 Deliver samples prepaid to Departmental Representative's office.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.7 PROGRESS SCHEDULE

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

1.8 TEST RESULTS AND INSPECTION REPORTS

- .1 Submit in duplicate test results and inspection reports required by the specifications.

1.9 MOCK-UPS

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

1.10 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, high resolution format at the end of each week and monthly with progress statement.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Images and recordings are to be of reasonable quality and quantity to enable the viewer to understand the context and subject recorded.
- .4 Frequency of photographic documentation: weekly.
- .5 Minimum 4 megapixels per image in standard format that will print proportionately on a 127mmx178mm photographic paper, or as accepted by the Departmental Representative.
- .6 Date stamp visible in the photograph and not obscuring subject matter of photograph.

Part 2 Product

Part 3 Execution

END OF SECTION

1. References

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II
 - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 The Canadian Electric Code (as amended)
- .4 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2009 Code of Practice for Access Scaffold
 - .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
 - .4 CSA Z1006-10 Management of Work in Confined Spaces.
 - .5 CSA Z462- 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):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .7 Yukon Territories:
 - .1 Workers Compensation Act.
 - .2 Occupational Health and Safety Act
- .8 Any Hazardous Materials Assessment Reports must be listed in this section.

2. Related Sections

- .1 Refer to the following current NMS sections as required:
 - 1. General Instructions: Section 011155
 - 2. Construction progress schedules: Section 013216
 - 3. Submittals procedures: Section 013300
 - 4. Environmental Procedures: Section 013543
 - 5. Temporary Facilities: Section 015100
 - 6. Temporary barriers and enclosures: Section 015600

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.

4. Compliance with Regulations

- .1 PSPC may terminate the Contract without liability to PSPC where the Constructor, in the opinion of PSPC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Act.
- .2 It is the Constructor'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 Act.

5. Submittals

- .1 Submit to Departmental Representative submittals listed for review. [in accordance with Section 013300]
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Site Specific Safety Plan.
 - .2 Exposure Control Plan(s)
 - .3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .4 Copies of incident and accident reports.
 - .5 Complete set of current Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements
 - .6 Emergency Procedures.
- .4 The Departmental Representative will review the Constructor's Site Specific Health and Safety Plan and emergency procedures and provide comments to the Constructor within 5 days after receipt of the plan. Revise the plan as appropriate and re-submit 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 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.

6. Responsibility

- .1 Assume responsibility as the Constructor for work under this contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with Site Specific Health and Safety Plan.

7. Health and Safety Coordinator

- .1 The Health and Safety Coordinator:
 - .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, revising, daily enforcing, and monitoring the Site Specific Safety Plan.
 - .3 Be on site during execution of work.

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.

**9. Project/Site
Conditions**

- .1 Work at site will involve contact with:
 - .1 Multi-employer work site.
 - .2 Federal employees and general public.
 - .3 Confined Space
 - .4 Hazardous Substances (asbestos, lead)
 - .5 Reference: Appendix B – Pre-Renovation Hazardous Buildings Material Assessment, Dated July 12, 2016

10. Utility Clearances

- .1 The Constructor is solely responsible for all utility detection and clearances prior to starting the work
- .2 The Constructor will not rely solely upon the Reference Drawings or other information provided for utility locations.

**11. Regulatory
Requirements**

- .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

11. Work Permits

- .1 Obtain speciality permit[s] related to project before start of work.

12. Filing of Notice

- .1 The Constructor is to complete and submit a Notice of Project as required by the Territorial authorities.
- .2 Provide copies of all notices to the Departmental Representative.

**13. Health and Safety
Plan**

- .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

- .1 Primary requirements:
 - .1 Constructor's safety policy.
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project.
 - .4 Site Specific Safety Plan for project.
 - .5 Job-specific safe work procedures.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee/Representative procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
- .3 List hazardous materials to be brought on site as required by work.
- .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the site specific safety plan.
- .4 Revise and update Site Specific Safety Plan as required, and re-submit to the Departmental Representative.
- .5 Departmental Representative's review: the review of Site Specific Safety Plan by Public Service and Procurement Canada (PSPC) shall not relieve the Constructor of responsibility for errors or omissions in final Site Specific Safety Plan or of responsibility

for meeting all requirements of construction and Contract documents.

14. Emergency Procedures

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulations.
 - .3 Local emergency resources.
 - .4 Departmental Representative [site staff].
- .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 [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.

15. Hazardous Products

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and

-
- WHMIS documents as per Section 013300.
- .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 Legislative requirements.
 - .4 The constructor shall ensure that the product is applied as per manufacturers recommendations.
 - .5 The constructor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.
- 16. Asbestos Hazard**
- .1 Carry out any activities involving asbestos in accordance with applicable Territorial / Federal Regulations.
 - .2 Removal and handling of asbestos will be in accordance with applicable Territorial / Federal Regulations.
- 17. Removal of Lead-Containing Paints**
- .1 All paints 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 applicable Territorial Regulations.
 - .3 Dry Scraping/Sanding of any materials containing lead is strictly prohibited.
 - .4 The use of Methylene Chloride based paint removal products is strictly prohibited.
- 18. Silica Hazard**
- .1 Carry out any activities involving silica in accordance with applicable Territorial / Federal Regulations.
- 19. Electrical Safety Requirements**
- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
 - .1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

- .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.
- 20. Electrical Lockout** .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a 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.
- 21. Overloading** .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.
- 22. Falsework** .1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003).
- 23. Scaffolding** .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and applicable Territorial Regulations.
- 24. Confined Spaces** .1 Carry out work in confined spaces in compliance with Territorial Regulations
- 25. Powder-Actuated Devices** .1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.
- 26. 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.

27. Fire Safety

Requirements .1

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

28. Fire Protection and Alarm System

Alarm System .1

- .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.

29. Unforeseen Hazards .1

Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

30. Posted Documents .1

- .1 Post legible versions of the following documents on site:
 - .1 Site Specific Safety Plan.
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor plans or site plans.
 - .7 Notice as to where a copy of the Workers' Compensation Act and Occupational Health and Safety Act are available on the work site for review by employees and workers.
 - .8 Workplace Hazardous Materials Information System (WHMIS) documents.

- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

31. Meetings.1

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

32. Correction of Non-Compliance.1

Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting 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 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
 - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
 - .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
 - .7 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
 - .10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent

introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Territorial, and Municipal laws and regulations for storage and handling of these materials.

- .11 Waste Water Management Plan identifying methods and procedures for management for 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.

1.2 FIRES

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

1.3 POLLUTION CONTROL

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

1.4 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial, Territorial, 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.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial, territorial, or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: demolition of asbestos-containing material is hazardous to health. Stop work immediately when material resembling asbestos-containing material that has not otherwise been assessed per reports included herein, is encountered during demolition work. Notify Departmental Representative. Refer to Section 02 81 01 Hazardous Materials Abatement
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling polychlorinated biphenyl that has not otherwise been assessed per reports included herein, is encountered during demolition work. Notify Departmental Representative. Refer to Section 02 81 01 Hazardous Materials Abatement
- .3 Mould: Stop work immediately when mould that has not otherwise been assessed per reports included herein, is encountered during demolition work. Notify Departmental Representative. Refer to Section 02 81 01 Hazardous Materials Abatement.

1.3 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

1.4 NATIONAL PARKS ACT

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by the Contractor for purpose of inspecting and/or testing portions of Work, and will be approved by and responsible to the Departmental Representative. Cost of such services will be borne by the Contractor.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Owner. Pay costs for retesting and reinspection.

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 Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on

site. Provide 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 Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by .

1.6 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested.

1.7 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs shall be borne by the contractor.

1.8 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative .
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.
- .7 Mock-ups may remain as part of Work.
- .8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.9 MILL TESTS

- .1 Submit mill test certificates as requested.

Part 2 Product
 .2 Not Used.

Part 3 Execution
 .3 Not Used.

END OF SECTION

Part 1 General

1.1 ACCESS AND DELIVERY

- .1 Only the designated entrance may be used for access to building.
 - .1 Maintain for duration of Contract.
 - .2 Make good damage resulting from Contractor's use.

1.2 STORAGE FACILITIES

- .1 Storage space will be limited to SS Keno property.
- .2 Enclose all on site storage with construction fencing.

1.3 WATER SUPPLY

- .1 Water supply is available at existing building and may be used for construction purposes at no cost.
 - .1 The 19mm hose bibb at the existing valve building has not been tested for flow rate or pressure - neither is guaranteed to the contractor.
 - .2 The 19mm hose bibb must be disconnected and re-fed as part of the plumbing upgrade.

1.4 SANITARY FACILITIES

- .1 There are no existing sanitary facilities available on-site.
- .2 The contractor shall arrange temporary facilities for the duration of the Work.

1.5 HEATING AND VENTILATION

- .1 No existing heating and ventilation systems are present on the SS Keno itself.
- .2 The existing Valve Building is heated with electric baseboard.
- .3 The contractor shall provide temporary heating and ventilation as required to complete the work.
- .4 Provide dust control.

1.6 SCAFFOLDING

- .1 Construct and maintain scaffolding in rigid, secure and safe manner.
- .2 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.7 REMOVAL OF TEMPORARY FACILITIES

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

1.8 SIGNS AND NOTICES

- .1 Signs and notices for safety and instruction shall be in both official languages or graphic symbols conforming to CAN/CSA-Z321.
- .2 Maintain approved signs and notices in good condition for duration of project,

and dispose of off site on completion of project or when directed by Departmental Representative.

1.9 TEMPORARY POWER AND LIGHT

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.2 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.3 DUST TIGHT SCREENS

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.4 ACCESS TO SITE

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

1.5 PUBLIC TRAFFIC FLOW

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

1.6 FIRE ROUTES

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

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.8 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Be responsible for damage incurred due to lack of or improper protection.

Part 2 Product

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRODUCTS/MATERIAL AND EQUIPMENT

- .1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.
- .2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified
- .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than 1 diameter beyond nuts.
- .10 Types of washers as follows:
 - .1 Plain type washers: use on equipment and sheet metal.
 - .2 Soft gasket lock type washers: use where vibrations occur.
 - .3 Resilient washers: use with stainless steel.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .12 Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site.
- .13 Store products in accordance with suppliers' instructions.
- .14 Touch up damaged factory finished surfaces to Departmental Representative's satisfaction:
 - .1 Use primer or enamel to match original.
 - .2 Do not paint over nameplates.

1.2 QUALITY OF PRODUCTS

- .1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality

(compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided.

- .2 Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY OF PRODUCTS

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.5 CONTRACTOR'S OPTIONS FOR SELECTION OF PRODUCTS FOR TENDERING

- .1 Products are specified by "Prescriptive" specifications: select any product meeting or exceeding specifications.
- .2 Products specified under "Acceptable Products" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.
- .3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
- .4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers".
- .5 When products are specified by a referenced standard or by Performance specifications, upon request of Departmental Representative obtain from manufacturer and independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 SUBSTITUTION AFTER CONTRACT AWARD

- .1 No substitutions are permitted without prior written approval of the Departmental Representative.
- .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals will be considered by the Departmental Representative if:
 - .1 products selected by tenderer from those specified are not available;
 - .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
 - .3 alternative product to that specified, which is brought to the attention of considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount
- .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

- Part 3 Execution**
- 3.1 NOT USED**
- .1 Not Used.

END OF SECTION

Part 1 General

1.1 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.2 WORK ON THE SS KENO - PRESERVATION OF HISTORICAL ASSET

- .1 The preservation of the historical asset is of paramount importance in the completion of the Work.
- .2 These requirements apply to all elements of the SS Keno structure itself, but do not apply to the Control Building, or the Foundation Level.
- .3 A Departmental Representative - denoted as "Departmental Representative for Heritage" - will be made available to conduct the required site reviews during construction.
 - .1 Establish lines of communication between the Contractor's site supervisor and the Departmental Representative for Heritage at the Start Up Meeting.
 - .2 The Departmental Representative for Heritage will attend the weekly Construction Progress meetings to review and discuss Historical Preservation aspect of the Work.
 - .3 Elements requiring review by the Departmental Representative for Heritage shall be grouped together as-practicable to minimize the frequency of site reviews.
 - .4 Departmental Representative for Heritage will be available Monday to Friday 8AM to 5PM - unless specific arrangements are requested by the Contractor and approved by the Departmental Representative for Heritage.
 - .5 Allow for 24 hours from notification for Departmental Representative for Heritage's attendance to site.
- .4 The contractor shall not cut, drill, or otherwise modify the existing ship without approval of the Departmental Representative for Heritage.
- .5 Patching and repair as required will be subject to review and approval by the Departmental Representative upon completion.
- .6 New piping, wiring, and equipment shall be installed on the same alignment and locations as the existing systems being removed wherever possible.

- .1 Correction of pipe grading will require changes to wall and floor penetrations in certain key locations. Contractor to minimize as-practicable in-consultation with the Departmental Representative for Heritage and the Consultant.
- .2 Where removal of existing equipment scheduled for demolition results in an inconsistent finish, patch and make-good to match existing.
 - .1 Removal of manual pull stations;
 - .2 Removal of fire alarm bells;
 - .3 Relocation of sprinkler piping & heads;
- .3 Pipe hangers to re-use existing upper-attachment points wherever possible. Where changes are required, add as few new hangers as-possible. Patch and make-good holes from removed pipe hangers per plans.
- .4 Installation of new fire alarm devices (manual pull stations and audio/visual signal devices) will require new wiring and conduit. Conduit to be run from nearest existing device, on surface. Conceal conduit runs along least visible edge of structural members minimizing visual impact. Conduit routing plan to be reviewed and approved by Departmental Representative for Heritage prior to installation.

1.3 FIRE WATCH

- .1 Work shall comply with NFPA 101 Life Safety Code;
- .2 Provide fire watch in compliance with Dawson Fire Department requirements;
 - .1 See Appendix D: Dawson Fire Department Fire Watch Requirements;
 - .2 Provide documentation of Fire Watch to Departmental Representative and Dawson Fire Department, per the Dawson Fire Department Fire Watch Requirements.
 - .3 A fire watch shall consist of trained personnel who continuously patrol the affected area. Ready access to fire extinguishers and the ability to promptly notify the fire department are important items to consider. During the patrol of the area, the person should not only be looking for fire, but making sure that the other fire protection features of the building such as egress routes and alarm systems are available and functioning properly.
- .3 Provide Fire Watch whenever the Fire Alarm System is not in service.
- .4 Provide Fire Watch whenever the Automatic Fire Sprinkler system is not in service.
- .5 Parks Canada's existing Security Patrol service to be integrated into the Fire Watch work. Provide coordination to minimize additional work scope.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete

Work.

- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .10 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .11 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

Part 2 Product

- .2 Not Used.

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site waste containers for collection of waste materials and debris.
- .6 Dispose of waste materials and debris off site.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors .
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove snow and ice from access to building.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal do not become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.
- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

1.2 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by existing facility.

1.4 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and fully operational.
 - .4 Certificates required by Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with PWGSC's commissioning plan and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Owner's

acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

- .7 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions.
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Three weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: blue, hard covered, expandable posts, 219 x 279 mm with spine and face embossed with project title.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dxf format on CD.
- .10 Provide CD of construction photos in sleeve for each binder.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, one RECORD copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.

- .7 Inspection certificates.
- .8 Manufacturer's certificates.
- .2 Store RECORD documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label RECORD documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain RECORD documents in clean, dry and legible condition.
 - .1 Do not use RECORD documents for construction purposes.
- .5 Keep RECORD documents and samples available for inspection by Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of blue line opaque drawings, and in copy of Project Manual, provided by Departmental Representative .
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, required by

individual specifications sections.

- .7 Digital Photographs
 - .1 Provide digital progress photos for site records, allow for a minimum of 100 photos per month.
 - .2 Minimum 4 megapixels per image in standard format.
 - .3 Date stamp visible in the photograph and not obscuring subject matter of photograph.
 - .4 Digital photographs to be taken for each day of work, minimum of two photographs from different angles of work on site. In addition to this, close-ups of work in progress and photographs of product labels may be submitted.
 - .5 At Substantial Performance, provide two (2) identical copies on high density DVD(s) or thumbdrive of all progress photos.
- .8 Electronic "RECORD DRAWINGS" by Contractor: Transfer Contractor's "AS-BUILT" information (red-line revisions) on to electronic drawings in a recent version of AutoCAD. Identify each electronic drawing, in lower right hand corner, in legible font, red ink, as follows: "RECORD DRAWINGS" (This drawing has been revised to show systems as installed).
- .9 Label each CD "RECORD DRAWINGS" c/w Project Name and Date; supply Owner with one copy of the CD (dwg format) for all disciplines. Prepare these "RECORD DRAWINGS" once the Contractor has submitted the "AS-BUILT" red-line for review and approval by Departmental Representative.

1.7 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.

- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
- .15 Aboveground storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA SOR/2008-197.
- .16 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

- .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month warranty inspection, measured from time of acceptance.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended

- warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .4 Contractor's plans for attendance at 4 and 10 month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

Part 2 Product

.5 Not Used.

Part 3 Execution

.6 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
 - .1 System: 1 full day of instruction.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

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

- .1 Instruct Owner's personnel.
- .2 Provide written report that demonstration and instructions have been completed.

Part 2 Product
2.1 NOT USED

- .1 Not Used.

Part 3 Execution
3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Related Requirements
 - .1 Section 01 11 55 - General Instructions.
 - .2 Section 01 73 00 - Execution.
 - .3 Section 01 91 31- Commissioning (Cx) Plan.
 - .4 Section 01 91 33 - Commissioning Forms.
 - .5 Section 01 91 41 - Commissioning Training.
 - .6 Section 21 05 05 - Common Work results for Fire Suppression.
 - .7 Section 21 13 16 - Dry Pipe Sprinkler System.
 - .8 Section 26 05 00 - Common Work Results for Electrical.
 - .9 Section 28 31 01 - Fire Alarm Systems
- .3 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx Authority: Personnel who direct the commissioning.
 - .3 Cx Agent - Personnel who execute the commissioning.
 - .4 Cx - Commissioning.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.

1.2 GENERAL

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.

- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.3 COMMISSIONING OVERVIEW

- .1 The Contractor shall engage and pay for an independent 3rd party Commissioning Authority.
- .2 The Commissioning Authority shall be the same or independent from the Commissioning Agent, but shall be free from any affiliations with the Contractor or any of its subcontractors, or the Consultant team.
- .3 The Commissioning Authority represents interest of the Departmental Representative, and is responsible for overseeing all commissioning activities during the development, implementation, and post construction stages of the project.
- .4 The Commissioning Authority:
 - .1 Develops the Commissioning Plan within 6 weeks of Contract Award and make updates throughout the Cx process to the satisfaction of the PSPC Commissioning Manager.
 - .2 Reviews and comments on design from an operational and maintenance perspective.
 - .3 Develops Cx forms and checklists.
 - .4 Prepares training plan.
 - .5 Develops Cx Schedule.
 - .6 Develops other Cx documentation as specified.
 - .7 Witnesses and certifies performance of all commissioning activities.
 - .8 Organizes and monitors all activities as per the contract document.
 - .9 Organizes and submits all Cx deliverables.
- .5 For Cx responsibilities refer to Section 01 91 31- Commissioning (Cx) Plan .
- .6 Cx to be a line item of Contractor's cost breakdown.
- .7 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .8 Departmental Representative will issue Interim Acceptance Certificate when:

- .1 Completed Cx documentation has been received, reviewed for suitability and approved by Commissioning Authority .
- .2 Equipment, components and systems have been commissioned.
- .3 O&M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Commissioning Authority , to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review Contract Documents, confirm by writing to Commissioning Authority .
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Commissioning Authority .
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Commissioning Authority for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Commissioning Authority in writing of discrepancies and deficiencies

on finished works.

1.6 CONFLICTS

- .1 Report conflicts between requirements of this section and other sections to Consultant before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00- Submittal Procedures .
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Commissioning Authority for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Commissioning Authority where not specified and obtain written approval at least 8 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Commissioning Authority .

1.8 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33- Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use .
- .2 Commissioning Authority to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Commissioning Authority .

1.9 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07- Construction Progress Schedules - Bar (GANTT) Chart .
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.10 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 16.06- Construction Progress Schedule - Critical Path Method (CPM) and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60 % construction completion stage. Section 01 32 16.07- Construction Progress Schedules - Bar (GANTT) Chart . Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Commissioning Authority , who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60 % and subsequent Cx meetings and as required.

1.11 STARTING AND TESTING

- .1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
- .2 Commissioning Authority to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

- .1 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Commissioning Authority
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

- .2 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.
- .3 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Document require tests on approved PV forms.
- .4 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative . If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Commissioning Authority .
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative .
 - .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.

- .2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Commissioning Authority for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Commissioning Authority to repeat start-up at any time.

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit Commissioning Authority for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.17 TEST RESULTS

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

1.18 START OF COMMISSIONING

- .1 Notify Departmental Representative and Commissioning Authority at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS / EQUIPMENT

- .1 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.

1.21 WITNESSING COMMISSIONING

- .1 Commissioning Authority to witness activities and verify results.

1.22 AUTHORITIES HAVING JURISDICTION

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative and Commissioning Authority within 5 days of test and with Cx report.

1.23 REPEAT VERIFICATIONS

- .1 Assume costs incurred by Departmental Representative and Commissioning Authority for third and subsequent verifications where:
 - .1 Verification of reported results fail to receive Commissioning Authority approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 Commissioning Authority deems Contractor's request for second verification was premature.

1.24 SUNDRY CHECKS AND ADJUSTMENTS

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

1.25 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Commissioning Authority .
- .2 Report problems, faults or defects affecting Cx to Commissioning Authority in writing. Stop Cx until problems are rectified. Proceed with written approval from Commissioning Authority .

1.26 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx

specifications, complete Cx prior to issuance of Interim Certificate of Completion.

- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Commissioning Authority .

1.27 ACTIVITIES UPON COMPLETION OF COMMISSIONING

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.28 TRAINING

- .1 In accordance with Section 01 91 41- Commissioning (Cx) - Training .

1.29 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.30 OWNER'S PERFORMANCE TESTING

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

Part 2 Product

- .2 Not Used.

Part 3 Execution

- .3 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

1.2 REFERENCE STANDARDS

- .1 National Fire Protection Association (NFPA)
- .2 Public Works and Government Services Canada (PSPC)
- .3 PSPC - Commissioning Guidelines
- .4 Underwriters' Laboratories of Canada (ULC)

1.3 GENERAL

- .1 Provide a fully functional facility :
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance.
 - .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .3 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet design requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Acronyms:
 - .1 Cx - Commissioning.

- .2 BMM - Building Management Manual.
- .3 MSDS - Material Safety Data Sheets.
- .4 PI - Product Information.
- .5 PV - Performance Verification.
- .6 WHMIS - Workplace Hazardous Materials Information System.

1.4 DEVELOPMENT OF 100% CX PLAN

- .1 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .2 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 6 during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 The commissioning (Cx) process is a team effort throughout the life cycle of a project. The team members include:
 - .1 PSPC Project Manager - Has overall responsibility for managing the project and demonstrating to the client that the installed systems and overall facility meet the requirements of the Technical Requirements.
 - .2 Design Consultant - Develops the design solutions to meet client requirements and performance specification requirements.
 - .3 Commissioning Authority - Develops the commissioning plan, design intent, and system operating manual; prepares commissioning specifications and other commissioning documentation including the

Product Information (PI) and Performance Verification (PV) report forms; develops the training plan; monitors, witnesses, and certifies the performance of all commissioning activities as per the contract agreement; and is responsible for design, construction, and warranty-related commitments for commissioning. The appointment of a commissioning Authority does not permit the Design Consultant to abrogate traditional design responsibilities such as carrying out site supervision and ensuring that construction conforms to the design intent.

- .4 Commissioning Agent - Carries out start-up and performance verification activities and performs acceptance tests and related procedures for all equipment, systems and integrated systems under the guidance of the Commissioning Authority. This individual also coordinates commissioning activities, conducts commissioning meetings, refines the commissioning plan, refines commissioning schedule, assembles maintenance manuals, and organizes training.

1.7 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Client: responsible for intrusion and access security systems.
 - .4 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 - .1 Modifications of fire alarm systems.

1.8 EXTENT OF CX

- .1 Commission mechanical systems and associated equipment:
 - .1 Fire and life safety systems:
 - .1 Dry pipe sprinkler systems.
 - .2 Seismic restraint and control measures.
- .2 Commission electrical systems and equipment:
 - .1 Fire alarm systems, equipment:
 - .1 Annunciators.
 - .2 Control panels.

.3 Fire alarm battery banks.

1.9 DELIVERABLES RELATING TO THE CX PROCESS

.1 General:

.1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:

.1 Cx as used in this section includes:

.1 Cx of components, equipment, systems, subsystems, and integrated systems.

.2 Factory inspections and performance verification tests.

.3 Deliverables: provide:

.1 Startup, pre-Cx activities and documentation for systems, and equipment.

.2 Completed installation checklists (ICL).

.3 Completed product information (PI) report forms.

.4 Completed performance verification (PV) report forms.

.5 Results of Performance Verification Tests and Inspections.

.6 Description of Cx activities and documentation.

.7 Description of Cx of integrated systems and documentation.

.8 Training Plans.

.9 Cx Reports.

.10 Prescribed activities during warranty period.

.4 Departmental Representative to participate.

1.10 START-UP

.1 Start up components, equipment and systems.

.2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction, following equipment, systems:

.3 Commissioning Authority to monitor all of these start-up activities.

.1 Rectify start-up deficiencies to satisfaction of Departmental Representative .

.4 Performance Verification (PV):

.1 Approved Cx Agent to perform.

.1 Repeat when necessary until results are acceptable to Departmental Representative .

- .2 Use procedures modified generic procedures to suit project requirements.
- .3 Commissioning Authority to witness reported results using approved PI and PV forms.
- .4 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.11 CX REPORTS

- .1 Submit reports of tests, witnessed and certified by Commissioning Authority to Departmental Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by Departmental Representative .

1.12 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project .

1.13 TRAINING PLANS

- .1 Refer to Section 01 91 41- Commissioning (Cx) - Training .

Part 2 Product

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 INSTALLATION/START-UP CHECK LISTS

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative . Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured

data and readings taken during functional testing and Performance Verification procedures.

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

1.5 SAMPLES OF COMMISSIONING FORMS

- .1 Commissioning Authority will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Contractor to complete Cx forms to suit project requirements as per reviewed shop drawings and return to Commissioning Authority for review and approval at least 4 weeks prior to commissioning.
- .3 Revise items on Commissioning forms to suit project requirements.

1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, but are not available from Departmental Representative develop appropriate verification forms and submit to Commissioning Authority for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by Commissioning Authority.

1.7 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Commissioning Authority provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by Commissioning Authority .
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Commissioning Authority with originals of completed forms.

- .12 Maintain copy on site during start-up, testing and commissioning period.
- .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual.

1.8 LANGUAGE

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

Part 2 Product

- .2 Not Used.

Part 3 Execution

- .3 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training.

1.2 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

- .1 Departmental Representative will provide:
 - .1 Descriptions of systems.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.

- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
- .3 Project Manager, Commissioning Authority, and Property Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 3 hours in length.
- .3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Commissioning Authority will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Commissioning Authority .

1.8 TRAINING CONTENT

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
 - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
 - .7 Maintenance and servicing.
 - .8 Trouble-shooting diagnosis.

.9 Review of O&M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.9 VIDEO-BASED TRAINING

.1 On-Site training videos:

.1 Videotape training sessions for use during future training.

.2 To be performed after systems are fully commissioned.

.3 Organize into several short modules to permit incorporation of changes.

.2 Production methods to be high quality.

Part 2 Product

.3 Not Used.

Part 3 Execution

.4 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 73 00 - Execution
- .2 Section 01 74 21 - Construction/Demolition Waste Management Disposal.
- .3 Section 02 81 01 - Hazardous Materials Abatement

1.2 REFERENCES

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Where required by authorities having jurisdiction, submit for approval drawings, diagrams and details showing sequence of deconstruction work, materials designated for salvage and support of structures.

1.4 SCOPE OF WORK

- .1 The majority of the work involves the demolition/removal of existing fire sprinkler system piping and fittings.
- .2 All demolition shall be completed in a manner which protects the historical asset of the SS Keno Sternwheeler and the artifacts therein. Refer to Section 01 73 00 - Execution
- .3 Demolition Scope: Refer to drawings and specifications.

1.5 SITE CONDITIONS

- .1 If material resembling asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.

1.6 ENVIRONMENTAL PROTECTION

- .1 Ensure Work is done in accordance with municipal and territorial regulations.
- .2 Ensure deconstruction work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air noise pollution.
- .3 Fires and burning of waste or materials is not permitted on site.
- .4 Do not bury waste or materials on site.
- .5 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures in accordance with CEPA.

- .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties in accordance with authorities having jurisdiction.
- .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
- .8 Protect trees, plants and foliage on site.
- .9 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.
- .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust.

Part 2 Product

2.1 EQUIPMENT

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .2 Demonstrate that tools and machinery are being used in a manner which allows for salvage of material in best condition possible.

Part 3 Execution

3.1 EXAMINATION

- .1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
 - .2 Investigate site and structures to determine dismantling, processing and storage logistics required prior to beginning of Work
 - .3 Employ necessary means to assess site conditions and structures to determine quantity and locations of hazardous materials.
 - .4 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
 - .5 Notify and obtain approval of utility companies before starting demolition.
 - .6 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
- .1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

- .2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- .2 Prior to start of demolition work remove contaminated or hazardous materials listed as hazardous from site and dispose of at designated disposal facilities in safe manner and in accordance with Section 02 81 01 - Hazardous Materials Abatement.

3.3 PREPARATION

- .1 Obtain necessary permits and approvals including Fire Marshall and "Building Permit for Demolition of a Structure". Owner to arrange for required Development Permit. Contractor to pay all fees required for the Demolition permit and disposal fees.
 - .1 Provide copies to Owner.
- .2 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures and utilities and parts of building to remain in place. Provide bracing and shoring as required.
 - .2 Keep noise, dust, to minimum.
 - .3 Protect building systems, services and equipment.
 - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .3 Demolition/Removal:
 - .1 Remove parts of existing building to permit new construction. Sort materials into appropriate piles for reuse and recycling.
 - .2 Refer to demolition drawings and specifications for items to be salvaged for reuse.
 - .3 Remove items to be reused, store as directed by Departmental Representative, or re-install under appropriate section of specification. materials or items that are to remain in place are to be protected during the course of construction.
 - .4 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.2 REFERENCES

- .1 Regulations, standards and/or codes including, but not limited to the following will apply to the abatement work to be conducted:
 - .1 The Yukon Occupational Health and Safety Regulations.
 - .2 The Yukon Special Waste & Solid Waste Regulations.
 - .3 The Federal Transportation of Dangerous Goods Regulation.
 - .4 The Federal PCB Regulations (SOR/2008-273)
 - .5 The Federal Halocarbons Regulations, July 2003

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Contractor shall submit the following information to the Departmental Representative:
 - .1 Applicable "Notice of Project" documentation pertaining to asbestos abatement, to authorities having jurisdiction.
 - .2 The name of the facility or facilities where the hazardous building material shall be disposed, included in the Workplan.
 - .3 Contractor shall provide copies of the scale tickets, manifests, waybills and/or other and written confirmation(s) of disposal (i.e. landfill weigh scale receipts) to the Departmental Representative.
 - .4 Contractor shall record and provide copies of the number of loads, unit measures, date and time of each load transported to the landfill (or other approved facility) to the Departmental Representative.
 - .5 Departmental Representative may request additional scaling of the trucks at any time during transportation.

1.4 DOCUMENTS

- .1 The following report pertaining to hazardous building materials present within the building are included in APPENDIX B;
 - .1 Hazardous Building Materials Assessments by Stantec Consulting Ltd.,

dated June 29, 2016.

1.5 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with Federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial or territorial regulations.
- .2 If hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Departmental Representative.
 - .2 Ensure compliance with applicable Federal, provincial, territorial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as perscribed by federal, provincial, and territorial regulations.
 - .6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photo copy of shipping documents and waste manifests to Departmental Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial or territorial authority. Take reasonable measures to control release.

Part 2 Product

2.1 MATERIALS

- .1 Description:
 - .1 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 DISPOSAL

- .1 Abatement shall be conducted to remove and dispose of hazardous materials as identified in the Hazardous Building Materials Assessments in accordance

with applicable regulations, guidelines, standards and/or best practices for such work.

- .2 Where asbestos containing materials, or other hazardous materials, are encountered follow all OH&S codes and standards during demolition and removal.
- .3 The listing below is a summary of the identified hazardous building materials and associated removal and disposal regulations, guidelines and/or standards
- .4 The estimated extent of each of the items listed below is indicated in the Hazardous Building Materials Assessment Report (Appendix B) , and is provided for information purposes only. Verification and/or measurement of the amount of each hazardous building material listed and how they will be impacted by the renovation project are the responsibility of the Contractor.

3.2 ASBESTOS

- .1 Abatement work to be conducted in accordance with the requirements of the Yukon Occupational Health and Safety Regulations.
- .2 Waste transportation to be conducted in accordance with the Federal Transportation of Dangerous Goods Regulation.
- .3 Waste disposal to be conducted in accordance with the Yukon Special Waste & Solid Waste Regulations.
- .4 Remove and dispose of those asbestos-containing materials that will be impacted by the planned renovation work, PRIOR TO the initiation of general renovation activities.
 - .1 Locations and types of asbestos-containing materials identified that may be impacted by the work are indicated in the Hazardous Building Materials Assessment by Stantec Consulting Ltd. found in APPENDIX B

3.3 LEAD

- .1 Demolition to be conducted in accordance with the requirements of the current version of the Yukon Occupational Health and Safety Regulations, keeping airborne exposure to lead dust to less than the 8-hour Occupational Exposure Limit (OEL) for lead of 0.15 milligram per cubic metre (mg/m3).
- .2 Waste transportation to be conducted in accordance the Federal Transportation of Dangerous Goods Regulation.
- .3 Waste disposal to be conducted in accordance with the Yukon Special Waste & Solid Waste Regulations.
- .4 Lead-containing materials to be considered during demolition include the following:
 - .1 Refer to APPENDIX B: Hazardous Building Materials Assessments by Stantec Consulting Ltd. for locations of lead-containing materials.

3.4 PCB

- .1 Remove all fluorescent lamp fixtures. Assess all ballasts in comparison to the Environment Canada document entitled "Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2", dated August 1991 (or equivalent reference).
- .2 Sort PCB-containing lamp ballasts from non-PCB-containing lamp ballasts.
- .3 Waste transportation to be conducted in accordance the Federal Transportation of Dangerous Goods Regulation.
- .4 Waste disposal to be conducted in accordance with the Yukon Special Waste & Solid Waste Regulations and The Federal PCB Regulations (SOR/2008-273).

3.5 MERCURY

- .1 Remove all thermostats with mercury-containing switches, fluorescent light tubes and high intensity discharge lights (mercury vapour) and/or other mercury- containing items.
- .2 Waste transportation to be conducted in accordance with the Federal Transportation of Dangerous Goods Regulation.
- .3 Waste disposal to be conducted in accordance with the Yukon Special Waste & Solid Waste Regulations.

3.6 SILICA

- .1 Silica may be present in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic tiles, which are present in various locations throughout.
- .2 When silica-containing materials are to be removed during demolition activities, ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by the Yukon Occupational Health and Safety Regulations (300 particles/mL). This would include, but not be limited to, the following:
 - .1 Providing workers with respiratory protection.
 - .2 Wetting the surface of the materials to prevent dust emissions.
 - .3 Providing workers with facilities to properly wash prior to exiting the work area.
 - .4 Providing dust control to mitigate the potential for demolition dust to escape from the work area into public and/or adjacent areas.

3.7 MONITORING

- .1 Contractor shall monitor conditions during the above-noted work to ensure that appropriate protective clothing and equipment is in use.
- .2 Air monitoring and inspections, as required by the Yukon Occupational Health and Safety Regulations, will be conducted by the Contractor during hazardous building materials abatement activities.
- .3 Contractor shall regularly monitor workers using protective equipment and

respiratory equipment for signs of heat stress and other health effects.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Requirements for preparation of substrates, supply and application of the following, as required for complete and proper installation:
 - .1 All Interior and Exterior Painting work as indicated on the Finish Schedule and to the full extent of the contract drawings and specifications.

1.2 RELATED SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 61 10 - Product Requirements.
- .3 Section 01 73 00 - Execution
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .5 Section 01 78 00 - Closeout Procedures.

1.3 REFERENCES

- .1 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .2 Maintenance Repainting Manual - current edition.
- .2 National Fire Code of Canada.
- .3 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency (EPA).
- .4 Society for Protective Coatings (SSPC)
 - .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
 - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeypersons in accordance with applicable trade regulations.
- .2 Conform to latest MPI requirements for exterior and interior repainting work

including cleaning, preparation and priming.

- .3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, and solvents) to be in accordance with the latest edition of the MPI Approved Product List and to be from a single manufacturer for each system used.
- .4 Paint materials such as linseed oil, shellac, and turpentine, to be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.
- .5 All surfaces requiring painting shall be inspected by the Departmental Representative for Heritage, who is to notify the Departmental Representative and General Contractor in writing of any defects or problems, prior to commencing painting works, or after the prime coat shows defects in the substrate.
- .6 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
- .7 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements.
- .3 Samples:
 - .1 Submit samples to Departmental Representative for review and acceptance of each unit.
 - .2 Submit a draw down sample of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on following substrate materials:
 - .1 Standard draw down plastic cards.
 - .3 Retain set of reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Manufacturer's Instructions:

- .1 Submit manufacturer's application instructions.
- .5 Operation and Maintenance Data:
 - .1 Submit maintenance data in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Include the following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 10 - Product Requirements.
- .2 Delivery:
 - .1 Deliver materials to the project in original, unopened packages and labeled to clearly identify product name and manufacturer and in sizes to suit project.
 - .2 Sequence deliveries to avoid delays, but minimize on site storage.
- .3 Storage and Handling Requirements:
 - .1 Store and handle materials in strict accordance with manufacturer's recommendations.
 - .2 Provide and maintain dry, temperature controlled, secure storage.
 - .3 Store painting materials and supplies away from heat generating devices.
 - .4 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.
- .4 Fire Safety Requirements:
 - .1 Supply 1 kg dry chemical fire extinguisher adjacent to paint storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse in accordance with Section 01 74 21 - Construction and Demolition Waste Management and Disposal.

- .2 Paint, stain and wood preservative finishes and related materials are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Territorial Ministries of Environment and Regional levels of Government.
- .3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
 - .6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

1.8 PROJECT CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .2 Provide ventilation to enclosed spaces seven (7) days after completion of application of paint.
 - .3 Co-ordinate use of existing ventilation system with Consultant and ensure its operation during and after application of paint as required.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
 - .2 Test concrete for alkalinity as required.
 - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
 - .4 Do not perform exterior (re)painting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside paint manufacturer's prescribed limits.
 - .4 Relative humidity is above 85% or when dew point is less than 3 degrees C variance between air/surface temperature.
 - .5 Rain or snow is forecast to occur before paint has thoroughly cured.
 - .6 It is foggy, misty, raining or snowing at site.
 - .5 Conduct moisture tests using properly calibrated electronic Moisture Meter, except test existing painted concrete floors for moisture using simple "cover patch test" on failed areas.
 - .6 Do not perform repainting work when maximum moisture content of substrate exceeds:
 - .1 15% for wood.
 - .2 12% for concrete
 - .3 12% for gypsum board
- .3 Additional application requirements:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

Part 2 Product

2.1 MATERIALS

- .1 Supply paint materials for paint systems from single manufacturer.
- .2 Conform to latest MPI requirements for painting work including preparation and priming.

- .3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing:
 - .1 Use MPI listed materials having E2 rating where indoor air quality requirements exist.
 - .2 Primer: VOC limit 100 g/L maximum to SCAQMD Rule 1113.
 - .3 Paint: VOC limit 100 g/L maximum to GS-11.
- .4 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
- .5 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS:

- .1 For exterior and interior paint colors refer to Finish Schedule on contract drawings.
- .2 Selection of colours to be standard colour to match existing as approved by Departmental Representative. Coordination with Parks Canada Yukon Field Unit to determine the appropriate type of paint products for patching/painting of the historic wood fabric on the vessel is required. Contractor responsible for using colour matching technology to provide paint that matches existing colours
- .3 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.
- .4 Paint colours to be submitted to Heritage Departmental Representative for approval prior to commencing work.

Part 3 EXECUTION

3.1 MIXING AND TINTING:

- .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations.
- .2 Use and add thinner in accordance with paint manufacturer's recommendations.
 - .1 Do not use kerosene or similar organic solvents to thin water-based paints.
- .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour

and gloss uniformity.

3.2 GLOSS/SHEEN RATINGS:

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max. 10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35
Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

- .2 Gloss level ratings of painted surfaces as indicated.

3.3 EXTERIOR AND INTERIOR PAINTING SYSTEMS:

- .1 All sprinkler piping, pipe hangers and seismic restraint systems:
- .1 EXT 5.1A - Alkyd primer, Alkyd Paint, Semi-Gloss Finish
 - .2 Colour: Sprinkler Piping Above the Hull level: White.
- .2 Historical wood - Elements of SS Keno
- .1 EXT 6.2A - Alkyd primer, Latex Paint, Semi-Gloss Finish
 - .2 Colour: Coordinate custom colours to match existing colours, with Departmental Representative for Heritage.

3.4 GENERAL

- .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Perform preparation and operations for interior painting in accordance with MPI - Maintenance Repainting Manual except where specified otherwise.

3.5 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within manufacturer's acceptable range. Coordination with Parks Canada Yukon Field Unit to review existing conditions and proposed painting preparation before commencing work.

3.6 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.
 - .3 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.
 - .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
 - .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
 - .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
 - .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
 - .8 Touch up of shop primers with primer as specified.
 - .9 Do not apply paint until prepared surfaces have been accepted by

Departmental Representative.

3.7 APPLICATION

- .1 Apply paint by method that is best suited for substrate being repainted. Conform to manufacturer's application instructions unless specified otherwise. In each case method of application to be as pre-approved by Departmental Representative before commencing work.
 - .1 Protect existing finishes. Perform painting outside of the historical asset as required to ensure historical finishes are not disturbed.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
 - .1 Do not apply spray paint onboard or inside the Historical Asset.
 - .2 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .3 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .4 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .5 Brush out immediately all runs and sags.
 - .6 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Apply coats of paint in continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets

and projecting ledges.

- .8 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .9 Finish closets and alcoves as specified for adjoining rooms.
- .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.8 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .3 Do not paint over nameplates.
- .4 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .5 Paint plywood backboards, on both sides and edges, behind electrical panels and circuit boards with two coats of fire retardant paint.
- .6 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .7 Do not paint interior transformers and substation equipment.

3.9 FIELD QUALITY CONTROL

- .1 Exterior and interior painting and decorating work shall be inspected by the Departmental Representative. Painting contractor shall notify the Departmental Representative a minimum of one week prior to commencement of work and provide a copy of project painting specification, samples, (including pertinent details) as well as a Finish Schedule.
- .2 All surfaces requiring painting shall be inspected by the Paint Inspection Agency who is to notify the Departmental Representative and General Contractor in writing of any defects or problems, prior to commencing painting works, or after the prime coat shows defects in the substrate.
- .3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.
- .4 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 1000mm at 90 degrees to surface.
 - .2 Ceilings: no defects visible from floor at 45 degrees to surface when

viewed using final lighting source.

- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.10 CLEANING

- .1 Progress Cleaning:
 - .1 Perform cleanup as work progresses in accordance with Section 01 74 11 - Cleaning.
 - .2 Leave work area clean at end of each day.
- .2 Final Cleaning:
 - .1 Upon completion of installation, remove temporary coverings, surplus materials, rubbish, tools and equipment barriers in accordance with Section 01 74 11 - Cleaning.
 - .2 Place paint defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

3.11 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

3.12 SCHEDULE

- .1 Patches on existing architecture/historical elements shall match existing.
 - .1 Submit selections for approval by Departmental Representative.
- .2 All new sprinkler piping, equipment, and hangers and seismic restraints:
 - .1 Refer to schedule on plans.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

- .1 Provide complete sprinkler system as required by local codes and as indicated on drawings.

1.2 SUBMITTALS

- .1 Submit manufacturer's printed product literature, specifications, and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings, hydraulic calculations and equipment data of entire sprinkler system. Submitted drawings to be designed and stamped by a Professional Engineer registered or licensed in Territory of Yukon Canada.
- .3 Shop drawings to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .4 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .5 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures : use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .6 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals
 - .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative Consultant before final inspection.
 - .3 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.

- .6 Valves schedule and flow diagram.
- .7 Colour coding chart.
- .4 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .5 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Contractor's material and test certificate for above ground piping to meet the requirements of NFPA 13 Section 25.
- .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
 - .1 Prepare and insert into "Operation and Maintenance Manual" additional data when need for it becomes apparent during specified demonstrations and instructions.
 - .2 Data to include pro-forma log(s) to record daily, weekly and monthly operating performance as specified in the National Fire Code of Canada (NFCC).
- .8 Site records:
 - .1 Departmental Representative will provide 1 one set of reproducible mechanical drawings. Provide sets of white copy prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring .
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use red colour waterproof ink.
 - .4 Make available for reference purposes and inspection.

- .9 AS-BUILT drawings:
 - .1 Prior to start of verification of the fire sprinkler system, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right-hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Departmental Representative for approval and make corrections as directed.
 - .4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.3 QUALITY ASSURANCE

- .1 Quality Assurance: In accordance with Section 01 45 00 - Quality Control .
- .2 Health and Safety Requirements: Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.4 MAINTENANCE

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
 - .1 One cabinet for spare sprinklers (capacity: Twelve sprinklers).
 - .2 Twelve spare sprinkler heads, with a minimum of two for each type installed.
- .2 Provide one set of special tools required to service equipment as recommended by manufacturers, including a wrenches as required to remove all sprinkler types and in accordance with Section 01 78 00 - Closeout Submittals .
- .3 Provide drawing mounted in 215-mm x 279-mm frame with glass cover, showing schematic layout of incoming water service, valves, appurtenances and mainline(s) to sprinkler zones.
- .4 Provide drawing(s) mounted in 215-mm x 279-mm frame with glass cover, showing locations of all low point drains, fire extinguishers and fire extinguisher ratings.
- .5 Attach framed drawings specified in paragraphs 1.4.3 and 1.4.4 on a wall adjacent to the fire alarm panel.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal .

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 SUPERVISORY REQUIREMENTS: PRESERVATION OF HISTORICAL ASSET

- .1 Refer to Section 01 73 00 Execution.
- .2 The Contractor shall not cut, drill, or otherwise modify the existing ship without prior approval of the Departmental Representative.

3.2 RESTORATION, REPAIRS AND PAINTING

- .1 Install pipe within bulkheads, joist spaces and chases at locations where pipe is currently installed in bulk heads, joist spaces and chases.
- .2 Exposed pipe may be installed only in areas where exposed pipe is currently installed.
- .3 Reconstruct existing and construct new bulkheads and chases to match type and style of existing bulkheads and spaces.
- .4 Provide wood spacers / escutcheons to match existing as required at sprinkler protrusions.
- .5 Where access doors are required in wood bulkheads and chases to service valves and equipment, fabricate doors / removable panels to match.
- .6 Do painting in accordance with Section 09 91 00 - Painting .
- .7 Prime and touch up marred finished paintwork to match original.
- .8 Restore to new condition, finishes which have been damaged.

3.3 CLEANING

- .1 Clean interior and exterior of all systems.

3.4 FIELD QUALITY CONTROL

- .1 Site Tests: Conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS..
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

3.6 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Material (ASTM).
 - .1 ASTM A-47M, Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A-53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, welded and seamless.
- .2 Canadian Standards Association/CSA International.
 - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
 - .2 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
 - .3 CAN/CSA B64.10-01, Selection and Installation of Backflow Preventers.
- .3 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)
 - .1 ANSI/NFPA13-2016 ,Standard for the Installation of Sprinkler Systems.
 - .2 ANSI/NFPA 25-2017 ,Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - .3 NFPA 170-2018, Standard for Fire Safety and Emergency Symbols.
- .4 National Research Council Canada.
 - .1 National Building Code of Canada 2015.
 - .2 National Fire Code of Canada 2015.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .6 Underwriter's Laboratories of Canada (ULC).
 - .1 CAN/ULC S543-M1984, Internal Lug Quick Connect Coupling for Fire Hose.
- .7 Public Works and Government Services Canada - Heritage Conservation Western (PWGSC - HCW).
 - .1 Standards and Guidelines for the Conservation of Historic Places in Canada, Second Edition.
- .8 Where there are conflicting requirements arising from National, Territorial, Local and AHJ Codes, the most stringent shall apply.

1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures

- .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures
- .2 Shop Drawings:
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures and in accordance with ANSI/NFPA 13 Standard.
 - .2 Submit installation drawings as per NFPA-13 Standard, based on Tender drawings.
 - .3 Shop drawings shall include manufacturing materials, finishes, anchoring method, the number of anchors, dimensions, construction and assembly details, accessories for equipment, tables, and performance curves of apparatus.
 - .4 Shop drawings shall be stamped and signed by professional engineer registered or licensed in Yukon Territory.
- .3 Seismic Drawings:
 - .1 Submit seismic drawings in accordance with Section 01 33 00 - Submittal Procedures and in accordance with ANSI/NFPA 13 and NBCC 2015 Standards.
 - .1 Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in Yukon Territory of Canada.
 - .2 Materials used in Seismic restraint and method of construction shall meet requirements for preservation of historical assets.
 - .3 An earthquake importance factor (I_e) of 1.5 shall be considered for seismic calculations.
 - .4 Provide seismic bracing calculations in accordance with Figure A.9.3.5.a) of NFPA 13 (See example in appendix E).
- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Submit samples of following:
 - .1 Each type of sprinkler head.
 - .2 Signs and valve tags.
 - .3 Seismic anchor.
 - .4 Pipe support.
- .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures
 - .1 Certificates: submit certificates signed by manufacturer certifying that

materials comply with specified performance characteristics and physical properties.

- .2 Instructions: submit manufacturer's installation instructions.
- .3 Manufacturer's Field Reports: manufacturer's field reports specified.
- .6 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals
 - .2 Provide detailed summary sheet, Contractor's Material and Test Certificate for piping, as well as other deliverables for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 13.
 - .3 Maintenance Data Sheets.
 - .1 Maintenance data sheets must include the following elements items;
 - .1 Technical data from catalogs and product literature, including the model number, type, and size for the items listed below;
 - .1 Piping and fittings;
 - .2 Alarm check valves;
 - .3 Valves, including gate valves, check valves, and globe valves;
 - .4 Sprinklers;
 - .5 Pipe hangers and suspension;
 - .6 Monitoring switches;
 - .7 Compressors;
 - .8 Nitrogen generators with accessories;
 - .9 Mechanical couplings.
 - .2 Relevant details concerning operation, maintenance, and servicing.
 - .3 A list of recommended spare parts.
 - .4 Provide a copy of NFPA 25 "Inspection, Testing, and Maintenance of Water Based Fire Protection Systems" and incorporate it into the "Operation and Maintenance Manual".

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company or person specializing in dry sprinkler systems with documented experience approved by manufacturer.

- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 10 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Remove, retain, reuse and reinstallation:
 - .1 Carefully remove material for reuse and reinstallation to prevent damage. Store material to prevent damage.
 - .2 Reinstall materials for reuse once piping has been installed, tested and accepted.
- .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 11 - Cleaning.

1.5 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals
 - .2 Provide spare sprinklers and tools as required by ANSI/NFPA 13 Standard.

1.6 SKETCHES

- .1 Submit a maintenance diagram which includes following items:
 - .1 A key localisation plan at 1: 500 scale;
 - .2 A drawing for every floor (foundation, hull, decks, wheelhouse) affected by fire protection work, showing the location of isolating valves, auxiliary drains, nitrogen purge system, and test pipes.
- .2 Once approved, provide two laminated copies of the diagram, plasticized, glued on plywood, and inserted in a solid wooden frame.
- .3 Install one diagram in the alarm valve room and deliver the other one to the Departmental Representative.

1.7 ACCEPTABLE PRODUCTS AND MATERIALS

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products.

1.8 FIRE FLOW TEST

- .1 Complete a fire flow test (flow/pressure) on hydrants L6-9 (Residual hydrant) and L6-8 (Flowing hydrant) per NFPA 291 Standard, in order to evaluate hydraulic calculation reference assessment.
- .2 Provide procedure form explaining the fire flow testing and include the following : Scaled water main map, including water supply dimensions, testing hydrants location and identification and safety factor used on the flow curve.
- .3 Provide a fire flow summary report including all the information obtained during fire flow test, and a pressure-flow curves as per NFPA 291 Standard.
- .4 Fire flow report must be provided to the Department Representative for approval at least 10 working days prior the dry pipe system installation.

Part 2 Products

2.1 GENERAL

- .1 All products used in fire safety installations must be "CUL" or "ULC" listed and must be labelled as such.
- .2 Provide accessories that can withstand the normal pressure exerted in the fire protection network.

2.2 PIPE, FITTINGS AND VALVES

- .1 Historic Locations:
 - .1 Historic appearances are critical in the following locations: Freight Deck, Saloon Deck, Boat Deck, and Wheelhouse, and piping on the exterior of the Hull.
 - .2 In historic locations:
 - .1 Maintain historic appearances by using screwed Schedule 40 piping.
 - .2 Paint new sprinkler piping to match walls/ceilings - Refer to plans and coordinate with the Departmental Representative.
- .2 Pipe:
 - .1 Pipes in historic locations (NPS 1 to NPS 6) :
 - .1 Black steel, Schedule 40, threaded, ULC listed or cUL certified for fire protection and complying with NFPA 13 and ASTM A-53 Standards.
 - .2 Pipes in non-historic locations:
 - .1 NPS 2 and less:
 - .1 Black steel, Schedule 40, roll or cut grooved or threaded, ULC listed or cUL certified for fire protection and complying with NFPA 13 and ASTM A-53 Standards.
 - .2 NPS 2 ½ and over:
 - .1 Black steel, Schedule 40, cut grooved, ULC listed or cUL

certified for fire protection and complying with NFPA 13 and ASTM A-53 Standards.

- .3 Acceptable Products:
 - .1 Nova Tube;
 - .2 Allied;
 - .3 Bull Moose;
 - .4 Wheatland;
 - .5 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .3 Fittings and joints to ANSI/NFPA 13 Standard:
 - .1 Use fittings and couplings with galvanized finish when unpainted galvanized steel pipes are being used.
 - .2 Use anticorrosive paint in all roll grooved couplings and on the threads of galvanized steel pipes.
 - .3 Gaskets must be selected to withstand local external temperature (up to -40degC).
 - .4 Fittings and joints:
 - .1 Fittings and joints, rigid, provided by same manufacturer.
 - .2 Fittings, screwed with Teflon tape, to ASTM A 47M Standard, Grade 32510.
 - .3 Fittings and welded flanges, to CSA W47.1 and CSA W47.1S1 Standards. No welding is permitted on galvanized steel pipes.
 - .4 Joints for pipes with grooved ends, coupling to CSA B242 and ANSI/API Spec 5L Standards.
 - .5 Fittings with grooved ends, to ASTM A-536 Standard, Grade 65-45-12.
- .4 Backflow Prevention Valve:
 - .1 Backflow preventer, complying with CAN/CSA B64.10-01 Standard and listed for fire protection service.
 - .2 Type 304 stainless steel housing and sleeve, roll groove connections.
 - .3 Indicating butterfly isolation valves with integral tamper switches.
 - .4 Double, spring type swing check valves with elastomeric seat disks.
 - .5 Rated for 1200 kPa working pressure.
 - .6 Test ports.
 - .7 Backflow preventers with double check -valve assembly and supervised valves:
 - .1 Acceptable products:

- .1 Wilkins, 350 Series.
- .2 Watts, 757 Series.
- .3 Apollo, DC-4SG Series.
- .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .5 Backflow Prevention Test Connections :
 - .1 Twin type connection, installed as indicated, freestanding mounted with indicating plates; threaded caps with metallic chains.
- .6 Auxiliary valves:
 - .1 All valves to be listed for fire protection service.
 - .2 Acceptable products:
 - .1 Valves, NPS 2 and less, threaded ends.
 - .1 Bronze gate valves, with outside screw and yoke (OS&Y):
 - .1 Acceptable products:
 - .1 Nibco T-104-0.
 - .2 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Bronze ball valves
 - .1 Acceptable products:
 - .1 Victaulic S/728 Firelock with monitoring switches;.
 - .2 Anvil F171N.
 - .3 Jenkins Fig. 202J.
 - .4 Nibco KT-505-W-8.
 - .5 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Valves, NPS 2 and less, grooved ends:
 - .1 Bronze ball valves.
 - .1 Acceptable products:
 - .1 Victaulic S/728 Firelock with monitoring switches.
 - .2 Nibco KG-505-W-8.
 - .3 Replacement materials or products: Approved by addendum according to

Instructions to Bidders.

- .3 Gate valves, NPS 2½ and over, grooved or flanged ends:
 - .1 Ductile iron gate valve with outside screw and yoke (OS&Y), bronze trim, grooved ends.
 - .1 Acceptable products:
 - .1 Victaulic 771H.
 - .2 Replacement materials or products:
Approved by addendum according to Instructions to Bidders.
 - .2 Ductile iron gate valve with outside screw and yoke (OS&Y), bronze trim, flanged ends.
 - .1 Acceptable products:
 - .1 Nibco F 607 RW.
 - .2 Replacement materials or products:
Approved by addendum according to Instructions to Bidders.
- .4 Butterfly valves, NPS 2½ and over, with monitoring switch:
 - .1 Ductile iron butterfly valves, with indicating yoke, flanged ends.
 - .1 Acceptable products:
 - .1 Tyco, Model BFV-N, TFP1520.
 - .2 Nibco LD3510 8.
 - .3 Replacement materials or products:
Approved by addendum according to Instructions to Bidders.
 - .2 Ductile iron butterfly valves, with indicating yoke, grooved ends.
 - .1 Acceptable products:
 - .1 Victaulic S/705W Firelock.
 - .2 Tyco, Models BFV-N, TFP1510, and TFP1515.
 - .3 Gruvlok GN722-FP, GN7722-6D and AE7722-3A.
 - .4 Replacement materials or products:
Approved by addendum according to Instructions to Bidders.
 - .5 Swing check valves with composite material disc:
 - .1 Flanged ends:

- .1 Acceptable products:
 - .1 Nibco F908W.
 - .2 Viking D-1 and G-1 flanged.
 - .3 Replacement materials or products:
Approved by addendum according to
Instructions to Bidders.
- .2 Grooved ends:
 - .1 Acceptable Products:
 - .1 Victaulic S/717 Firelock.
 - .2 Gruvlok 78FP and 7800 Series.
 - .3 Viking D-1 and G-1 grooved.
 - .4 Replacement materials or products:
Approved by addendum according to
Instructions to Bidders.
 - .3 Quiet type, adapted for flanged ends:
 - .1 Acceptable products.
 - .1 Rite, Model 212.
 - .2 Replacement materials or products:
Approved by addendum according to
Instructions to Bidders.
- .6 Ball Drip:
 - .1 Acceptable products:
 - .1 Victaulic S/748.
 - .2 Viking B-1.
 - .3 Replacement materials or products: Approved by
addendum according to Instructions to Bidders.
- .7 Pipe Hangers:
 - .1 Hangers for fire protection service, in compliance with NFPA 13
Standard.
 - .2 ULC listed for fire protection services.
 - .3 Hangers, pipe sizes 15 mm to 40 mm: Adjustable wrought steel ring.
 - .4 Hangers, pipe sizes 50 mm and Over: Adjustable steel clevis.
 - .5 Wall Support, pipe sizes to 80 mm: Cast iron hook.
 - .6 Wall Support, Pipe sizes 100 mm and Over: Welded steel bracket and
wrought steel clamp, adjustable steel yoke and cast iron roll for pipe
sizes 150 mm and over.
 - .7 Vertical Support: Steel riser clamp.

- .8 Design hangers so they cannot become disengaged by movements of supported pipe.
- .9 Provide steel hanger rods, threaded both ends, threaded one end, or continuous threaded.

2.3 SEISMIC CONTROL MEASURES

- .1 Historic Locations:
 - .1 Historic appearances are critical in the following locations: Freight Deck, Saloon Deck, Boat Deck, and Wheelhouse.
 - .2 All new bracings' location shall be coordinated with the Department Representative.
 - .3 In historic locations:
 - .1 Adhere to the acceptable seismic restraint types - Refer to drawings.
 - .2 Paint all seismic restraints to match the piping.
- .2 General:
 - .1 Following systems and/or equipment to remain operational during and after earthquakes.
 - .2 Provide hangers, braces, guides and restraints that are manufactured by a single manufacturer.
 - .3 Seismic control systems to provide axial and lateral restraint in accordance with NFPA 13 Standard.
 - .4 Fasteners and attachment points to resist same maximum load as seismic restraint.
 - .5 Drilled or power driven anchors and fasteners not permitted.
 - .6 No equipment, equipment supports or mounts to fail before failure of structure.
 - .7 Supports of cast-iron or threaded pipe not permitted.
 - .8 Seismic control measures not to interfere with integrity of firestopping.
- .3 Static equipment:
 - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
 - .2 Suspended equipment:
 - .1 Use one or more of following methods:
 - .1 Install tight to structure.
 - .2 Cross brace in every direction.
 - .3 Brace back to structure.
 - .3 Seismic restraints:

- .1 Cushioning action gentle and steady.
- .2 Never reach metal-like stiffness.
- .4 Piping systems:
 - .1 Fire protection systems: to NFPA 13 Standard.
 - .2 Piping systems: hangers longer than 300 mm; brace at each hanger.
 - .3 Compatible with requirements for anchoring and guiding of piping systems.
- .5 Bracing methods:
 - .1 Approved by Seismic Engineer
- .6 Service and utilities entrance into building:
 - .1 Seismic separation assembly at water service entry and at seismic separation joints within the building

2.4 SPRINKLER HEADS

- .1 General Requirements: Sprinkler heads complying with NFPA 13 Standard, and approved for fire protection service.
- .2 Provide, for bidding, an additional quantity of each type of sprinklers, including installation, and corresponding to the equivalent to 5% of the number of each type of sprinklers provided, or 20 sprinklers, whichever is the greater.
- .3 Sprinkler guard for sprinkler exposed to mechanical shock, with zinc coated steel rod, provided by the same manufacturer as the sprinkler it protects.
- .4 Upright Sprinklers:
 - .1 Upright sprinkler, quick-response, with frangible bulb, "K" factor of 5.6 (G-01):
 - .1 Acceptable products:
 - .1 Viking Microfast, Model M, VK-300;.
 - .2 Victaulic, Style V2704;.
 - .3 Tyco, Model TY3131;.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Upright sprinkler, quick-response, with frangible bulb, "K" factor of 4.2 (G-02):
 - .1 Viking Microfast, Model M, VK-327.
 - .2 Victaulic, Style V2402.
 - .3 Tyco, Model TY2231.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.

- .3 Temperature ratings: 68°C, 93°C, 141°C, as needed or as indicated on drawings.
- .4 Finish: brass, white polyester, as indicated on drawings.
- .5 Maximal distance per sprinkler:
 - .1 Combustible construction:
 - .1 Light hazard - unobstructed ceiling:
 - .1 Maximum coverage: 20.9 m2.
 - .2 Maximum distance between heads: 4.6 m.
 - .2 Light hazard - obstructed ceiling with exposed members with 915 mm or more on center:
 - .1 Maximum coverage: 15.6 m2.
 - .2 Maximum distance between heads: 4.6 m.
 - .3 Light hazard - obstructed and unobstructed ceiling with exposed members less than 915 mm on center:
 - .1 Maximum coverage: 12.1 m2.
 - .2 Maximum distance between heads: 4.6 m.
 - .4 Ordinary hazard:
 - .1 Maximum coverage: 12.1 m2
 - .2 Maximum distance between heads: 4.6 m.
- .5 Sidewall Sprinklers
 - .1 Sidewall sprinklers, quick response, with frangible bulb, "K" factor of 5.6 (G 03):
 - .1 Acceptable products:
 - .1 Viking Microfast, Model M, VK-305;.
 - .2 Victaulic, Style V2710;.
 - .3 Tyco, Model TY3331;.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Vertical sidewall sprinklers, quick response, with frangible bulb, "K" factor of 5.6 (G-04):
 - .1 Acceptable products:
 - .1 Viking Microfast, Model M, VK-306.
 - .2 Reliable, Model F1FR56.
 - .3 Tyco, Model TY3431.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.

- .3 Extended coverage sidewall sprinklers, quick response, with frangible bulb, "K" factor of 8.0 (G-05):
 - .1 Acceptable products:
 - .1 Viking Microfast, Model M, VK-630.
 - .2 Victaulic, Style V3416.
 - .3 Tyco, model V3416.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .4 Temperature ratings: 68°C, 93°C, 141°C, as needed or as indicated on drawings.
 - .5 Finish: brass, white polyester, as indicated on drawings.
 - .6 Maximal distance per sprinkler:
 - .1 Combustible finish:
 - .1 Maximal coverage: 11.1 m².
 - .2 Maximal distance between heads along wall: 4.3 m.
 - .3 Maximal projection distance: 3.7 m.
 - .2 Extended coverage:
 - .1 Maximal coverage: 29.7m².
 - .2 Maximal distance between heads along wall: 4.9 m.
 - .3 Maximal projection distance: 6.1 m.
- .6 Pendant Sprinklers:
 - .1 Dry pendant sprinkler, quick-response, plain barrel, with frangible bulb, "K" factor of 5.6 (G-06):
 - .1 Acceptable products:
 - .1 Viking, Model VK-150.
 - .2 Victaulic, Model V3606.
 - .3 Tyco, DS-1 Series, model TY3235.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Temperature ratings: 68°C, 93°C, 141°C, as needed or as indicated on drawings.
 - .3 Finish: Brass, white polyester, as indicated on drawings.
 - .4 Maximal distance per sprinkler:
 - .1 Combustible construction
 - .1 Light hazard - Unobstructed ceiling:

- .1 Maximum coverage: 20.9 m².
- .2 Maximum distance between heads: 4.6 m.
- .2 Light hazard - Obstructed ceiling with exposed members with 915 mm or more on center:
 - .1 Maximum coverage: 15.6 m².
 - .2 Maximum distance between heads: 4.6 m.
- .3 Light hazard - Obstructed and unobstructed ceiling with exposed members less than 915 mm on center:
 - .1 Maximum coverage: 12.1 m².
 - .2 Maximum distance between heads: 4.6 m.
- .7 Nozzles:
 - .1 Fire protection frame style directional spray nozzles, quick response, with frangible bulb, "K" factor of 5.6, spray pattern of 110deg to 150deg, (G 07):
 - .1 Acceptable products:
 - .1 Viking frame style spray nozzle, Model 16951.
 - .2 Tyco, Type EA-1 Protectospray
 - .3 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .2 Temperature rating: 68°C.
 - .3 Finish: Black Teflon, as indicated on drawings.
 - .4 Maximal distance per nozzles : As indicated on drawings.

2.5 AUXILIARY SUPERVISORY SWITCHES

- .1 General: to ANSI/NFPA 13 Standard and ULC listed for fire service.
- .2 Valves:
 - .1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.
 - .2 Add monitoring contacts on non-supervised valves, as indicated on-site.
- .3 Pressure alarm switch:
 - .1 With normally open and normally closed contacts and supervisory capability.

2.6 IDENTIFICATION

- .1 Bilingual indicating plates for test/drain valves: To NFPA 13 Standard.
- .2 Provide and install at the base of riser, in a permanent manner, three hydraulic design information sign, including the following information:

- .1 Location of the design area;
 - .2 Discharge density over the design area;
 - .3 System flows and residual pressures requirements at the base of riser;
 - .4 Occupancy classification;
 - .5 Hose stream allowance included.
- .3 Fire protection equipment identification to NFPA 170, Standard for Fire Safety and Emergency Symbols.

2.7 DRY PIPE VALVE

- .1 Dry pipe alarm check valve complying with NFPA 13 Standard, for fire protection use, including the following component :
- .1 Compressed air supply with high and low pressure switches;
 - .2 Low pressure alarm switch;
 - .3 Nitrogen generator system ;
 - .4 Relief valve;
 - .5 Accelerator
 - .6 Supervised control valve;
 - .7 Pressure gauges;
 - .8 Drain valves;
 - .9 All accessories, and piping required for proper check valve assembly.
 - .10 Acceptable products:
 - .1 Viking, Model F-2 or Model G;
 - .2 Victaulic, Model Firelock NXT-Dry, 768 Series;
 - .3 Tyco, Model DPV-1;
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.

2.8 COMPRESSED AIR SUPPLY

- .1 Automatic Air Compressor, quiet type, electric drive, tank mounted, single stage compressor, belt guard and controls, built-in to the Nitrogen generation system.
- .2 ULC listed, listed for use with fire protection systems.
- .3 Capacity:
 - .1 To restore normal air pressure in system within 30 min
 - .2 To provide air pressure of 140 kPa in excess of calculated trip pressure of dry pipe valve and in accordance with instruction sheet furnished with dry pipe valve.
- .4 Power:

- .1 As required for capacity - 1HP maximum.
- .2 115/1/60.
- .5 Storage Tank: horizontal, steel, A.S.M.E. rated, 75-liter capacity, threaded couplings for air supply, air discharge, relief valve, control device.
- .6 Ancillary Devices.
 - .1 Pressure switch for automatic operation, factory installed, wired and tested.
 - .2 Air maintenance device: Complete with pressure regulator, check valve, isolation and bypass valves.
 - .1 Acceptable products
 - .1 General Air Products, model AMD-1.
 - .2 Tyco, Model AMD-1.
 - .3 Victaulic, 757 Series.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
 - .3 Tank's automatic drain valve.

2.9 NITROGEN GENERATION AND CORROSION INHIBITING SYSTEM

- .1 Complete packaged system consisting of:
 - .1 Nitrogen generation system.
 - .2 Auto-purge system.
 - .3 Leak Detection system.
 - .4 Supervisory Gas Monitoring system.
 - .5 Manufacturer's site commissioning.
- .2 Package and components to be ULc listed, listed for use with fire protection systems.
- .3 Nitrogen Generation system:
 - .1 To provide supervisory pressure between 0-60 PSI.
 - .2 System to be floor mounted and to include an integral air compressor located with unit.
 - .1 Air compressor to be oil-less and provide clean, dry, oil-free compressed air to the nitrogen system.
 - .3 Generator to be capable of producing a minimum of 98% pure nitrogen.
 - .4 Power requirements: dedicated 20A circuit, 120VAC.
 - .5 Nitrogen storage tank: minimum 75 litre, ASME rated for 1034 kPa, on/off valve, 1/2" NPT fitting, complete with ASME rated 689 kPa safety relief valve.

- .6 Acceptable products:
 - .1 General air products, Model NGP-500DQ.
 - .2 Potter, Model INS-500.
 - .3 SouthTek.
 - .4 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .4 Auto-purge system
 - .1 Pneumatic system (no AC or DC electrical connections) to ensure continuous cycling of nitrogen through system.
 - .2 Complete with auto high pressure water shut-off and adjustable auto-purge orifice.
 - .3 Quick-connect connections test port for use with nitrogen purity sensor or provide additional sampling port adjacent to auto-purge system.
 - .4 Acceptable products:
 - .1 Potter, Model NGP-SPV.
 - .2 South-Tek, Model N2blast AutoPurge.
 - .3 ECS, Model PSV-D.
 - .4 General air products, NPV Series.
 - .5 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .5 Leak Detection System
 - .1 Integral leak detection system to alarm if a significant leak occurs in system prior to supervisory pressure falling below specified pressure.
 - .2 Integral system shall also indicated if there is a failure with the Nitrogen generation system or its integral air compressor.
- .6 Sampling Ports
 - .1 Provide sampling ports as indicated on the drawings.
 - .2 Includes isolation valve and quick connect fitting compatible with Portable Nitrogen Purity Sensor.
- .7 Portable Nitrogen Purity Monitoring Sensor
 - .1 Provide two (2) monitoring devices. One (1) will be held as spare.
 - .2 Portable hand-held nitrogen purity sensor.
 - .3 Battery operated.
 - .4 Manually connected to designated system test locations.
 - .5 Quick-connect connections test ports as indicated for use with supplied sensor.

2.10 PRESSURE GAUGES

- .1 ULC listed.
- .2 Maximum limit of not less than twice normal working pressure at point where installed.

2.11 SPARES

- .1 Provide twelve (12) sprinkler heads, with at least two (2) models of each sprinkler type inside "Spares" box.

Part 3 Execution

3.1 WORK ON SS KENO - PRESERVATION OF THE HISTORICAL ASSET

- .1 Refer to Section 01 73 00 - Execution Requirements.
- .2 The Contractor shall not cut, drill, or otherwise modify the existing ship without prior approval of the Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.3 INSTALLATION

- .1 Install, inspect and test to acceptance in accordance with ANSI/NFPA 13 Standard.
- .2 Testing to be witnessed by the authority having jurisdiction.
- .3 Provide "Contractors Material Test Certificate" as per ANSI/NFPA 13 Standard for insertion in O&M Manual.
- .4 Proper operation and installation coordination of the system, including automatic sprinkler system, system's monitoring points as well as the systems commissioning, are all under the fire protection Contractor's responsibility.
- .5 Clearly identify main shut off valves, drain valves, by pass valves, and all auxiliary valves.
- .6 Connect to existing fire department connection as indicated.
- .7 Pressure gauges:
 - .1 Location:
 - .1 On water side and air side of dry pipe valve.
 - .2 At air receiver.
 - .3 In each independent pipe from air supply to dry pipe valve.
 - .4 At exhausters and accelerators.
 - .2 Install with valve to permit removal of pressure gauge.
 - .3 Locate so as not subjected to freezing.

- .8 Install the maintenance diagram inside the alarm valve room.
- .9 Install the piping for the dry pipe system with a slope for drainage towards the system lowest point. Slope of 1%.
- .10 Provide low points with adequate drainage devices, in accordance with NFPA 13 Standard. Provide for bidding six (6) additional auxiliary drains for permafrost moving issue.
- .11 Install hydraulic design information signs on the riser, near alarm check valves.
- .12 Install drainage piping of compressor's tank automatic drain valve to nearest drain.
- .13 Drain the network at the end of the tests.

3.4 NITROGEN GENERATION SYSTEM

- .1 Auto-purge valve:
 - .1 Install per manufacturer's recommendations.
 - .2 Adjust needle valve or orifice on system auto-purge valve to purge the system as per the manufacturer's recommendations.
 - .3 Ensure ball valve to each auto-purge system is left in "open" position during normal operation and is "closed" during system hydro testing.
- .2 Manufacturer's Site Commissioning Services.
 - .1 Provide manufacturer's technical start-up and commissioning services and training on all nitrogen system components as well as provide instruction and training for owner representatives once commissioning has been completed.
- .3 Spare Parts.
 - .1 Provide one (1) N2 System annual maintenance kit.

3.5 PAINTING

- .1 Carry out painting of piping, including fittings and joints, in all heritage area according to section 09 91 00.
- .2 Provide and apply adapted primer over galvanized piping.
- .3 For on- site painting, protect sprinkler head near the painting zone.
- .4 Remove sprinkler protector only once painting is completed.
- .5 Replace any paint soiled sprinklers by new ones.

3.6 TESTS AND VERIFICATION

- .1 Carry out the following tests on the sprinkler systems, complying with NFPA 13 Standard:
 - .1 Execute an air leak test on the piping network at a pressure of 275 kPa during 24 hours. Correct each leak allowing a pressure drop of more than 10 kPa during the 24-hour test.

- .2 Execute complete hydrostatic testing on the automatic sprinkler systems piping and appurtenances at a pressure of 1,380 kPa for 2 hours.
 - .3 Complete a flow test through the test pipe connection in order to confirm alarm device operation. The alarm signals must be transmitted to the alarm panel within 1 minute maximum starting at test connection opening and during flow test.
 - .4 Complete a flow test through the main drain connections, fully opened to ensure that no pressure build-up occurs in the drainage piping, that could affect the proper operation of the system.
 - .5 Execute opening and closing of all water supply control valves while under system pressure.
 - .6 Execute a test showing that the air working pressure can be restore within 30 minutes.
- .2 Conduct tests in presence of the Departmental Representative and supply test certificates, as required by NFPA 13 Standard.

3.7 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Section 01 78 00 Closeout Submittals.
 - .2 Provide manufacturer's field services consisting of product use recommendations and one time site commissioning of product installation in accordance with manufacturer's instructions.
 - .1 Allow for minimum 2 days of time on site for Commissioning activities and operator training.
- .2 Verification requirements in accordance include:
 - .1 Provide written certification to Departmental Representative that system was installed, flushed and tested in accordance with appropriate codes, approved drawings and calculations.
 - .2 Certificate to include:
 - .1 Contractors name.
 - .2 Contractors address..
 - .3 Contractors license number.
 - .4 List of approved materials and devices installed
 - .5 Description of system test conducted.
 - .6 Dates of flushing and testing.
 - .7 Certification that connections comply with acceptable

Standards.

- .8 Certification that system is complete and in service.
 - .9 Approved signage has been provided and attached as appropriate.
 - .10 Hose connections of system and test connections match those of responding fire department.
 - .11 Copy of fire alarm verification certificate.
 - .12 Name, address and contact information of "Fire Alarm" monitoring agency.
- .3 Provide completed contractor's material and test certificate for above-ground piping to the requirements of NFPA-13 Standard.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.9 MOCK-UP

- .1 Prepare a mock-up of the following systems for review and acceptable by the Departmental Representative. Mock-up will be reviewed by Departmental Representative.
 - .1 Each type of seismic restraint system. If there is only one type of restraint to be installed in all locations, then one mock-up will suffice.
 - .2 Pipe hangers.
- .2 Allow minimum 2 weeks for review.
- .3 Do not proceed with system installation until mock-up has been reviewed and accepted.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 21 13 16 - Dry Pipe Sprinkler System .

1.2 REFERENCE STANDARDS

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B31.1-07 , Power Piping.
- .2 ASTM International
 - .1 ASTM A125-1996(2007) , Standard Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A307-07b , Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563-07a , Standard Specification for Carbon and Alloy Steel Nuts.
- .3 National fire Protection Association
 - .1 NFPA 13 - Installation of Sprinkler Systems.
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP58-2002 , Pipe Hangers and Supports - Materials, Design and Manufacture.
 - .2 MSS SP69-2003 , Pipe Hangers and Supports - Selection and Application.
 - .3 MSS SP89-2003 , Pipe Hangers and Supports - Fabrication and Installation Practices.
- .5 Underwriter's Laboratories of Canada (ULC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures .
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Canada.
 - .2 Submit shop drawings for:
 - .1 Bases, hangers and supports.

- .2 Connections to equipment and structure.
- .3 Structural assemblies.
- .4 Certificates:
 - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturers' Instructions:
 - .1 Provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements .
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 11 - Cleaning.

Part 2 Product

2.1 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
 - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
 - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
 - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
 - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- .2 Performance Requirements:

- .1 Design supports, platforms, catwalks, hangers to withstand seismic events as specified Section <Insert Value> .

2.2 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with MSS SP58, ANSI B31.1 and
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.
- .3 Perforated metal bands are not accepted.

2.3 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: galvanized after manufacture.
 - .2 Use electro-plating galvanizing process .
 - .3 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated .
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
 - .1 Piping NPS 2 1/2 or greater: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL and ULC listed, FM approved, to MSS SP69.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
 - .1 Ductile iron top of beam C clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL and ULC listed, FM approved, to MSS SP69.
 - .2 Malleable iron top of beam jaw clamp with hooked rod, spring washer, plain washer and nut, UL listed, FM approved, to MSS SP69.
- .4 Steel section or angle beam (upper flange):
 - .1 Malleable iron top of beam jaw clamp with hooked rod, spring washer, plain washer and nut, UL listed, FM approved, to MSS SP69.
- .5 Shop and field-fabricated assemblies:
 - .1 Trapeze hanger assemblies.
 - .2 Steel brackets.
 - .3 Sway braces for seismic restraint systems: to Section 21 13 16 .
- .6 Hanger rods: threaded rod material to MSS SP58:
 - .1 Ensure that hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .7 Pipe attachments installed directly on the pipe (All diameter):
 - .1 Plastic piping, longitudinal movement less than 25 mm: adjustable

clevis, to MSS SP-69, type 10, UL listed and FM approved.

- .2 Ductile iron vent and drainage piping, steel mechanical joints, adjustable double hook-type on both sides of the joint, (for NPS 2 to NPS 6) and ductile iron shield (for DN 8 and DN 10).
- .8 Fire protection pipe attachments:
 - .1 Steel or fire protection piping: adjustable clevis, to MSS SP-69, type 10, UL listed and FM approved.
- .9 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
 - .1 Finishes for steel pipework: black .

2.4 RISER CLAMPS

- .1 Steel or cast iron pipe: black carbon steel to MSS SP58, type 42, FM approved .
- .2 Bolts: to ASTM A307.
- .3 Nuts: to ASTM A563.

2.5 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23- Structural Steel for Buildings . Submit calculations with shop drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

- .1 Install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
- .2 Clamps on riser piping:
 - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - .2 Bolt-tightening torques to industry standards.
 - .3 Steel pipes: install below coupling or shear lugs welded to pipe.
 - .4 Cast iron pipes: install below joint.
- .3 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

3.3 HANGER SPACING

- .1 Plumbing piping: to National Plumbing Code of Canada (NPC) .
- .2 Fire protection: to NFPA 13
- .3 Within 300 mm of each elbow.
- .4 Plastic piping, other than polypropylene, polymer and pyrex: to manufacturer recommendations.
- .5 Ductile iron pipe: hanger at each joint. Distance between two hangers shall not be more than 3 m. This distance must be reduced to 1 m when adjacent fittings spaced of 300 mm or less are installed on piping with mechanical joints.
- .6 Vertical piping: supported at the base, highest point and at each floor.
- .7 In addition to hangers requested above, install brackets and suspensions on straight lengths of pipe as shown in the schedule below :
- .8 Maximum spacing for horizontal pipe shall not exceed that listing the following table.

pipe dia (NPS)	Rod dia, mm	Steel, m	Copper, m	Thin wall steel, m	Ductile Iron, m	CPVC, m
3/4	10	---	2.4	---	---	1.3
1	10	3.6	2.4	3.6	---	1.5
1 1/4	10	3.6	3.0	3.6	---	1.6
1 1/2	10	4.5	3.0	3.6	---	1.7
2	10	4.5	3.6	3.6	---	1.9
2 1/2	10	4.5	3.6	3.6	---	2.3
3	10	4.5	3.6	---	4.5	2.5
3 1/2	10	4.5	4.5	---	---	---
4	10	4.5	4.5	---	4.5	---
5	13	4.5	---	---	---	---
6	13	4.5	---	---	4.5	---

3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and

support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.
- .2 Adjustable clevis:
 - .1 Tighten hanger load nut securely to ensure proper hanger performance.
 - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

3.7 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00- Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .3 Verification requirements include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.8 CLEANING

- .1 Clean in accordance with Section 01 74 11- Cleaning .
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 01 35 21- LEED Requirements .

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Sections of Divisions 26 and 28. This section supplements requirements of Division 1.
- .2 For the proper execution of work, cooperate with other trades and contracts as needed.
- .3 To avoid installation conflicts, thoroughly examine the complete set of contract documents. Resolve conflicts with Departmental Representative prior to installation.
- .4 Prior to installation of electrical connections to equipment, examine the manufacturer's shop drawings, wiring diagrams, product data and installation instructions. Verify that the electrical characteristics detailed in the contract documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Departmental Representative.
- .5 Examine the entire set of contract documents to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.
- .6 Should the electrical documents indicate a condition conflicting with the governing codes or regulations, refrain from installing that portion of the work until clarified by Departmental Representative.
- .7 Definitions:
 - .1 Provide - To furnish and install complete and ready for intended use.
 - .2 Furnish - Supply and deliver to project site, ready for unpacking, assembly and installation.
 - .3 Install - Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operation at the project site to complete items of work furnished.
- .8 All correspondence and documents shall be submitted in English. Copies in other languages shall be provided where indicated.
- .9 The entire bid package is considered related to all disciplines and shall be examined prior to bid and followed throughout construction and thereafter. Related sections listed hereinafter in this specification shall not be considered as relieving any Division from the above - indicated responsibility.
- .10 Sufficiency of drawings and specifications:
 - .1 Hold the Drawings and Specifications to determine the general character and general arrangement of the Work.
 - .2 Drawings and Specifications indicate the general scope of the Project in terms of the dimensions of the Work, the type of structural, mechanical, electrical utility systems and the architectural elements of

construction. The Drawings and Specifications do not necessarily indicate or describe all Work required for the full performance and completion of the requirements of the Contract Documents. On the basis of the general scope indicated, stated, described or implied, furnish all items required for the proper execution and completion of the Work.

- .3 The Contract Documents are issued to facilitate construction by expressing the design intent. The Drawings and Specifications do not necessarily contain all of the details required to construct the project, and contractor supplied detail in the form of detailed construction documents (referred to in the Contract Documents as the Contractors supplied shop drawings, submittals, and field coordination drawings) is required for construction of the Work; all of which set out the specific and final details required for placing and constructing the finished Work. By contrast, the Drawings and Specifications are provided to reflect the finished design of the Work. The Drawings and Specifications are not intended to be used as a set of detailed instructions on how to construct the Work. Construction means, methods, techniques, sequences, procedures, and site safety precautions are the responsibility of the Contractor.
- .4 Shop Drawings, Product Data, Samples and similar submittals provided by the Contractor are not Contract Documents. The purpose of these submittals is to demonstrate the way by which the Contractor proposes to conform to the design intent expressed in the Contract Documents.
- .5 Examine the Drawings and Specifications to satisfy yourself regarding the design intent and the extent of the proposed Work, and by personal examination of the site and surroundings make your own estimate of the facilities condition and difficulties attending the performance and completion of the Work.
- .11 Make known in writing to the Departmental Representative ten (10) days prior to the tender closing date any materials specified or is required to complete the work, which are not currently available or will not be available for use as called for herein or on drawings. Failing to do so, it will be assumed that the most expensive compliant alternate has been included in the tender price.
- .12 For the sake of clarity, electrical symbols are typically shown larger than they would be at the actual scale of the drawing. Therefore, do not scale electrical drawings. Where exact dimensions are required, refer to dimensioned architectural plans or civil drawings. Failing to do so, bear all resulted costs and make good of the work.
- .13 The general contractor who has a contractual relationship with the Departmental Representative shall be responsible for providing complete and workable systems as outlined on drawings and in specifications. The Departmental Representative will not recognize any sub-contractor as such, but will consider all persons engaged on the work to be under the control of

General Contractor. The Departmental Representative will not under any circumstances, enter into discussions concerning the responsibility of sub-trades or the apportionment of work. No claim based on the division of work between specification sections or subtrades will be considered.

1.2 CODES AND STANDARDS

- .1 Unless otherwise indicated, all references to standards and codes throughout this specification is to the latest applicable edition at the time of bid closing.
- .2 Do complete installation in accordance with CSA C22.1, Canadian Electrical Code, Part 1. In case of a conflict between the code requirements and the contract documents, request clarification prior to proceeding with the work.
- .3 Definitions:
 - .1 Abbreviations for electrical terms: to CSA Z85 - Abbreviations for Scientific and Engineering Terms.
 - .2 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122 - The Authoritative Dictionary of IEEE Standards Terms.
- .4 Coordinate with other disciplines and provide plenum rated equipment and devices and plenum rated raceway, wiring and installation methods in all plenum spaces.
- .5 Material and installations shall comply with the requirements of the following codes and standards, codes and standards mentioned in other sections of this specification, as well as other applicable codes and standards to the satisfaction of the Authorities Having Jurisdiction (AHJ):
 - .1 Canadian Electrical Code (CEC).
 - .2 National Building Code of Canada (NBCC)
 - .3 National Fire Code of Canada (NFCC).
 - .4 CAN/ULC-S524-14, Installation of Fire Alarm Systems.
 - .5 CAN/ULC-S537-13, Verification of Fire Alarm Systems.
- .6 Provide the site office with a current copy of the following documents, codes and standards. These documents shall remain on site throughout the duration of construction for electricians and others reference and use. The maintenance of these codes on site may be checked at each site visit. Absence of one or more such documents will be indicated on the field review report as deficiency and non-compliance with contract requirements.
 - .1 Project's electrical specifications, drawings and any addenda.
 - .2 Project's up to date electrical RFIs and responses, SIs and CCNs.
 - .3 Canadian Electrical Code (CEC).
 - .4 CAN/ULC-S524, Installation of Fire Alarm Systems.
 - .5 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.3 QUALITY ASSURANCE

- .1 Conform to the requirements of CEC with amendments by the AHJ.
- .2 Conform to the requirements of the NBCC with amendments by the AHJ.
- .3 Obtain and pay for the electrical permits, plan review and inspection from the AHJ.
- .4 Conform to the requirements of the serving electric, telephone utilities.

1.4 PERMITS, FEES AND INSPECTION

- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay associated fees.
- .3 Provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Departmental Representative of changes required by Electrical Inspection Department or Supply Authority prior to making such changes.
- .5 Furnish Certificates of Acceptance from Authorities Having Jurisdiction on completion of work to Departmental Representative.

1.5 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 General:
 - .1 Provide submittals for review for all electrical material and equipment.

1.6 CONTRACT BREAKDOWN

- .1 Provide separate material and labour breakdown for the total electrical sub-contract as indicated below. This breakdown is to meet the satisfaction of the Departmental Representative and is to be submitted within 14 days of contract award.
- .2 The breakdown will be used in computing of progress claims. Progress claims are to be itemized with separate labour and material listing against each item of the contract breakdown. Progress claims will not be reviewed if they are not presented as per the following breakdown:
 - .1 Mobilization
 - .2 Fire Alarm System
 - .3 Demolition of existing installations.
 - .4 Training, O&M Manuals, Reports and Record Documents and Closeout

1.7 CLOSEOUT SUBMITTALS

- .1 Provide Operation and Maintenance Data and Record Drawings for electrical installations and submit in accordance with Section 01 78 00 - Closeout

Submittals.

1.8 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, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment and materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Product

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

- .1 Equipment and Material to be approved by a Certified Accreditation Body of the Standards Council of Canada. Where certified components are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval to the Departmental Representative.
- .2 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Departmental Representative.

2.4 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with labels as follows:
 - .1 Nameplates: plastic laminate mm melamine, black face, white core,

lettering accurately aligned and engraved into core.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per line.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.

2.6 WIRING IDENTIFICATION

- .1 Maintain phase sequence and colour coding throughout.
- .2 Colour coding: to CSA C22.1.
- .3 Use colour coded wires in communication cables, matched throughout system.

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .2 Clean and touch up surfaces of devices and equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .4 All electrical fittings, supports hanger rods, pullboxes, channel frames, conduit racks, outlet boxes, brackets, clamps, etc. to have galvanized finish or enamel paint finish over corrosion-resistant primer.
- .5 All panelboards, distribution centres, transformers, motor control centres, etc. to be factory finished in gloss air dry enamel applied over corrosion-resistant

primer. Matte or flat type finish paint not acceptable. Factory finished units that are scratched or marked during installation or shipping to be touched up with matching spray-on air dry lacquer or, if required to provide a satisfactory job, completely refinished.

- .6 All 347/600V and 120/208V equipment to be colour finished to match grey ANSI 61.
- .7 Fire alarm pullboxes and junction boxes to be finished in red.

Part 3 Execution

3.1 SUPERVISORY REQUIREMENTS: PRESERVATION OF HISTORICAL ASSET

- .1 Refer to Section 01 73 00 Execution.
- .2 The contractor shall not cut, drill, or otherwise modify the existing ship without prior approval of the Departmental Representative.

3.2 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or contracts are acceptable for electrical installation in accordance with manufacturer's written instructions.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied.

3.3 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.4 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.5 MOUNTING HEIGHTS

- .1 Mounting height of equipment and devices is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment or devices is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment and devices at the equipment heights as indicated on the drawings.

3.6 FIELD QUALITY CONTROL

- .1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

- .1 Systems: fire alarm.
- .2 Carry out tests in presence of Departmental Representative.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 SYSTEM STARTUP

- .1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .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.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for wire and box connectors.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International):
 - .1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65, Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC):
 - .1 EEMAC 1Y-2, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA)

Part 2 Product

2.1 MATERIALS

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
 - .1 Connector body and stud clamp for stranded or round solid copper conductors as required.
 - .2 Clamp for stranded or round copper conductors as required.
 - .3 Clamp for conductors.
 - .4 Stud clamp bolts.
 - .5 Bolts for copper conductors bar.
 - .6 Bolts for aluminum conductors.
 - .7 Sized for conductors as indicated.
- .4 Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 INSTALLATION

- .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 CAN/CSA-

C22.2 No.65.

- .2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65.
Replace insulating cap every time the connection is removed and
reinstalled.
- .3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables.

1.2 PRODUCT DATA

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

Part 2 Product

2.1 BUILDING WIRES

- .1 Conductors: Copper, stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90 XLPE

2.2 FIRE ALARM CABLE

- .1 Conductors: multiconductor, insulated, copper, minimum size to be #18 AWG for device loops and #14 for signal circuits.
- .2 CSA Type: FAS105.
- .3 Insulation: 105 degrees C Flame retardant PVC.
- .4 Outer Jacket: 105 degrees C Flame retardant PVC Red. FT-4 Flame spread minimum.
- .5 Armour: Interlocking Aluminium without overall Jacket.

Part 3 Execution

3.1 GENERAL CABLE INSTALLATION

- .1 All wiring to be installed in conduit except where otherwise identified in these contract documents.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

3.2 INSTALLATION OF FIRE ALARM WIRING

- .1 Install fire alarm wiring in conduit.
- .2 Provide grounding conductor throughout.
- .3 Use listed, armoured cable, only for tamper and flow switches exposed wiring.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 83, Electrical Metallic Tubing.

1.2 LOCATION OF CONDUIT

- .1 Drawings do not indicate all conduit runs. Those indicated are diagrammatic only. Determine best routing for conduit on site, ensuring requirements of this specification are met.

Part 2 Products

2.1 CONDUIT

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83 , with couplings.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 53 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 53 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1.5 m on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" for 90 degrees bends for 35 mm and larger conduits.
- .3 EMT couplings and connectors to be dry type in type 1 environments, and watertight where installed outdoors, or as required on the drawings.

2.4 PULL CORD

- .1 Minimum 6mm stranded nylon (polypropylene) pull rope, tensile strength 5 kN. Leave pull rope in any spare conduit exceeding 3 meters in length, or 90 degrees of bend.

2.5 THREAD LUBRICANT

- .1 Make up all male conduit threads with thread lubricant prior to connection.

Part 3 Execution

3.1 MANUFACTURER`S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or

specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
- .3 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
- .4 Minimum conduit size for lighting and power circuits: 21 mm.
- .5 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .6 Mechanically bend steel conduit over 21 mm diameter.
- .7 Field threads on rigid conduit must be of sufficient length to draw conduits up tight. Allow for minimum of 5 threads to be engaged.
- .8 Install pull cord in empty conduits.
- .9 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .10 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Group conduits wherever possible on suspended channels. Channels to have 25% spare capacity.
- .4 Do not pass conduits through structural members except as indicated.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

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

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
- .2 Common-trip breakers: with single handle for multi-pole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
- .4 Breakers to be compatible with existing panel. Existing breakers are Commander Type BQL.

2.2 THERMAL MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 ENCLOSURE

- .1 As indicated on drawings or specified.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 International Electrotechnical Commission (IEC)
 - .1 IEC 947-4-1-2002, Part 4: Electromechanical contactors and motor-starters.
- .2 National Electrical Manufacturers Association (NEMA).

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
 - .1 Mounting method and dimensions.
 - .2 Starter size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for motor starters for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Include operation and maintenance data for each type and style of starter.
- .3 Submit operation and maintenance data for each type and style of motor starter for incorporation into maintenance manual.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse by manufacturer of packaging materials in accordance with Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

1.5 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Provide manufacturer recommended spare parts for each different size and type of starter. Provide listed spare parts for each different size and type of starter:

Part 2 Product

2.1 MATERIALS

- .1 Starters: EEMAC E14-1.
 - .1 Half size starters not acceptable.
- .2 Starters: to IEC 947-4 with AC4 utilization category.
- .3 Enclosure: Indoor type sprinkler proof.

2.2 FULL VOLTAGE MAGNETIC STARTERS

- .1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Power and control terminals.
 - .4 Wiring and schematic diagram inside starter enclosure in visible location.
 - .5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
 - .6 Hand-off-auto switch in enclosure door.
 - .7 Electronic overload relay:
 - .1 Self powered, non-thermal type with current sensing, 3:1 current range adjustment, phase unbalance and phase loss protection, harmonically insensitive, ambient insensitive with visible trip indication.
 - .8 Overloads to be interchangeable without having to replace the entire starter.
 - .9 Two sets of (NO) normally open auxiliary contacts in addition to the standard auxiliary holding contacts supplied with each contactor. One set of auxiliary contacts convertible to normally closed (NC).
- .2 Combination type starters to include motor circuit interrupter with operating lever on outside of enclosure to control circuit breaker, and provision for:
 - .1 Locking in "OFF" position with padlocks.
 - .2 Locking in "ON" position.
 - .3 Independent locking of enclosure door.
 - .4 Provision for preventing switching to "ON" position while enclosure door open.
- .3 Accessories:
 - .1 Selector switches: oil tight labeled as indicated.

- .4 Starter assembly to be fully rated for the maximum available fault current (rms symmetrical) at the location installed.
- .5 Enclosure: Type 1 or 3 suitable for the location shown on drawings.

2.3 ACCESSORIES

- .1 Pushbutton: heavy duty.
- .2 Selector switches: heavy duty.
- .3 Indicating lights: heavy duty, colour as indicated.

2.4 FINISHES

- .1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.5 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Magnetic starter designation label, white plate, black letters, size 2 engraved as indicated.

Part 3 Execution

3.1 INSTALLATION

- .1 Install starters, connect power and control as indicated.
- .2 Ensure correct fuses and overload device elements installed.
- .3 Provide CEC required disconnect switch whether specifically shown on drawings or not. Provide disconnect switch in sight of each motor controller.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and per manufacturer's instructions.
- .2 Operate switches and contactors to verify correct functioning.
- .3 Perform starting and stopping sequences of contactors and relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

3.3 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 NBC, National Building Code of Canada.
- .2 CSA C22.1, Canadian Electrical Code.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525, Audible Signal Appliances for Fire Alarm.
 - .3 CAN/ULC-S526, Visual Signal Appliances For Fire Alarm Systems.
 - .4 CAN/ULC-S527, Control Units For Fire Alarm Systems.
 - .5 CAN/ULC-S528, Manual Pull Stations.
 - .6 CAN/ULC-S529, Smoke Detectors For Fire Alarm Systems.
 - .7 CAN/ULC-S530, Fire Detectors, Heat Actuated, For Fire Alarm Systems.
 - .8 CAN/ULC-S531, Smoke Alarms.
 - .9 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - .10 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.2 DESCRIPTION OF SYSTEM

- .1 Fully supervised, addressable, Class A & B , single-stage, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital multiplexing techniques for data transmission.
 - .1 Existing conventional Class B initiating zones to be monitored by zone addressable modules. All zone addressable modules and new addressable devices within the Valve House to be wired on a single Class A SLC loop.
 - .2 Existing 2-wire Class B signalling circuits to be re-used.
- .2 System includes:
 - .1 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; signalling annunciators and actuating auxiliary functions; initiating trouble signals and signaling to monitoring agency.
 - .2 Trouble signal devices.
 - .3 Power supply facilities.
 - .4 Manual alarm stations.
 - .5 Automatic alarm initiating devices.
 - .6 Audio-visual alarm signal devices.
 - .7 Sprinkler supervisory devices.

- .8 End-of-line devices.
- .9 Loop Isolation modules.
- .10 Annunciators.
- .11 Ancillary devices - Spare contacts for:
 - .1 Future systems to be signalled. Provide 4 sets of NO and NC contacts.
 - .2 Digital Alarm Communicator Transponders (DACT's)

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- .1 Complete system:
 - .1 To approval and final acceptance of the Authority Having Jurisdiction.
- .2 System components: listed by ULC, bear the ULC label and comply with applicable provisions of National Building Code with Local and Territorial amendments, CAN/ULCS524 standard for the installation of fire alarm systems, Canadian Electrical Code C22.1; part I and meet requirements of Authority Having Jurisdiction.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Include:
 - .1 Detailed assembly of the control panel(s), battery cabinets and annunciator enclosures and components, including dimensions.
 - .2 Overall system riser wiring diagram identifying control equipment, initiating zones, signaling circuits, ancillary devices, monitoring inputs, zone isolators.
 - .3 Technical details for all devices.
 - .4 Details and performance specifications for all system components with item-by-item cross reference to specification for compliance.
 - .5 Battery capacity calculations indicating compliance with the applicable codes and these specifications.
 - .6 Manufacturer-recommended testing material, devices, equipment and methods for smoke and heat detectors.
- .3 Shop drawings to be stamped by manufacturer to ensure equipment/design is in accordance with ULC standards.

1.5 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Section 26 05 00 - Common Work Results for Electrical.
- .2 Include:

- .1 Operation and maintenance instructions from the manufacturer for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings.
 - .4 Certificate of verification.
 - .5 List of recommended spare parts.
- .3 Installer to provide drawing of zone plan showing all fire alarm zones. As described in Section 26 05 00 - Common Work Results - Electrical.

1.6 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and devices: ULC listed and labeled, and supplied by single manufacturer in compliance with the standards referenced in this section of the specifications.

2.2 SYSTEM OPERATION

- .1 Single stage operation. Operation of any alarm initiating device to:
 - .1 Cause audible and visual signal devices to operate continuously throughout building, at fire alarm panel and annunciators.
 - .2 Initiate DACT or directly transmit signal to central monitoring facility. Contact information to be provided by Departmental Representative and programmed by this Division.
 - .3 Cause zone and unique identification of alarm device to be indicated on control panel.

2.3 CONTROL PANEL

- .1 Zoned.
- .2 For use with addressable devices.
- .3 Non-coded.
- .4 Enclosure: CSA Enclosure 1, c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys.
- .5 Supervised, modular design with plug-in modules:
 - .1 Alarm receiver with trouble and alarm indications provision for remote supervised annunciation, for class A initiating circuit.
 - .2 Spare Zones: Compatible with smoke detectors and open circuit devices.

- .3 Space for future modules. Latching type supervisory receiver circuits. Discrete indication for both off-normal and trouble.
- .6 Visual indication:
 - .1 Liquid crystal display capable of simultaneously displaying minimum 8 events at the same time.
- .7 Components:
 - .1 Alarm receiver panel with trouble and alarm indications for class A initiating circuit.
 - .2 Audible signal control panel with initiating control circuits complete with terminals for wiring and 2 plug-in modules for dc signals up to 2.0 A load with trouble indication with class B connections.
 - .3 Common control and power units:
 - .1 Control panel containing following indications and controls:
 - .1 "Power on" LED (green) to monitor primary source of power to system.
 - .2 "Power trouble" indication.
 - .3 "Ground trouble" indication.
 - .4 "System trouble" indication.
 - .5 "System trouble" buzzer and silence switch c/w trouble resound feature.
 - .6 System reset switch.
 - .7 "LED test" switch if applicable.
 - .8 "Alarm silence" switch to silence signals manually. If new alarm occurs after signals have been silenced, signals to resound.
 - .9 "Signals Silenced" indication.
 - .2 Master power supply panel to provide 24 V dc to system from 120 V ac, 60 Hz input.
 - .4 Auxiliary relays: plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit and c/w individual bypass switch.
 - .1 Contacts: 2.0 A, 120 V ac, for functions such as release of door holders or initiation of fan shut down.
 - .2 Contact terminal size: Capable of accepting 22-12 AWG wire.

2.4 POWER SUPPLY

- .1 120V, ac, 60Hz input, 24Vdc output from rectifier to operate alarm and signal circuits, with standby power of gel cell batteries minimum expected life of 5 years, sized in accordance with NBC to operate system under supervisory

load conditions without recharging for 24 consecutive hours and have sufficient power left to operate sounding devices for 30 minutes. Battery bank and charger to be integrally mounted in main fire alarm control panel.

2.5 MANUAL ALARM STATIONS

- .1 Manual alarm stations: pull lever, wall mounted semi-flush type, non-coded, single-pole, normally-open contacts, bilingual English/French signage.
- .2 Designed for single stage operation.
- .3 Fully addressable with address settings on device or non-addressable as shown on drawings.
- .4 Key-lock reset feature.
- .5 Rated for outdoor applications. Provide weather proof cover for devices installed outdoors.

2.6 AUTOMATIC ALARM INITIATING DEVICES

- .1 Addressable thermal fire detectors: combination fixed temperature and rate of rise, restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57 °C, rate of rise 8.3°C per minute.
 - .1 Electronics to communicate detector's status to addressable module/transponder.
 - .2 Detector address to be set on detector head in field.
- .2 Non-addressable
 - .1 Existing to be reused.

2.7 AUDIO/VISUAL SIGNAL DEVICES

- .1 Integral Strobe: flashing, output candela rating as indicated on drawing. Minimum 30 cd output rating. Field adjustable to 30, 75 or 110 cd.
- .2 Horn: temporal output, high-low adjustable up to 99 dB. Factory built to 99 dB, which could be field changed to 94 dB by cutting a circuit board jumper.
- .3 Designed for surface mounting on walls as indicated, 24V dc, Red housing.
- .4 Outdoor rated, suitable for operation from -40°C to 60°C.

2.8 END-OF-LINE DEVICES

- .1 End-of-line devices to control supervisory current in alarm circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.9 ADDRESSABLE MONITOR MODULES

- .1 Designed for integration of analogue switching devices with single or double-pole dry contacts on to the system communication loop.
- .2 To include self-contained loop isolation module.
- .3 To provide supervision of the analogue input wiring.

- .4 Suitable for mounting in standard electrical box.
- .5 LED indicator lights on exterior identifying status.
- .6 Powered from communication loop with no external power required.
- .7 Single or dual input as indicated on drawings.

2.10 AS-BUILT ZONE DIAGRAM

- .1 Fire alarm system zone diagram: in glazed frame minimum size 600 x 600 mm.
- .2 Fire alarm building zoning plan as identified in this specification section and on the drawings.
- .3 Provide at the main fire alarm panel.
- .4 The zoning plan to show the building plan with each zone indicated on the plan and room name and number of each space indicated on the plan.

2.11 DIGITAL ALARM COMMUNICATOR TRANSMITTER FOR APPROVED CENTRAL STATION

- .1 Existing fire alarm communicator to be reused: ESC 8240 by Electronic Surveillance Corporation.

Part 3 Execution

3.1 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524.
- .2 Use armoured fire alarm cable for connections to flow and tamper switches.
- .3 Fire alarm wiring and cable to be installed in conduit. Use flexible conduit for final runs to devices mounted in suspected ceilings.
- .4 Install main control panel and connect to ac power supply, dc standby power. Control panel mounting height as shown on the drawings.
- .5 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors.
- .6 Connect alarm circuits to main control panel.
- .7 Connect signaling circuits to main control panel.
- .8 Initiating and signal circuits are not to be run in the same conduit.
- .9 Install end-of-line devices at end of alarm and signaling circuits.
- .10 Sprinkler system: wire alarm and supervisory switches and sensors and connect to control panel. Coordinate with sprinkler contractor prior to bid and price so as to provide all devices and wiring necessary whatsoever at no extra cost.
- .11 Each device to be permanently labeled:

- .1 Zone Isolation Module: Indicate Zone number, "ISO".
- .2 Addressable Input Module: Indicate Zone number, "INPUT", and device address number on loop.
- .3 Addressable Output Module: Indicate Zone number, "OUTPUT", and device address number on loop.
- .12 Provide ground connection conductor (wire) throughout the system.
- .13 Provide necessary raceway and wiring for all listed connections and any other code required connections even if not listed herein.

3.2 SYSTEM VERIFICATION

- .1 A authorized representative of the fire alarm system manufacturer is to make a thorough inspection of the complete installed fire alarm system including all components such as manual stations, thermal detections, products-of-combustion detectors, and controls to ensure the following:
 - .1 System is complete and functional in accordance with specifications and drawings.
 - .2 System is installed according to CAN/ULC S524 requirements.
 - .3 System is installed in accordance with manufacturer's recommendations.
 - .4 Regulations covering supervision of components are adhered to.
 - .5 Subsequent changes necessary to conform to Items 1, 2, 3 and/or 4 to be done by Division 28 with technical assistance supplied by the manufacturer.
 - .6 During the period of this inspection by the manufacturer, supply to the manufacturer one journeyman electrician.
 - .7 Manufacturer to submit to Departmental Representative on completion of inspection a point-by-point check list indicating date and time of each item inspected and also issue a Certificate for his records confirming that inspection has been completed and system is installed and functioning in accordance with the specifications. Included with this Certificate to be satisfactory- proof of liability insurance valid for not less than one (1) year from date of final inspection.
 - .8 Certificate to be free from defining and qualified statements, which would make it unacceptable by the Departmental Representative.
 - .9 Verification shall be performed by manufacturer's certified representative with contractor's assistance. Verification results shall be documented by the manufacturer's representative on the manufacturer's comprehensive fire alarm verification forms.
 - .10 All aspects of the system verification are to be conducted in the presence of the Departmental Representative or his designated representative.

- .11 Notify Departmental Representative of verification date and time at least ten business days in advance.
- .12 Verification may be performed only after:
 - .1 Building is at a state of completion that will ensure a reasonably dust free environment and the absence of contaminating fumes from verification date to final completion.
- .13 Manufacturer to provide sufficient backup parts on site during verification to accommodate any component failures. Backup parts not used during verification can be removed from site by the manufacturer. Recommended back-up parts list:
 - .1 10 break-glass rods
 - .2 2 fire detectors
 - .3 2 pull stations
 - .4 2 horn-strobes and electronics.
 - .5 1 outdoor horn/strobe.
 - .6 2 spare signal zone cards
 - .7 5 appropriate sized fuses
 - .8 1 CPU programming chip
 - .9 2 addressable monitor modules
 - .10 Any additional parts pertinent to the particular manufacturer that may possibly fail resulting in cancellation of the verification.
- .14 Provide two fully charged hand held two-way voice communication radios during verification.
- .15 Provide all testing equipment and material required for testing smoke detectors and heat detectors during verification. Testing methods are to be as approved by manufacturer. Asper CAN/ULC-S537 article 5.4.1.3, each smoke detector shall be tested to confirm that it is within its rated operating range using one of the following methods:
 - .1 Using a ULC approved smoke density measurement instrument for verification of smoke detectors. Canned smoke alone is not acceptable.
 - .2 Installed control units or transponders designed to test the sensitivity of individual smoke detectors.
 - .3 Manufacturer's recommended test instrument, equipment or method. This method is acceptable only when complete official description of the manufacturer's recommended method, including the description of material, devices and equipment is submitted for Departmental Representative's review at least four (4) weeks prior to the verification date.
 - .4 Similar for heat detectors.

- .16 Provide all testing equipment and material required for testing sound levels of the fire alarm signaling devices during verification.
- .17 Verification to be performed by the system manufacturer or its qualified representative, certified to verify fire alarm system within the Yukon Territory.
- .18 Schedule the work at the outset of the construction so that work schedules are properly coordinated to ensure that the verification is complete prior to achieving substantial performance and occupancy.
- .19 Coordinate with other trades and the Departmental Representative for setting up their contract with the remote monitoring company, to ensure completion and attendance at the time of tests

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.
- .2 Pretest the system prior to request for verification inspection and troubleshoot all deficiencies. Submit a copy of successful pretesting report along with the request for fire alarm verification field review.
- .3 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors, sprinkler system (flow), transmit alarm to control panel and actuate first stage alarm general alarm ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of trouble signals.
 - .4 Functionally test all sprinkler valve operations, including tamper and flow switches to ensure proper annunciation on supervisory zones.
 - .5 Simulate and test all auxiliary functions.
 - .6 Simulate and test alarm and monitoring indication functions at building's control & automation panel.
 - .7 Class A Circuits:
 - .1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near mid-post point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on all circuits for capability of providing alarm signal during ground-fault condition imposed near mid-post point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .8 Pay for all testing costs, excluding those of the Departmental

Representative for single-time witnessing the verification. It is the contractor's responsibility to coordinate the verification and pretest the system prior to verification to minimize the efforts and cost.

3.4 TRAINING

- .1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

3.5 OPERATION OF DACT FOR APPROVED CENTRAL STATION

- .1 Provide all necessary wiring and auxiliary relays required to connect fire alarm panel to separate channel of the DACT for alarm, supervisory and trouble conditions.
- .2 Test and verify the operation of the existing DACT.

3.6 LABELING

- .1 The company name and phone number of the fire alarm monitoring company and a clear statement that the equipment is being monitored and that notification must be given prior to working on or testing of the fire alarm system shall be prominently displayed on the DACT and/or autodialer (as provided for under the contract) as well as the fire alarm panel, as required by CAN/ULC-S561 article 9.2.2.
- .2 When DACT and/or autodialer (as provided for under the contract) transmit signals for other systems such as intrusion alarm system to the monitoring company, include all systems monitored on the same label and display the label on the control panels of other monitored systems as well.

3.7 CLEANING

- .1 Perform per section 26 05 00 Common Work results for Electrical.

END OF SECTION

APPENDIX A

PRELIMINARY HAZARD ASSESSMENT FORM – 4 PAGES



SS KENO - PRELIMINARY HAZARD ASSESSMENT FORM

Project Number:	R.075645.001
Location:	SS Keno National Historic Site, Dawson City, YT
Date:	January 31, 2018
Name of Departmental Representative:	Tom Dunphy, P.S.P.C. – Kai Mark, P.S.P.C.
Name of Client:	Parks Canada

REFERENCE DOCUMENT: Stantec - Pre-Remediation Hazardous Materials Assessment Report, Dated July 12, 2016

Site Specific Orientation Provided at Project Location Yes

Notice of Project Required Yes

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 Yukon Territories that may impose OHS obligations.

Important Notice: This hazard assessment has been prepared by PSPC 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. PSPC 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
	PWGSC, OGD's, or tenants		General Public or other contractors		
	Yes	No	Yes	No	
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.					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.

Typical Construction Hazards					
Hazard	Yes	No	Yes	No	Comments
Concealed/Buried Services (electrical, gas, water, sewer etc)	yes				
Slip Hazards or Unsound Footing	yes				
Working at Heights	yes				
Working Over or Around Water	yes				
Heavy overhead lifting operations, mobile cranes etc.		no			
Marine and/or Vehicular Traffic (site	yes				



vehicles, public vehicles, etc.					
Fire and Explosion Hazards	yes				
High Noise Levels	yes				
Excavations		no			
Blasting		no			
Construction Equipment		no			
Pedestrian Traffic (site personnel, tenants, visitors, public)	yes				
Multiple Employer Worksite	yes				Contractor working in a Federal Employee and Public space.

Electrical Hazards					Comments
Contact With Overhead Wires	yes				
Live Electrical Systems or Equipment	yes				
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions		no			
Earthquake	yes				
Tsunami		no			
Avalanche		no			
Forest Fires		no			
Fire and Explosion Hazards	yes				
Working in Isolation		no			
Working Alone		no			
Violence in the Workplace	yes				
High Noise Levels	yes				
Inclement weather	yes				
High Pressure Systems	yes				
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces PSPC employees do not enter confined space.	yes				If available, provide the contractor with the existing confined space assessment(s) for information only. Contractor must perform their own confined space assessment as per territorial regulations.
Suspended / Mobile Work Platforms		no			
Other:					
Biological Hazards					
Mould Proliferations		no			
Accumulation of Bird or Bat Guano		no			
Bacteria / Legionella in Cooling Towers / Process Water		no			
Rodent / Insect Infestation		no			
Poisonous Plants		no			
Sharp or Potentially Infectious Objects in Wastes	yes				
Wildlife		no			



Chemical Hazards					
Asbestos Materials on Site	yes				If "yes" a pre-project asbestos survey report is required. Provide Contractor with ELF Form 16 "Contractor Notification and Acknowledgement"
Designated Substance Present	yes				If "yes" a pre-project designated substance survey report is required.
Chemicals Used in work	TBD				TBD by contractor
Lead in paint	yes				If "yes" a pre-project lead survey report is required.
Mercury in Thermostats or Switches	TBD				If "yes" a pre-project mercury survey report is required.
Application of Chemicals or Pesticides		no			
PCB Liquids in Electrical Equipment		no			
Radioactive Materials in Equipment		no			
Other:					
Contaminated Sites Hazards					
Hazardous Waste		no			
Hydrocarbons		no			
Metals		no			
Other:					

Security Hazards					Comments
Risk of Assault	yes				
Other:					
Other Hazards					

Other Compliance and Permit Requirements ¹	YES	NO	Notes / Comments ²
Is a Building Permit required?			
Is an Electrical permit required?			
Is a Plumbing Permit required?			
Is a Sewage Permit required?			
Is a Dumping Permit required?			
Is a Hot Work Permit required?			
Is a Permit to Work required?			Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?			Mandatory
Is a Confined Space Entry Log required			Mandatory for all Confined Spaces
Discharge Approval for treated water required			

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 PSPC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING			

APPENDIX B

Pre-Renovation Hazardous Buildings Materials Assessment, 46 pgs

**PRE-RENOVATION HAZARDOUS
BUILDING MATERIALS
ASSESSMENT**

SS Keno, Dawson City, YT



Prepared for:
Public Works and Government
Services Canada, Pacific Region
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Vancouver, BC V6Z 2V8

Prepared by:
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Project No.: 123220581

July 12, 2016

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Parks Canada, to conduct a pre-renovation hazardous building materials assessment of the SS Keno and associated Valve House (subject vessel) located in Dawson City, YT.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the requirements of the Canada Labour Code, Part II (*Canada Labour Code*), the Yukon Workers' Compensation Health and Safety Board (WCB) and the current version of the *Yukon Territory Occupational Health and Safety Act and Regulations (YT OHS Reg.)*, prior to planned renovation activities.

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould-impacted building materials and silica.

Based on Stantec's visual assessment and on the laboratory analyses performed on samples collected, hazardous building materials were identified within the subject vessel.

A summary of our findings and recommendations is presented below. Recommendations pertaining to the handling, removal, transportation and disposal of identified hazardous materials are provided in Section 6 of this report.

It should be noted that this summary is subject to the same restrictions and limitations as presented in Section 4 (Assessment Limitations) and Section 7 (Closure). The information provided is to be read in conjunction with the remainder of this report.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Table 1 Summary of Findings

Hazardous Material	Summary of Identified Hazardous Building Materials
Asbestos	<p>The following ACMs were identified through this assessment:</p> <ul style="list-style-type: none"> • Boiler seam liners applied to boilers on the freight deck. • Mechanical gaskets in various locations throughout including but not limited to flanges on the freight deck boiler, a flange on the freight deck filter pump and stored gaskets in the freight deck storage room. • Brown oven insulation in the saloon deck galley. • Blue pipe fitting sealant applied to the sprinkler system fittings throughout. <p>These materials were observed to be in good condition.</p>
Lead	<p>The following LCPs were identified through this assessment:</p> <ul style="list-style-type: none"> • Yellow paint on the filter tank and mechanical equipment on the freight deck. • Red paint on the mechanical equipment on the freight deck. • White paint on the upper walls and ceiling of the freight deck. • Black paint on the mechanical equipment of the freight deck. • Grey paint on the lower walls and stairs of the freight deck. • White paint on the exterior of the saloon deck. • Teal paint on the underside of the boat deck. • Red paint on doors throughout. • Red paint on the interior walls of the saloon deck. • Teal paint on the walls and ceiling of the saloon deck. • Yellow paint on the stack. • Green paint on the upper walls and ceiling of the wheelhouse. • White paint on the valve shed exterior. • Red paint on the paddlewheel. <p>Lead may also be present in the following materials:</p> <ul style="list-style-type: none"> • Lead-acid batteries used in emergency lighting. • Older electrical wiring materials and sheathing. • Solder used on domestic water lines, in bell fittings for cast iron pipes, and in electrical equipment. • Vent and pipe flashings.
PCBs	No suspected PCB-containing equipment was observed within the subject vessel.
Mercury	No suspected mercury-containing equipment was observed within the subject vessel.
Mould	No suspect mould or moisture impacted building materials were observed within the subject vessel.
Ozone-Depleting Substances	No suspected ODS-containing equipment was observed within the subject vessel.
Silica	No silica-containing building materials were observed within the subject vessel.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Introduction
July 12, 2016

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Parks Canada, to conduct a pre-renovation hazardous building materials assessment of the SS Keno and associated Valve House (subject vessel) located in Dawson City, YT.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the requirements of the Canada Labour Code, Part II (*Canada Labour Code*), the Yukon Workers' Compensation Health and Safety Board (WCB) and the current version of the *Yukon Territory Occupational Health and Safety Act and Regulations (YT OHS Reg.)*, prior to planned renovation activities.

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould-impacted building materials and silica.

The site work was conducted by Keith Irwin of Stantec on May 10, 2016.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that the information pertaining to the identity, location and approximate extent of hazardous building materials (if any) within the subject vessel is either not on-file or outdated. Stantec further understands that PWGSC is planning renovation activities (fire protection sprinkler system replacement) within the subject vessel. As such, and in accordance with the requirements of the *Canada Labour Code*, the *YT OHS Reg.* and PWGSC's internal management practices pertaining to identifying hazards associated with hazardous building materials for renovation projects, PWGSC commissioned this assessment.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope and Methodology
July 12, 2016

2.0 SCOPE AND METHODOLOGY

Keith Irwin of Stantec conducted an assessment within the subject vessel on May 10, 2016. Site work was conducted in general compliance with the requirements of the *Canada Labour Code*, the WCB, the current version of the *YT OHS Reg.* and Stantec's Safe Work Practices (SWPs).

Mechanical systems, structures and finishes of the subject vessel were visually examined to determine the suspected presence of ACMs, lead including LCPs, PCBs, mercury, ODSs, mould, and silica. Where building materials were suspected but not confirmed to contain asbestos, lead (in paint), or mould samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.

Additional background information and the methodology used for the determination of presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

2.1 ASBESTOS

The common use of friable (materials which, when dry, can be easily crumbled or powdered by hand pressure) ACMs in construction generally ceased voluntarily in the mid-1970s but was only banned through legislation by the late 1980s. Friable asbestos was used in many building products, primarily high temperature insulations, spray-applied structural fireproofing, and a material known as vermiculite that was commonly used as block wall insulation and may be contaminated with asbestos fibres. Asbestos was also used in many non-friable manufactured products such as floor tiles, ceiling tiles, Transite™ cement products, and various other construction materials. Some cement products currently used in the construction of buildings may still contain asbestos.

The presence of asbestos in federal workplaces, and pertaining to federally regulated workers is governed by the *Canada Labour Code*. The presence of asbestos in the workplace in the Yukon pertaining to territorially regulated workers is governed by the WCB, with provisions published in the current version of the *YT OHS Reg.* As both federally regulated workers and territorially regulated workers (e.g., contractors) are expected to carry out work activities within the subject vessel, and as the territorial regulations are generally more prescriptive pertaining to asbestos (and generally include the requirements noted in the *Canada Labour Code*), this assessment was conducted to meet the requirements of the current version of the *YT OHS Reg.*

According to current version of the *YT OHS Reg.*, asbestos-containing material (ACM) means any material which is found to contain any asbestos.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope and Methodology
July 12, 2016

Based on this criterion, a visual assessment of accessible areas was undertaken in order to check for the presence of materials suspected of containing asbestos. Locations to collect discrete bulk asbestos samples of suspect building materials were identified. Samples of representative materials were then collected at these locations.

Multiple samples were collected from each "homogenous application" of observed suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) and submitted to EMSL Canada Inc. (EMSL) in Vancouver, BC for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 method.

The number of samples to be collected for each homogenous application of a suspected ACM was based on accepted occupational hygiene standards and protocols, along with the assessor's experience and understanding of the consistency of that building material's application.

EMSL's analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

2.1.1 Sample Results Interpretation

When asbestos is detected in any concentration in one of the samples within a set that was collected to represent a "homogenous application" of a particular material, the entire sample set and the entire application of that material is then considered to be an ACM.

In addition to the above, a "positive stop" option was used during the laboratory analysis of the building material samples submitted for asbestos analysis. The "positive stop" option is utilized by the laboratory when asbestos is detected in any concentration in one of the samples within a set that was collected to represent a "homogenous application" of that material. At this point, further analysis of subsequent samples within the set is deemed to be unnecessary (as the entire set will be considered an ACM, per above), and the remainder of the samples within the set are not analysed.

2.1.2 Potential Asbestos-containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessel for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, and floor cavities, which are typical areas where vermiculite is found.

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2.1.3 Asbestos Sampling Quality Assurance/Quality Control

Sampling activities pertaining to asbestos were conducted in accordance with Stantec's Safe Work Practices (SWPs), which take into account current territorial regulations pertaining to such work (i.e., sampling procedures, required number of samples, and laboratory analytical procedures).

Representative bulk samples were collected of accessible suspect ACMs in sufficient quantities for laboratory analyses. Suspect ACM samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

Sample bags were compiled in order and placed into a single container accompanied with a Chain of Custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

2.2 LEAD

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin, and antimony as lead alloys for use in the manufacture of a variety of metal products. Lead is commonly found in buildings in the solder used on copper domestic pipes, in the caulking on bell fittings of cast iron drainage pipes and in electrical equipment.

The presence of lead-containing materials (other than paint) was assessed through visual means.

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, various occupational health and safety administrations have indicated that working with materials coated with paint that has a lead content that exceeds 600 ppm can lead to exposures in excess of 50% of the occupational exposure limit (OEL) for lead, when the OEL is 0.05 mg/m³ (the OEL for lead in the Yukon, according to the current version of the *YT OHS Reg.*, is 0.15 mg/m³).

Prior to disposal, Yukon Environment recommends that analytical results for building materials should be compared to the territorial soil guideline value of 1,000 ppm as found in the *Contaminated Sites Regulations*. As such, and given that the OEL for lead in the Yukon is 3 times that of jurisdictions that reference 600 ppm as lead-containing, Stantec will reference the 1,000 ppm value in defining paints as "lead-containing" as the most applicable criteria.

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Based on this criterion, samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples collected were placed into separate, sealed, and labeled polyethylene bags, and submitted to EMSL in Mississauga, Ontario for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B*/7000B).

EMSL's analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program.

2.3 POLYCHLORINATED BIPHENYLS

PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. In fluorescent fixtures, PCBs were usually found within the small capacitors inside the ballast that controls the lamp. The Federal *Chlorobiphenyls Regulation*, SOR/91-152, prohibited the use of PCBs in electrical equipment manufactured after July 1, 1980.

The presence of PCB-containing equipment was assessed through visual means. With respect to fluorescent lamp ballasts, due to the risk of electrical shock associated with dismantling operating fixtures, fluorescent lamp ballasts were not removed to view identification numbers/information.

The total number of fluorescent lamp ballasts that may contain PCBs within the subject vessel was approximated.

Suspected PCB-containing electrical equipment can be visually inspected and compared to the Environment Canada reference guide entitled *Identification of Lamp Ballasts Containing PCBs*, Report EPS 2/CC/2, dated August 1991 (PCB Guide).

2.4 MERCURY

Mercury is commonly found in buildings as mercury vapour lighting, thermostats/thermometers with mercury-containing glass ampoules, electrical switches and can also be found in minor amounts in fluorescent lamp tubes and vapour bulbs and may be present in stable forms in adhesives. Exposure to mercury in workplaces is governed by the WCB.

The presence of mercury and mercury-containing equipment was assessed through visual means.

2.5 MOULD

Moist building materials may provide suitable conditions for mould growth, and the removal of building materials impacted by mould growth may require workers with specific training and experience using work procedures that have been developed to protect workers and work areas from exposure to elevated concentrations of airborne mould.

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The presence of suspect visible mould was assessed through visual means. Material observed with dark-coloured staining and/or a textured and discoloured appearance is described as “suspect mould”. Mould identified visually is defined as “suspect mould” unless it is confirmed as mould by laboratory analysis.

2.5.1 Mould Reference Guidelines

With respect to mould and/or moisture, the visual assessment and bulk sampling procedures utilized during this project were based on the recommendations provided in the documents listed below:

- Standard Construction Document CCA 82 *Mould Guidelines for the Canadian Construction Industry*, Canadian Construction Association, 2004 (referred to as “CCA 82”).
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health, Bureau of Environmental and Occupational Disease Epidemiology, April 2000 (referred to as the “NYC Guidelines”).
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health, 2004 (referred to as the “Health Canada Guide”).
- *Indoor Air Quality in Office Buildings: A Technical Guide*, Report of the Federal-Provincial Advisory Committee on Environmental and Occupational Health, 1995. (referred to as the “IAQ Guide”).
- *Bioaerosols: Assessment and Control*, American Conference of Governmental Industrial Hygienists (ACGIH), 1999 (referred to as the ACGIH Report).

2.6 OZONE-DEPLETING SUBSTANCES

Chlorofluorocarbons (CFCs) and other ODSs are often found in refrigeration units associated with air-conditioning or other refrigeration equipment. In September 1987, forty-seven countries agreed to the Montreal Protocol on Substances that Deplete the Ozone Layer. Disposal of ODSs are regulated in the Yukon by the Yukon Government’s *Special Waste Regulations* (2010) and the *Federal Halocarbon Regulations*, 2003 (FHR 2003).

The presence of ODSs and equipment containing these materials was assessed through visual means.

2.7 SILICA

Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic ceiling tiles. Prolonged exposure to, and inhalation of free crystalline silica, may result in respiratory disease known as silicosis, which is characterized by progressive fibrosis of the inner lung tissue and marked shortness of breath or impaired lung function.

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Exposure to silica dust is governed by the WCB, with applicable exposure limits indicated in the current version of the *YT OHS Reg.*, depending on the type of silica to be considered (quartz, cristobalite or tridymite).

The presence of silica was assessed through visual means.

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Assessment Limitations
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3.0 ASSESSMENT LIMITATIONS

In preparation of this report, Stantec used professional judgment based on experience. The work was conducted in accordance with generally accepted professional standards. Stantec relied on information gathered during the site investigation and laboratory analytical reports.

This report reflects the observations made within accessed areas of the subject vessel and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

Sampling was conducted pertaining to suspected ACMs and suspected LCPs only. The assessment for the presence of other hazardous building materials was visual in nature, and was conducted pertaining to readily visible surfaces within accessible spaces only. Concealed spaces were inspected via existing access panels, where present. Interior and exterior finishes, solid ceilings, walls, flooring and structural elements were not removed to access concealed areas.

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas and limitations associated with working in occupied/operational spaces, there are specific limitations to the information that can be provided to each hazardous building material considered in this assessment, as outlined below.

3.1 ASBESTOS

Suspected ACMs that were not sampled include, but are not limited to, the following (where present, based on vessel construction or as otherwise noted):

- Sub-grade materials
- Interior components of mechanical equipment (e.g., inner linings or gaskets in boilers)
- Interior components of heating, ventilation and air conditioning (HVAC) units
- Heat protection materials inside mechanical installations (e.g., gaskets) and light fixtures (e.g., paper backing in sealed incandescent fixtures)
- Flooring material concealed beneath ceramic tile, brickwork, hardwood flooring, and/or concealed beneath existing sub-floors
- Drywall and/or wall plaster and associated finish materials concealed behind new and/or additional walls or ceilings
- Woven tape inside duct connection joints or inner ducting insulation
- Materials within wall cavities, hard ceiling cavities or crawlspaces
- Insulation materials inside fire doors.

If encountered during renovation, demolition or other activities, any suspected ACMs not identified within this report should be presumed to contain asbestos and handled as such until otherwise proven, through analytical testing.

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3.2 LEAD

Assessment for the presence of lead or lead-containing materials was visual in nature, and was conducted pertaining to readily visible surfaces within accessible (and accessed) spaces of the subject vessel only. Additional lead or lead-containing materials may be present in inaccessible areas not assessed including, but not limited to ceiling spaces, wall cavities, and buried materials.

With respect to paint, samples of suspected LCPs were collected within the subject vessel only from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub surface paints, if any.

3.3 POLYCHLORINATED BIPHENYLS

Due to height restrictions and the risk of electrical shock in handling operational light fixtures, the ballasts present in the fixtures observed within the subject vessel were not removed for comparison to the PCB Guide.

Conclusions and recommendations regarding the presence of PCBs within the subject vessel are based on Stantec's limited observations in combination with information provided by staff regarding lighting renovations (where requested by Stantec based on observations) and is presented to provide guidance regarding the likelihood that PCB-containing equipment is or is not present within the subject vessel. The exact extent and/or number of fluorescent lamp ballasts containing PCBs, if any, within the subject vessels will not be commented on.

3.4 MERCURY

Visual assessment for the presence of mercury-containing equipment within the subject vessel was conducted in accessible areas only. Additional mercury or mercury-containing equipment may be present in inaccessible areas including, but not limited to ceiling spaces, wall cavities, and crawlspaces, or as internal parts of HVAC mechanisms.

3.5 MOULD

Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) were conducted in accessed portions of the subject vessel only. The assessment was not intrusive in nature and included visual assessment of exposed surfaces and closer inspection of known problem areas.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

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The conclusions made in this report provide description(s) of the potential source(s) of moisture within the subject vessel that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. These conclusions will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the subject vessel or within the impacted area(s).

This assessment does not constitute a building envelope/building systems assessment for the subject vessel, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.

3.6 OZONE-DEPLETING SUBSTANCES

Visual assessment for the presence of ODSs within the subject vessel was conducted in accessible areas only. Additional ODS-containing equipment may be present in inaccessible areas including, but not limited to, ceiling spaces, wall cavities and crawlspaces. In addition, portable equipment that may contain ODSs (refrigerators, drink coolers, etc.) was not considered as part of this assessment.

3.7 SILICA

Visual assessment for the presence of silica-containing materials within the subject vessel was conducted in accessible areas only. Additional silica-containing materials may be present in inaccessible areas including, but not limited to, ceiling spaces and wall cavities.

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4.0 FINDINGS

Floor plans showing bulk sample locations and locations of identified hazardous materials (where practical) are provided in Appendix A.

The results of the assessment for each of the considered hazardous materials are provided in the following sub-sections.

4.1 ASBESTOS

Stantec identified and sampled the following suspected ACMs:

- Assorted caulking and sealants
- Vinyl sheet flooring
- Seam Liner
- Counter top material
- Mechanical gaskets
- Deck canvas
- Seam wrap
- Electrical cable
- Oven insulation
- Penetration putty

Thirty-three (33) samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

A summary of the sample types, locations and analytical results are presented in Table 4-1 below. Copies of the certificates of analysis provided by EMSL for the suspected ACM samples submitted are included in Appendix B.

**Table 4-1 Suspected ACM Sample Collection and Analysis Summary
SS Keno, Dawson City, YT**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
EWPC-01A	Exterior Window Pane Caulking, White	Exterior Wheelhouse Deck	Not Detected
EWPC-01B	Exterior Window Pane Caulking, White	Exterior Saloon Deck	Not Detected
EWPC-01C	Exterior Window Pane Caulking, White	Exterior Boat Deck	Not Detected
SF-01	Vinyl Sheet Flooring, Red With Black Smudges	Freight Deck Cabin	Not Detected
SF-02	Vinyl Sheet Flooring, Rectangle and Square Pattern	Freight Deck Cabin	Not Detected

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

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**Table 4-1 Suspected ACM Sample Collection and Analysis Summary
SS Keno, Dawson City, YT**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SF-03	Vinyl Sheet Flooring, Red With Black Smudges	Saloon Deck Galley	Not Detected
SF-04	Vinyl Sheet Flooring, Grey	Boat Deck Washroom	Not Detected
BSL-01	Boiler Seam Liner	Freight Deck Boiler	21.9% Chrysotile
BSL-02	Boiler Seam Line, Top Boiler Seam	Freight Deck Boiler	45.5% Chrysotile
CT-01	Counter Top, 1 st Layer	Freight Deck, Outside Cabins	Not Detected
CT-02	Counter Top, 2 nd Layer	Freight Deck, Outside Cabins	Not Detected
MG-01	Mechanical Gasket	Freight Deck, Filter Pump	45% Chrysotile
MG-02	Mechanical Gasket	Freight Deck Boiler	47.2% Chrysotile
MG-03	Mechanical Gasket, Stored	Freight Deck Storage	43.4% Chrysotile
DC-01A	Deck Canvas	Saloon Deck	Not Detected
DC-01B	Deck Canvas	Saloon Deck	Not Detected
DC-01C	Deck Canvas	Wheelhouse Deck	Not Detected
DSC-01A	Deck Seam Caulking, Cream	Saloon Deck	Not Detected
DSC-01B	Deck Seam Caulking, Cream	Saloon Deck	Not Detected
DSC-01C	Deck Seam Caulking, Cream	Saloon Deck	Not Detected
SW-01	Seam Wrap on Standpipe Penetrations	Saloon Deck	Not Detected
EC-01	Electrical Cable, Black	Freight Deck Cabin	Not Detected
EC-02	Electrical Cable, Black and White	Saloon Deck, Outside Storage	Not Detected
OI-01	Oven Insulation, Brown	Saloon Deck Galley	65% Chrysotile
PFS-01A	Blue Pipe Fitting Sealant Applied to Sprinkler System	Freight Deck	0.89% Chrysotile
PFS-01B	Blue Pipe Fitting Sealant Applied to Sprinkler System	Freight Deck	Positive Stop
PFS-01C	Blue Pipe Fitting Sealant Applied to Sprinkler System	Freight Deck	Positive Stop
PFS-02A	Blue Pipe Fitting Sealant Applied to Sprinkler System	Saloon Deck, Galley	1.0% Chrysotile
PFS-02B	Blue Pipe Fitting Sealant Applied to Sprinkler System	Saloon Deck	Positive Stop
PFS-02C	Blue Pipe Fitting Sealant Applied to Sprinkler System	Saloon Deck	Positive Stop

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**Table 4-1 Suspected ACM Sample Collection and Analysis Summary
SS Keno, Dawson City, YT**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
EPP-01A	Electrical Penetration Putty, Grey	Valve Shed Exterior	Not Detected
EPP-01B	Electrical Penetration Putty, Grey	Valve Shed Exterior	Not Detected
EPP-01C	Electrical Penetration Putty, Grey	Valve Shed Exterior	Not Detected

Based on our observations of vessel construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, the materials presented in Table 4-2 below were identified as ACMs.


**Table 4-2 Summary of Identified ACMs
SS Keno, Dawson City, YT**

Identified ACM Description and Condition Information		Photo
Bottom boiler seam liner on the freight deck boiler		
Friability	Friable	
Condition	Good	
Content	21.9% Chrysotile	

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**Table 4-2 Summary of Identified ACMs
SS Keno, Dawson City, YT**

Identified ACM Description and Condition Information		Photo
Top boiler seam liner on the freight deck boiler		
Friability	Friable	
Condition	Good	
Content	45.5% Chrysotile	

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**Table 4-2 Summary of Identified ACMs
SS Keno, Dawson City, YT**

Identified ACM Description and Condition Information		Photo
Mechanical gaskets in various locations throughout including but not limited to flanges on the freight deck boiler, a flange on the freight deck filter pump and stored gaskets in the freight deck storage room.		
Friability	Friable	
Condition	Good	
Content	43.4–47.2% Chrysotile	

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**Table 4-2 Summary of Identified ACMs
SS Keno, Dawson City, YT**

Identified ACM Description and Condition Information		Photo
Brown oven insulation in the saloon deck galley.		
Friability	Friable	
Condition	Good	
Content	65% Chrysotile	
Blue pipe fitting sealant applied to the sprinkler system fittings throughout.		
Friability	Non-friable	
Condition	Good	
Content	0.89-1% Chrysotile	

4.1.1 Assessment for Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessel for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, and floor cavities, which are typical areas where vermiculite is found. No vermiculite or potential areas where vermiculite might be found were observed.

4.2 LEAD

Lead is expected to be present in the following materials:

- Lead-acid batteries used in emergency lighting
- Older electrical wiring materials and sheathing
- Solder used on domestic water lines, in bell fittings for cast iron pipes and in electrical equipment
- Vent and pipe flashings

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With respect to paint, eighteen (18) paint chip samples were obtained from the predominant suspected LCP applications within the vessel. Summaries of the sample types, locations and analytical results are presented in Table 4-3 below. Copies of the certificates of analysis provided by EMSL for the suspected LCP samples submitted are included in Appendix C.

**Table 4-3 Suspected LCP Sample Collection and Analysis Summary
SS Keno, Dawson City, YT**



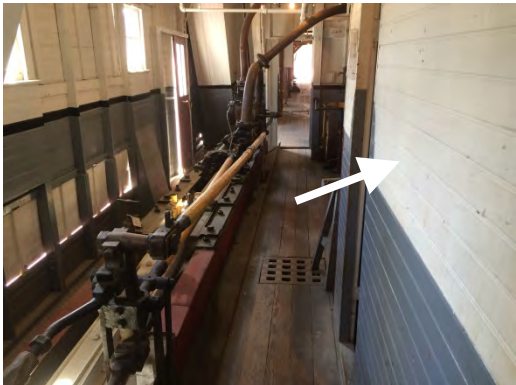
Sample No.	Sample Colour	Sample Location	Lab Result (ppm)	Lead Containing (Yes/No)
L-01	Yellow	Filter Tank and Mechanical Equipment on Freight Deck	120,000	Yes
L-02	Red	Mechanical Equipment on Freight Deck	38,000	Yes
L-03	White	Upper Walls and Ceiling of Freight Deck	140,000	Yes
L-04	Red	Freight Deck Bow	<90	No
L-05	Black	Mechanical Equipment on Freight Deck	9,600	Yes
L-06	Grey	Lower Walls and Stairs of Freight Deck	10,000	Yes
L-07	White	Exterior Saloon Deck	14,000	Yes
L-08	Teal	Underside of Boat Deck	56,000	Yes
L-09	Red	Saloon Deck Doors	130,000	Yes
L-10	Red	Interior Walls of Saloon Deck	77,000	Yes
L-11	Teal	Walls and Ceiling of Saloon Deck	82,000	Yes
L-12	Yellow	Stack	54,000	Yes
L-13	Green	Upper Walls and Ceiling of Wheelhouse	100,000	Yes
L-14	Yellow	Exterior Trim	<140	No
L-15	Red	Standpipes on Saloon Deck	540	No
L-16	White	Valve Shed Exterior	1,500	Yes
L-17	Red	Paddlewheel	190,000	Yes
L-18	Red Primer	Structured Steel Under Keno	<300	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, the materials presented in Table 4-4 below were identified as LCPs.

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**Table 4-4 Summary of Identified LCPs
SS Keno, Dawson City, YT**

Identified LCP Description	Photo
<p>Yellow coloured paint on filter tank and mechanical equipment on the freight deck. This paint was observed to be in poor condition (bubbling, flaking or peeling).</p>	
<p>Red coloured paint on mechanical equipment on the freight deck. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>White coloured paint on upper walls and ceiling of the freight deck. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

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**Table 4-4 Summary of Identified LCPs
SS Keno, Dawson City, YT**

Identified LCP Description	Photo
<p>Black coloured paint on mechanical equipment on the freight deck.</p> <p>This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Grey coloured paint on lower walls and stairs of the freight deck.</p> <p>This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>White coloured paint on the exterior of the saloon deck</p> <p>This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
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**Table 4-4 Summary of Identified LCPs
SS Keno, Dawson City, YT**

Identified LCP Description	Photo
<p>Teal coloured paint on the underside of the boat deck. This paint was observed to be in poor condition (bubbling, flaking or peeling).</p>	
<p>Red coloured paint on doors throughout. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Red coloured paint on the interior walls of the saloon deck. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

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**Table 4-4 Summary of Identified LCPs
SS Keno, Dawson City, YT**

Identified LCP Description	Photo
<p>Teal coloured paint on the walls and ceiling of the saloon deck. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Yellow coloured paint on the stack. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Green coloured paint on upper walls and ceiling of the wheelhouse. This paint was observed to be in poor condition (bubbling, flaking or peeling).</p>	

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**Table 4-4 Summary of Identified LCPs
SS Keno, Dawson City, YT**

Identified LCP Description	Photo
<p>White coloured paint on the valve shed exterior. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Red coloured paint on the paddlewheel. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

4.3 POLYCHLORINATED BIPHENYLS

No suspected PCB-containing equipment was observed within the subject vessel.

4.4 MERCURY

No suspected mercury-containing equipment was observed within the subject vessel.

4.5 MOULD

No suspect mould or moisture impacted building materials were observed within the subject vessel.

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4.6 OZONE-DEPLETING SUBSTANCES

No suspected ODS-containing equipment was observed within the subject vessel.

4.7 SILICA

No silica-containing building materials were observed within the subject vessel.

Recommendations
July 12, 2016

5.0 RECOMMENDATIONS

5.1 ASBESTOS

Based on the visual assessment and results of laboratory analyses, Stantec recommends the following with regards to meeting the requirements of the *Canada Labour Code*, the Yukon Workers' Compensation Health and Safety Board (WCB) and the *YT OHS Reg.* as they pertain to managing asbestos in the SS Keno during renovation projects and/or for continued operations and maintenance:

- Identified ACMs that may be impacted during renovations activities should be removed prior to the onset of those activities in accordance with the requirements of the Canada Labour Code, the WCB and the current version of the *YT OHS Reg.* It is expected that this will require the involvement of a qualified, licensed asbestos abatement contractor.
- Due to the confirmed presence of asbestos within the subject vessel, and in accordance PWGSC requirements, an asbestos exposure control plan (also known as an Asbestos Management Plan [AMP] or asbestos operations and management plan) should be developed and implemented for the subject vessel. The AMP would serve to compile the available data, results and reports regarding the presence, extent, handling, removal, and disposal of ACMs within the subject vessel. The AMP would also provide sections for information regarding future sampling and analysis of suspected ACMs, if required, asbestos-abatement projects, if undertaken, and other information regarding the management of asbestos within the subject vessel.
- Identified ACMs that will not be impacted by renovation activities and that are in good condition can be managed in place, upon development and implementation of an AMP.
- Should a material suspected to contain asbestos fibres become uncovered during renovation activities, all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if asbestos fibres are present. Confirmed asbestos materials should be handled in accordance with applicable guidelines and regulations.
- Suspected ACMs deemed visually similar to the ACMs identified in this report should be considered asbestos-containing and handled as such, unless proven otherwise, through analytical testing.
- Ensure asbestos containing waste is handled, stored, and disposed of in accordance with the requirements of the Federal *Transportation of Dangerous Goods Regulation*, the *Asbestos Abatement Code of Practice* (May 2012) and Yukon Environment Special Waste & Solid Waste Regulations document entitled *Asbestos Disposal* (2010).
- This report should be added to the AMP and referred to as the current ACM record.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

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5.2 LEAD

Lead-containing paint in poor condition should be cleaned-up and/or addressed to mitigate potential for loose paint chips to be released. Consideration should be given to re-painting areas to avoid continued delamination and/or flaking of LCPs.

Lead-containing materials and LCPs in good condition do not pose significant hazards to workers for continued operations and maintenance.

If LCPs or other lead-containing materials are to be disturbed and/or removed during renovation or other activities, ensure compliance with the following:

- The occupational exposure control requirements of the Canada Labour Code and the WCB
- The disposal requirements of Yukon Environment – *Contaminated Sites Regulations* and the Yukon Government *Special Waste Regulations*
- The transportation requirements of the Federal *Transportation of Dangerous Goods Regulation*

Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the WCB 8-hour Occupational Exposure Limit (OEL) of 0.15 milligram per cubic metre (mg/m³) during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust.

5.3 POLYCHLORINATED BIPHENYLS

As no equipment suspected of containing PCBs was observed within the subject vessel during the assessment, no recommendations have been provided.

5.4 MERCURY

As no mercury-containing items were observed within the subject vessel during the assessment, no recommendations have been provided.

5.5 MOULD

As no mould or moisture damage was identified within the subject vessel, no recommendations have been developed.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Recommendations

July 12, 2016

5.6 OZONE-DEPLETING SUBSTANCES

As no ODS-containing equipment was identified within the subject vessel, no recommendations have been developed.

5.7 SILICA

As no silica-containing material was identified within the subject vessel, no recommendations have been developed.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
July 12, 2016

6.0 CLOSURE

This report has been prepared for the sole benefit of Public Works and Government Services Canada and Parks Canada. Any use which a third party makes of this report, or any reliance on decisions based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professionals and technical staff in accordance with generally accepted engineering, scientific and occupational health and safety practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Stantec Consulting Ltd. based on the data obtained from the work.

The conclusions are based on the site conditions encountered by Stantec Consulting Ltd. at the time the work was performed at the specific assessment and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on building construction and conditions, weather, building usage and other factors. Due to the nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental or health and safety liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
July 12, 2016

We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, or require additional information, please do not hesitate to contact the Stantec Project Manager at your convenience.

Regards,

STANTEC CONSULTING LTD.



Amanda Bell, B.Sc., EPT
Report Writer
Phone: (604) 412-3006
Amanda.Bell@stantec.com



Tiffany Waite, B.Sc.
Technical Reviewer
Phone: (604) 412-3004
Tiffany.Waite@stantec.com

This report was approved for transmittal by:



Sean Brigden, B.Sc., P.B.Dipl., CRSP
Senior Reviewer
Phone: (250) 389-2346
Sean.Brigden@stantec.com

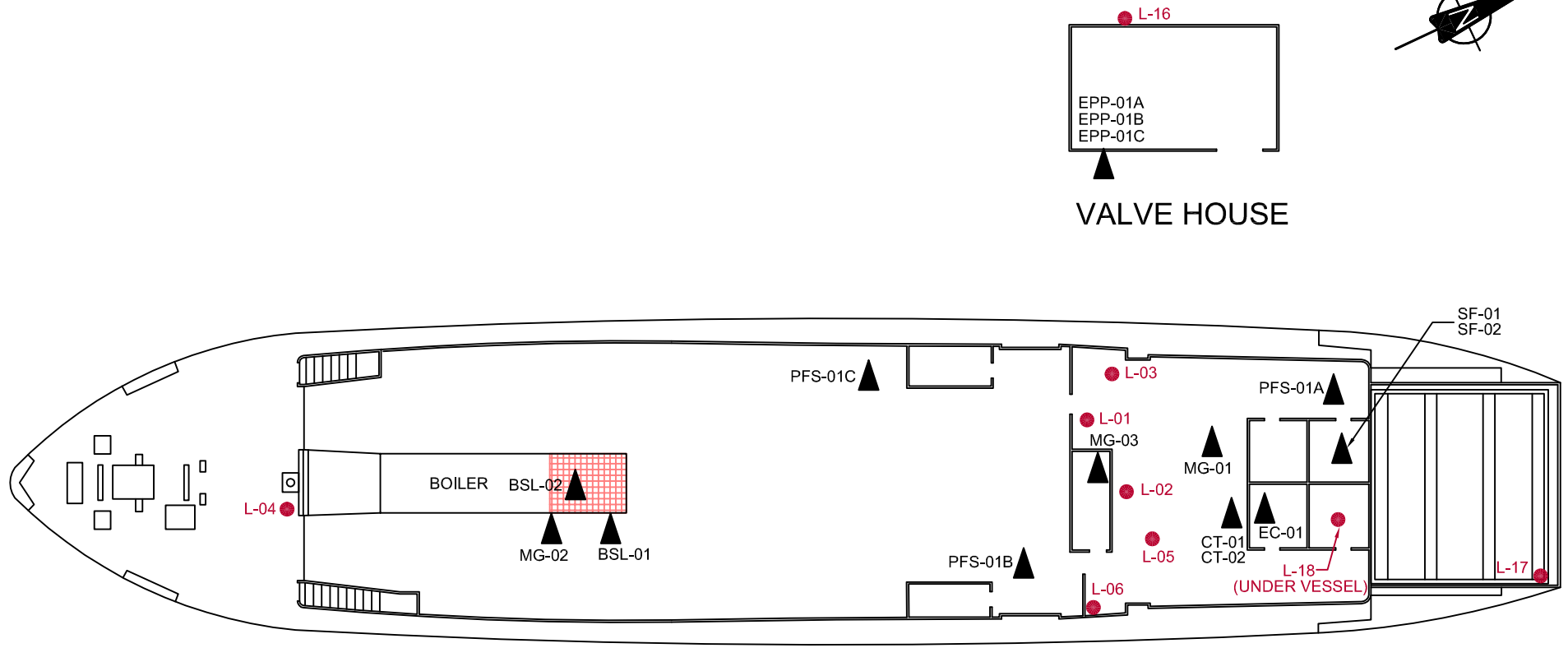
AB/TW/SB/dsc

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Floor Plan Drawing

July 12, 2016

Appendix A FLOOR PLAN DRAWING



FREIGHT DECK

LEGEND

- ASBESTOS BULK SAMPLE
- LEAD PAINT SAMPLE
- ACM BOILER SEAM LINER

- NOTES:** 1. MECHANICAL GASKETS IN VARIOUS LOCATIONS THROUGHOUT ARE ASBESTOS-CONTAINING.
 2. BLUE PIPE FITTING SEALANT APPLIED TO THE SPRINKLER SYSTEM FITTINGS THROUGHOUT IS ASBESTOS-CONTAINING.
 3. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

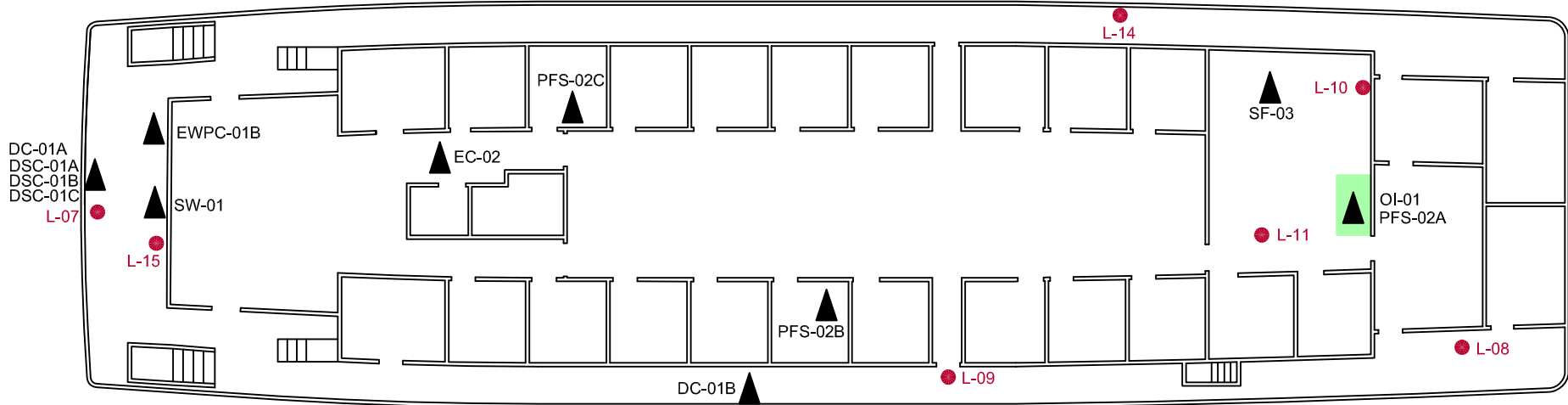
SS KENO, DAWSON CITY, YT

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.:	123220581
Scale:	N.T.S.
Date:	16/06/28
Dwn. By:	CD <small>SL2016060166</small> PK/DM
App'd By:	TW

Dwg. No.:	1
------------------	---





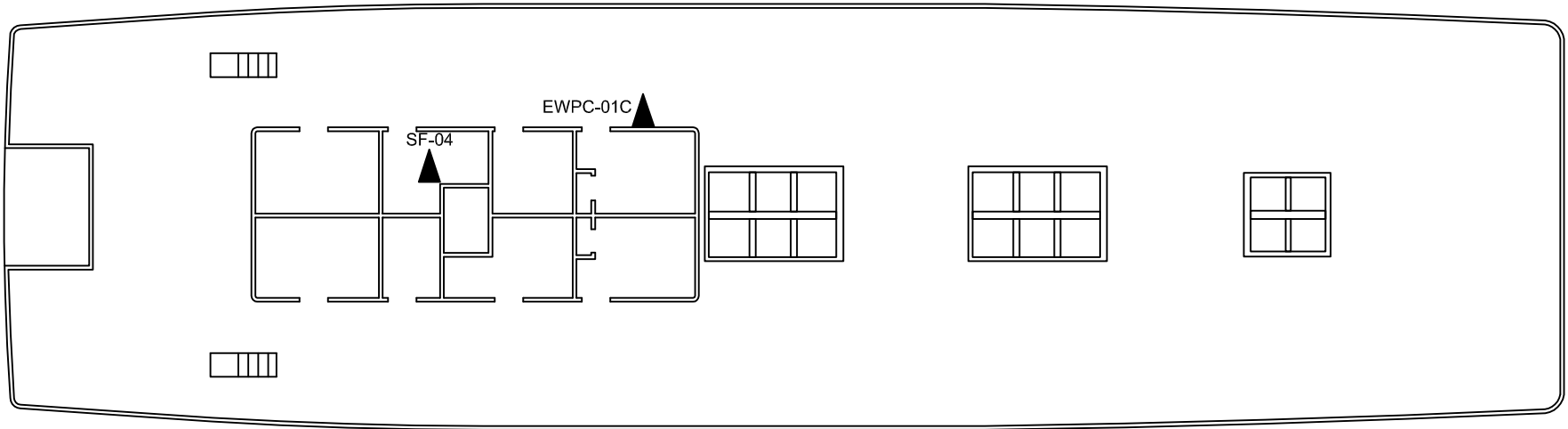
SALOON DECK

LEGEND

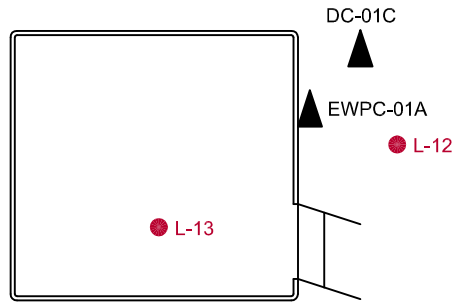
- ASBESTOS BULK SAMPLE
- LEAD PAINT SAMPLE
- ACM OVEN INSULATION

- NOTES:** 1. MECHANICAL GASKETS IN VARIOUS LOCATIONS THROUGHOUT ARE ASBESTOS-CONTAINING.
 2. BLUE PIPE FITTING SEALANT APPLIED TO THE SPRINKLER SYSTEM FITTINGS THROUGHOUT IS ASBESTOS-CONTAINING.
 3. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p>SS KENO, DAWSON CITY, YT</p>	Project No.: 123220581	2	
	Scale: N.T.S.		
	Date: 16/06/25		
	Dwn. By: CD <small>DM</small> <small>SL2016060160</small>		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		



BOAT DECK



WHEELHOUSE DECK

LEGEND

- ASBESTOS BULK SAMPLE
- LEAD PAINT SAMPLE

- NOTES:** 1. MECHANICAL GASKETS IN VARIOUS LOCATIONS THROUGHOUT ARE ASBESTOS-CONTAINING.
 2. BLUE PIPE FITTING SEALANT APPLIED TO THE SPRINKLER SYSTEM FITTINGS THROUGHOUT IS ASBESTOS-CONTAINING.
 3. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

<p>FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</p> <p>SS KENO, DAWSON CITY, YT</p>	Project No.: 123220581	3	
	Scale: N.T.S.		
	Date: 16/06/28		
	Dwn. By: CD _{DM} SL2016060167		
Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix B Certificate of Analysis – Asbestos Samples
July 12, 2016

Appendix B CERTIFICATE OF ANALYSIS – ASBESTOS SAMPLES



EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691600608
Customer ID: 55JACQ30L
Customer PO: 123220581
Project ID:

Attn: Keith Irwin
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 5/19/2016
Analyzed: 5/30/2016
Proj: 123220581

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: EWPC-01A **Lab Sample ID:** 691600608-0001

Sample Description: EXTERIOR WHEELHOUSE DECK/EXTERIOR WINDOW PANE CAULKING, WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Gray/White	0.0%	100%	None Detected	

Client Sample ID: EWPC-01B **Lab Sample ID:** 691600608-0002

Sample Description: EXTERIOR SALOON DECK/EXTERIOR WINDOW PANE CAULKING, WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	White	0%	100%	None Detected	

Client Sample ID: EWPC-01C **Lab Sample ID:** 691600608-0003

Sample Description: EXTERIOR BOAT DECK/EXTERIOR WINDOW PANE CAULKING, WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Gray/White	0.0%	100%	None Detected	

Client Sample ID: SF-01 **Lab Sample ID:** 691600608-0004

Sample Description: FREIGHT DECK CABIN/VINYL SHEET FLOORING, RED WITH BLACK SMUDGES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Brown/Red	0.0%	100%	None Detected	

Client Sample ID: SF-02 **Lab Sample ID:** 691600608-0005

Sample Description: FREIGHT DECK CABIN/VINYL SHEET FLOORING, RECTANGLE AND SQUARE PATTERN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: SF-03 **Lab Sample ID:** 691600608-0006

Sample Description: SALOON DECK GALLEY/VINYL SHEET FLOORING, RED WITH BLACK SMUDGES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Gray/Red	0.0%	100%	None Detected	

Client Sample ID: SF-04 **Lab Sample ID:** 691600608-0007

Sample Description: BOAT DECK WASHROOM/VINYL SHEET FLOORING, GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Gray/Red	0.0%	100%	None Detected	



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<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691600608
 Customer ID: 55JACQ30L
 Customer PO: 123220581
 Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: BSL-01 **Lab Sample ID:** 691600608-0008
Sample Description: FREIGHT DEC BOILER/BOILER SEAM LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Gray	0.0%	78.1%	21.9% Chrysotile	

Client Sample ID: BSL-02 **Lab Sample ID:** 691600608-0009
Sample Description: FREIGHT DEC BOILER/BOILER SEAM LINE, TOP BOILER SEAM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Brown	0.0%	54.5%	45.5% Chrysotile	

Client Sample ID: CT-01 **Lab Sample ID:** 691600608-0010
Sample Description: FREIGHT DECK, OUTSIDE CABINS/COUNTER TOP, 1ST LAYER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/25/2016	Brown	0.0%	100%	None Detected	

Client Sample ID: CT-02 **Lab Sample ID:** 691600608-0011
Sample Description: FREIGHT DECK, OUTSIDE CABINS/COUNTER TOP, 2ND LAYER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: MG-01 **Lab Sample ID:** 691600608-0012
Sample Description: FREIGHT DECK, FILTER PUMP/MECHANICAL GASKET

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Black	0%	55%	45% Chrysotile	

Client Sample ID: MG-02 **Lab Sample ID:** 691600608-0013
Sample Description: FREIGHT DECK BOILER/MECHANICAL GASKET

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/30/2016	Black	0.0%	52.8%	47.2% Chrysotile	

Client Sample ID: MG-03 **Lab Sample ID:** 691600608-0014
Sample Description: FREIGHT DECK STORAGE/MECHANICAL GASKET, STORED

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/30/2016	Gray	0.0%	56.6%	43.4% Chrysotile	

Client Sample ID: DC-01A **Lab Sample ID:** 691600608-0015
Sample Description: SALOON DECK/DECK CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray	70%	30%	None Detected	



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<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691600608
 Customer ID: 55JACQ30L
 Customer PO: 123220581
 Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: DC-01B **Lab Sample ID:** 691600608-0016
Sample Description: SALOON DECK/DECK CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray	70%	30%	None Detected	

Client Sample ID: DC-01C **Lab Sample ID:** 691600608-0017
Sample Description: WHEELHOUSE DECK/DECK CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray	70%	30%	None Detected	

Client Sample ID: DSC-01A **Lab Sample ID:** 691600608-0018
Sample Description: SALOON DECK/DECK SEAM CAULKING, CREAM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Beige	0.0%	100%	None Detected	

Client Sample ID: DSC-01B **Lab Sample ID:** 691600608-0019
Sample Description: SALOON DECK/DECK SEAM CAULKING, CREAM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Beige	0.0%	100%	None Detected	

Client Sample ID: DSC-01C **Lab Sample ID:** 691600608-0020
Sample Description: SALOON DECK/DECK SEAM CAULKING, CREAM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Beige	0.0%	100%	None Detected	

Client Sample ID: SW-01 **Lab Sample ID:** 691600608-0021
Sample Description: SALOON DECK/SEAM WRAP ON STANDPIPE PENETRATIONS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	White/Red	95%	5%	None Detected	

Client Sample ID: EC-01 **Lab Sample ID:** 691600608-0022
Sample Description: FREIGHT DECK CABIN/ELECTRICAL CABLE, BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Gray	0.0%	100%	None Detected	

Client Sample ID: EC-02 **Lab Sample ID:** 691600608-0023
Sample Description: SALOON DECK, OUTSIDE STORAGE/ELECTRICAL CABLE, BLACK AND WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Gray	0.0%	100%	None Detected	



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<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691600608
 Customer ID: 55JACQ30L
 Customer PO: 123220581
 Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: OI-01 **Lab Sample ID:** 691600608-0024
Sample Description: SALOON DECK GALLEY/OVEN INSULATION, BROWN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Brown	0%	35%	65% Chrysotile	

Client Sample ID: PFS-01A **Lab Sample ID:** 691600608-0025
Sample Description: FREIGHT DECK/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Gray	0.45%	98.6%	0.89% Chrysotile	

Client Sample ID: PFS-01B **Lab Sample ID:** 691600608-0026
Sample Description: FREIGHT DECK/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016				Positive Stop (Not Analyzed)	

Client Sample ID: PFS-01C **Lab Sample ID:** 691600608-0027
Sample Description: FREIGHT DECK/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016				Positive Stop (Not Analyzed)	

Client Sample ID: PFS-02A **Lab Sample ID:** 691600608-0028
Sample Description: SALOON DECK, GALLEY/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray/Blue	1%	98%	1% Chrysotile	

Client Sample ID: PFS-02B **Lab Sample ID:** 691600608-0029
Sample Description: SALOON DECK/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016				Positive Stop (Not Analyzed)	

Client Sample ID: PFS-02C **Lab Sample ID:** 691600608-0030
Sample Description: SALOON DECK/BLUE PIPE FITTING SEALANT APPLIED TO SPRINKER SYSTEM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016				Positive Stop (Not Analyzed)	

Client Sample ID: EPP-01A **Lab Sample ID:** 691600608-0031
Sample Description: VALVE SHED EXTERIOR/ELECTRICAL PENETRATION PUTTY, GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray	0%	100%	None Detected	



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Phone/Fax: 604-757-3158 / (604) 757-4731
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EMSL Canada Order 691600608
Customer ID: 55JACQ30L
Customer PO: 123220581
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: EPP-01B **Lab Sample ID:** 691600608-0032
Sample Description: VALVE SHED EXTERIOR/ELECTRICAL PENETRATION PUTTY, GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/26/2016	Gray	0.0%	100%	None Detected	

Client Sample ID: EPP-01C **Lab Sample ID:** 691600608-0033
Sample Description: VALVE SHED EXTERIOR/ELECTRICAL PENETRATION PUTTY, GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/26/2016	Gray	0%	100%	None Detected	

Analyst(s):

Kathleen Cruz PLM (10)
PLM Grav. Reduction (19)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 05/26/2016 13:48:28

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix C Certificate of Analysis – Paint Samples
July 12, 2016

Appendix C CERTIFICATE OF ANALYSIS – PAINT SAMPLES

**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L9T 5N4

Phone/Fax: 289-997-4602 / (289) 997-4607

<http://www.EMSL.com>torontolab@emsl.com

EMSL Canada Or	551605711
CustomerID:	55JACQ30L
CustomerPO:	123220581.200
ProjectID:	

Attn: **Keith Irwin**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 05/20/16 11:56 AM
 Collected:

Project: 123220581.200 KENO

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
L-01 Site: FILTER TANK & MECHANICAL EQUIPMENT ON FREIGHT DECK Desc: YELLOW	551605711-0001	5/25/2016		120000 ppm
L-02 Site: MECHANICAL EQUIPMENT ON FREIGHT DECK Desc: RED	551605711-0002	5/25/2016		38000 ppm
L-03 Site: UPPER WALLS & CEILING OF FREIGHT DECK Desc: WHITE	551605711-0003	5/25/2016		140000 ppm
L-04 Site: FREIGHT DECK BOW Desc: RED	551605711-0004	5/25/2016		<90 ppm
L-05 Site: MECHANICAL EQUIPMENT OF FREIGHT DECK Desc: BLACK	551605711-0005	5/25/2016		9600 ppm
L-06 Site: LOWER WALLS & STAIRS OF FREIGHT DECK Desc: GREY	551605711-0006	5/25/2016		10000 ppm
L-07 Site: EXTERIOR SALOON DECK Desc: WHITE	551605711-0007	5/25/2016		14000 ppm
L-08 Site: UNDERSIDE OF BOAT DECK Desc: TEAL	551605711-0008	5/25/2016		56000 ppm
L-09 Site: SALOON DECK DOORS Desc: RED	551605711-0009	5/25/2016		130000 ppm
L-10 Site: INTERIOR WALLS OF SALOON DECK Desc: RED	551605711-0010	5/25/2016		77000 ppm

Shiraz Saloojee
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 05/26/2016 17:41:06

**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L9T 5N4

Phone/Fax: 289-997-4602 / (289) 997-4607

<http://www.EMSL.com>torontolab@emsl.com

EMSL Canada Or	551605711
CustomerID:	55JACQ30L
CustomerPO:	123220581.200
ProjectID:	

Attn: **Keith Irwin**
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 05/20/16 11:56 AM
 Collected:

Project: 123220581.200 KENO

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
L-11 Site: WALLS & CEILING OF SALOON DECK Desc: TEAL	551605711-0011	5/25/2016		82000 ppm
L-12 Site: STACK Desc: YELLOW	551605711-0012	5/25/2016		54000 ppm
L-13 Site: UPPER WALLS & CEILING OF WHEELHOUSE Desc: GREEN	551605711-0013	5/25/2016		100000 ppm
L-14 Site: EXTERIOR TRIM Desc: YELLOW Insufficient sample to reach reporting limit.	551605711-0014	5/25/2016		<140 ppm
L-15 Site: STANDPIPES ON SALOON DECK Desc: RED	551605711-0015	5/25/2016		540 ppm
L-16 Site: VALVE SHED EXTERIOR Desc: WHITE	551605711-0016	5/25/2016		1500 ppm
L-17 Site: PADDLEWHEEL Desc: RED	551605711-0017	5/25/2016		190000 ppm
L-18 Site: STRUCTURED STEEL UNDER KENO Desc: RED PRIMER Insufficient sample to reach reporting limit.	551605711-0018	5/25/2016		<300 ppm

Shiraz Saloojee
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise.
 Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 05/26/2016 17:41:06

APPENDIX C

SS KENO NATIONAL HISTORIC SITE – COMMEMORATIVE INTEGRITY STATEMENT, 8 PGS

S.S. Keno National Historic Site Commemorative Integrity Statement

National Historic Site Objectives

The objectives of the National Historic Sites Program are summarized in the following statement from Parks Canada's Guiding Principles and Operational Policies:

- * To foster knowledge and appreciation of Canada's past through a national program of historical commemoration.
- * To ensure the commemorative integrity of national historic sites administered by Parks Canada by protecting and presenting them for the benefit, education and enjoyment of this and future generations, in a manner that respects the significant and irreplaceable legacy represented by these places and their associated resources.
- * To encourage and support the protection and presentation by others of places of national historic significance that are not administered by Parks Canada.

Commemoration focuses on what is nationally significant about a site, and includes protection as well as presentation. The National Historic Sites Policy states that:

protection and presentation are fundamental to commemoration since without protection there can be no historic site to be enjoyed, and without presentation there can be no understanding of why the site is important to our history and, hence, to all Canadians.



The S.S. Keno and her larger, and older, sistership the S.S. Casca at the ways in Whitehorse. The Keno was built in Whitehorse in 1922 to move ore from Mayo Landing on the Stewart River to Stewart Island on the Yukon River.
Al Olsen Coll., PC

Definition and Purpose of Commemorative Integrity

Commemorative integrity is used to describe the health or wholeness of a national historic site. A national historic site possesses commemorative integrity when the historic values and those cultural resources symbolizing or representing its importance are not impaired or under threat, when the reasons for the site's national historic significance are effectively communicated to the public, and when the site's heritage values are respected by all whose decisions or actions affect the site.

The purpose of a Commemorative Integrity Statement (CIS) is to focus our management of a site on what is most important; and to ensure that we address the whole (the "site"), not just the parts (the "individual resources"). For national historic sites, commemorative integrity is key to developing and implementing work plans, along with service to clients and ensuring efficient use of public funds. Commemorative integrity is also the basis for reporting to Canadians on the state of their national historic sites.

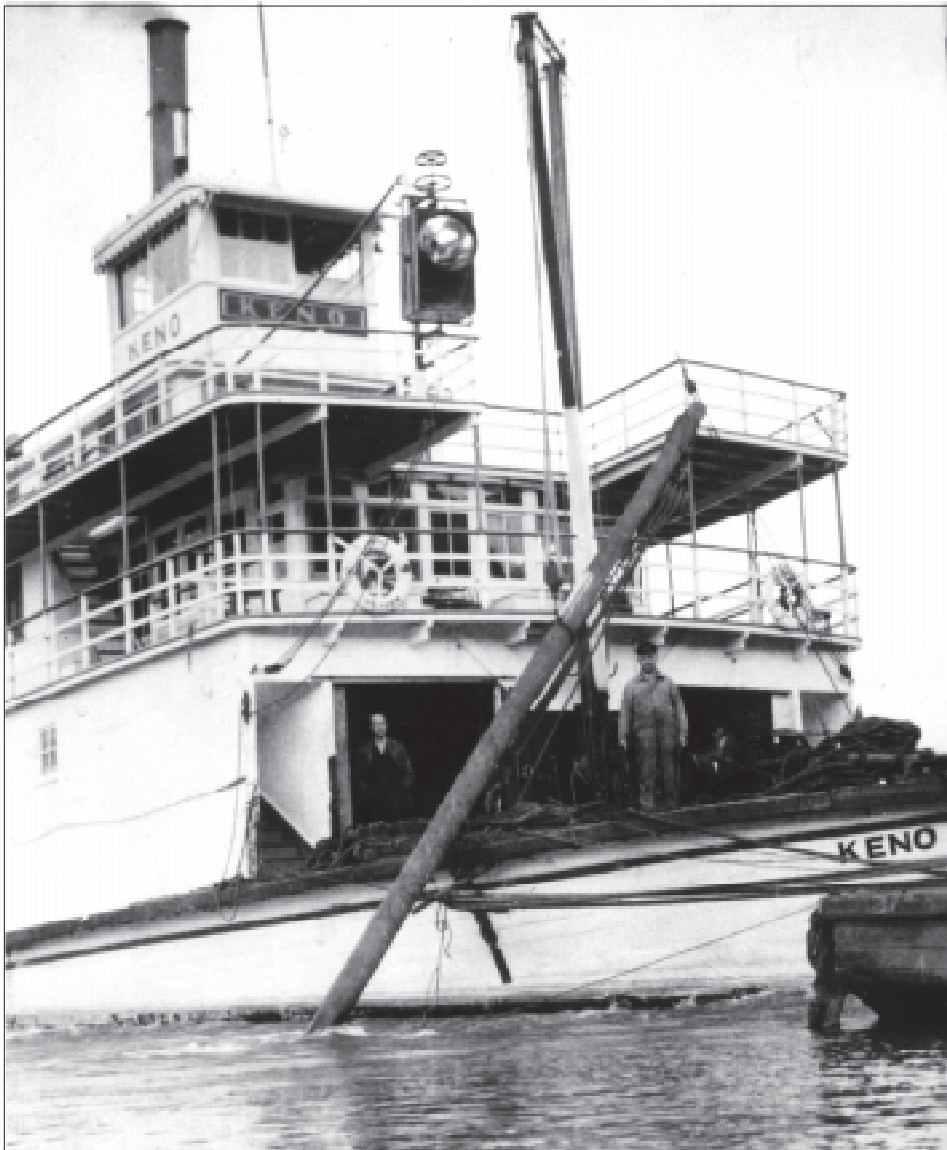
To effectively focus on commemorative integrity it is necessary to identify and evaluate those characteristics of a site that led to a recommendation by the Historic Sites and Monuments Board of Canada (HSMBC) and its designation by the Minister. Those characteristics that make the site of importance to all Canadians are Level 1 cultural resources. Characteristics of the site

determined to have a historic value of regional or local importance are Level 2 cultural resources. All Level 1 and 2 cultural resources will be managed by Parks Canada according to the principles of the Cultural Resource Management Policy.

A sound grasp of historic value is essential to ensuring commemorative integrity. This includes a definition of what constitutes the extent of the nationally-designated historic place. The Parks Canada Cultural Resource Management Policy requires that evaluation of resources not only determines their levels, but "what it is that constitutes their value", that is to say, what particular qualities and features make up the historic value of the cultural resource. Historic value can reflect both physical (tangible or artifactual) as well as symbolic (intangible or associative) attributes. It can be derived from an association with many periods in history, a single episode, or from the interaction of nature and human activities.

It is those Level 1 values, that is those attributes of resources or messages, of importance to all Canadians, that shall be the highest management priority for Parks Canada. These values and the threats to them are described in more detail in the section "Commemorative Integrity Objectives".

The S.S. Keno using its spars to lift off a sandbar. In 1937 the vessel was cut in half and three metres was added to its length to increase freight capacity. NAC



Commemorative Intent

Commemorative intent is a statement of what is nationally significant about the site. It refers specifically to the reasons for the site's national significance, as determined by the ministerially-approved recommendations of the HSMBC. For Board minutes relevant to the S.S. Keno, see Appendix A.

In 1958, during a discussion of Yukon river boats, the HSMBC noted that it; would like to record its interest in the general subject of transportation in Canada as a matter of national historic importance, and its concern that examples of different types of transport should be preserved. The Board believes that it is of national historic importance to preserve a typical representative or representatives of lake and river stern-wheel steamer transport.

The Board also recommended; that the Minister ask the Northern Administration and Lands Branch to consider the possibility of preserving one or more of the Yukon River steamers as a tourist attraction and perhaps as part of a river-steamer museum in the Yukon.

As part of the Dawson Festival in 1962, the S.S. Keno was re-furbished and sailed downriver to Dawson where on July 1, the Minister declared the vessel a national historic site.

The designation was reconfirmed by the HSMBC in 1987 when it; reaffirmed the national significance of both the S.S. Keno and S.S. Klondike. Further the Board recommended that the S.S. Keno should be maintained in a stabilized condition as it adds an extra visual dimension to the Dawson experience.

On the basis of the foregoing, the Statement of Commemorative Intent for the S.S. Keno is:

The S.S. Keno is of national historic significance because it is representative of Yukon lake and river sternwheel steamers.



Wood camps were an important part of the inland water transportation system for the riverboats.
Frank Coghlan Coll. PC

Commemorative Integrity

The National Historic Sites Policy states that a site has commemorative integrity if:

1. the resources that symbolize or represent its importance are not impaired or under threat,
2. the reasons for the site's national historic significance are effectively communicated to the public, and
3. the site's heritage values are respected by all whose decisions or actions affect the site.

These three elements cover the major responsibilities of Parks Canada in the management of the National Historic Site. To measure the success and effectiveness of this management commemorative integrity objectives have been identified and listed after the description of each of the three elements. Therefore, at S.S. Keno National Historic Site commemorative integrity will be ensured when:

1. Resources that Symbolize or Represent the National Significance of the S.S. Keno are Not Impaired or Under Threat

Resources imbued with these Level 1 historic values are those that symbolize or represent the national significance of the S.S. Keno. These resources are thus instrumental in, or integral to, the designation of national historic significance. Those Level 1 resources are the cultural resource management focus of the Parks Canada program. The following Level 1 cultural resources must not be threatened or impaired:

1.1.a. Historic Place - Values

Background

Steam powered river transportation was the central element in the development and connection of the Yukon to the outside world for almost a century after the first vessel reached Fort Selkirk in 1866. The character of the system that developed was shaped by the geography of the Yukon and the technology of the riverboats. Alternative transport options developed slowly. Overland winter travel supplemented the summer river transport, but in the late 1920s a more direct challenge appeared as aircraft began regular service to Yukon communities. However, it was only during and after World War II that road transport finally ended the importance of the inland water transport system in the Yukon. The S.S. Keno is representative of the vessels that serviced the Yukon for so long.

The S.S. Keno was designated a National Historic Site in 1962. It has become an important contributor to the historic urban landscape of Dawson, Yukon Territory. The vessel is managed by Parks Canada as a vehicle for national commemoration. Other stakeholders are non-specific but have a vested interest in the continuing presence of the site at its present location.

Physical Values

The historic place is the S.S. Keno itself and does not reside in the land upon which it rests. The value of the physical resource resides in its documentation and as a representative of a type of vessel constructed for the water transportation network established in the Yukon. This includes the following elements:

- the completeness of the vessel in its hull, superstructure, propulsion and auxiliary systems.
- the surviving unity of the original vessel and equipment.
- the quality of the construction of the vessel and its components.
- the well-executed carvel planking.
- it is an example of the fast water, shallow draft sternwheel steamers that plied the upper Yukon River.
- Broad defining characteristics of importance are those:
 - * systems associated with the vessel's structure.
 - * systems associated with the vessel as a freight system.
 - * systems associated with the vessel as water-borne accommodation.

Associative Values

The symbolic importance of the S.S. Keno derives from its role in the water transportation



system of the Yukon and its association with other shallow draft sternwheel steamers. Its meaning is enhanced by the current setting which is defined by its proximity to the Yukon River, a major river artery, and in the heart of the Town of Dawson, one of the urban anchors of this transportation network.

1.1.b. Historic Place - Objectives

The historic place will be safeguarded when:

- the appearance and physical integrity of the S.S. Keno, as defined by original massing, surface material, colour, hull construction and design, and exterior elements (lifeboats, lines, spars, etc.), is maintained;
- integrity of structural framing and mechanical systems is maintained;
- interior and exterior functional organization of space is maintained;
- original materials and mechanical systems are conserved in accordance with the CRM Policy;
- representative samples of removed historic fabric will be preserved and maintained for reference purposes;
- linkages and co-operation with other authorities to foster the integrity of the historic place are actively encouraged;
- proximity and visual access to the river are maintained;
- viewscales of the vessel and river are maintained;
- the visual contribution of the S.S. Keno to the commemorative integrity of Dawson Historical Complex NHS is acknowledged and maintained.

1.2.a. Moveable Resources - Values

The level 1 moveable resources are important contributors to the values and messages of S.S. Keno National Historic Site. These resources gain their value by:

- being authentic artifacts directly related to the vessel, whose provenance has been established through research and documentation.

1.2.b. Moveable Resources - Objectives

The site's moveable resources which are cultural resources will be safeguarded when:

- moveable resources related to the commemorative intent of the S.S. Keno have been evaluated, identified, protected, and maintained.
- strategies are in place for effective presentation and monitoring.
- access is ensured for research and presentation.



The inland water transportation system played an important role in supporting the building of the Alaska Highway. It was the extension of the road system that eventually shutdown the boats in the mid 1950s. NAC

2. Reasons for the Site's National Historic Significance are Effectively Communicated

The second element of commemorative integrity focuses on the effective communication of the reasons for the site's national historic significance. Each of the elements of commemorative intent forms an important component of the learning objectives which must be met if the site is to have commemorative integrity. This means that visitors to the site must understand the role of the S.S. Keno as a representative example of Yukon lake and river stern-wheel steamers.

Effective delivery on these learning objectives also implies that the messages are based on research, knowledge, and awareness and sensitivity to current historiography regarding the elements of commemoration. It also suggests that presentation is balanced. This means that various perspectives on the events associated with this site are communicated. Moreover, the individual components of the story should not be treated in isolation, but are integrated into the presentation of the history of inland water transportation as a whole.

The HSMBC has identified S.S. Klondike NHS in Whitehorse as the primary vehicle for the presentation of the messages of national historic significance related to the inland water transportation system. The Board has also highlighted the S.S. Keno's important role in contributing to the historic values of Dawson Historical Complex NHS. Therefore the S.S. Keno's presence in the urban landscape is its main presentation value.

2.1 Nationally Significant Messages - Values

To achieve commemorative integrity the following learning objective for S.S. Keno NHS must be understood by the audience:

The SS Keno is a representative example of the riverboats used on the lakes and rivers of the Yukon and exhibits the design and application of steam powered sternwheeler technology.

Messages supporting the learning objective include:

- * Stern-wheel steamers were the main form of water transportation in the Yukon and played a major role in the development of the Yukon interior until the 1950s.
- * This type of riverboat technology was an engineering response to regional transport requirements and to local economic and environmental conditions in the Yukon.
- * Riverboat transport as exemplified by the S.S. Keno played an important role in the existence of Dawson.

2.2 Nationally Significant Messages - Objectives

The reasons for the S.S. Keno's national historic significance will be effectively presented when as many Canadians as possible:

- are aware of the S.S. Keno's importance and contribution to the learning objectives of Dawson Historical Complex NHS.
- understand the site's national significance and its role in Canadian history.
- have knowledge of the linkages between the messages of national significance and the site's level 1 resources and other related resources.
- and when measures and measurement processes are in place to determine the effectiveness of message delivery.

3. The Site's Heritage Values are Respected

3.1 Heritage Values

S.S. Keno National Historic Site is a Parks Canada heritage place, one part of a system of national and international heritage places. The natural and cultural heritage represented by these places is our legacy as Canadians and a significant element of Canadian identity.

Beyond the values of national historic significance, the heritage values associated with the S.S. Keno National Historic Site include the role played by the Town of Dawson as an important transshipment point on the Yukon inland water transport system. This includes understanding the role and history of Dawson as an administrative and supply centre, a transshipment point between riverboat and rail and road transport into the Klondike Goldfields and as the site of shipyards and ways.

The role of S.S. Keno National Historic Site as a gateway to the related cultural and natural heritage of the Yukon waterways is another heritage value. For many visitors it is a point of exposure to the rich natural and cultural heritage of the Yukon inland waterways. These additional heritage values comprise the related histories and interrelationships of sites such as the MV Tarahane in Atlin, the Thirty Mile Heritage River, S.S. Klondike National Historic Site, Canyon City and Fort Selkirk with the S.S. Keno.

Other heritage values also include the level 2 cultural resources managed by Parks Canada, and messages relating to the history of this place beyond the themes and period of commemoration. These resources and messages do not relate to the national designation, but are important to the documentation and communication of the history of water transportation in the Yukon. This includes the waterfront site of the S.S. Keno.

The association of the site with other national historic sites relating to the Yukon (i.e. Dawson Historical Complex, Dredge No. 4, and the S.S. Klondike) is acknowledged. A more general heritage value is the relationship of the S.S. Keno to the larger family of national historic sites across Canada.

3.2 Heritage Values - Objectives

The site's other heritage values will be respected and maintained when:

- Parks Canada is working cooperatively with other stakeholders to protect and present the full history and heritage of the inland waterways of the Yukon;
- Level 2 resources are managed according to the Cultural Resource Management Policy;
- the level 2 messages pertaining to Dawson and the S.S. Keno are communicated to the public;
- the waterfront setting of the S.S. Keno is maintained;
- the S.S. Keno's relationship with other National Historic Sites in the Yukon is effectively communicated;
- the S.S. Keno's membership in the larger family of national historic sites is communicated.

S.S. Keno National Historic Site is located in downtown Dawson. Periodic maintenance stabilizes the vessel as a permanent landscape feature in the community.
D. Neufeld Coll. PC



Appendix A: HSMBC Recommendations on the S.S. Keno

This appendix reviews the major recommendations referring to the S.S. Keno made by the HSMBC.

In November, 1958 the Yukon riverboats were considered by the HSMBC, within the larger context of the history of transportation in Canada. The following recommendations resulted:

The Board would like to record its interest in the general subject of transportation in Canada as a matter of national historic importance, and its concern that examples of different types of transport should be preserved. The Board believes that it is of national historic importance to preserve a typical representative or representatives of lake and river stern-wheel steamship transport.

Yukon River Boats

The Board recommends further that the Minister ask the Northern administration and Lands Branch to consider the possibility of preserving one or more of the Yukon River steamers as a tourist attraction and perhaps as part of a river-steamer museum in the Yukon.

Six months later at the May, 1959 meeting the Board went further and made a definite recommendation to preserve one of the stern-wheel river boats at Whitehorse, and

The Board recommends that the purchase of one of the stern-wheel river boats at Whitehorse be arranged and that steps be taken for its preservation.

The program's contributions to the 1962 Dawson Festival included the refurbishment and sailing of the S.S. Keno from Whitehorse to Dawson where the vessel was set up as a tourist attraction. At the July 1 opening of the S.S. Keno, the Minister declared the vessel a National Historic Site.

In November, 1987, the Board;

reaffirmed the national significance of both the S.S. Keno and S.S. Klondike. Further the Board recommended that the S.S. Keno should be maintained in a stabilized condition as it adds an extra visual dimension to the Dawson experience.

APPENDIX D

DAWSON FIRE WATCH NOTICE, 3 PGS

DAWSON FIRE DEPARTMENT		
FIRE WATCH REQUIREMENTS		
Date:	Time Issued:	Issued By:
Notice Issued To:		Building Name:
Building Address:		Contact #:

Any persons with accessibility issues in the building? YES _____ NO _____

Fire Protection System Shutdown

1. Where Fire Protection Systems are out of service, the building shall be provided with an *acceptable* **Fire Watch**. This is for all occupants and all areas of the building left unprotected by the shutdown, until the Fire Alarm System or Sprinkler System has been returned to service.
2. Fire Protection Systems shall be repaired or replaced by an *acceptable* service company and returned to service as soon as possible.
3. Dawson Fire Department **MUST** be notified when Fire Protection Systems are out of service for more than **4 continuous hours** in a 24 hour period, as well as when systems are returned to service.
4. The Company monitoring the Fire Alarm **MUST** be notified when a Fire Protection System is out of service **ALSO** when it is repaired and returned to service.
5. Check all exit doors, magnetic locks on exit doors, and also magnetic hold open devices on separation doors, are not allowed to operate when a Fire Alarm is out of service



6. High hazard occupancies may have to keep a **Fire Watch** AND cease operations until repairs are completed.
7. THIS NOTICE **must** be visibly posted in the main entrance to the building; as well as notices posted at access points **including** elevators and stairs, when Protection Systems are out of service for an extended period of time.

FIRE WATCH PROCEDURES

1. THE PERSON/S PERFORMING THE Fire Watch must have a designated supervisor and shall:
 - a. Be identified to Dawson Fire Department, providing phone numbers for immediate contact.
 - b. Be easily identifiable to building occupants by uniform or clothing.
 - c. Be familiar with the operation of fire and life safety systems in the building.
 - d. Be able, and capable, of promptly notifying emergency agencies and occupants of an incident.
 - e. Have RADIO contact between each other using established emergency communication protocol.
 - f. Maintain a chronological, written log of activities on site for Dawson Fire Department, for the duration of the Fire Watch.



2. The Fire Watch shall **be in attendance at all times** when Fire Protection Systems are out of service, and have sufficient staff to **patrol all areas** of the building involved, using the following **minimum**:
 - a. Non-residential buildings;
 - i. During normal business hours; every thirty (30) minutes
 - ii. Other times; every sixty (60) minutes
 - b. buildings with sleeping accommodation, including hotels, Fire Watch must be continuously on site:
 - i. Between 2100-0800 hrs. every 15 minutes
 - ii. Between 0800-2100 hrs. every 30 minutes
3. The Fire Watch shall have ***an acceptable*** method of alerting building occupants, making them and Dawson Fire Department aware of what it will be (IE., Air Horn, etc.)
4. All building occupants shall be notified of Fire Protection System shut downs or equipment out of service.

Print name of Owner/Agent	Signature of Owner/Agent



APPENDIX E

NFPA-13 SEISMIC BRACING CALCULATION FORM, 1 PAGE

Seismic Bracing Calculations						Sheet _____ of _____
Project: _____		Contractor: _____				
Address: _____		Address: _____				
		Telephone: _____				
		Fax: _____				
Brace Information			Seismic Brace Attachments			
Length of brace: _____			Structure attachment fitting or tension-only bracing system:			
Diameter of brace: _____			Make: _____	Model: _____		
Type of brace: _____			Transition attachment fitting (where applicable):			
Angle of brace: _____			Make: _____	Model: _____		
Least radius of gyration:* _____			Listed load rating: _____ Adjusted load rating per 9.3.5.2.4: _____			
I/r value:* _____			Sway brace (pipe attachment) fitting:			
Maximum horizontal load: _____			Make: _____	Model: _____		
			Listed load rating: _____ Adjusted load rating per 9.3.5.2.4: _____			
Fastener Information			Seismic Brace Assembly Detail (Provide detail on plans)			
Orientation of connecting surface: _____			Brace identification no. (to be used on plans) _____ <input type="checkbox"/> Lateral brace <input type="checkbox"/> Longitudinal brace <input type="checkbox"/> 4-way brace			
Fastener:						
Type: _____						
Diameter: _____						
Length (in wood): _____						
Maximum load: _____						
Sprinkler System Load Calculation ($F_{PW} = C_p W_p$)						
$C_p =$ _____						
Diameter	Type	Length (ft)	Total (ft)	Weight per ft	Weight	
				lb/ft	lb	
				lb/ft	lb	
				lb/ft	lb	
				lb/ft	lb	
				lb/ft	lb	
				Subtotal weight	lb	
				W_p (incl. 15%)	lb	
Main Size	Type\Sch.	Spacing (ft)	Total (F_{PW})		lb	
Maximum F_{PW} per 9.3.5.5.2 (if applicable)						
* Excludes tension-only bracing systems						
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NFPA 13						

FIGURE A.9.3.5(a) Seismic Bracing Calculation Form.